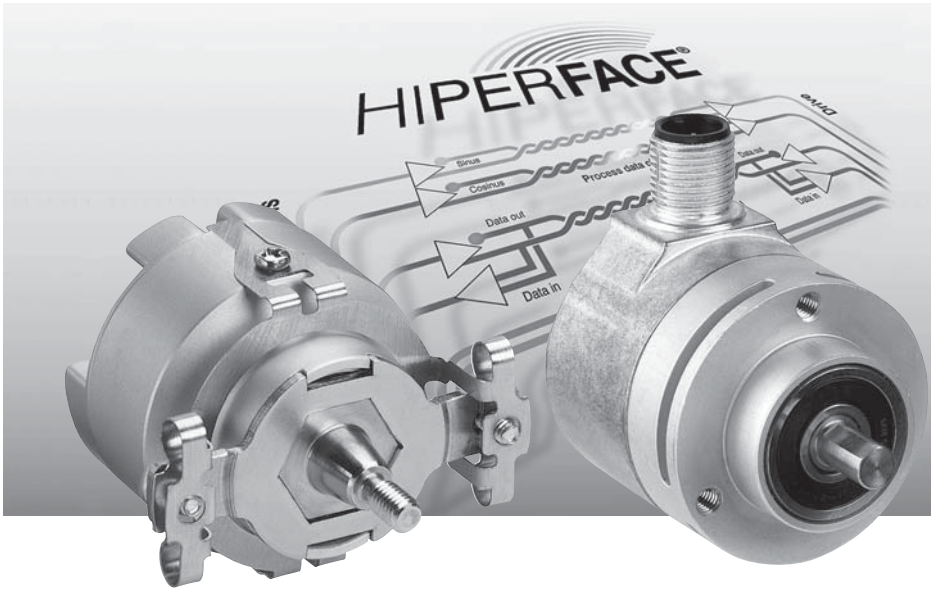# Encoders

Rotary Encoders Incremental/Absolute
Linear Encoders
Motor Feedback Systems
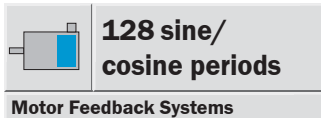
SICK

Sensor Intelligence.

SinCos® SKS36, SKM36, SKS36 Standalone, SKM36 Standalone: Motor Feedback Systems with HIPERFACE®-Interface for Servo Motors

128 sine/ cosine periods

Motor Feedback Systems

In doing so, the system compensates for eccentricity errors of code disc, ball bearing and shaft which are inevitably found in conventional systems.

By arranging the code disc in the middle of the rotational axis, high angular velocities are no longer limited by the code disc. The encoder size is essentially determined by the mechanical and electrical interfaces. Technologies such as "Chip On Board" are used to achieve this. The number of components is reduced to a minimum.

The SKS/SKM36 encoder is the first member of a new generation of optical encoders within the SinCos product range.

They all share the new Mini-Disc (MiDi) technology.

The special feature of this generation: a very small code disc of only 2 mm code track radius employs holistic (full) scanning.
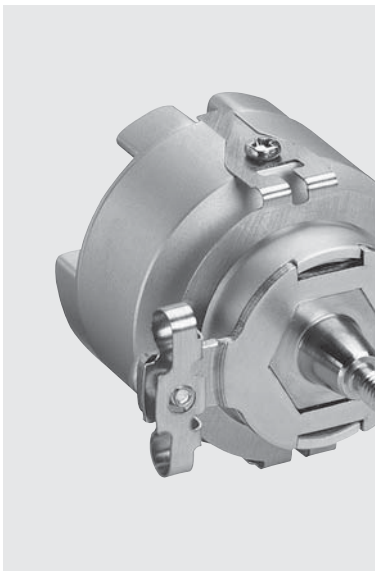
The small size of the SinCos SKS/SKM36 enables manufacturers of miniature and subminiature motors to significantly shorten their motors.

The standalone version is also ideally suited as master resp. slave encoder.
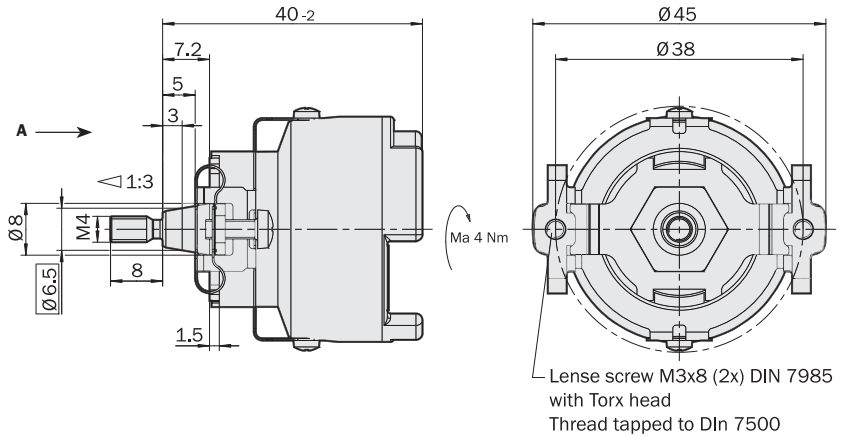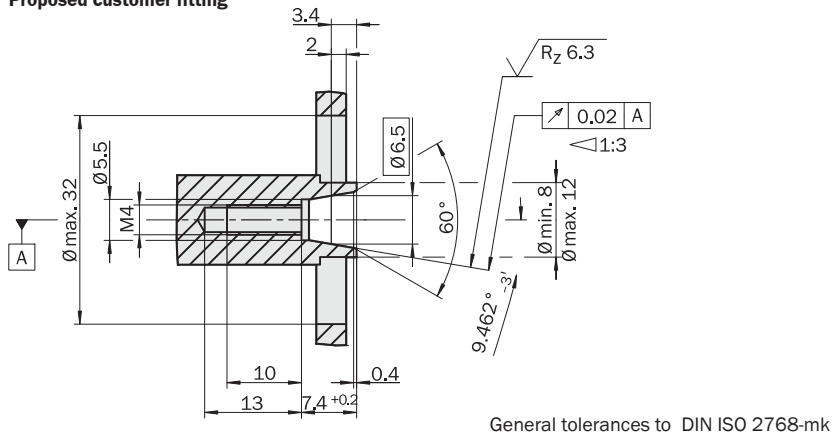
128 sine/cosine periods

Motor Feedback Systems

- **128 sine/cosine periods per revolution**
- **Absolute position with a resolution of 4,096 steps per revolution**
- **4,096 revolutions can be measured (Multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

Accessories

Connection systems (page 322)
Mounting systems (page 325)
Programming tool (page 322)

Dimensional drawing SKS/SKM36

Lense screw M3x8 (2x) DIN 7985 with Torx head
Thread tapped to DIn 7500

Proposed customer fitting

General tolerances to DIN ISO 2768-mk

PIN and wire allocation

| PIN	Signal	Colour of Wires	Explanation
1	U_s	red	Supply voltage 7 ... 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS-485-parameter channel
8	Data –	green or purple	RS-485-parameter channel

The housing is electrically connected to the motor housing, via the stator coupling.
The GND (0 V) connection of the supply voltage has no connection to the housing.
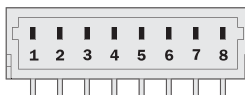
View of the plug-in face

Technical data to DIN 32878	Tapered shaft SKS/SKM36		SKS	SKM							
Number of sine/cosine periods per revolution		128	■	■							
Number of the absolute ascertainable revolutions	Single SKS	1	■	■							
	Multi SKM	4,096	■	■							
Dimensions		mm (see dimensional drawing)	■	■							
Mass		0.07 kg	■	■							
Inertial rotor moment		4.5 gcm^2	■	■							
Code type for the absolute value		Binary	■	■							
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	■	■							
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		2.5 angular seconds	■	■							
Error limits for the digital absolute value via RS 485		± 320 angular seconds	■	■							
Error limits for evaluating the "128" signals, integral non-linearity		± 80 angular seconds	■	■							
Non-linearity within a sine/cosine period differential non-linearity		± 40 angular seconds	■	■							
Output frequency for sine/cosine signals		0 ... 65 kHz	■	■							
Operating speed	SKS	12,000 min^{-1}	■								
	SKM	9,000 min^{-1}		■							
Max. angular acceleration		5 x 10^5 rad/s^2	■	■							
Operating torque		0.2 Ncm	■	■							
Starting torque		0.3 Ncm	■	■							
Permissible shaft movement static	radial/axial	± 0.1 mm/± 0.2 mm	■	■							
dynamic	radial/axial	± 0.05 mm/± 0.1 mm	■	■							
Life of ball bearings		3.6 x 10^9 revolutions	■	■							
Working temperature range		–20 ... +110 °C	■	■							
Storage temperature range [1]		–40 ... +125 °C	■	■							
Permissible relative humidity [2]		90 %	■	■							
Resistance to shocks [3]		100/6 g/ms	■	■							
to vibration [4]		50/10 ... 2000 g/Hz	■	■							
Protection to IEC 60529 [5]		IP 50	■	■							
EMC [6]			■	■							
Operating voltage range		7 ... 12 V	■	■							
Recommended supply voltage		8 V	■	■							
Max. operating current, no load		60 mA	■	■							
Available memory area within EEPROM [7]		1,792 bytes	■	■							
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	■	■							
Parameter channel = RS 485		Digital	■	■							

[1] Without packaging

[2] Condensation not permissible

[3] To DIN EN 60068-2-27

[4] To DIN EN 60068-2-6

[5] With mating connector inserted and closed cover

[6] To DIN EN 61000-6-2 and DIN EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[7] If applying the elctronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

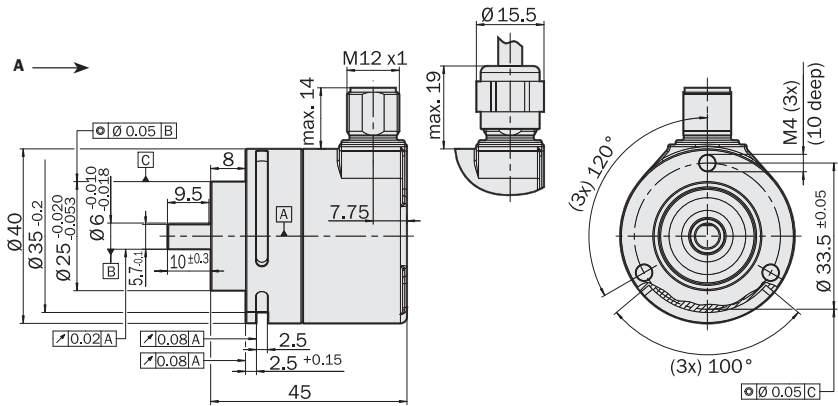| Ordering information		
SKS/SKM36 Tapered shaft		
Type	**Part no.**	**Description**
SKS36-HFA0-K02	1034095	Singleturn
SKM36-HFA0-K02	1034094	Multiturn

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128 sine/cosine periods

Motor Feedback Systems

- **128 sine/cosine periods per revolution**
- **Absolute position with a resolution of 4,096 steps per revolution**
- **4,096 revolutions can be measured (multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

Dimensional drawing SKS/SKM36 Standalone, Servo/Face Mount flange

General tolerances to DIN ISO 2768-mk

PIN and wire allocation

8-pin A coded

View of the plug-in face
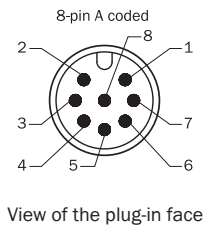
PIN	Colour of wires	Signal	Explanation
1	brown	REFSIN	Process data channel
2	white	+ SIN	Process data channel
3	black	REFCOS	Process data channel
4	pink	+ COS	Process data channel
5	grey or yellow	Daten +	RS-485 Parameter channel
6	green or purple	Daten –	RS-485 Parameter channel
7	blue	GND	Ground connection
8	red	+ U_s	Encoder Supply voltage
	Screen		Housing potential

CE   cULus

Connection type

Connector radial	Cable radial
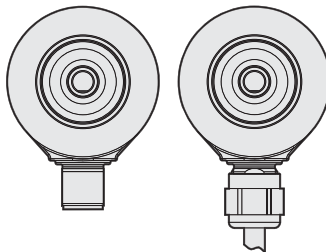
Accessories

Connection systems (page 322)
Mounting systems (page 325)
Programming tool (page 322)

Technical data to DIN 32878	Solid shaft 6 mm SKS/SKM36		SKS	SKM								
Number of sine/cosine periods per revolution	128											
Number of the absolute ascertainable												
revolutions	Single SKS	1										
	Multi SKM	4,096										
Dimensions	mm (see dimensional drawing)											
Mass	0.14 kg											
Inertial rotor moment	6 g/cm^2											
Code type for the absolute value	Binary											
Code sequence for clockwise shaft rotation, looking in												
direction "A" (see dimensional drawing)	Increasing											
Measurement step at interpolation of the sine/cosine												
signals with e. g. 12 bits	2.5 angular seconds											
Error limits for the digital absolute value												
via RS 485	± 320 angular seconds											
Error limits for evaluating the "128" signals,												
Non-linearity	± 120 angular seconds											
Output frequency for sine/cosine signals	0 ... 65 kHz											
Operating speed	6,000 min^{-1}											
Max. angular acceleration	5 x 10^5 rad/s^2											
Operating torque	0.6 Ncm											
Starting torque	0.9 Ncm											
Load capacity of shaft												
radial/axial	10 Nm/5 Nm											
Life of ball bearings	2 x 10^9 revolutions											
Working temperature range	–20 ... +100 °C											
Storage temperature range [1]	–40 ... +125 °C											
Permissible relative humidity [2]	90 %											
Resistance												
to shocks [3]	100 g / 6 ms											
to vibration [4]	50 g / 10 ... 2000 Hz											
Protection to IEC 60529 [5]	IP 65											
EMC [6]												
Operating voltage range	7 ... 12 V											
Recommended supply voltage	8 V											
Max. operating current, no load	60 mA											
Available memory area within EEPROM [7]	1,792 bytes											
Interface signals												
Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential											
Parameter channel = RS 485	Digital											

[1] Without packaging

[2] Condensation not permissible

[3] To DIN EN 60068-2-27

[4] To DIN EN 60068-2-6

[5] With mating connector inserted

[6] To DIN EN 61000-6-2 and DIN EN 61000-6-3

[7] If applying the elctronic type label, in connection with numeric
controllers, attention should be paid to Patent EP 425 912 B 2;
Application of the electronic type label in connection with
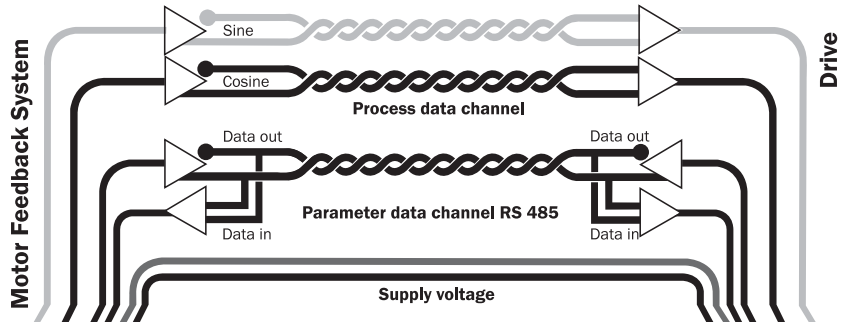speed regulation is exempt.

| Ordering information		
SKS/SKM36, Standalone; Solid shaft 6 mm; Servo/Face Mount Flange		
Type	**Part no.**	**Description**
SKS36-HVA0-K02	1035603	Singleturn; EEPROM 2048; Connector
SKS36-HVV0-K02	1035604	Singleturn; EEPROM 2048; Cable 1.5 m
SKM36-HVA0-K02	1035601	Multiturn; EEPROM 2048; Connector
SKM36-HVV0-K02	1035602	Multiturn; EEPROM 2048; Cable 1.5 m

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HIPERFACE®

by **SICK | STEGMANN**

Electrical interface

- **Safe data transmission**
- **High information content**
- **Electronic type label**

- **Only 8 leads**
- **Bus-enabled parameter channel**
- **Process data channel in real time**

Motor Feedback System

Drive

Sine

Cosine

Process data channel

Data out   Data out

Parameter data channel RS 485

Data in   Data in

Supply voltage

Signal specification of the process data channel

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

SIN

REFSIN/REFCOS

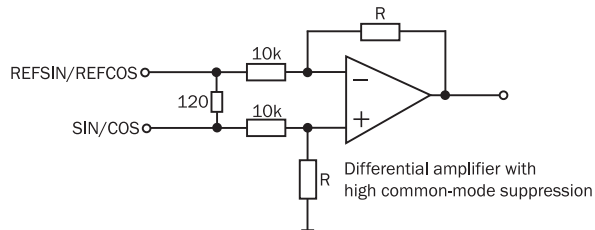COS

3 Volt

2,5 Volt

2 Volt

1 period = 360° : 128
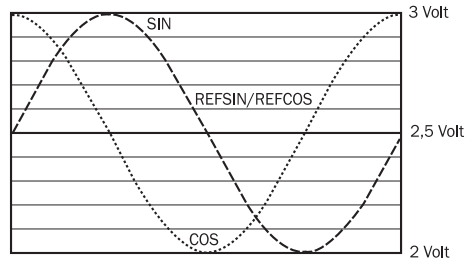
Access to the process data used for speed control, i.e. to the sine and cosine signals, is practically always "online". When the supply voltage is applied, the speed controller has access to this information at any time.

Sophisticated technology guarantees stable amplitudes of the analogue signals across all specified environmental conditions, with a maximum variation of only 30 %.
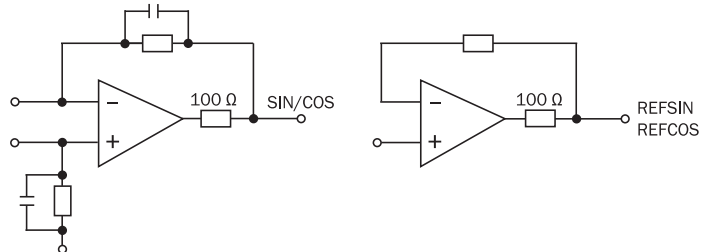
Characteristics applicable to all permissible environmental conditions

Signal	Value/Units
Signal peak, peak V_{ss} of SIN, COS	0.8 ... 1.1 V
Signal offset REFSIN, REFCOS	2.2 ... 2.8 V

Recommended receiver circuit for sine and cosine signals

REFSIN/REFCOS

SIN/COS

R

10k

120

10k

R

Differential amplifier with high common-mode suppression

The output circuit of the process data channel within the SinCos encoder

100 Ω   SIN/COS

100 Ω   REFSIN REFCOS

HIPERFACE®
by SICK|STEGMANN

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

| Overview of commands supported			SKS	SKM
Command byte	Function	Code 0 [1]	Comments	Comments
42h	Read position			
43h	Set position	●		
44h	Read analogue value		Channel number 48h	Channel number 48h
			Temperature [°C]	Temperature [°C]
46h	Read counter			
47h	Increase counter			
49h	Reset counter	●		
4Ah	Read data			
4Bh	Save 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 name plate		Encoder type = 32h	Encoder type = 37h
53h	Encoder reset			
55h	Allocate encoder address	●		
56h	Read serial number and program version			
57h	Configure serial interface	●		

[1] The commands thus labelled include the parameter "Code 0". Code 0 is a byte inserted into the protocol, for additional safeguarding of vital system parameters against accidental overwriting. When shipped, "Code 0" = 55h.

Overview of status messages			SKS	SKM
Error type	Status code	Description	SKS	SKM
	00h	The encoder has recognised no error	●	●
Initialisation	01h	Faulty compensating data	●	●
	02h	Faulty internal angular offset	●	●
	03h	Data field partitioning table damaged	●	●
	04h	Analogue limit values not available	●	●
	05h	Internal I2C bus not operational	●	●
	06h	Internal checksum error	●	●
Protocol	07h	Encoder reset occurred as a result of program monitoring	●	●
	09h	Parity error	●	●
	0Ah	Checksum of the data transmitted is incorrect	●	●
	0Bh	Unknown command code	●	●
	0Ch	Number of data transmitted is incorrect	●	●
	0Dh	Command argument transmitted is not allowed	●	●
Data	0Eh	The selected data field must not be written to	●	●
	0Fh	Incorrect access code	●	●
	10h	Size of data field stated cannot be changed	●	●
	11h	Word address stated, is outside data field	●	●
	12h	Access to non-existent data field	●	●
Position	01h	Analogue signals outside specification		
	1Fh	Speed too high, no position formation possible		
	20h	Singleturn position unreliable	●	●
	21h	Positional error Multiturn		●
	22h	Positional error Multiturn		●
	23h	Positional error Multiturn		●
Other	1Ch	Monitoring the value of the analogue signals (process data)		
	1Dh	LED current critical (dirt, LED breakage)	●	●
	1Eh	Encoder temperature critical	●	●
	08h	Counter overflow	●	●

Dimensional drawings and ordering information

Stranded cable/connector, straight, 8 wires, 8 x 0.15 mm²

Type	Part no.	Contacts	Wire length
DOL-0J08-G0M2XB6	2031086	8	0.2 m

Shrunk area
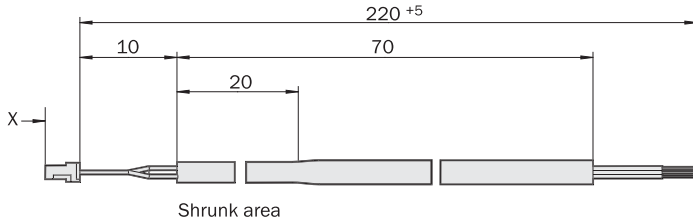
Assembly tool		
Type	**Part no.**	**Description**
BEF-MW-SKX36	2031079	Assembly tool SKX36
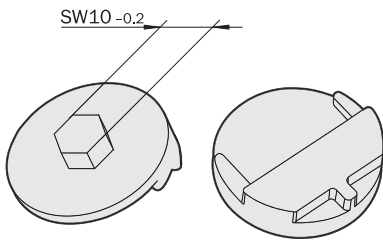
Servo clamps, Set (comprises 3 pieces)		
Type	**Part no.**	**Description**
BEF-WK-RESOL	2039082	Servo clamp

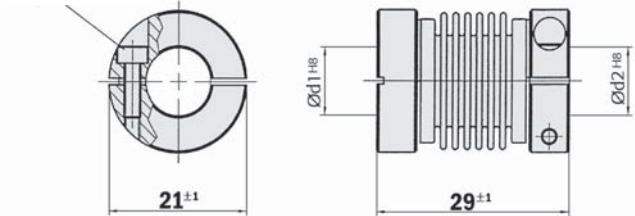General tolerances according to DIN ISO 2768-mk
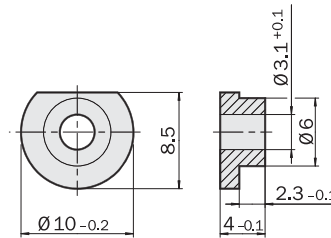
General tolerances according to DIN ISO 2768-mk

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

Type	Part no.	Shaft diameter
KUP-0606-B	5312981	6 mm ... 6 mm
KUP-0610-B	5312982	6 mm ... 10 mm

Programming tool for HIPERFACE® devices

Type	Part no.	Motor Feedback System
PGT-03-S	1034252	SKS/SKM36

Cheese-head screw
M2.5x8 DIN912 A2

Dimensional drawings and ordering information

Round screw system M12

Loose male connector M12, 8-pin, straight, screened, for field assembly (adapter side)		
Type	Part no.	Contacts/cable diameter
STE-1208-GA	6028370	8 / 4 ... 8 mm

Loose female connector M12, 8-pin, straight, screened, for field assembly (encoder side)		
Type	Part no.	Contacts/cable diameter
DOS-1208-GA	6028369	8 / 4 ... 8 mm
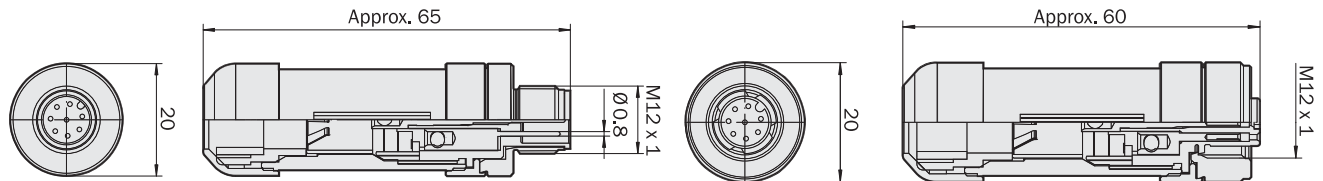
Cable HIPERFACE®, 8-wire, per metre 4 x 2 x 0.15 mm^2		
Type	Part no.	Wires
LTG-2708-MW	6028361	8

| Female connector M12, 8-pin, straight, pre-wired with cable 8-wire, 4 x 2 x 0.25 mm^2, screened, flexible (adapter side)			
Type	Part no.	Contacts	Cable length
DOL-1208-G02MAC1	6032866	8	2.0 m
DOL-1208-G05MAC1	6032867	8	5.0 m
DOL-1208-G10MAC1	6032868	8	10.0 m
DOL-1208-G20MAC1	6032869	8	20.0 m
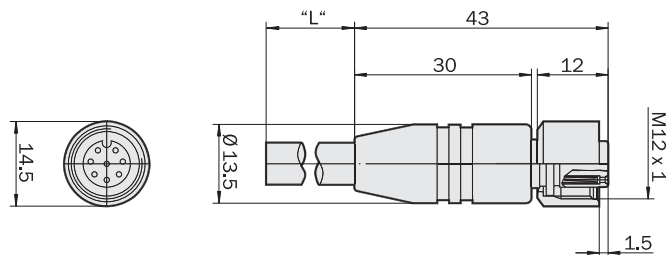
Dimensional drawings and ordering information

Mechanical Adapters

Adapter flange of aluminium for face mount flange, spigot 25 mm

Type	Part no.	Adaption
BEF-FA-025-050	2032622	To 50 mm servo flange
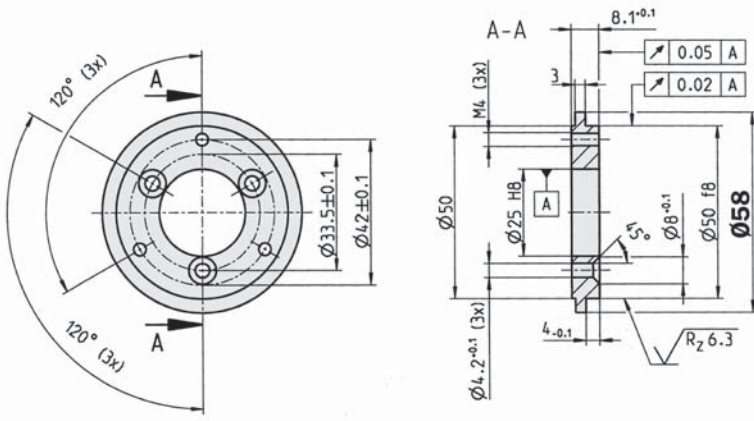
General tolerances according to DIN ISO 2768-mk

Adapter flange of aluminium for face mount flange, spigot 25 mm

Type	Part no.	Adaption
BEF-FA-025-036	2034226	To 36 mm face mount flange
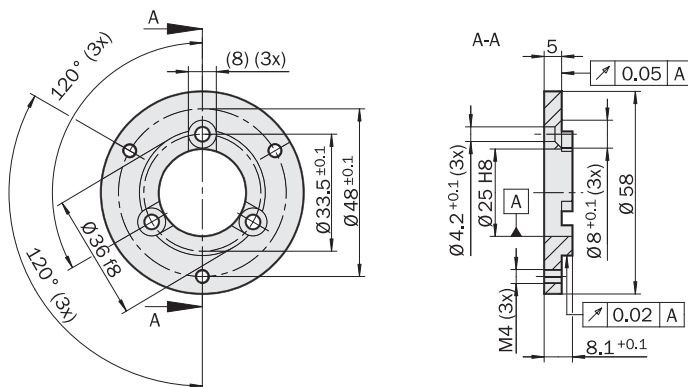
General tolerances according to DIN ISO 2768-mk

Adapter flange of aluminium for face mount flange, spigot 25 mm

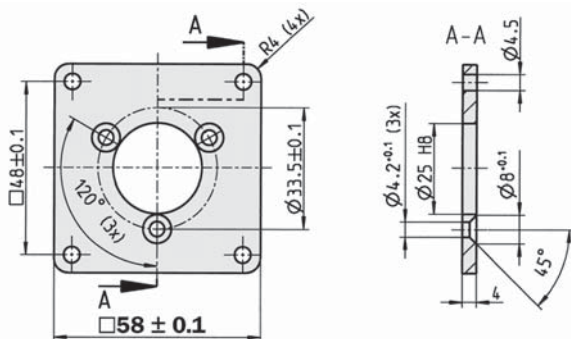| Type	Part no.	Adaption
BEF-FA-025-060RCA	2032623	To 60 mm square mounting plate

General tolerances according to DIN ISO 2768-mk

Adapter flange of aluminium for face mount flange, spigot 25 mm

Type	Part no.	Adaption
BEF-FA-025-060RSA	2032624	To 60 mm square mounting plate with shock absorbers
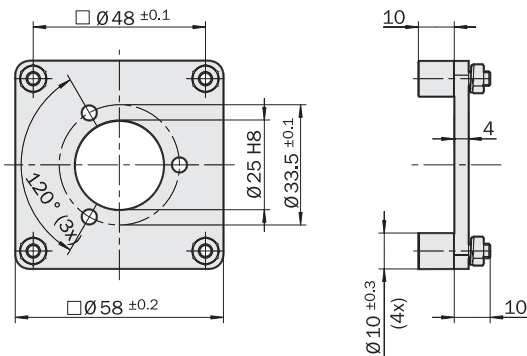
General tolerances according to DIN ISO 2768-mk

Adapter flange of aluminium for face mount flange, spigot 25 mm

Type	Part no.	Adaption
BEF-FA-025-063REC	2033631	To 63 mm square mounting plate

A-A
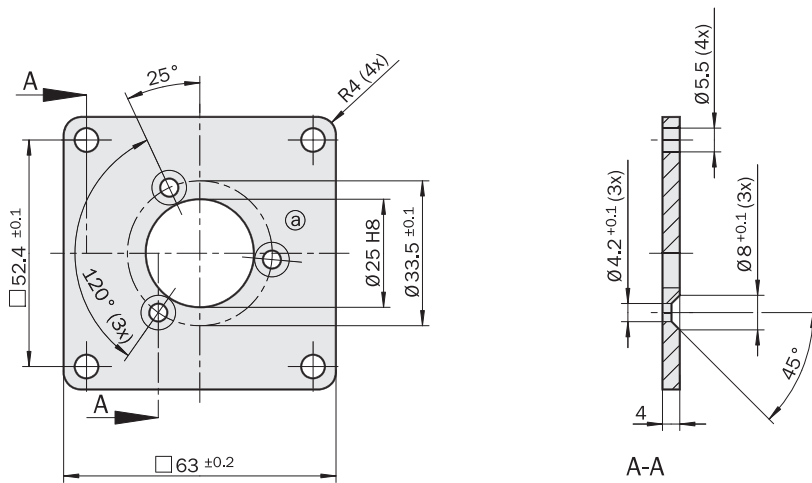
General tolerances according to DIN ISO 2768-mk

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

Type	Part no.	Flange spigot
BEF-WF-25	2032621	Diameter 25 mm

A-A
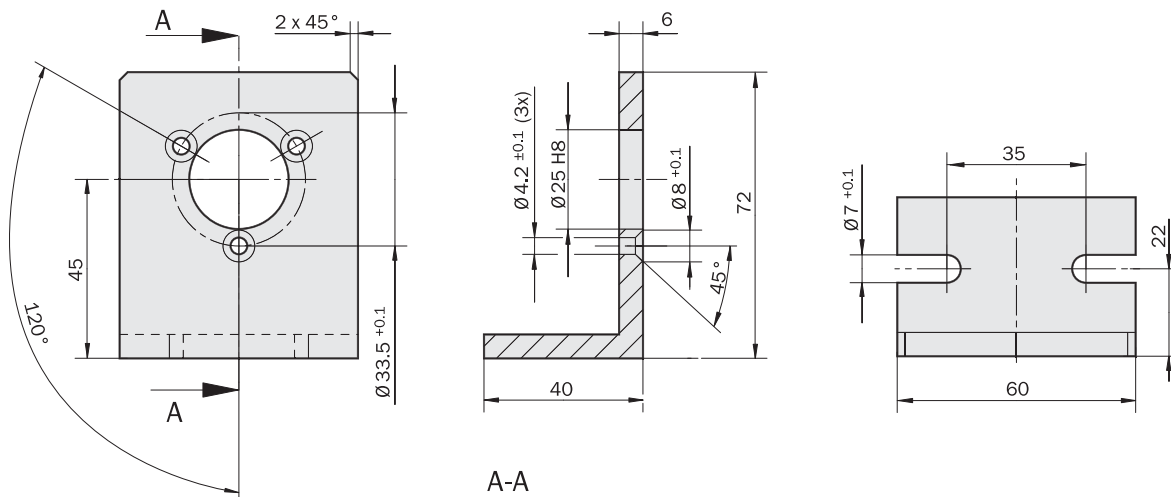
SinCos® SRS50, SRM50, SRS50 Standalone, SRM50 Standalone Generation 2:
Motor Feedback Systems with HIPERFACE® interface for Servo Motors
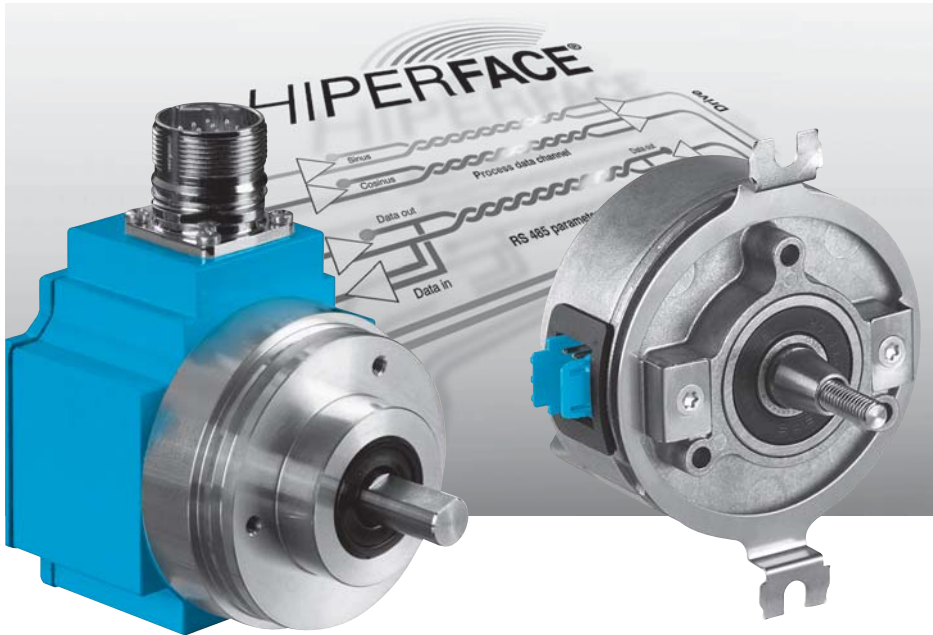
Writing motor-specific data to the electronic type label and programming are important features of these series.

Features of Generation 2:
· Shorter body reduces the encoder's installation depth
· Higher precision due to widely spaced bearings
· RoHS-compliant product range
· Reverse polarity protected

1,024 sine/ cosine periods

Motor Feedback Systems

HIPERFACE®
by **SICK** | **STEGMANN**

RoHS
2002/95/EC

SRS/SRM series of Motor Feedback Systems are used worldwide in many different applications and environments.
Absolute positioning with 32,768 steps per revolution and a maximum of 4,096 revolutions give a total resolution of 134,217,728 steps.

1,024 sine/ cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type label**

RoHS
2002/95/EC

Dimensional drawing SRS/SRM50, rubber support Ø 50

A

General tolerances according to DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	Us	red	Supply voltage 7 ... 12 V
2	GND	blue	Ground connection
3	REFSIN	brown	Process data channel
4	REFCOS	black	Process data channel
5	Data +	grey or yellow	RS-485-parameter channel
6	Data –	green or purple	RS-485-parameter channel
7	+ SIN	white	Process data channel
8	+ COS	pink	Process data channel

Caution: To ensure proper function, the screen connection strand (200 mm) MUST be connected. It is included in the supply.

Accessories
Connection systems (page 346)
Mounting systems (page 346)
Programming tool (page 346)

Technical data to DIN 32878	Plug-in shaft SRS/SRM50	SRS	SRM
Number of sine/cosine periods per revolution	1,024	■	■
Number of the absolute ascertainable revolutions — Single SRS	1	■	
Number of the absolute ascertainable revolutions — Multi SRM	4,096		■
Dimensions	mm (see dimensional drawing)	■	■
Mass	0.20 kg	■	■
Moment of inertia to the rotor	10 gcm^2	■	■
Code type for the absolut value	Binary	■	■
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing	■	■
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits	0.3 angular seconds	■	■
Error limits for evaluating the sine/cosine signals — integral non-linearity	± 45 angular seconds [1]	■	■
Non-linearity within a sine/cosine period — differential non-linearity	± 7 angular seconds	■	■
Output frequency for sine/cosine signals	0 ... 200 kHz	■	■
Working speed up to which the absolute position can be reliably produced	6,000 min^{-1}	■	■
Max. operating speed	12,000 min^{-1}	■	■
Max. angular acceleration	0.2 x 10^6 rad/s^2	■	■
Operating torque	0.2 Ncm	■	■
Starting torque	0.4 Ncm	■	■
Permissible shaft movement — static radial/axial	± 0.5 mm/± 0.75 mm	■	■
Permissible shaft movement — dynamic radial/axial	± 0.1 mm/± 0.2 mm	■	■
Angular motion, perpendicular to the rotational axis — static	± 0.005 mm/mm	■	■
Angular motion, perpendicular to the rotational axis — dynamic	± 0.0025 mm/mm	■	■
Life of ball bearings	3.6 x 10^9 revolutions	■	■
Working temperature range	–20 ... +115 °C	■	■
Storage temperature range (without packaging)	–40 ... +125 °C	■	■
Permissible relative humidity [2]	90 %	■	■
Resistance — To shocks [3]	100 g/10 ms	■	■
To vibration [4]	20 g/10 ... 2000 Hz	■	■
Protection class to IEC 60529 [5]	IP 40	■	■
EMC [6]		■	■
Operating voltage range	7 ... 12 V	■	■
Recommended supply voltage	8 V	■	■
Max. operating current, no load	80 mA	■	■
Available memory area — Within EEPROM 512 [7]	128 bytes	■	■
Within EEPROM 2048 [7]	1,792 bytes	■	■
Interface signals — Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential	■	■
Parameter channel = RS 485	Digital	■	■

[1] Without mechanical tension of the stator coupling

[2] Condensation not permitted

[3] To EN 60068-2-27

[4] To EN 60068-2-6

[5] With mating connector inserted

[6] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[7] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM50; plug-in shaft Ø 7mm; rubber support

Type	Part no.	Description
SRS50-HAA0-K21	1037059	Single, 512 EEprom, connector
SRS50-HAV0-K21	1037061	Single, 512 EEprom, stranded cable
SRS50-HAA0-K22	1037060	Single, 2048 EEprom, connector
SRS50-HAV0-K22	1037062	Single, 2048 EEprom, stranded cable
SRM50-HAA0-K21	1037063	Multi, 512 EEprom, connector
SRM50-HAV0-K21	1037065	Multi, 512 EEprom, stranded cable
SRM50-HAA0-K22	1037064	Multi, 2048 EEprom, connector
SRM50-HAV0-K22	1037066	Multi, 2048 EEprom, stranded cable

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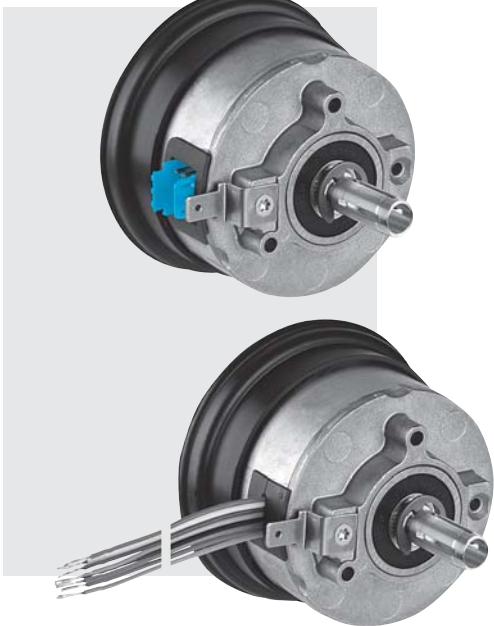
1,024 sine/ cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type label**

RoHS
2002/95/EC

Dimensional drawing SRS/SRM50, spring mounting plate Ø 66

Cylindrical screw
Torx15 head

General tolerances according to DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	Us	red	Supply voltage 7 … 12 V
2	GND	blue	Ground connection
3	REFSIN	brown	Process data channel
4	REFCOS	black	Process data channel
5	Data +	grey or yellow	RS-485-parameter channel
6	Data –	green or purple	RS-485-parameter channel
7	+ SIN	white	Process data channel
8	+ COS	pink	Process data channel

Screening:
The encoder housing for the integrated encoder is connected to the motor, via the torque support. The connection space is thus screened via the motor housing such that, within the connection space, unscreened connection strands can be used.

Accessories

Connection systems (page 346)

Mounting systems (page 346)

Programming tool (page 346)

Technical data to DIN 32878	Tapered shaft SRS/SRM50	SRS	SRM							
Number of sine/cosine periods per revolution	1,024	■	■							
Number of the absolute ascertainable revolutions	Single SRS	1	■							
	Multi SRM	4,096		■						
Dimensions	mm (see dimensional drawing)	■	■							
Mass	0.20 kg	■	■							
Moment of inertia to the rotor	10 gcm^2	■	■							
Code type for the absolut value	Binary	■	■							
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing	■	■							
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits	0.3 angular seconds	■	■							
Error limits for evaluating the sine/cosine signals integral non-linearity	± 45 angular seconds [1]	■	■							
Non-linearity within a sine/cosine period differential non-linearity	± 7 angular seconds	■	■							
Output frequency for sine/cosine signals	0 ... 200 kHz	■	■							
Working speed up to which the absolute position can be reliably produced	6,000 min^{-1}	■	■							
Max. operating speed	12,000 min^{-1}	■	■							
Max. angular acceleration	0.2 x 10^6 rad/s^2	■	■							
Operating torque	0.2 Ncm	■	■							
Starting torque	0.4 Ncm	■	■							
Permissible shaft movement static	radial/axial	± 0.5 mm/± 0.75 mm	■	■							
dynamic	radial/axial	± 0.1 mm/± 0.2 mm	■	■							
Angular motion, perpendicular to the rotational axis static	± 0.005 mm/mm	■	■							
dynamic	± 0.0025 mm/mm	■	■							
Life of ball bearings	3.6 x 10^9 revolutions	■	■							
Working temperature range	–20 ... +115 °C	■	■							
Storage temperature range (without packaging)	–40 ... +125 °C	■	■							
Permissible relative humidity [2]	90 %	■	■							
Resistance To shocks [3]	100 g/10 ms	■	■							
To vibration [4]	20 g/10 ... 2000 Hz	■	■							
Protection class to IEC 60529 [5]	IP 40	■	■							
EMC [6]		■	■							
Operating voltage range	7 ... 12 V	■	■							
Recommended supply voltage	8 V	■	■							
Max. operating current, no load	80 mA	■	■							
Available memory area Within EEPROM 512 [7]	128 bytes	■	■							
Within EEPROM 2048 [7]	1,792 bytes	■	■							
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential	■	■							
Parameter channel = RS 485	Digital	■	■							

[1] Without mechanical tension of the stator coupling

[2] Condensation not permitted

[3] To EN 60068-2-27

[4] To EN 60068-2-6

[5] With mating connector inserted

[6] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[7] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.
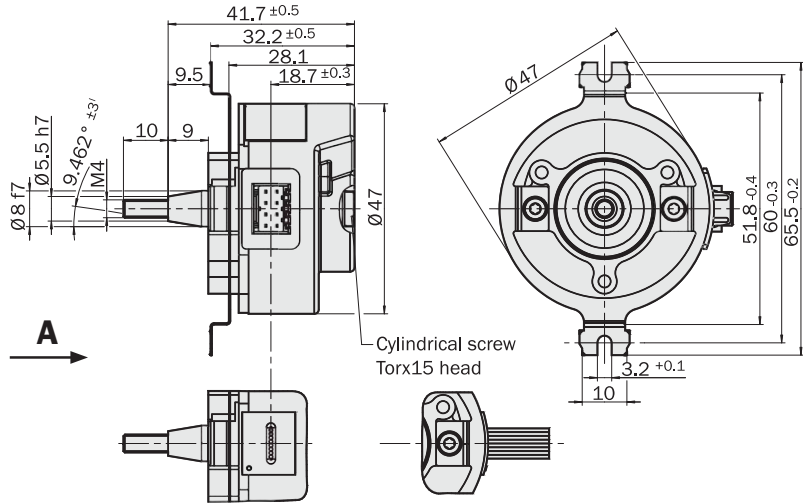
Ordering information

SRS/SRM50; tapered shaft; spring mounting plate		
Type	**Part no.**	**Description**
SRS50-HFA0-K21	1037067	Single, 512 EEprom, connector
SRS50-HFV0-K21	1037069	Single, 512 EEprom, stranded cable
SRS50-HFA0-K22	1037068	Single, 2048 EEprom, connector
SRS50-HFV0-K22	1037070	Single, 2048 EEprom, stranded cable
SRM50-HFA0-K21	1037071	Multi, 512 EEprom, connector
SRM50-HFV0-K21	1037073	Multi, 512 EEprom, stranded cable
SRM50-HFA0-K22	1037072	Multi, 2048 EEprom, connector
SRM50-HFV0-K22	1037074	Multi, 2048 EEprom, stranded cable

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1,024 sine/ cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
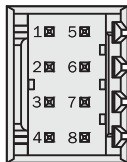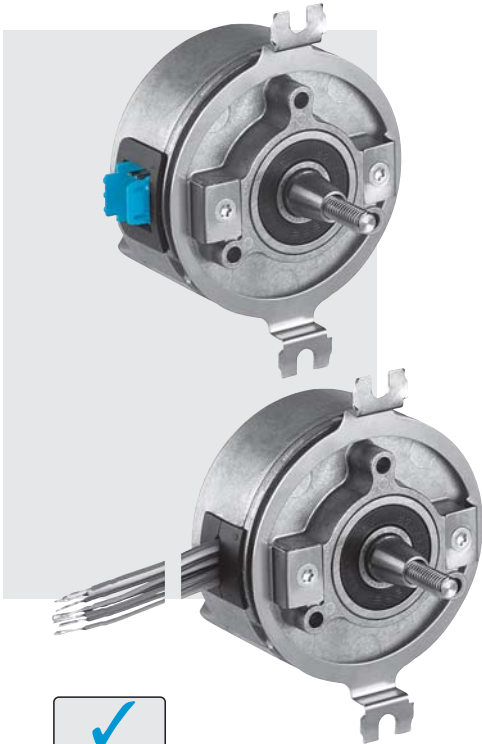- **Programming of the positional value**
- **Electronic type label**

RoHS
2002/95/EC

Dimensional drawing SRS/SRM50, resolver support Ø 52

General tolerances according to DIN ISO 2768-mk

Cylindrical screw
Torx15 head

A

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	Us	red	Supply voltage 7 … 12 V
2	GND	blue	Ground connection
3	REFSIN	brown	Process data channel
4	REFCOS	black	Process data channel
5	Data +	grey or yellow	RS-485-parameter channel
6	Data –	green or purple	RS-485-parameter channel
7	+ SIN	white	Process data channel
8	+ COS	pink	Process data channel

Caution: To ensure proper function, the screen connection strand (200 mm) MUST be connected. It is included in the supply.

Accessories

Connection systems (page 346)

Mounting systems (page 346)

Programming tool (page 346)

Technical data to DIN 32878		Tapered shaft SRS/SRM50	SRS	SRM								
Number of sine/cosine periods per revolution		1,024	▨	▨								
Number of the absolute ascertainable revolutions	Single SRS	1	▨									
	Multi SRM	4,096		▨								
Dimensions		mm (see dimensional drawing)	▨	▨								
Mass		0.20 kg	▨	▨								
Moment of inertia to the rotor		10 gcm^2	▨	▨								
Code type for the absolut value		Binary	▨	▨								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	▨	▨								
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		0.3 angular seconds	▨	▨								
Error limits for evaluating the sine/cosine signals integral non-linearity		± 45 angular seconds [1]	▨	▨								
Non-linearity within a sine/cosine period differential non-linearity		± 7 angular seconds	▨	▨								
Output frequency for sine/cosine signals		0 ... 200 kHz	▨	▨								
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	▨	▨								
Max. operating speed		12,000 min^{-1}	▨	▨								
Max. angular acceleration		0.2 x 10^6 rad/s^2	▨	▨								
Operating torque		0.2 Ncm	▨	▨								
Starting torque		0.4 Ncm	▨	▨								
Permissible shaft movement static	radial/axial	± 0.5 mm/± 0.75 mm	▨	▨								
dynamic	radial/axial	± 0.1 mm/± 0.2 mm	▨	▨								
Angular motion, perpendicular to the rotational axis static		± 0.005 mm/mm	▨	▨								
dynamic		± 0.0025 mm/mm	▨	▨								
Life of ball bearings		3.6 x 10^9 revolutions	▨	▨								
Working temperature range		–20 ... +115 °C	▨	▨								
Storage temperature range (without packaging)		–40 ... +125 °C	▨	▨								
Permissible relative humidity [2]		90 %	▨	▨								
Resistance To shocks [3]		100 g/10 ms	▨	▨								
To vibration [4]		20 g/10 ... 2000 Hz	▨	▨								
Protection class to IEC 60529 [5]		IP 40	▨	▨								
EMC [6]			▨	▨								
Operating voltage range		7 ... 12 V	▨	▨								
Recommended supply voltage		8 V	▨	▨								
Max. operating current, no load		80 mA	▨	▨								
Available memory area Within EEPROM 512 [7]		128 bytes	▨	▨								
Within EEPROM 2048 [7]		1,792 bytes	▨	▨								
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	▨	▨								
Parameter channel = RS 485		Digital	▨	▨								

[1] Without mechanical tension of the stator coupling

[2] Condensation not permitted

[3] To EN 60068-2-27

[4] To EN 60068-2-6

[5] With mating connector inserted

[6] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[7] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM50; tapered shaft; resolver support

Type	Part no.	Description
SRS50-HGA0-K21	1037075	Single, 512 EEprom, connector
SRS50-HGV0-K21	1037077	Single, 512 EEprom, stranded cable
SRS50-HGA0-K22	1037076	Single, 2048 EEprom, connector
SRS50-HGV0-K22	1037078	Single, 2048 EEprom, stranded cable
SRM50-HGA0-K21	1037079	Multi, 512 EEprom, connector
SRM50-HGV0-K21	1037081	Multi, 512 EEprom, stranded cable
SRM50-HGA0-K22	1037080	Multi, 2048 EEprom, connector
SRM50-HGV0-K22	1037082	Multi, 2048 EEprom, stranded cable

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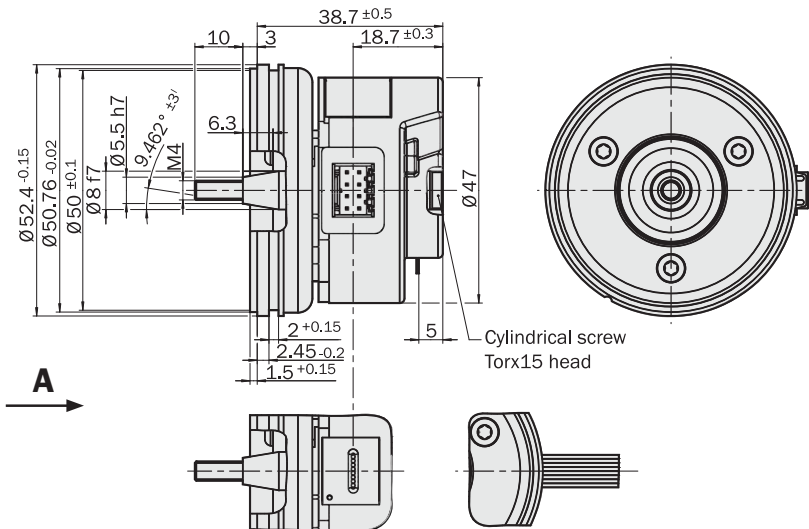
1,024 sine/cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type label**

RoHS
2002/95/EC

Dimensional drawing SRS/SRM50, rubber support Ø 50

A

Cylindrical screw
Torx15 head

General tolerances according to DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	Us	red	Supply voltage 7 ... 12 V
2	GND	blue	Ground connection
3	REFSIN	brown	Process data channel
4	REFCOS	black	Process data channel
5	Data +	grey or yellow	RS-485-parameter channel
6	Data –	green or purple	RS-485-parameter channel
7	+ SIN	white	Process data channel
8	+ COS	pink	Process data channel

Caution: To ensure proper function, the screen connection strand (200 mm) MUST be connected. It is included in the supply.

Accessories
Connection systems (page 346)
Mounting systems (page 346)
Programming tool (page 346)

Technical data to DIN 32878		Tapered shaft SRS/SRM50	SRS	SRM									
Number of sine/cosine periods per revolution		1,024	■	■									
Number of the absolute ascertainable revolutions	Single SRS	1	■										
	Multi SRM	4,096		■									
Dimensions		mm (see dimensional drawing)	■	■									
Mass		0.20 kg	■	■									
Moment of inertia to the rotor		10 gcm^2	■	■									
Code type for the absolut value		Binary	■	■									
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	■	■									
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		0.3 angular seconds	■	■									
Error limits for evaluating the sine/cosine signals integral non-linearity		± 45 angular seconds [1]	■	■									
Non-linearity within a sine/cosine period differential non-linearity		± 7 angular seconds	■	■									
Output frequency for sine/cosine signals		0 ... 200 kHz	■	■									
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	■	■									
Max. operating speed		12,000 min^{-1}	■	■									
Max. angular acceleration		0.2 x 10^6 rad/s^2	■	■									
Operating torque		0.2 Ncm	■	■									
Starting torque		0.4 Ncm	■	■									
Permissible shaft movement static	radial/axial	± 0.5 mm/± 0.75 mm	■	■									
dynamic	radial/axial	± 0.1 mm/± 0.2 mm	■	■									
Angular motion, perpendicular to the rotational axis static		± 0.005 mm/mm	■	■									
dynamic		± 0.0025 mm/mm	■	■									
Life of ball bearings		3.6 x 10^9 revolutions	■	■									
Working temperature range		–20 ... +115 °C	■	■									
Storage temperature range (without packaging)		–40 ... +125 °C	■	■									
Permissible relative humidity [2]		90 %	■	■									
Resistance To shocks [3]		100 g/10 ms	■	■									
To vibration [4]		20 g/10 ... 2000 Hz	■	■									
Protection class to IEC 60529 [5]		IP 40	■	■									
EMC [6]			■	■									
Operating voltage range		7 ... 12 V	■	■									
Recommended supply voltage		8 V	■	■									
Max. operating current, no load		80 mA	■	■									
Available memory area Within EEPROM 512 [7]		128 bytes	■	■									
Within EEPROM 2048 [7]		1,792 bytes	■	■									
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	■	■									
Parameter channel = RS 485		Digital	■	■									

[1] Without mechanical tension of the stator coupling

[2] Condensation not permitted

[3] To EN 60068-2-27

[4] To EN 60068-2-6

[5] With mating connector inserted

[6] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[7] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM50; tapered shaft; rubber support Ø 50 mm

Type	Part no.	Description
SRS50-HEA0-K21	1037083	Single, 512 EEprom, connector
SRS50-HEV0-K21	1037085	Single, 512 EEprom, stranded cable
SRS50-HEA0-K22	1037084	Single, 2048 EEprom, connector
SRS50-HEV0-K22	1037086	Single, 2048 EEprom, stranded cable
SRM50-HEA0-K21	1037087	Multi, 512 EEprom, connector
SRM50-HEV0-K21	1037089	Multi, 512 EEprom, stranded cable
SRM50-HEA0-K22	1037088	Multi, 2048 EEprom, connector
SRM50-HEV0-K22	1037090	Multi, 2048 EEprom, stranded cable

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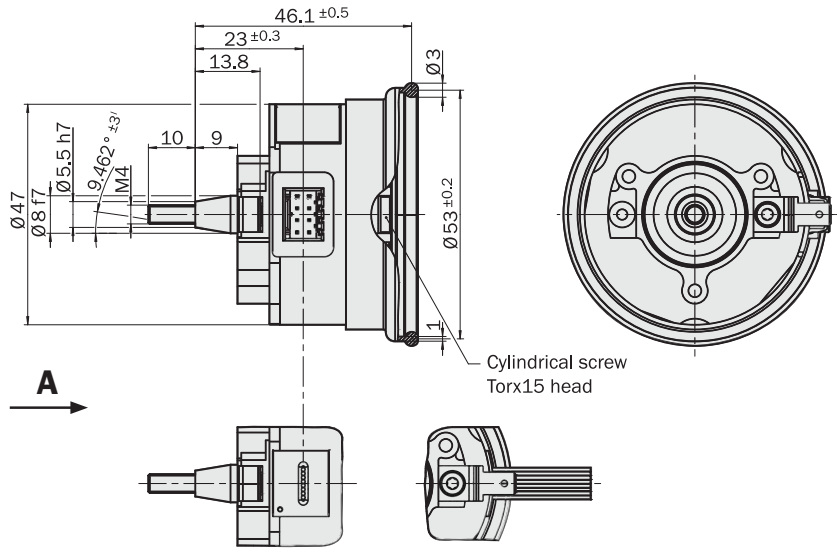
1,024 sine/cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type label**

CE

RoHS
2002/95/EC

Accessories

Connection systems (page 346)

Mounting systems (page 346)

Programming tool (page 346)
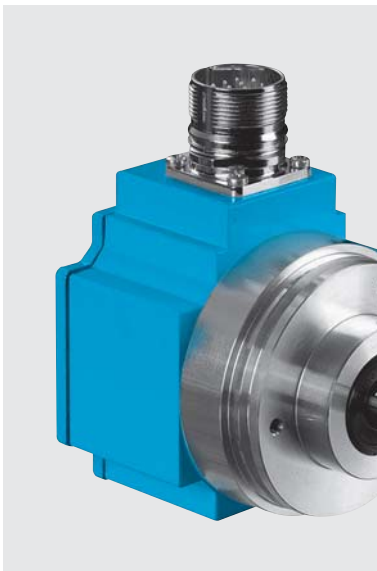
Dimensional drawing SRS50/SRM50 Standalone, rectangular housing, face mount flange

① R = min. bending radius 40 mm   General tolerances according to DIN ISO 2768-mk

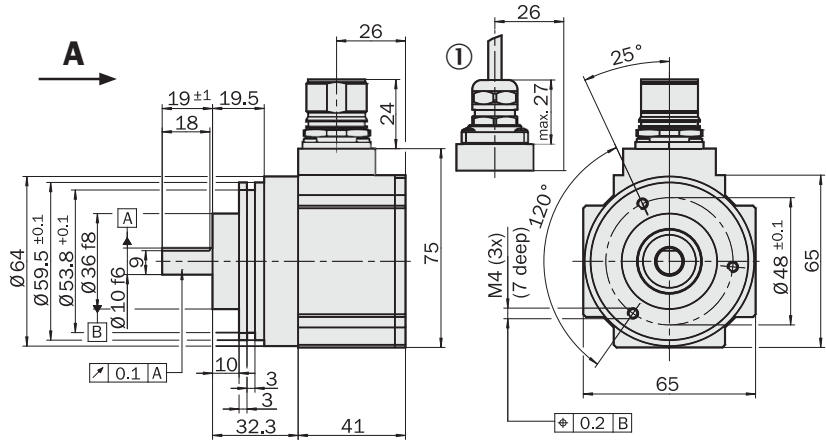**PIN and wire allocation**

PIN	Signal	Colour of Wires	Explanation
1	REFCOS	black	Process data channel
2	Data +	grey or yellow	RS-485-parameter channel
3	N. C.	–	N. C.
4	N. C.	–	N. C.
5	SIN	white	Process data channel
6	REFSIN	brown	Process data channel
7	Data –	green or purple	RS-485-parameter channel
8	COS	pink	Process data channel
9	N. C.	–	N. C.
10	GND	blue	Ground connection
11	N. C.	–	N. C.
12	Us	red	7 ... 12 V Supply voltage

View of the plug-in face

Screen connection on connector housing

N. C. = Not connected

Type of connection

M23 Connector radial   Cable radial

Technical data to DIN 32878	Standalone, face mount flange SRS/SRM50		SRS	SRM									
Number of sine/cosine periods per revolution	1,024		■	■									
Number of the absolute ascertainable revolutions	Single SRS	1	■										
	Multi SRM	4,096		■									
Dimensions	mm (see dimensional drawing)		■	■									
Mass	0.55 kg		■	■									
Moment of inertia to the rotor	25 gcm^2		■	■									
Code type for the absolut value	Binary		■	■									
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing		■	■									
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits	0.3 angular seconds		■	■									
Error limits for evaluating the sine/cosine signals integral non-linearity	± 45 angular seconds		■	■									
Non-linearity within a sine/cosine period differential non-linearity	± 7 angular seconds		■	■									
Output frequency for sine/cosine signals	0 ... 200 kHz		■	■									
Working speed up to which the absolute position can be reliably produced	6,000 min^{-1}		■	■									
Max. operating speed	6,000 min^{-1}		■	■									
Max. angular acceleration	0.2 x 10^6 rad/s^2		■	■									
Operating torque with shaft sealing ring	1 Ncm		■	■									
Starting torque with shaft sealing ring	1.5 Ncm		■	■									
Load capacity of shaft radial/axial	40 N/20 N		■	■									
Life of ball bearings	3.6 x 10^9 revolutions		■	■									
Working temperature range	−20 ... +85 °C		■	■									
Storage temperature range	−30 ... +90 °C		■	■									
Permissible relative humidity [1]	90 %		■	■									
Resistance To shocks [2]	30 g/11 ms		■	■									
To vibration [3]	20 g/10 ... 2000 Hz		■	■									
Protection class to IEC 60529 [4]	IP 65		■	■									
EMC [5]			■	■									
Operating voltage range	7 ... 12 V		■	■									
Recommended supply voltage	8 V		■	■									
Max. operating current, no load	80 mA		■	■									
Available memory area Within EEPROM 512 [6]	128 bytes		■	■									
Within EEPROM 2048 [6]	1,792 bytes		■	■									
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential		■	■									
Parameter channel = RS 485	Digital		■	■									

[1] Condensation not permitted

[2] To EN 60068-2-27

[3] To EN 60068-2-6

[4] With mating connector inserted

[5] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[6] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM50 Standalone; solid shaft Ø 10 mm; face mount flange		
Type	Part no.	Decription
SRS50-HWA0-K21	1037091	Single, 512 EEprom, connector
SRS50-HWV0-K21	1037093	Single, 512 EEprom, stranded cable
SRS50-HWA0-K22	1037092	Single, 2048 EEprom, connector
SRS50-HWV0-K22	1037094	Single, 2048 EEprom, stranded cable
SRM50-HWA0-K21	1037095	Multi, 512 EEprom, connector
SRM50-HWV0-K21	1037097	Multi, 512 EEprom, stranded cable
SRM50-HWA0-K22	1037096	Multi, 2048 EEprom, connector
SRM50-HWV0-K22	1037098	Multi, 2048 EEprom, stranded cable

1,024 sine/cosine periods

Motor Feedback Systems

- ■ **1,024 sine/cosine periods per revolution**
- ■ **Absolute position with a resolution of 32,768 steps per revolution**
- ■ **4,096 revolutions measurable (Multiturn)**
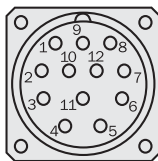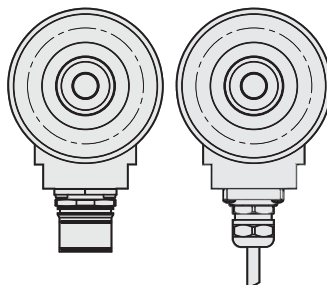- ■ **Programming of the positional value**
- ■ **Electronic type label**

CE

RoHS
2002/95/EC

Accessories

Connection systems (page 346)
Mounting systems (page 346)
Programming tool (page 346)

Dimensional drawing SRS50/SRM50 Standalone, rectangular housing, servo flange

① R = min. bending radius 40 mm   General tolerances according to DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	REFCOS	black	Process data channel
2	Data +	grey or yellow	RS-485-parameter channel
3	N. C.	–	N. C.
4	N. C.	–	N. C.
5	SIN	white	Process data channel
6	REFSIN	brown	Process data channel
7	Data –	green or purple	RS-485-parameter channel
8	COS	pink	Process data channel
9	N. C.	–	N. C.
10	GND	blue	Ground connection
11	N. C.	–	N. C.
12	Us	red	7 ... 12 V Supply voltage

View of the plug-in face

Screen connection on connector housing

N. C. = Not connected

Type of connection

M23 Connector radial	Cable radial

Technical data to DIN 32878	Standalone, servo flange SRS/SRM50		SRS	SRM								
Number of sine/cosine periods per revolution		1,024	■	■								
Number of the absolute ascertainable revolutions	Single SRS	1	■									
	Multi SRM	4,096		■								
Dimensions		mm (see dimensional drawing)	■	■								
Mass		0.55 kg	■	■								
Moment of inertia to the rotor		25 gcm^2	■	■								
Code type for the absolut value		Binary	■	■								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	■	■								
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		0.3 angular seconds	■	■								
Error limits for evaluating the sine/cosine signals integral non-linearity		± 45 angular seconds	■	■								
Non-linearity within a sine/cosine period differential non-linearity		± 7 angular seconds	■	■								
Output frequency for sine/cosine signals		0 ... 200 kHz	■									
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	■	■								
Max. operating speed		6,000 min^{-1}	■	■								
Max. angular acceleration		0.2 x 10^6 rad/s^2	■	■								
Operating torque with shaft sealing ring		1 Ncm	■	■								
Starting torque with shaft sealing ring		1.5 Ncm	■	■								
Load capacity of shaft	radial/axial	40 N/20 N	■	■								
Life of ball bearings		3.6 x 10^9 revolutions	■	■								
Working temperature range		−20 ... +85 °C	■	■								
Storage temperature range		−30 ... +90 °C	■	■								
Permissible relative humidity [1]		90 %	■	■								
Resistance To shocks [2]		30 g/11 ms	■	■								
To vibration [3]		20 g/10 ... 2000 Hz	■	■								
Protection class to IEC 60529 [4]		IP 65	■	■								
EMC [5]			■	■								
Operating voltage range		7 ... 12 V	■	■								
Recommended supply voltage		8 V	■	■								
Max. operating current, no load		80 mA	■	■								
Available memory area Within EEPROM 512 [6]		128 bytes	■	■								
Within EEPROM 2048 [6]		1,792 bytes	■	■								
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	■	■								
Parameter channel = RS 485		Digital	■	■								

[1] Condensation not permitted

[2] To EN 60068-2-27

[3] To EN 60068-2-6

[4] With mating connector inserted

[5] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[6] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM50 Standalone; solid shaft Ø 6 mm; servo flange

Type	Part no.	Description
SRS50-HXA0-K21	1037099	Single, 512 EEprom, connector
SRS50-HXV0-K21	1037101	Single, 512 EEprom, stranded cable
SRS50-HXA0-K22	1037100	Single, 2048 EEprom, connector
SRS50-HXV0-K22	1037102	Single, 2048 EEprom, stranded cable
SRM50-HXA0-K21	1037103	Multi, 512 EEprom, connector
SRM50-HXV0-K21	1037105	Multi, 512 EEprom, stranded cable
SRM50-HXA0-K22	1037104	Multi, 2048 EEprom, connector
SRM50-HXV0-K22	1037106	Multi, 2048 EEprom, stranded cable

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1,024 sine/cosine periods

Motor Feedback Systems

- 1,024 sine/cosine periods per revolution
- Absolute position with a resolution of 32,768 steps per revolution
- 4,096 revolutions measurable (Multiturn)
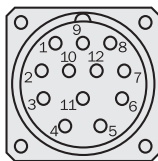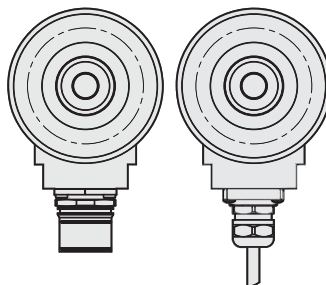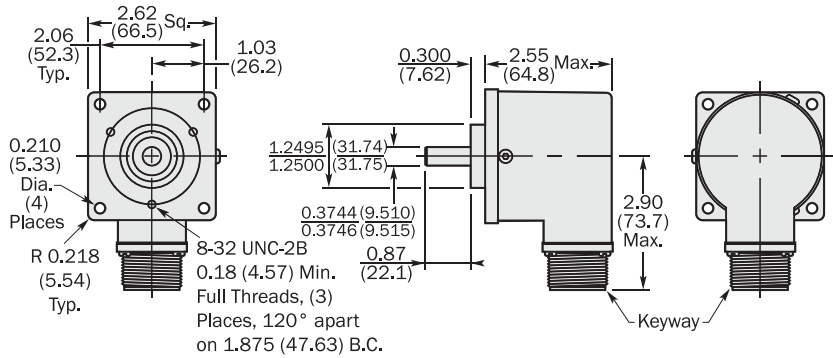- Programming of the positional value
- Electronic type label

CE

RoHS 2002/95/EC

Accessories

Connection systems (page 346)

Mounting systems (page 346)

Programming tool (page 346)

Dimensional drawing SRS50/SRM50 Standalone, square mount flange

All dimensions in inch, dimensions within brackets in mm.

Dimensional drawing shaft options

Solid shaft

Solid shaft with flat

All dimensions in inch, dimensions within brackets in mm.

PIN and wire allocation

PIN	Signal	Wire colour	Explanation
A	+ U$_S$	red	7 ... 12 V Supply voltage
B	GND	blue	Ground connection
C	Ref SIN	brown	Process data channel
D	Ref COS	black	Process data channel
E	Data +	grey	RS-485-parameter channel
F	Data –	green	RS-485-parameter channel
G	SIN	white	Process data channel
H	COS	pink	Process data channel
I	N. C.		
J	Housing	Housing	

View of the plug-in face

Screen connection on connector housing

N. C. = Not connected

Technical data to DIN 32878 Standalone, square mount flange SRS/SRM50		SRS	SRM							
Number of sine/cosine periods per revolution	1,024	■	■							
Number of the absolute ascertainable revolutions	Single SRS	1	■							
	Multi SRM	4,096		■						
Dimensions	mm (see dimensional drawing)	■	■							
Mass	0.48 kg	■	■							
Moment of inertia to the rotor	28.8 gcm^2	■	■							
Code type for the absolut value	Binary	■	■							
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing	■	■							
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits	0.3 angular seconds	■	■							
Error limits for evaluating the sine/cosine signals integral non-linearity	± 45 angular seconds	■	■							
Non-linearity within a sine/cosine period differential non-linearity	± 7 angular seconds	■	■							
Output frequency for sine/cosine signals	0 ... 200 kHz	■	■							
Working speed up to which the absolute position can be reliably produced	6,000 min^{-1}	■	■							
Max. operating speed without shaft sealing ring	6,000 min^{-1}	■	■							
Max. operating speed with shaft sealing ring	3,000 min^{-1}	■	■							
Max. angular acceleration	5 x 10^5 rad/s^2	■	■							
Operating torque with shaft sealing ring	1 Ncm	■	■							
Starting torque with shaft sealing ring	1.5 Ncm	■	■							
Load capacity of shaft radial/axial	155 N/88 N	■	■							
Life of ball bearings	3.6 x 10^9 revolutions	■	■							
Working temperature range	0 ... +75 °C	■	■							
Storage temperature range	–40 ... +85 °C	■	■							
Permissible relative humidity [1]	90 %									
Resistance		■	■							
To shocks [2]	100 g/10 ms	■	■							
To vibration [3]	20 g/10 ... 2000 Hz	■	■							
Protection class to IEC 60529 [4]	IP 66	■	■							
EMC [5]		■	■							
Operating voltage range	7 ... 12 V	■	■							
Recommended supply voltage	8 V	■	■							
Max. operating current, no load	80 mA									
Available memory area		■	■							
Within EEPROM 512 [6]	128 bytes	■	■							
Interface signals		■	■							
Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential	■	■							
Parameter channel = RS 485	Digital	■	■							

[1] Condensation not permitted

[2] To EN 60068-2-27

[3] To EN 60068-2-6

[4] With mating connector inserted

[5] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[6] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information		
SRS/SRM50 Standalone; solid shaft Ø 3/8"; square mount flange 2,5"		
Type	**Part no.**	**Description**
SRS50-HTA0-K21	7127309	Single, solid shaft, connector MS/10
SRS50-HUA0-K21	7127310	Single, solid shaft with flat, connector MS/10
SRM50-HTA0-K21	7127313	Multi, solid shaft, connector MS/10
SRM50-HUA0-K21	7127311	Multi, solid shaft with flat, connector MS/10

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1,024 sine/cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
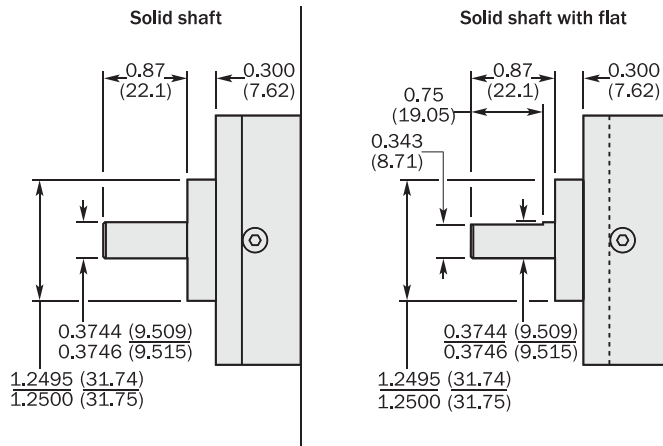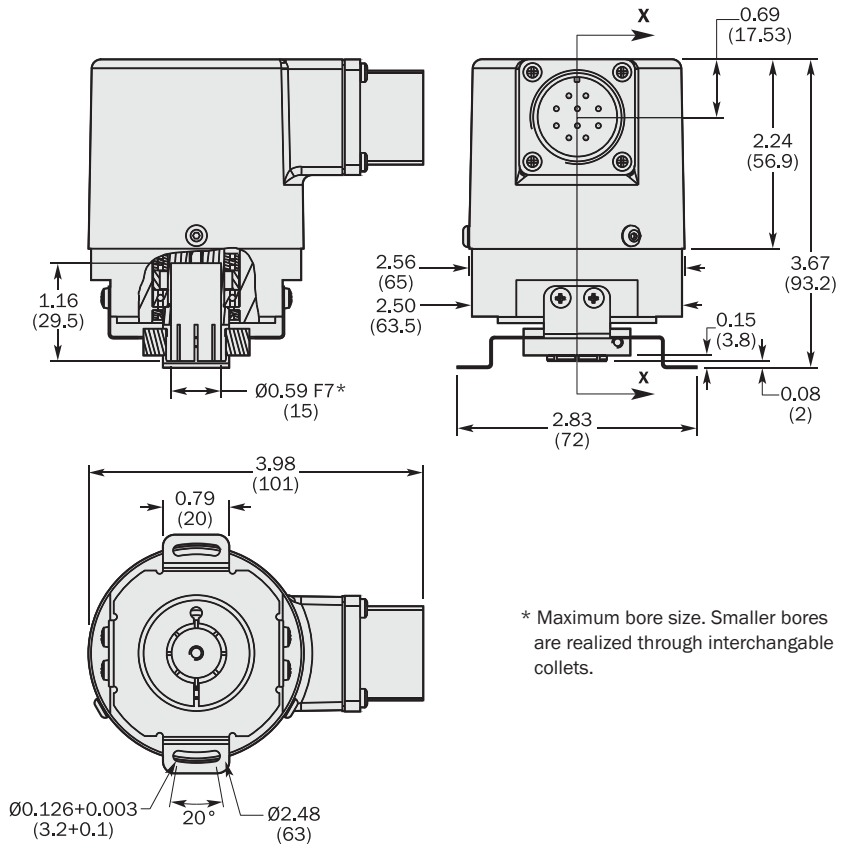- **Electronic type label**

CE

RoHS
2002/95/EC

Accessories

Connection systems (page 346)
Mounting systems (page 346)
Programming tool (page 346)

Dimensional drawing SRS50/SRM50 Standalone, blind hollow shaft

* Maximum bore size. Smaller bores are realized through interchangable collets.

All dimensions in inch, dimensions within brackets in mm.

PIN and wire allocation

PIN	Signal	Wire colour	Explanation
A	+ U_S	red	7 ... 12 V Supply voltage
B	GND	blue	Ground connection
C	Ref SIN	brown	Process data channel
D	Ref COS	black	Process data channel
E	Data +	grey	RS-485-parameter channel
F	Data –	green	RS-485-parameter channel
G	SIN	white	Process data channel
H	COS	pink	Process data channel
I	N. C.		
J	Housing	Housing	

View of the plug-in face

Screen connection on connector housing

N. C. = Not connected

Technical data to DIN 32878	Standalone, blind hollow shaft SRS/SRM50	SRS	SRM								
Number of sine/cosine periods per revolution	1,024	■	■								
Number of the absolute ascertainable revolutions	Single SRS	1	■									
	Multi SRM	4,096		■								
Dimensions	mm (see dimensional drawing)	■	■								
Mass	0.48 kg	■	■								
Moment of inertia to the rotor	50 gcm^2 max.	■	■								
Code type for the absolut value	Binary	■	■								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing	■	■								
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits	0.3 angular seconds	■	■								
Error limits for evaluating the sine/cosine signals											
integral non-linearity	± 45 angular seconds	■	■								
Non-linearity within a sine/cosine period											
differential non-linearity	± 7 angular seconds	■	■								
Output frequency for sine/cosine signals	0 ... 200 kHz	■	■								
Working speed up to which the absolute position can be reliably produced	3.000 min^{-1}	■	■								
Max. operating speed	3.000 min^{-1}	■	■								
Max. angular acceleration	5 x 10^5 rad/s^2	■	■								
Max. operating torque	1.8 Ncm	■	■								
Starting torque with shaft sealing ring	2.6 Ncm	■	■								
Allowable runout		■	■								
static/dynamic radial	± 3/± 1 mm	■	■								
static/dynamic axial	± 5/± 2 mm	■	■								
Working temperature range	0 ... +75 °C	■	■								
Storage temperature range	–40 ... +85 °C	■	■								
Permissible relative humidity [1]	90 %										
Resistance		■	■								
To shocks [2]	100 g/10 ms	■	■								
To vibration [3]	20 g/10 ... 2000 Hz	■	■								
Protection class to IEC 60529 [4]	IP 66	■	■								
EMC [5]		■	■								
Operating voltage range	7 ... 12 V	■	■								
Recommended supply voltage	8 V	■	■								
Max. operating current, no load	80 mA										
Available memory area		■	■								
Within EEPROM 512 [6]	128 bytes	■	■								
Interface signals											
Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential	■	■								
Parameter channel = RS 485	Digital	■	■								

Ordering information

SRS/SRM50 Standalone; blind hollow saft Ø 15 mm		
Type	**Part no.**	**Description**
SRS50-HPA0-K21	7127312	Single, Aufsteckhohlwelle, Stecker MS/10
SRM50-HPA0-K21	7127314	Multi, Aufsteckhohlwelle, Stecker MS/10

[1] Condensation not permitted

[2] To EN 60068-2-27

[3] To EN 60068-2-6

[4] With mating connector inserted
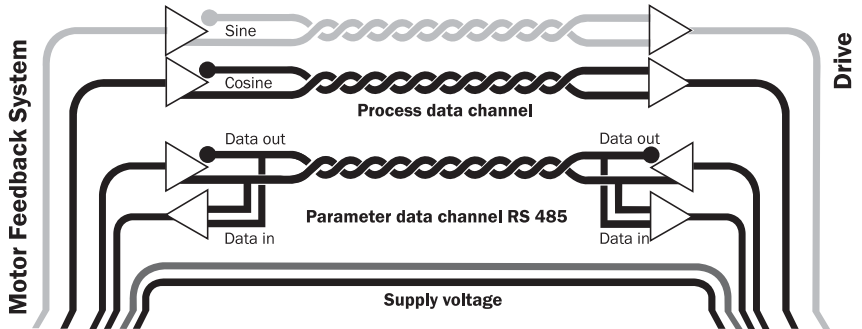
[5] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth.
Users must perform their own tests when other screen designs are used.

[6] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Collets

Type	**Part no.**	**Size**
SPZ-006-AD-A	2029174	6 mm
SPZ-1E4-AD-A	2029175	1/4"
SPZ-008-AD-A	2029176	8 mm
SPZ-3E8-AD-A	2029177	3/8"
SPZ-010-AD-A	2029178	10 mm
SPZ-012-AD-A	2029179	12 mm
SPZ-1E2-AD-A	2029180	1/2"
Attention: Please order the Collet with required diameter separately.		

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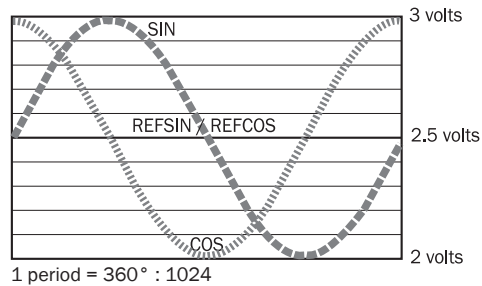
HIPERFACE®

by SICK|STEGMANN

Electrical interface

- **Safe data transmission**
- **High information content**
- **Electronic type label**

- **Only 8 leads**
- **Bus-enabled parameter channel**
- **Process data channel in real time**

Motor Feedback System

Sine

Cosine

Process data channel

Data out Data out

Parameter data channel RS 485

Data in Data in

Supply voltage

Drive

Signal specification of the process data channel

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

SIN

REFSIN, REFCOS

COS

3 volts

2.5 volts
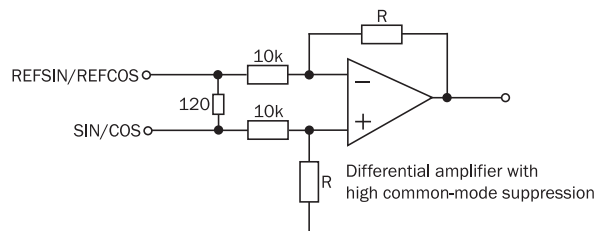
2 volts

1 period = 360° : 1024

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 guarantees stable amplitudes of the analogue signals across all specified environmental conditions, with a maximum variation of only 20%.
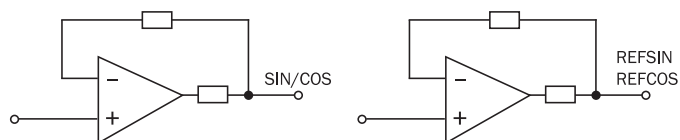
Characteristics applicable to all permissible environmental conditions

Signal	Value/Units
Signal peak, peak V_{ss} of SIN, COS	0.9 ... 1.1 V
Signal offset REFSIN, REFCOS	2.2 ... 2.8 V

Recommended receiver circuit for sine and cosine signals

REFSIN/REFCOS

SIN/COS

120

10k

10k

R

R

Differential amplifier with
high common-mode suppression

The output circuit of the process data channel within the SinCos encoder

SIN/COS

REFSIN
REFCOS

Further informations to the interface
see HIPERFACE®-description
part no. 8010701

HIPERFACE®
by SICK|STEGMANN

Type-specific settings	SRS	SRM
Type ID (command 52h)	22h	27h
Free EEPROM [bytes]	128/1,792	128/1,792
Address	40h	40h
Mode_485	E4h	E4h
Codes 0 ... 3	55h	55h
Counter	0	0

Overview of commands supported			Code 0 [1]	SRS	SRM
Command byte	Function			Comments	Comments
42h	Read position (5 bits per sine/cosine period)			15 bits	27 bits
43h	Set position		•		
44h	Read analogue value			Channel number 48h	Channel number 48h
				Temperature [°C]	Temperature [°C]
46h	Read counter				
47h	Increase counter				
49h	Reset counter		•		
4Ah	Read data				
4Bh	Save 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 name plate			Encoder type = 22h	Encoder type = 27h
53h	Encoder reset				
55h	Allocate encoder address		•		
56h	Read serial number and program version				
57h	Configure serial interface		•		

[1] The commands thus labelled include the parameter "Code 0".
Code 0 is a byte inserted into the protocol, for additional safeguarding of vital system parameters against accidental overwriting.
When shipped, "Code 0" = 55h.

Overview of status messages					
Error type	Statuscode	Description		SRS	SRM
	00h	The encoder has recognised no error		•	•
Initialisation	01h	Faulty compensating data		•	•
	02h	Faulty internal angular offset		•	•
	03h	Data field partitioning table damaged		•	•
	04h	Analogue limit values not available		•	•
	05h	Internal I2C bus not operational		•	•
	06h	Internal checksum error		•	•
Protocol	07h	Encoder reset occurred as a result of program monitoring		•	•
	09h	Parity error		•	•
	0Ah	Checksum of the data transmitted is incorrect		•	•
	0Bh	Unknown command code		•	•
	0Ch	Number of data transmitted is incorrect		•	•
	0Dh	Command argument transmitted is not allowed		•	•
Data	0Eh	The selected data field must not be written to		•	•
	0Fh	Incorrect access code		•	•
	10h	Size of data field stated cannot be changed		•	•
	11h	Word address stated, is outside data field		•	•
	12h	Access to non-existent data field		•	•
Position	01h	Analogue signals outside specification		•	•
	1Fh	Speed too high, no position formation possible		•	•
	20h	Singleturn position unreliable		•	•
	21h	Positional error Multiturn			•
	22h	Positional error Multiturn			•
	23h	Positional error Multiturn			•
Other	1Ch	Monitoring the value of the analogue signals (process data)			
	1Dh	Transmitter current critical (dirt, transmitter breakage)		•	•
	1Eh	Encoder temperature critical		•	•
	08h	Counter overflow		•	•

Further informations to the interface see HIPERFACE®-description part no. 8010701
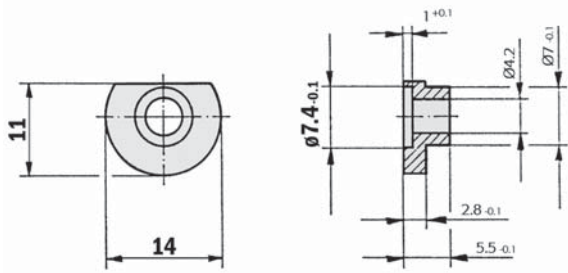
Dimensional drawings and ordering information

Accessories for SRS50/SRM50 Standalone

Programming Tool for HIPERFACE® devices

Type	Part no.	Motor Feedback System
PGT-03-S	1034252	SRS50/SRM50 Standalone

Servo clamp small, set (contents 3 off) for servo flanges
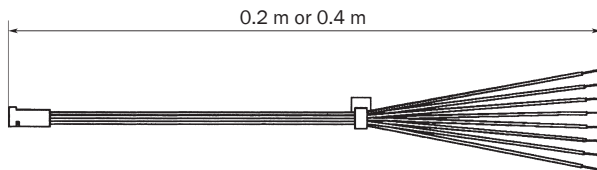
Type	Part no.
BEF-WK-SF	2029166

General tolerances according to DIN ISO 2768-mk

Stranded cable/connector, straight, 8 wires, 8 x 0.24 mm2

Type	Part no.	Contacts	Wire length
DOL-0B08-G0M2XB1	2031081	8	0.2 m
DOL-0B08-G0M4XB1	2031083	8	0.4 m

0.2 m or 0.4 m

HIPERFACE® cable, 8 wires, supplied by the metre 4 x 2 x 0.15 mm2, screened, flexible

Type	Part no.	Cores
LTG-2708-MW	6028361	8

Connector M23 female, 12-pin, straight, screened

Type	Part no.	Contacts
DOS-2312-G	6027538	12
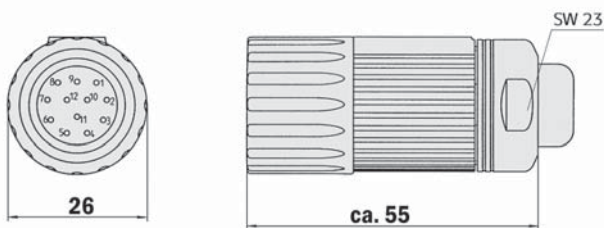
Connector M23 male, 12-pin, straight, screened

Type	Part no.	Contacts
STE-2312-G	6027537	12

General tolerances according to DIN ISO 2768-mk
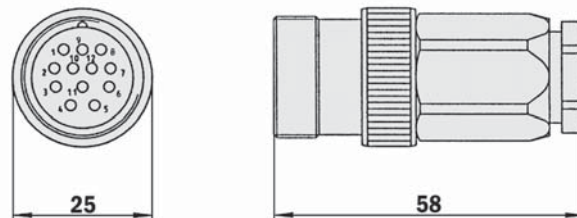
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and ordering information

Cable connector M23, 12-pin, straight, cable 8-core, HIPERFACE®, screened

Type	Part no.	Contacts	Cable length
DOL-2308-G1M5JB2	2031069	12	1.5 m
DOL-2308-G03MJB2	2031070	12	3.0 m
DOL-2308-G05MJB2	2031071	12	5.0 m
DOL-2308-G10MJB2	2031072	12	10.0 m
DOL-2308-G15MJB2	2031073	12	15.0 m

Mating Connectors fit in for MS/10

Type	Part no.	PIN
DOS-MS10-G	7102129	10-pin

Cable and connector assembly MS/10, 10-pin, straight, cable 8-core

Type	Part no.	Cable length
DOL-MS10-G1M5MA3	7102160	1.5 m
DOL-MS10-G03MMA3	7102161	3.0 m
DOL-MS10-G05MMA3	7102162	5.0 m
DOL-MS10-G10MMA3	7102163	10.0 m
DOL-MS10-G20MMA3	7102164	20.0 m
DOL-MS10-G30MMA3	7102165	30.0 m

Accessories for SRS50/SRM50 Standalone

Interchangeable collets for blind hollow shaft

| Type	Part no.	Size
SPZ-006-AD-A	2029174	6 mm
SPZ-1E4-AD-A	2029175	1/4"
SPZ-008-AD-A	2029176	8 mm
SPZ-3E8-AD-A	2029177	3/8"
SPZ-010-AD-A	2029178	10 mm
SPZ-012-AD-A	2029179	12 mm
SPZ-1E2-AD-A	2029180	1/2"

SinCos® SRS64, SRM64:
Motor Feedback Systems with HIPERFACE®-Interface for Self-Ventilated and Force-Ventilated Drives
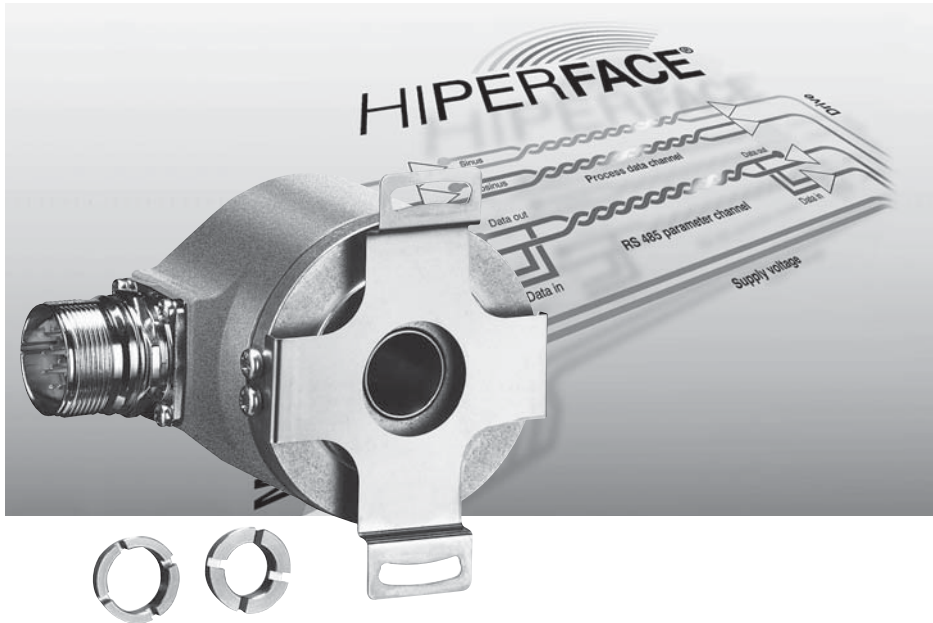
Writing motor-specific data to the electronic type label and programming are important features of these series.

Possible product variations:

Hollow shafts up to 14 mm in diameter.

1,024 sine/cosine periods

Motor Feedback Systems

HIPER**FACE**®
by **SICK | STEGMANN**

The SRS/SRM series of Motor Feedback Systems are used world-wide in many different applications and environments.
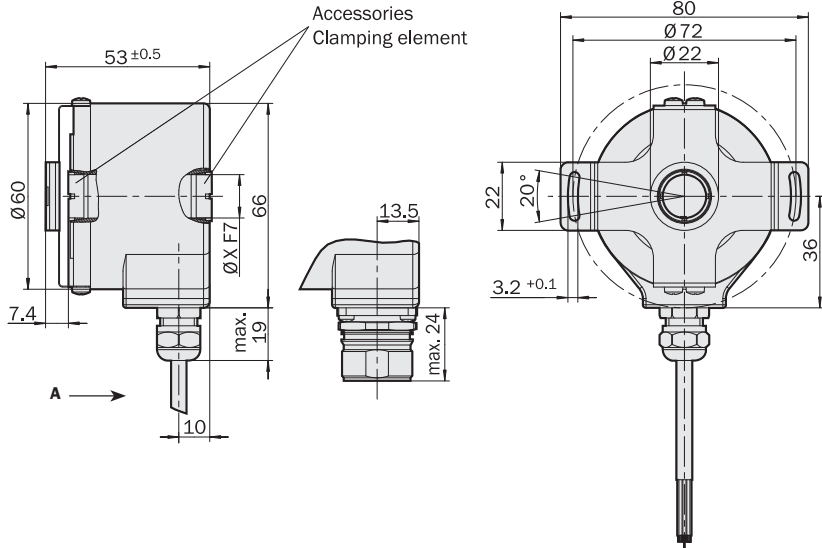
Absolute positioning with 32,768 steps per revolution and a maximum of 4,096 revolutions give a total resolution of 134,217,728 steps.
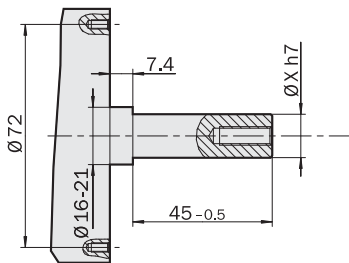
1,024 sine/cosine periods

Motor Feedback Systems

- **1,024 sine/cosine periods per revolution**
- **Absolute position with a resolution of 32,768 steps per revolution**
- **4,096 revolutions can be measured (Multiturn)**
- **Programming of the positional value**
- **Electronic type label**

Dimensional drawing SRS/SRM64

Accessories
Clamping element

Proposed customer fitting

General tolerances to DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Colour of Wires	Explanation
1	REFCOS	black	Process data channel
2	Data +	grey or yellow	RS 485 parameter channel
3	N. C.	–	N. C.
4	N. C.	–	N. C.
5	SIN	white	Process data channel
6	REFSIN	brown	Process data channel
7	Data –	green or purple	RS 485 parameter channel
8	COS	pink	Process data channel
9	N. C.	–	N. C.
10	GND	blue	Ground connection
11	N. C.	–	N. C.
12	U_s	red	Supply voltage 7 ... 12 V

View of the plug-in face

Screen connection on connector housing

N. C. = Not connected

Accessories

Accessories
Connection systems (page 354)
Programming tool (page 355)
Clamping elements (page 354)
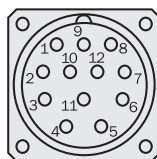
Technical Data according to DIN 32878	Hollow Shaft SRS/SRM64	SRS	SRM								
Number of sine/cosine periods per revolution	1,024	▢	▢								
Dimensions	mm (see dimensional drawing)	▢	▢								
Weight	0.3 kg	▢	▢								
Inertial rotor moment	45 gcm^2	▢	▢								
Type of code for the absolute value	Binary	▢	▢								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)	Increasing	▢	▢								
Measurement step after generating arctan with 12 bit resolution	0.3 angular seconds	▢	▢								
Total number of steps Single SRS	32,768	▢									
Multi SRM	134,21,728 = 4,096 x 32,768		▢								
Error limits for the digital absolute value via RS 485	± 90 angular seconds	▢	▢								
Error limits for evaluating the "1,024" signals, integral non-linearity	± 45 angular seconds	▢	▢								
Non-linearity within a sine/cosine period differential non-linearity	± 7 angular seconds	▢	▢								
Output frequency for sine/cosine signals	0 ... 200 kHz	▢	▢								
Working speed up to which the absolute position can be reliably produced	6,000 min^{-1}	▢	▢								
Max. operating speed	9,000 min^{-1}	▢	▢								
Max. angular acceleration	5 x 10^5 rad/s^2	▢	▢								
Operating torque	0.2 Ncm	▢	▢								
Starting torque	0.4 Ncm	▢	▢								
Permissible shaft movement static radial/axial	± 0.1 mm/± 2 mm	▢	▢								
dynamic radial/axial	± 0.05 mm/± 0,2 mm	▢	▢								
Angular motion, perpendicular to the rotational axis static	34 x 10^{-3} mm/mm	▢	▢								
dynamic	17 x 10^{-3} mm/mm	▢	▢								
Life of ball bearings	3.6 x 10^9 revolutions	▢	▢								
Working temperature range	–20 ... +110 °C	▢	▢								
Storage temperature range (without packaging)	–20 ... +115 °C	▢	▢								
Permissible relative humidity [1]	90 %	▢	▢								
Shock resistance [2]	100/10 g/ms	▢	▢								
Oscillation resistance [3]	20/10 ... 2000 g/Hz	▢	▢								
Protection to IEC 60529 [4]	IP 65	▢	▢								
EMC [5]		▢	▢								
Operating voltage range	7 ... 12 V	▢	▢								
Recommended supply voltage	8 V	▢	▢								
Max. operating current, no load	< 80 mA	▢	▢								
Available memory area within EEPROM 512 [6]	128 bytes	▢	▢								
within EEPROM 2048 [6]	1,792 bytes	▢	▢								
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS	Analogue, differential	▢	▢								
Parameter channel = RS 485	Digital	▢	▢								

[1] Condensation not permissible

[2] To EN 60068-2-27

[3] To EN 60068-2-6

[4] In assembled state

[5] To EN 61000-6-2 and N 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. This is also where the GND (0 V) connection of the supply voltage is linked to earth. Users must perform their own tests when other screen designs are used.

[6] If applying the elctronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SRS/SRM64; hollow shaft *

Type	Part no.	Description
SRS64-HRK0-K01	1034225	Single, 512 EEprom, cable 1.5 m
SRS64-HRA0-K01	1034223	Single, 512 EEprom, connector
SRM64-HRK0-K01	1034164	Multi, 512 EEprom, cable 1.5 m
SRM64-HRA0-K01	1034162	Multi, 512 EEprom, connector
SRS64-HRK0-K02	1034226	Single, 2048 EEprom, cable 1.5 m
SRS64-HRA0-K02	1034224	Single, 2048 EEprom, connector
SRM64-HRK0-K02	1034165	Multi, 2048 EEprom, cable 1.5 m
SRM64-HRA0-K02	1034163	Multi, 2048 EEprom, connector

* Clamping elements for 10, 12, 14 mm and 3/8" and 1/2" as accessories separate order item (see page 354).

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HIPER*FACE*®

by SICK|STEGMANN

Electrical interface

- Safe data transmission
- High information content
- Electronic rating plate
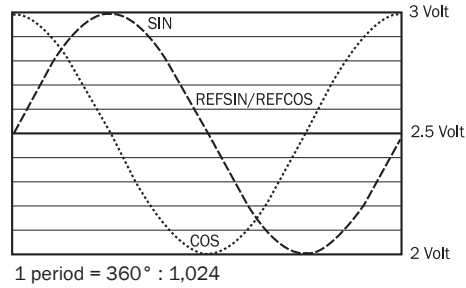- Only 8 leads
- Bus-enabled parameter channel
- Process data channel in real time
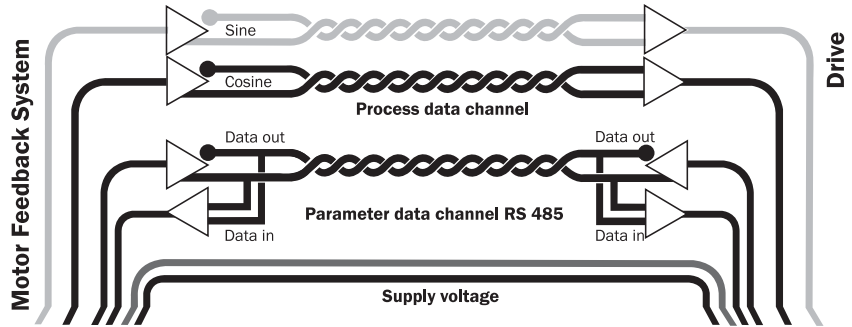
Motor Feedback System

Sine

Cosine

Process data channel

Data out

Data out

Parameter data channel RS 485

Data in

Data in

Supply voltage

Drive

Signal specification of the process data channel

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

SIN

REFSIN/REFCOS

COS

3 Volt

2.5 Volt

2 Volt

1 period = 360° : 1,024

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 guarantees stable amplitudes of the analogue signals across all specified environmental conditions, with a maximum variation of only 20 %.

Characteristics applicable to all environmental conditions stated

Signal	Values/Units
Signal peak, peak V_{ss} of SIN, COS	0.9 ... 1.1 V
Signal offset REFSIN, REFCOS	2.2 ... 2.8 V

Recommended receiver circuit for sine and cosine signals

REFSIN/REFCOS

SIN/COS

120

10k

10k

R

R

Differential amplifier with high common-mode suppression

The output circuit of the process data channel within the SinCos encoder

SIN/COS

REFSIN
REFCOS

HIPER**FACE**®
by **SICK** | STEGMANN

Type-specific settings	SRS	SRM
Type ID (command 52h)	22h	27h
Free EEPROM [bytes]	128/1,792	128/1,792
Address	40h	40h
Mode_485	E4h	E4h
Codes 0 ... 3	55h	55h
Counter	0	0

Overview of commands supported			SRS	SRM
Command byte	**Function**	**Code 0** [1]	**Comments**	**Comments**
42h	Read position			
43h	Set position	●		
44h	Read analogue value		Channel number 48h	Channel number 48h
			Temperature [°C]	Temperature [°C]
46h	Read counter			
47h	Increase counter			
49h	Reset counter	●		
4Ah	Read data			
4Bh	Save 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 name plate		Encoder type = 22h	Encoder type = 27h
53h	Encoder reset			
55h	Allocate encoder address	●		
56h	Read serial number and program version			
57h	Configure serial interface	●		

[1] Code 0 is a byte inserted into the protocol, for additional safeguarding of vital system parameters against accidental overwriting.
When shipped, "Code 0" = 55h.

Overview of status messages				
Error type	**Status code**	**Description**	**SRS**	**SRM**
	00h	The encoder has recognised no error	●	●
Initialisation	01h	Faulty compensating data	●	●
	02h	Faulty internal angular offset	●	●
	03h	Data field partitioning table damaged	●	●
	04h	Analogue limit values not available	●	●
	05h	Internal I²C bus not operational	●	●
	06h	Internal checksum error	●	●
Protocol	07h	Encoder reset occurred as a result of program monitoring	●	●
	09h	Parity error	●	●
	0Ah	Checksum of the data transmitted is incorrect	●	●
	0Bh	Unknown command code	●	●
	0Ch	Number of data transmitted is incorrect	●	●
	0Dh	Command argument transmitted is not allowed	●	●
Data	0Eh	The selected data field must not be written to	●	●
	0Fh	Incorrect access code	●	●
	10h	Size of data field stated cannot be changed	●	●
	11h	Word address stated, is outside data field	●	●
	12h	Access to non-existent data field	●	●
Position	01h	Analogue signals outside specification	●	●
	1Fh	Speed too high, no position formation possible	●	●
	20h	Singleturn position unreliable	●	●
	21h	Positional error Multiturn		●
	22h	Positional error Multiturn		●
	23h	Positional error Multiturn		●
Other	1Ch	Monitoring the value of the analogue signals (process data)		
	1Dh	Transmitter current critical (dirt, transmitter breakage)	●	●
	1Eh	Encoder temperature critical	●	●
	08h	Counter overflow	●	●

Dimensional drawings and ordering information

Clamping elements, set (contents 2 off)

Type	Part no.	Size
BEF-MW-SR64D14	2031074	14 mm
BEF-MW-SR64D12	2031075	12 mm
BEF-MW-SR64D10	2031076	10 mm
BEF-MW-SR64D1E2	2031077	1/2"
BEF-MW-SR64D3E8	2031078	3/8"

Connector M23 female, 12-pin, straight

Type	Part no.	Contacs
DOS-2312-G	6027538	12

Connector M23 male, 12-pin, straight, screened

Type	Part no.	Contacts
STE-2312-G	6027537	12
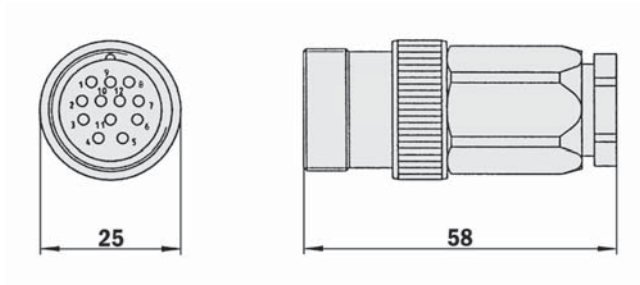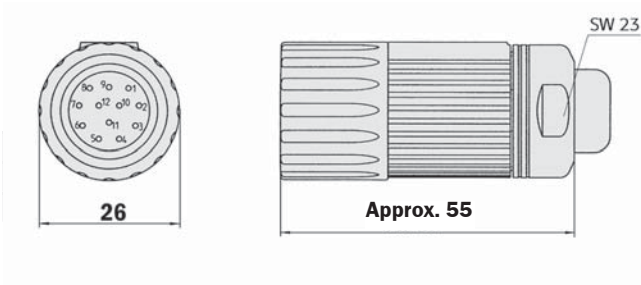
General tolerances to DIN ISO 2768-mk

General tolerances to DIN ISO 2768-mk

Cable connector M23, 12-pin, straight, cable 8-core, HIPERFACE®, screened

Type	Part no.	Contacts	Wire length
DOL-2308-G1M5JB2	2031069	12	1.5 m
DOL-2308-G03MJB2	2031070	12	3.0 m
DOL-2308-G05MJB2	2031071	12	5.0 m
DOL-2308-G10MJB2	2031072	12	10 m
DOL-2308-G15MJB2	2031073	12	15 m

HIPERFACE® cable 8 wires, supplied by the metre 4 x 2 x 0,15 mm², screened, flexible

| Type	Part no.	Cores
LTG-2708-MW	6028361	8

Dimensional drawings and ordering information

Programming tool for HIPERFACE®-devices

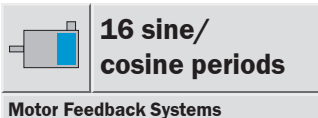| Type	Part no.	Motor Feedback System
PGT-03-S	1034252	SRS/SRM64

SinCos® SEK52/SEL52 and SEK37/SEL37: Motor Feedback Systems with HIPERFACE® interface

16 sine/ cosine periods

Motor Feedback Systems

HIPERFACE®
by SICK|STEGMANN

RoHS
2002/95/EC
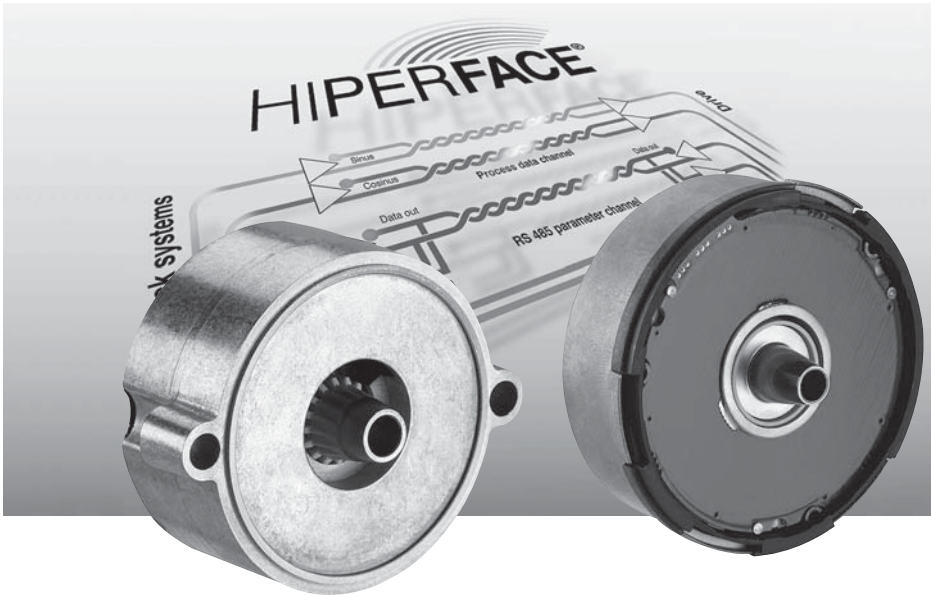
The holistic scanning almost completely compensates for eccentricity errors. The capacitive operating principle can function without ball bearings and is therefore extremely robust. By dispensing with wearing parts, possible error sources are largely excluded, and the motor feedback systems have a high temperature resistance previously reserved for resolvers. Moreover, the system construction allows extremely low power consumption.

Extreme robustness, multiturn capability and all benefits of the HIPERFACE® interface are reflected in the new SinCos® SEK/SEL52 and SEK/SEL37 product ranges.

At the heart of these new ranges is a bearing-less, capacitive sensor element.

The compact SEK/SEL37 products are designed for mounting onto conical shafts. In addition to the shoulder clamping used with resolvers, SEK/SEL device types in the 2.1" housing also feature hollow shaft and conical shaft types. Thus, these motor feedback systems with high resolution are particularly suited to industrial applications requiring a compact, precise and cost-effective solution.
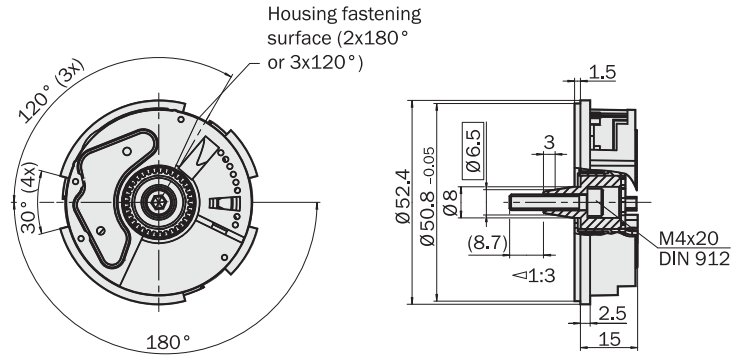
16 sine/cosine periods

Motor Feedback Systems

- **16 sine/cosine periods per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

RoHS
2002/95/EC

Dimensional drawing SEK/SEL52 tapered shaft

Housing fastening surface (2x180° or 3x120°)

120° (3x)

30° (4x)

180°

Ø52.4
Ø50.8 −0.05
Ø6.5
Ø8
3
1.5
(8.7)
◁1:3
M4x20 DIN 912
2.5
15

Proposed customer fitting

Nominal position

Minimum depth center flange 1.7mm

6.5
5
Rz 6.3
Ø6.5
0.02 A
◁1:3
60°
Ø60.3 ±0.1
Ø50.8 +0.025
Ø5.5 +0.025
M4
A
9.462° -3'
Ø min. 9
Ø max. 13
10
0.4
13
9
M3 (3x120°) or M3 (2x180°)

max. 18.2

Dimensions with cover (see accessory order no. 2048234)

General tolerances according to DIN ISO 2768-mk

Pin and wire allocation

PIN	Signal	Colour of wires	Explanation
1	U_S	red	Supply voltage7 ... 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS485-parameter channel
8	Data –	green or purple	RS485-parameter channel

The GND-(0V) connection of the supply voltage has no connection to the housing.

1 2 3 4 5 6 7 8

Accessories

Connection systems (page 370)
Mounting systems (page 370)
Programming Tool (page 370)
Cover (page 371)

Technical data to DIN 32878		Tapered shaft SEK/SEL52	SEK	SEL								
Number of sine/cosine periods per revolution		16	▪	▪								
Number of the absolute ascertainable revolutions	Single SEK	1	▪									
	Multi SEL	4,096		▪								
Dimensions		mm (see dimensional drawing)	▪	▪								
Mass		0.04 kg	▪	▪								
Mass with cover [1]		0.07 kg	▪	▪								
Moment of inertia to the rotor		7 gcm^2	▪	▪								
Code type for the absolut value		Binary	▪	▪								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	▪	▪								
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		20 angular seconds	▪	▪								
Error limits for evaluating the sine/cosine signals integral non-linearity		± 288 angular seconds	▪	▪								
Non-linearity within a sine/cosine period differential non-linearity		± 72 angular seconds [2]	▪	▪								
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	▪	▪								
Max. Operating speed	Single SEK	12,000 min^{-1}	▪									
	Multi SEL	10,000 min^{-1}		▪								
Max. angular acceleration		5 x 10^5 rad/s^2	▪	▪								
Permissible shaft movement axial		± 0.5 mm	▪	▪								
radial		± 0.15 mm	▪	▪								
Working temperature range	Single SEK	–40 ... +115 °C	▪									
	Multi SEL	–20 ... +115 °C		▪								
Storage temperature range [3]		–50 ... +125 °C	▪	▪								
Permissible relative humidity		90 % [4]	▪	▪								
Resistance To shocks [5]		100 g/10 ms	▪	▪								
To vibration [6]		50 g/10 ... 2000 Hz	▪	▪								
Protection class to IEC 60529 [7]		IP 40	▪	▪								
EMC [8]			▪	▪								
Operating voltage range		7 ... 12 V	▪	▪								
Recommended supply voltage		8 V	▪	▪								
Max. operating current, no load		< 50 mA	▪	▪								
Available memory area within EEPROM 2048 [9]		1,792 bytes	▪	▪								
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	▪	▪								
Parameter channel = RS 485		Digital	▪	▪								

[1] Accessory part no. 2048234

[2] At nominal position ± 0.1 mm

[3] Without packaging

[4] Condensation not permitted

[5] To EN 60068-2-27

[6] To EN 60068-2-6

[7] With mating connector inserted and closed cover

[8] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen and by using the cover (see accessory part no. 2048234).
Users must perform their own tests when other screen designs are used.

[9] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SEK/SEL52 tapered shaft		
Type	Part no.	Description
SEK52-HFA0-K02	1037368	Singleturn
SEL52-HFA0-K02	1037371	Multiturn

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16 sine/cosine periods

Motor Feedback Systems

- **16 sine/cosine periods per revolution**
- **4,096 revolutions measurable (Multiturn)**
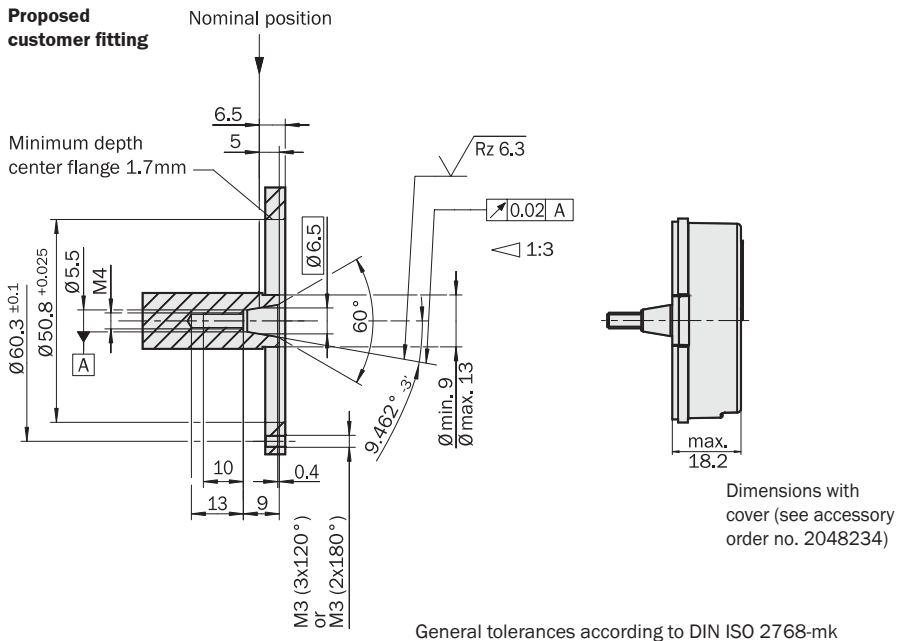- **Programming of the positional value**
- **Electronic type lable**

RoHS
2002/95/EC

Accessories

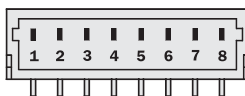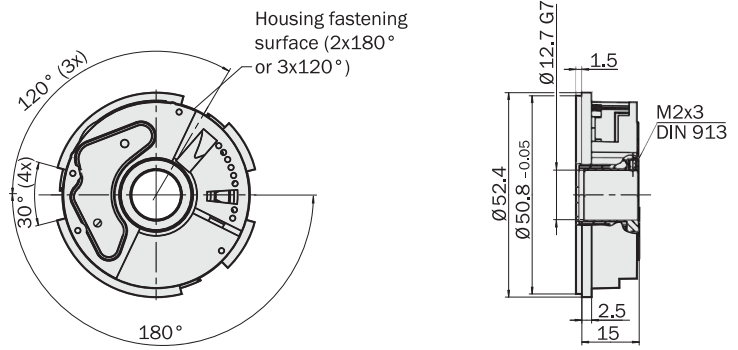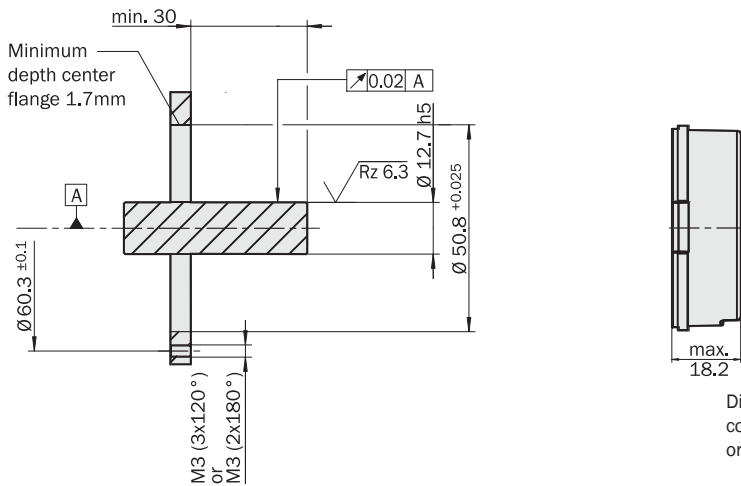| |
|---|
| Connection systems (page 370) |
| Mounting systems (page 370) |
| Programming Tool (page 370) |
| Cover (page 371) |

Dimensional drawing SEK/SEL52 hollow shaft

Housing fastening surface (2x180° or 3x120°)

120° (3x)

30° (4x)

180°

Ø 12.7 G7

1.5

Ø 52.4

Ø 50.8 −0.05

M2x3 DIN 913

2.5

15

Proposed customer fitting

min. 30

Minimum depth center flange 1.7mm

0.02 A

A

Rz 6.3

Ø 12.7 h5

Ø 60.3 ±0.1

Ø 50.8 +0.025

M3 (3x120°) or M3 (2x180°)

max. 18.2

Dimensions with cover (see accessory order no. 2048232)

General tolerances according to DIN ISO 2768-mk

Pin and wire allocation

PIN	Signal	Colour of wires	Explanation
1	U_S	red	Supply voltage7 ... 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS485-parameter channel
8	Data –	green or purple	RS485-parameter channel

The GND-(0V) connection of the supply voltage has no connection to the housing.

1 2 3 4 5 6 7 8

Technical data to DIN 32878		Hollow shaft SEK/SEL52	SEK	SEL									
Number of sine/cosine periods per revolution		16	�	▪									
Number of the absolute ascertainable revolutions	Single SEK	1	▪										
	Multi SEL	4,096		▪									
Dimensions		mm (see dimensional drawing)	▪	▪									
Mass		0.04 kg	▪	▪									
Mass with cover [1]		0.06 kg	▪	▪									
Moment of inertia to the rotor		7 gcm^2	▪	▪									
Code type for the absolut value		Binary	▪	▪									
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	▪	▪									
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		20 angular seconds	▪	▪									
Error limits for evaluating the sine/cosine signals integral non-linearity		± 288 angular seconds	▪	▪									
Non-linearity within a sine/cosine period differential non-linearity		± 72 angular seconds [2]	▪	▪									
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	▪	▪									
Max. Operating speed	Single SEK	12,000 min^{-1}	▪										
	Multi SEL	10,000 min^{-1}		▪									
Max. angular acceleration		5 x 10^5 rad/s^2	▪	▪									
Permissible shaft movement axial		± 0.5 mm	▪	▪									
radial		± 0.15 mm	▪	▪									
Working temperature range	Single SEK	–40 ... +115 °C	▪										
	Multi SEL	–20 ... +115 °C		▪									
Storage temperature range [3]		–50 ... +125 °C	▪	▪									
Permissible relative humidity		90 % [4]	▪	▪									
Resistance To shocks [5]		100 g/10 ms	▪	▪									
To vibration [6]		50 g/10 ... 2000 Hz	▪	▪									
Protection class to IEC 60529 [7]		IP 40	▪	▪									
EMC [8]			▪	▪									
Operating voltage range		7 ... 12 V	▪	▪									
Recommended supply voltage		8 V	▪	▪									
Max. operating current, no load		< 50 mA	▪	▪									
Available memory area within EEPROM 2048 [9]		1,792 bytes	▪	▪									
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	▪	▪									
Parameter channel = RS 485		Digital	▪	▪									

[1] Accessory part no. 2048232

[2] At nominal position ± 0.1 mm

[3] Without packaging

[4] Condensation not permitted

[5] To EN 60068-2-27

[6] To EN 60068-2-6

[7] With mating connector inserted and closed cover

[8] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen and by using the cover (see accessory part no. 2048232).
Users must perform their own tests when other screen designs are used.

[9] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

SEK/SEL52 hollow shaft

Type	Part no.	Description
SEK52-HNA0-K02	1037370	Singleturn
SEL52-HNA0-K02	1037373	Multiturn

16 sine/cosine periods

Motor Feedback Systems

- **16 sine/cosine periods per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

RoHS
2002/95/EC

Accessories

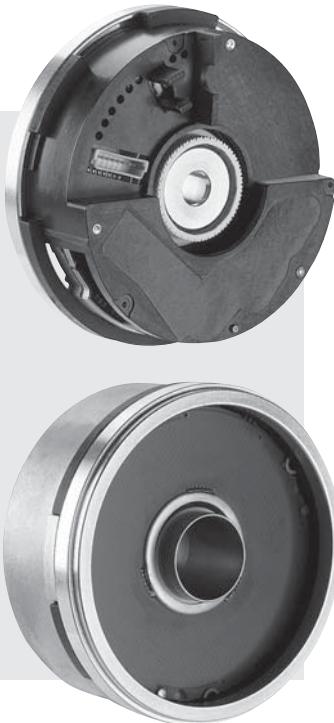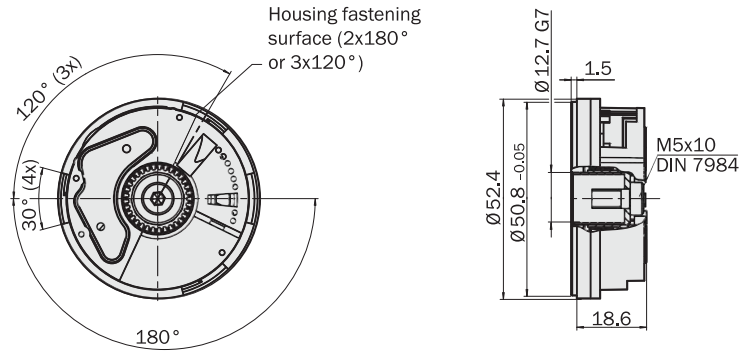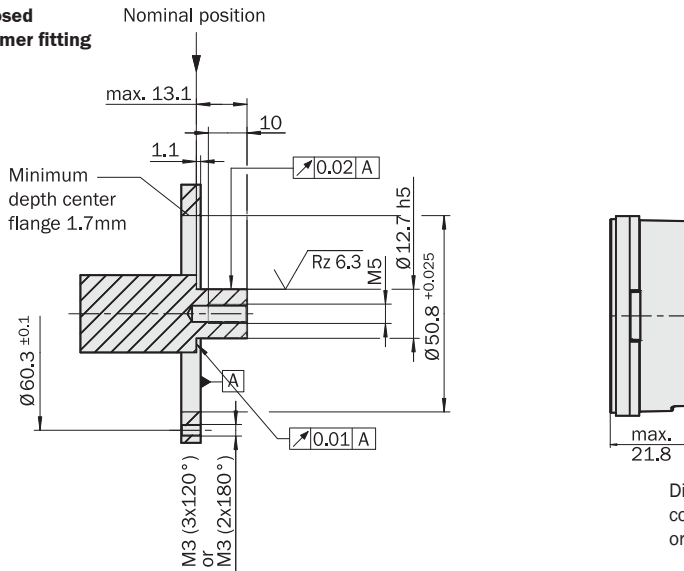| |
|---|
| Connection systems (page 370) |
| Mounting systems (page 370) |
| Programming Tool (page 370) |
| Cover (page 371) |

Dimensional drawing SEK/SEL52 with shoulder clamping

Housing fastening surface (2x180° or 3x120°)

120° (3x)
30° (4x)
180°

Ø 12.7 G7
Ø 52.4
Ø 50.8 −0.05
1.5
M5x10 / DIN 7984
18.6

Proposed customer fitting

Nominal position

max. 13.1
10
1.1
Minimum depth center flange 1.7mm
0.02 A
Ø 12.7 h5
Rz 6.3
M5
Ø 50.8 +0.025
Ø 60.3 ±0.1
A
0.01 A
M3 (3x120°) or M3 (2x180°)

max. 21.8
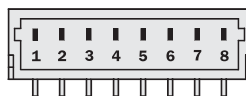
Dimensions with cover (see accessory order no. 2048234)

General tolerances according to DIN ISO 2768-mk

Pin and wire allocation

PIN	Signal	Colour of wires	Explanation
1	U_S	red	Supply voltage7 … 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS485-parameter channel
8	Data –	green or purple	RS485-parameter channel

The GND-(0V) connection of the supply voltage has no connection to the housing.

1 2 3 4 5 6 7 8

Technische Daten nach DIN 32878	Shoulder clamping SEK/SEL52	SEK	SEL							
Number of sine/cosine periods per revolution	16	■	■							
Number of the absolute ascertainable revolutions	Single SEK	1	■							
	Multi SEL	4,096		■						
Dimensions		mm (see dimensional drawing)	■	■						
Mass		0.04 kg	■	■						
Mass with cover [1]		0.07 kg	■	■						
Moment of inertia to the rotor		6 gcm^2	■	■						
Code type for the absolut value		Binary	■	■						
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	■	■						
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		20 angular seconds	■	■						
Error limits for evaluating the sine/cosine signals integral non-linearity		± 288 angular seconds	■	■						
Non-linearity within a sine/cosine period differential non-linearity		± 72 angular seconds [2]	■	■						
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	■	■						
Max. Operating speed	Single SEK	12,000 min^{-1}	■							
	Multi SEL	10,000 min^{-1}		■						
Max. angular acceleration		5 x 10^5 rad/s^2	■	■						
Permissible shaft movement axial		± 0.5 mm	■	■						
radial		± 0.15 mm	■	■						
Working temperature range	Single SEK	–40 ... +115 °C	■							
	Multi SEL	–20 ... +115 °C		■						
Storage temperature range [3]		–50 ... +125 °C	■	■						
Permissible relative humidity		90 % [4]	■	■						
Resistance To shocks [3]		100 g/10 ms	■	■						
To vibration [4]		50 g/10 ... 2000 Hz	■	■						
Protection class to IEC 60529 [5]		IP 40	■	■						
EMC [6]			■	■						
Operating voltage range		7 ... 12 V	■	■						
Recommended supply voltage		8 V	■	■						
Max. operating current, no load		< 50 mA	■	■						
Available memory area within EEPROM 2048 [7]		1,792 bytes	■	■						
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	■	■						
Parameter channel = RS 485		Digital	■	■						

[1] Accessory part no. 2048234

[2] At nominal position ± 0.1 mm

[3] Without packaging

[4] Condensation not permitted

[5] To EN 60068-2-27

[6] To EN 60068-2-6

[7] With mating connector inserted and closed cover

[8] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen and by using the cover (see accessory part no. 2048234).
Users must perform their own tests when other screen designs are used.

[9] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.
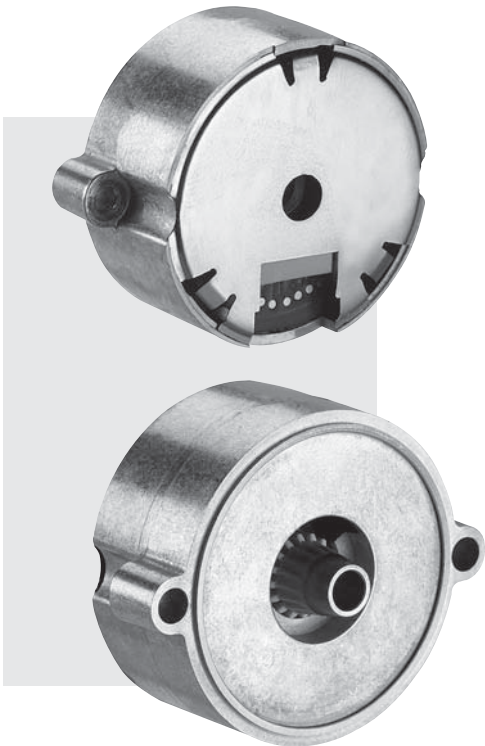
Ordering information

SEK/SEL52 with shoulder clamping

Type	Part no.	Description
SEK52-H1A0-K02	1037369	Singleturn
SEL52-H1A0-K02	1037372	Multiturn

16 sine/cosine periods
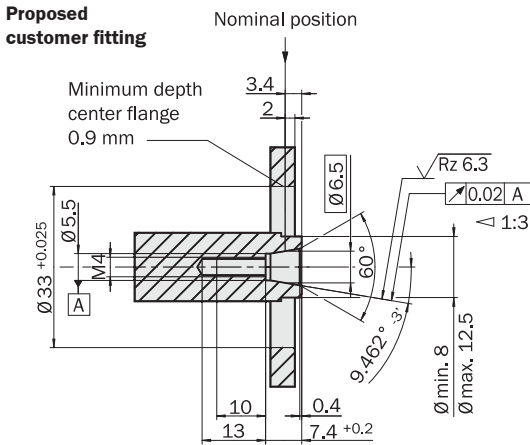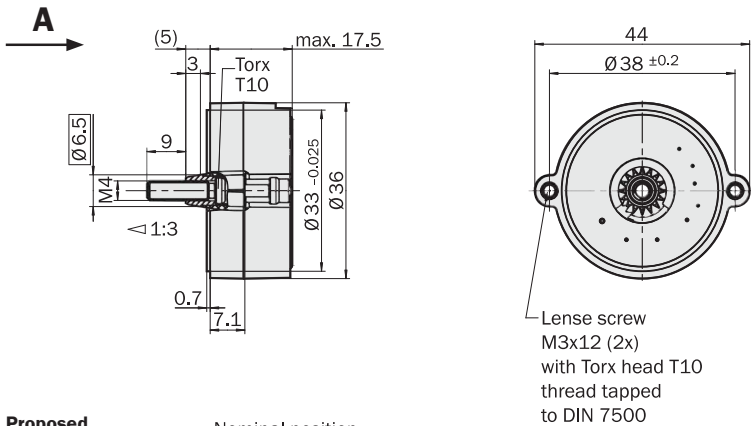
Motor Feedback Systems

- **16 sine/cosine periods per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

RoHS
2002/95/EC

Accessories

Connection systems (page 370)

Mounting systems (page 370)

Programming Tool (page 370)
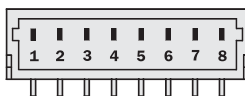
Dimensional drawing SEK/SEL37 radial connector

A

(5)   max. 17.5

3   Torx T10

Ø 6.5

9

M4

1:3

0.7

7.1

Ø 33 −0.025

Ø 36

44

Ø 38 ±0.2

Lense screw
M3x12 (2x)
with Torx head T10
thread tapped
to DIN 7500

Proposed customer fitting

Nominal position

Minimum depth center flange 0.9 mm

3.4

2

Ø 6.5

Rz 6.3

0.02 A

1:3

Ø 5.5

Ø 33 +0.025

M4

A

60°

9.462° -3°

Ø min. 8
Ø max. 12.5

10

13

0.4

7.4 +0.2

General tolerances according to DIN ISO 2768-mk

Pin and wire allocation

PIN	Signal	Colour of wires	Explanation
1	U_S	red	Supply voltage 7 … 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS485-parameter channel
8	Data –	green or purple	RS485-parameter channel

The GND-(0V) connection of the supply voltage has no connection to the housing.

1 2 3 4 5 6 7 8

Technische Daten nach DIN 32878		SEK/SEL37 radial connector	SEK	SEL									
Number of sine/cosine periods per revolution		16	▣	▣									
Number of the absolute ascertainable revolutions	Single SEK	1	▣										
	Multi SEL	4,096		▣									
Dimensions		mm (see dimensional drawing)	▣	▣									
Mass		0.04 kg	▣	▣									
Moment of inertia to the rotor		1 gcm^2	▣	▣									
Code type for the absolut value		Binary	▣	▣									
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	▣	▣									
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		20 angular seconds	▣	▣									
Error limits for evaluating the sine/cosine signals integral non-linearity		± 288 angular seconds	▣	▣									
Non-linearity within a sine/cosine period differential non-linearity		± 144 angular seconds [1]	▣	▣									
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	▣	▣									
Max. Operating speed Single SEK and Multi SEL		12,000 min^{-1}	▣	▣									
Max. angular acceleration		5 x 10^5 rad/s^2	▣	▣									
Permissible shaft movement axial		± 0.3 mm	▣	▣									
radial		± 0.15 mm	▣	▣									
Working temperature range	Single SEK	–40 ... +115 °C	▣										
	Multi SEL	–20 ... +115 °C		▣									
Storage temperature range [2]		–50 ... +125 °C	▣	▣									
Permissible relative humidity		90 % [3]	▣	▣									
Resistance To shocks [4]		100 g/10 ms	▣	▣									
To vibration [5]		50 g/10 ... 2000 Hz	▣	▣									
Protection class to IEC 60529 [6]		IP 20	▣	▣									
EMC [7]			▣	▣									
Operating voltage range		7 ... 12 V	▣	▣									
Recommended supply voltage		8 V	▣	▣									
Max. operating current, no load		< 50 mA	▣	▣									
Available memory area within EEPROM 2048 [8]		1,792 bytes	▣	▣									
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	▣	▣									
Parameter channel = RS 485		Digital	▣	▣									

[1] At nominal position ± 0.1 mm

[2] Without packaging

[3] Condensation not permitted

[4] To EN 60068-2-27

[5] To EN 60068-2-6

[6] With mating connector inserted and closed cover

[7] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen.
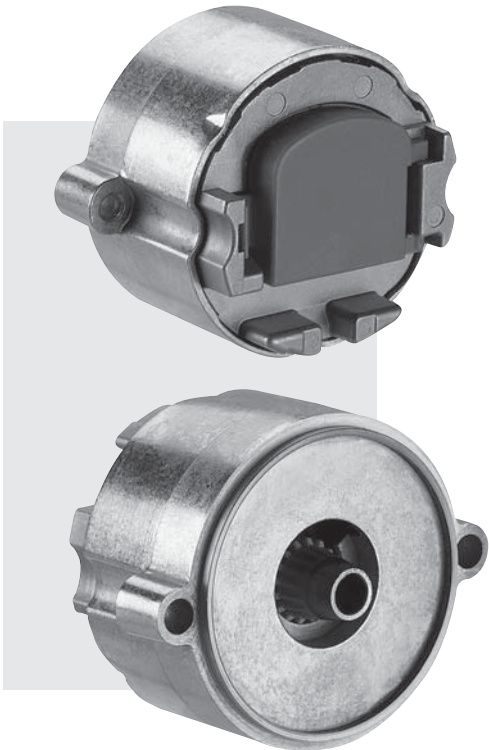Users must perform their own tests when other screen designs are used.

[8] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information		
SEK/SEL37 radial connector		
Type	Part no.	Description
SEK37-HFB0-K02	1037378	Singleturn
SEL37-HFB0-K02	1037379	Multiturn

16 sine/cosine periods
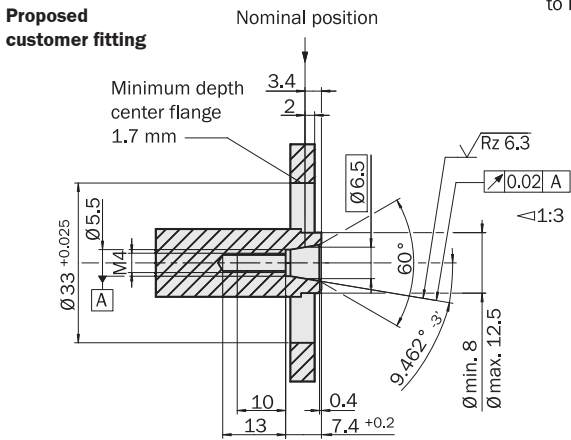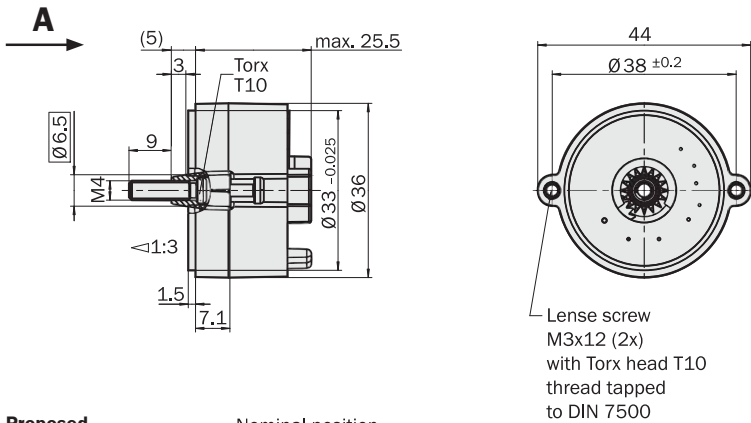
Motor Feedback Systems

- **16 sine/cosine periods per revolution**
- **4,096 revolutions measurable (Multiturn)**
- **Programming of the positional value**
- **Electronic type lable**

RoHS
2002/95/EC

Accessories

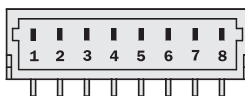| |
|---|
| Connection systems (page 370) |
| Mounting systems (page 370) |
| Programming Tool (page 370) |

Dimensional drawing SEK/SEL37 axial connector

A

Torx T10

Lense screw
M3x12 (2x)
with Torx head T10
thread tapped
to DIN 7500

Proposed customer fitting

Nominal position

Minimum depth
center flange
1.7 mm

General tolerances according to DIN ISO 2768-mk

Pin and wire allocation

PIN	Signal	Colour of wires	Explanation
1	U$_S$	red	Supply voltage7 ... 12 V
2	+ SIN	white	Process data channel
3	REFSIN	brown	Process data channel
4	+ COS	pink	Process data channel
5	REFCOS	black	Process data channel
6	GND	blue	Ground connection
7	Data +	grey or yellow	RS485-parameter channel
8	Data –	green or purple	RS485-parameter channel

The GND-(0V) connection of the supply voltage has no connection to the housing.

1 2 3 4 5 6 7 8

Technische Daten nach DIN 32878		SEK/SEL37 axial connector	SEK	SEL								
Number of sine/cosine periods per revolution		16	■	■								
Number of the absolute ascertainable revolutions	Single SEK	1	■									
	Multi SEL	4,096		■								
Dimensions		mm (see dimensional drawing)	■	■								
Mass		0.05 kg	■	■								
Moment of inertia to the rotor		1 gcm^2	■	■								
Code type for the absolut value		Binary	■	■								
Code sequence for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)		Increasing	■	■								
Measurement step at interpolation of the sine/cosine signals with e. g. 12 bits		20 angular seconds	■	■								
Error limits for evaluating the sine/cosine signals integral non-linearity		± 288 angular seconds	■	■								
Non-linearity within a sine/cosine period differential non-linearity		± 144 angular seconds [1]	■	■								
Working speed up to which the absolute position can be reliably produced		6,000 min^{-1}	■	■								
Max. Operating speed Single SEK and Multi SEL		12,000 min^{-1}	■	■								
Max. angular acceleration		5 x 10^5 rad/s^2	■	■								
Permissible shaft movement axial		± 0.3 mm	■	■								
radial		± 0.15 mm	■	■								
Working temperature range	Single SEK	–40 ... +115 °C	■									
	Multi SEL	–20 ... +115 °C		■								
Storage temperature range [2]		–50 ... +125 °C	■	■								
Permissible relative humidity		90 % [3]	■	■								
Resistance To shocks [4]		100 g/10 ms	■	■								
To vibration [5]		50 g/10 ... 2000 Hz	■	■								
Protection class to IEC 60529 [6]		IP 40	■	■								
EMC [7]			■	■								
Operating voltage range		7 ... 12 V	■	■								
Recommended supply voltage		8 V	■	■								
Max. operating current, no load		< 50 mA	■	■								
Available memory area within EEPROM 2048 [8]		1,792 bytes	■	■								
Interface signals Process data channel = SIN, REFSIN, COS, REFCOS		Analogue, differential	■	■								
Parameter channel = RS 485		Digital	■	■								

[1] At nominal position ± 0.1 mm

[2] Without packaging

[3] Condensation not permitted

[4] To EN 60068-2-27

[5] To EN 60068-2-6

[6] With mating connector inserted and closed cover

[7] To EN 61000-6-2 and EN 61000-6-3
The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen.
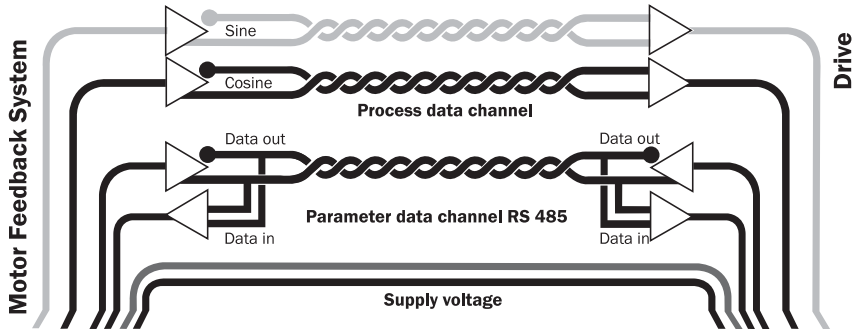Users must perform their own tests when other screen designs are used.

[8] If applying the electronic type label, in connection with numeric controllers, attention should be paid to Patent EP 425 912 B 2; Application of the electronic type label in connection with speed regulation is exempt.

Ordering information

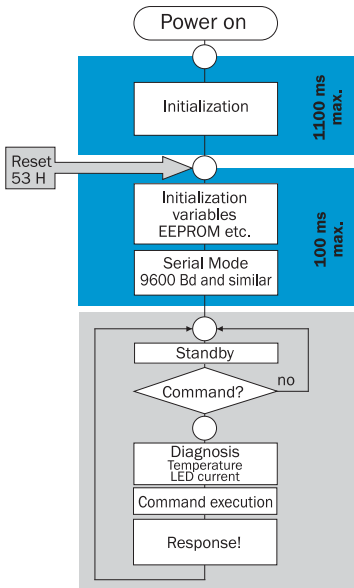| SEK/SEL37 axial connector		
Type	**Part no.**	**Description**
SEK37-HFA0-K02	1037376	Singleturn
SEL37-HFA0-K02	1037377	Multiturn

HIPERFACE®
by SICK | STEGMANN

Electrical interface

• Safe data transmission
• High information content
• Electronic type label

• Only 8 leads
• Bus-enabled parameter channel
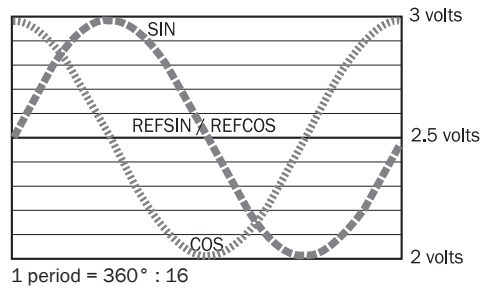• Process data channel in real time

Motor Feedback System

Sine
Cosine

Process data channel

Data out ——— Data out

Parameter data channel RS 485

Data in ——— Data in

Supply voltage

Drive

HIPERFACE® Starting time

Power on

Initialization — 1100 ms max.

Reset 53 H

Initialization variables EEPROM etc.

Serial Mode 9600 Bd and similar — 100 ms max.

Standby

Command? — no

Diagnosis
Temperature
LED current

Command execution

Response!

CAUTION:
No **RS485 communication** is possible during the phases highlighted in blue

Signal specification of the process data channel

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

SIN

REFSIN / REFCOS

COS

3 volts

2.5 volts

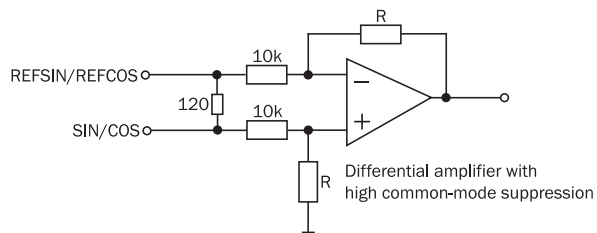2 volts

1 period = 360° : 16

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 guarantees stable amplitudes of the analogue signals across all specified environmental conditions, with a maximum variation of only ± 20 %.

Characteristics applicable to all permissible environmental conditions

Signal	Value/Units
Signal peak, peak V_{ss} of SIN, COS	0.8 ... 1.2 V
Signal offset REFSIN, REFCOS	2.2 ... 2.8 V

Recommended receiver circuit for sine and cosine signals

REFSIN/REFCOS
SIN/COS
R
10k
10k
120
R
Differential amplifier with high common-mode suppression

Further informations to the interface
see HIPERFACE®-description
part no. 8010701

HIPERFACE®
by SICK|STEGMANN

Type-specific settings	SEK37/SEK52	SEL37/SEL52
Type ID (command 52h)	42h	47h
Free EEPROM [bytes]	1,792	1,792
Address	40h	40h
Mode_485 [1) 2)]	E4h	E4h
Codes 0 ... 3	55h	55h
Counter	0	0

[1)] The baud rate 9600 is set by default. Other baud rates cannot be selected.

[2)] When using the motor feedback systems SEK|SEL37 and SEK|SEL52, please ensure that the controller's auto-baud function is not enabled, since these motor feedback systems compensate for minor variations when transmitting at a baud rate of 9600.

[3)] The commands thus labelled include the parameter "Code 0". Code 0 is a byte inserted into the protocol, for additional safeguarding of vital system parameters against accidental overwriting. When shipped, "Code 0" = 55h.

[4)] Temperature compatible with SCx (encoder temperature [°C] *2.048 – 40)

Overview of commands supported			SEK37/SEK52	SEL37/SEL52
Command byte	Function	Code 0 [3)]	Comments	Comments
42h	Read position (5 bits per sine/cosine period)		9 bits	21 bits
43h	Set position	•		
44h	Read analogue value		Channel number F0h [4)] and 48h	Channel number F0h [4)] and 48h
			Temperature [°C]	Temperature [°C]
46h	Read counter			
47h	Increase counter			
49h	Reset counter	•		
4Ah	Read data			
4Bh	Save 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 name plate		Encoder type = 42h	Encoder type = 47h
53h	Encoder reset			
55h	Allocate encoder address	•		
56h	Read serial number and program version			

Overview of status messages				
Error type	Status code	Description	SEK37/52	SEL37/52
	00h	The encoder has recognised no error	•	•
Initialisation	01h	Faulty compensating data	•	•
	02h	Faulty internal angular offset	•	•
	03h	Data field partitioning table damaged	•	•
	04h	Analogue limit values not available	•	•
	05h	Internal I²C bus not operational	•	•
	06h	Internal checksum error	•	•
Protocol	07h	Encoder reset occurred as a result of program monitoring	•	•
	09h	Parity error	•	•
	0Ah	Checksum of the data transmitted is incorrect	•	•
	0Bh	Unknown command code	•	•
	0Ch	Number of data transmitted is incorrect	•	•
	0Dh	Command argument transmitted is not allowed	•	•
Data	0Eh	The selected data field must not be written to	•	•
	0Fh	Incorrect access code	•	•
	10h	Size of data field stated cannot be changed	•	•
	11h	Word address stated, is outside data field	•	•
	12h	Access to non-existent data field	•	•
Position	1Fh	Speed too high, no position formation possible	•	•
	20h	Singleturn position unreliable	•	•
	21h	Positional error Multiturn		•
	22h	Positional error Multiturn		•
	23h	Positional error Multiturn		•
Other	1Ch	Monitoring the value of the analogue signals (process data)	•	•
	1Eh	Encoder temperature critical	•	•
	08h	Counter overflow	•	•

Further informations to the interface see HIPERFACE®-description part no. 8010701

This document provided by Barr-Thorp Electric Co., Inc.   800-473-9123   www.barr-thorp.com

Dimensional drawings and ordering information

Stranded cable/connector, straight, 8 wires, 8 x 0.15 mm²

Type	Part no.	Contacts	Wire length
DOL-OJ08-GOM2XB6	2031086	8	0.2 m

220 +5
10
70
20
X
Shrunk area

Assembly tool for SEK/SEL52 hollow shaft

Type	Part no.	Description
BEF-MW-SEY52	2048235	Assembly tool SEK/SEL52
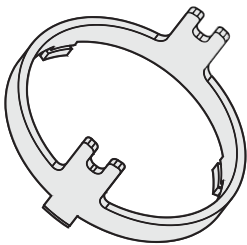
Servo clamp, Set (contents 3 off)

Type	Part no.	Description
BEF-WK-RESOL	2039082	Servo clamp for SEK/SEL52
		(Hollow shaft and tapered shaft)
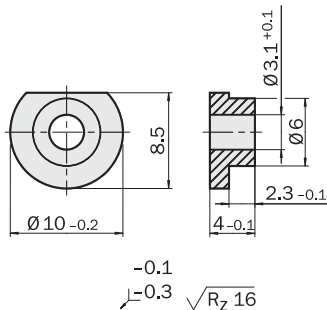
Servo clamp, Set (contents 3 off)

Type	Part no.	Description
BEF-WK-RESOL1	2048827	Servo clamp for SEK/SEL52
		(Shoulder clamping)

$\varnothing 3.1^{+0.1}$ $\varnothing 6$ 8.5 2.3 −0.1 4 −0.1 $\varnothing 10$ −0.2 −0.1 −0.3 $\sqrt{R_z\,16}$

$\varnothing 3.1^{+0.1}$ $\varnothing 6$ 8.5 5.9 −0.1 7.6 −0.1 $\varnothing 10$ −0.2 −0.1 −0.3 $\sqrt{R_z\,16}$
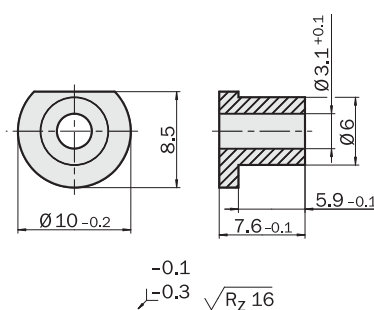
Cable HIPERFACE®, 8 wires, per metre 4 x 2 x 0,15 mm²

Type	Part no.	Wires
LTG-2708-MW	6028361	8

Programming Tool for HIPERFACE® devices

Type	Part no.	Motor Feedback System
PGT-03-S	1034252	SEK/SEL37 and SEK/SEL52

Dimensional drawings and ordering information

Cover SEK/SEL52 with tapered shaft or collar clamping

Type	Part no.	Description
BEF-GA-SEY52BS1	2048234	Cover closed

Cover SEK/SEL52 with hollow shaft

Type	Part no.	Description
BEF-GA-SEY52TS1	2048232	Cover opened