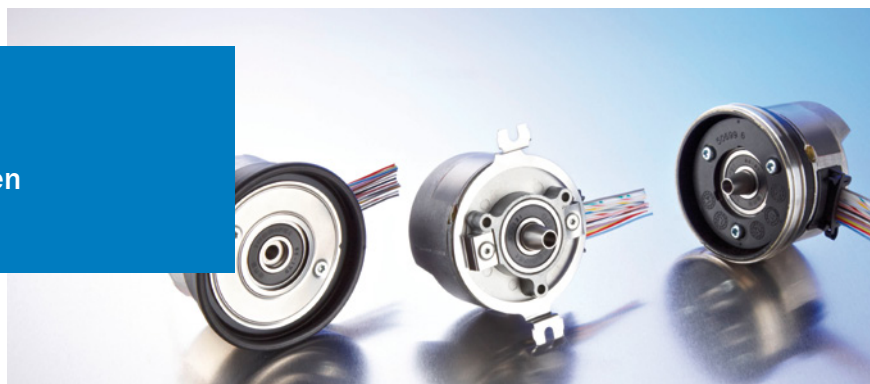# CFS50
Motor Feedback Systems

High performance in the proven
mechanical design

SICK
Sensor Intelligence.

High performance in the proven mechanical design

CE

Product description

Motor feedback systems of the CFS50 product family are used worldwide in a large variety of applications and environments. Incremental signals with resolutions of up to 65,536 lines per revolution and commutation signals are available.

At a glance

- Output driver for incremental and commutation signals as per EIA 422
- Resolution of up to 65,536 lines per revolution
- Commutation signals up to 32 pole pairs
- Temperature range from –20 °C to +115 °C
- Various mechanical interfaces

Your benefit

- High level of flexibility due to mechanics already proven in other motor feedback systems
- Time-saving due to electrical zero adjustment
- High level of compatibility thanks to standard interface

Detailed technical data

Performance

Number of lines per revolution	1000, 1024, 2000, 2048, 4000, 4096, other number of lines on request
Commutation signals	See diagram on page 8, other commutations on request
Max. output frequency	800 kHz
Measuring step	90° electric/number of lines
Reference signal	
Number	1
Position	90° electr., logic operation with A and B

Interfaces

Output driver	TTL/RS422
Output signal sequence	See pulse time diagram on page 8
Signal tolerance tx1 ... tx4 max. at 300 kHz	1.5 x ¼ T

Electrical data

Supply voltage	5 V ± 10 %
Max. operating current	60 mA (without load)

Mechanical data

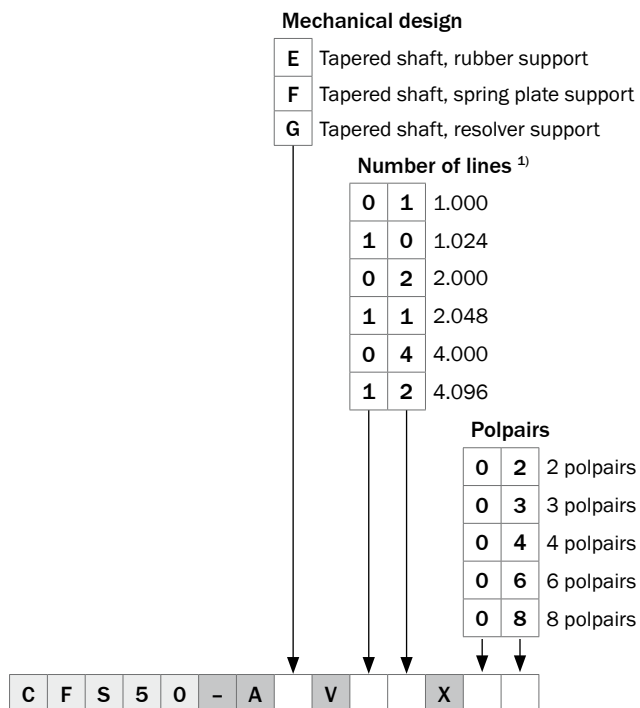|	
Dimensions	See dimensional drawing
Mass	0.1 kg
Moment of inertia to the motor	10 gcm^2
Operating speed	12 000 rpm^{-1}
Working speed	6000 rpm^{-1}
Max. angular acceleration	0.2 x 10^5 1/s^2
Operating torque	0.2 Ncm
Start-up torque	0.4 Ncm
Permissible shaft movement	
Static	Axial ± 0.75 mm Radial ± 0.5 mm
Dynamic	Axial ± 0.2 mm Radial ± 0.1 mm
Angular motion, perpendicular to the rotational axis	
Static	± 0.005 mm/mm
Dynamic	0.0025 mm/mm
Lifetime of ball learnings	3.6 x 10^9 revolutions

Ambient data

Working temperature range	–20 °C ... +115 °C
Storage temperature range (without packaging)	–40 °C ... +125 °C
Permissible relative air humidity [1]	90 %
Resistance	
To shocks as per EN 60068-2-27	100 g/10 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2000 Hz
EMC [2]	As per EN 61000-6-2 and EN 61000-6-3
Protection class as per IEC 60529	IP 40

[1] Condensation not permissible.

[2] EMC as per specified standards is ensured if the motor feedback system is fitted in a conductive housing connected to the central grounding point of the motor controller via cable shielding. The GND-(0V) connection of the supply voltage is also grounded there. If other shielding concepts are used, the user must perform his own tests.

Ordering information

Ordering code

Mechanical design

E	Tapered shaft, rubber support
F	Tapered shaft, spring plate support
G	Tapered shaft, resolver support

Number of lines [1]

0	1	1.000
1	0	1.024
0	2	2.000
1	1	2.048
0	4	4.000
1	2	4.096

Polpairs

0	2	2 polpairs
0	3	3 polpairs
0	4	4 polpairs
0	6	6 polpairs
0	8	8 polpairs

C	F	S	5	0	–	A		V			X		

[1] Number of lines from 4 ... 1000 and larger than 4096 ... 65 536 on request.

[2] Polpairs 5, 7 and from larger than 8 ... 32 on request.

Dimensional drawings

CFS50-AEVxxXx

All dimensions in mm (inch)

Proposed customer fitting for CFS50-AEVxxXx

*) Size of tolerance reduce the
allowed movement of the shaft,
see data sheet.
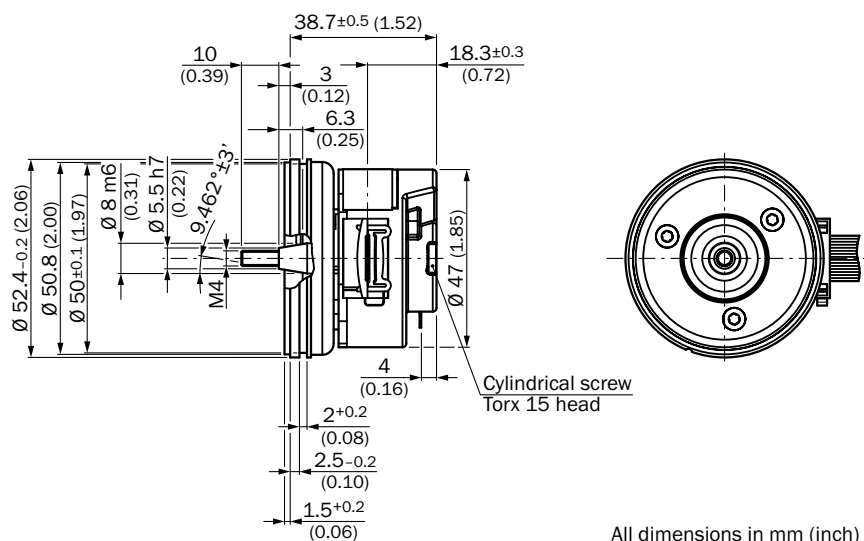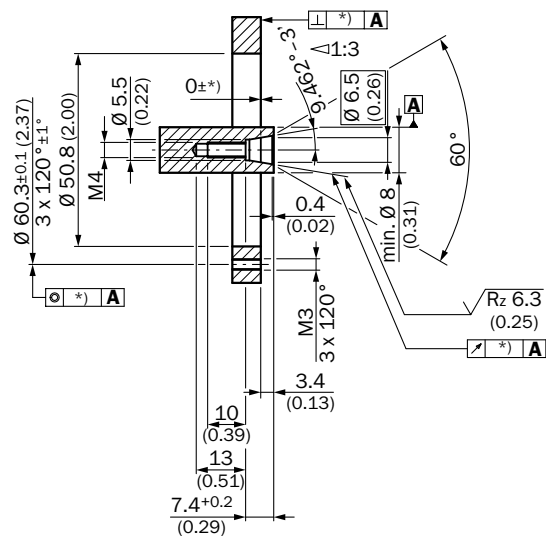
All dimensions in mm (inch)

CFS50-AFVxxXxx
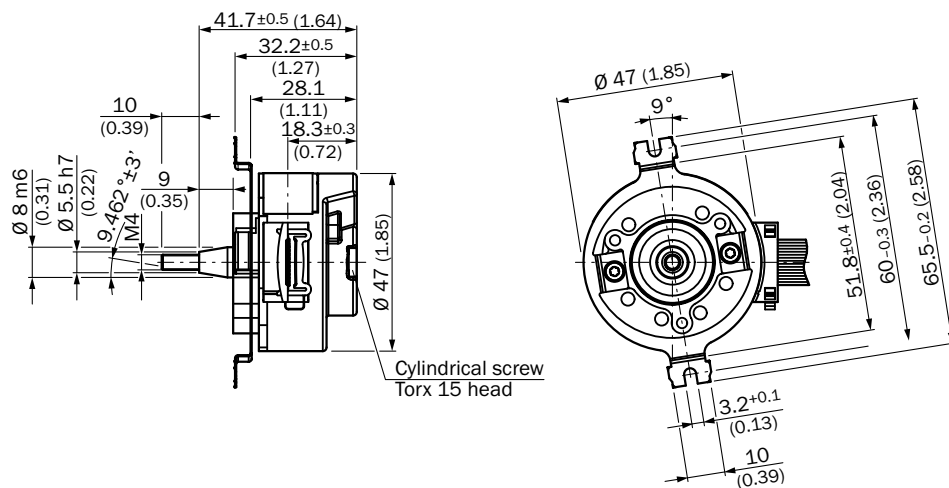
All dimensions in mm (inch)

CFS50-AGVxxXxx

All dimensions in mm (inch)

**Proposed customer fitting for CFS50-AGVxxXxx**

*) Size of tolerance reduce the allowed movement of the shaft, see data sheet.

All dimensions in mm (inch)

PIN and wire assignment

PIN	Color	Signal
1	Blue	Ground connection (GND)
2	Red	Supply voltage 5 V ± 10 % (U_s)
3	Yellow	Reference signal inverted ($\overline{Z}$)
4	Purple	Reference signal (Z)
5	Brown	Increment signal inverted ($\overline{A}$)
6	White	Increment signal (A)
7	Black	Increment signal inverted ($\overline{B}$)
8	Pink	Increment signal (B)
9	White/Red	Commutation signal inverted ($\overline{T}$)
10	White/Gray	Commutation signal (T)
11	White/Blue	Commutation signal inverted ($\overline{S}$)
12	White/Yellow	Commutation signal (S)
13	White/Pink	Commutation signal inverted ($\overline{R}$)
14	White/Green	Commutation signal (R)
15	Gray	Electronic setting of the commutation signals (SET0)

Incremental track
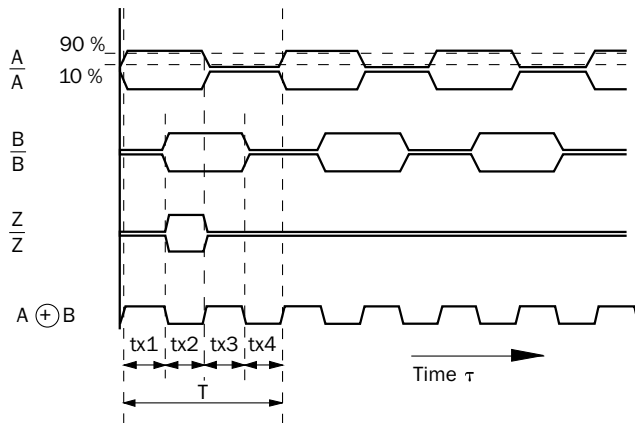
At constant rotational speed with regard to the input shaft and rotation in clockwise direction.

By connecting the two signals A and B, an output signal arises whose period durations tx1 … tx4 have varying lengths.

The differences are determined:

- by the pulse/pause ratio tolerance of the individual channels
- by the tolerance in the 90° phase shift between A and B
- by the frequency

The times tx1 … tx4 ideally have to amount to 1/4 of the particular period duration T. The typical output frequency of the encoder is defined so that the max. time tx is smaller than 1.5 x T/4.

Pulse time diagram
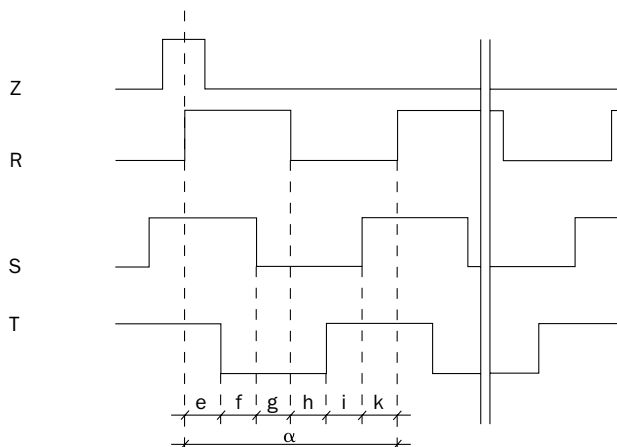
Polpairs	Number of poles	e, f, g, h, i, k	α
2	4	30°	180°
3	6	20°	120°
4	8	15°	90°
6	12	10°	60°
8	16	7.5°	45°

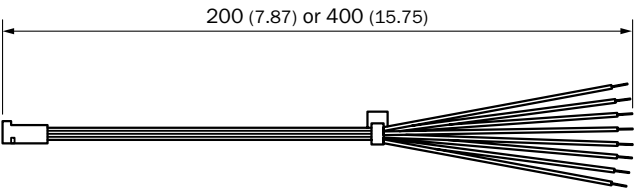The angle information is related to a mechanical shaft rotation. Flank precision of the signals R, S, T ±1°.

Accessories

Plug connectors and cables

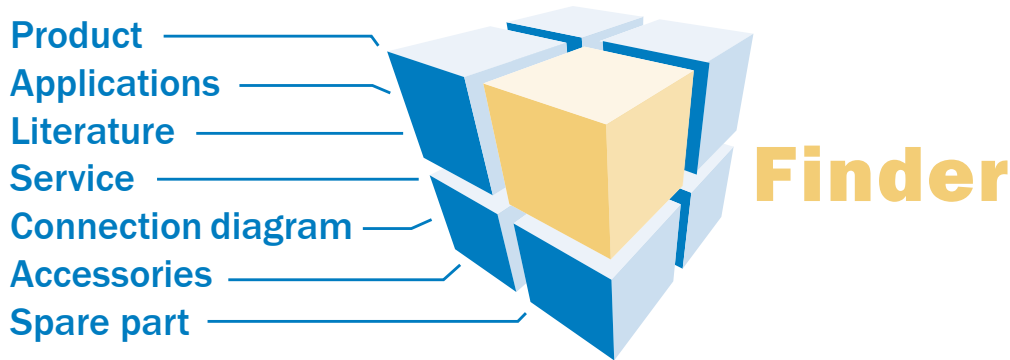| Description	Cable length	Model name	Part no.
Braid set, straight, 15-core, 15 x 0.24 mm²	200 mm	DOL-0J15-G0M2XBA	2051662
	400 mm	DOL-0J15-G0M4XBA	2061864

200 (7.87) or 400 (15.75)

All dimensions in mm (inch)

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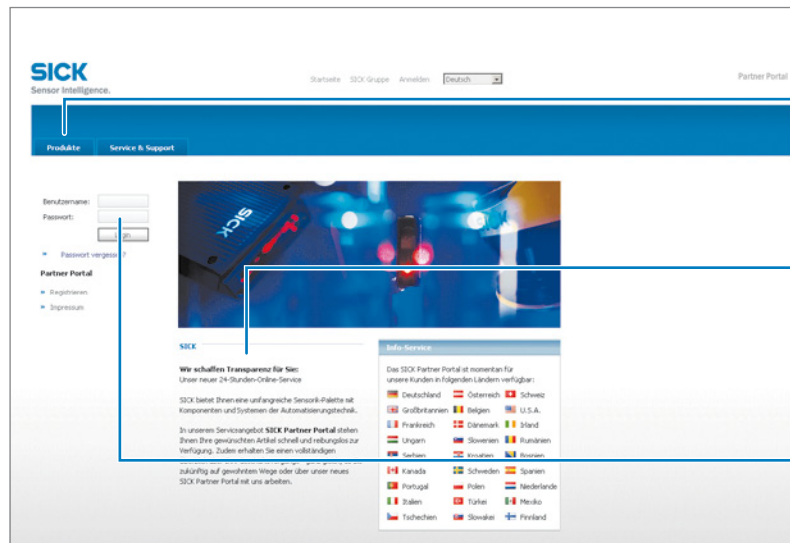
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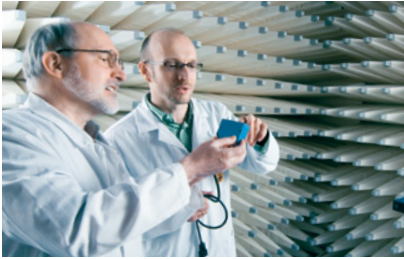
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Unique product range

- Non-contact detecting, counting, classifying, positioning and measuring of any type of object or media
- Accident and operator protection with sensors, safety software and services
- Automatic identification with bar code and RFID readers
- Laser measurement technology for detecting the volume, position and contour of people and objects
- Complete system solutions for analysis and flow measurement of gases and liquids

Comprehensive services

- SICK LifeTime Services – for safety and productivity
- Application centers in Europe, Asia and North America for the development of system solutions under real-world conditions
- E-Business Partner Portal www.mysick.com – price and availability of products, requests for quotation and online orders

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