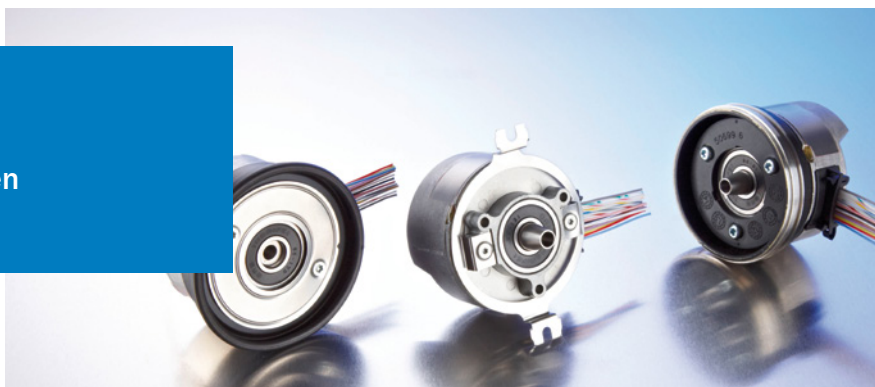





## CFS50 Motor Feedback Systems

High performance in the proven  
mechanical design

High performance in the proven mechanical design





**Additional information**

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**Product description**

Motor feedback systems of the CFS50 product family are used worldwide in a large variety of applications and environ-

ments. 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

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

### Interfaces

<b>Output driver</b>	TTL/RS422
<b>Output signal sequence</b>	See pulse time diagram on page 9
<b>Signal tolerance tx1 ... tx4 max. at 300 kHz</b>	1.5 x ¼ T

### Electrical data

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

### Mechanical data

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

Ambient data

<b>Working temperature range</b>	-20 °C ... +115 °C
<b>Storage temperature range (without packaging)</b>	-40 °C ... +125 °C
<b>Permissible relative air humidity <sup>1)</sup></b>	90 %
<b>Resistance</b>	
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
<b>EMC <sup>2)</sup></b>	As per EN 61000-6-2 and EN 61000-6-3
<b>Protection class as per IEC 60529</b>	IP 40

<sup>1)</sup> Condensation not permissible.

<sup>2)</sup> 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-(OV) 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

**Connection type**

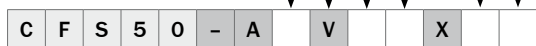
- V** Stranded cable outlet 200 mm

**Number of lines <sup>1)</sup>**

<b>0 1</b>	1.000
<b>1 0</b>	1.024
<b>0 2</b>	2.000
<b>1 1</b>	2.048
<b>0 4</b>	4.000
<b>1 2</b>	4.096

**Polpairs**

<b>0 2</b>	2 polpairs
<b>0 3</b>	3 polpairs
<b>0 4</b>	4 polpairs
<b>0 6</b>	6 polpairs
<b>0 8</b>	8 polpairs

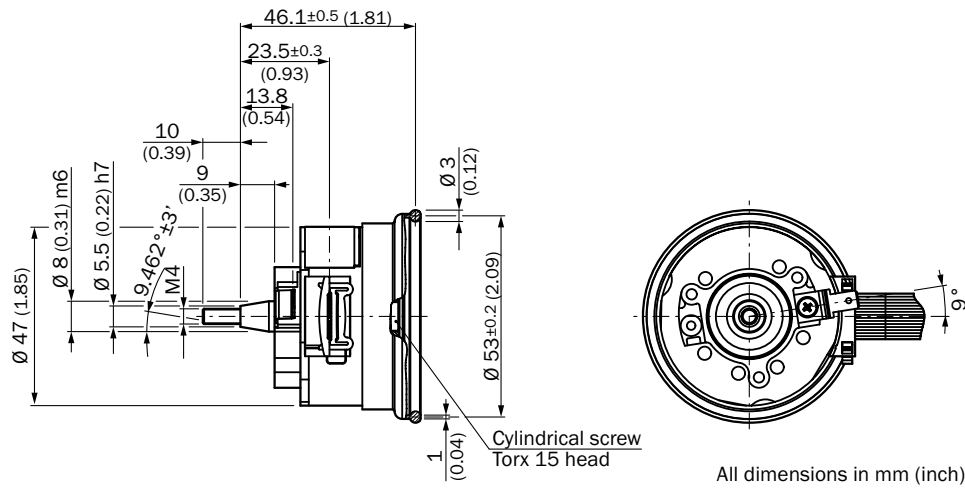


<sup>1)</sup> Number of lines from 4 ... 1000 and larger than 4096 ... 65 536 on request.

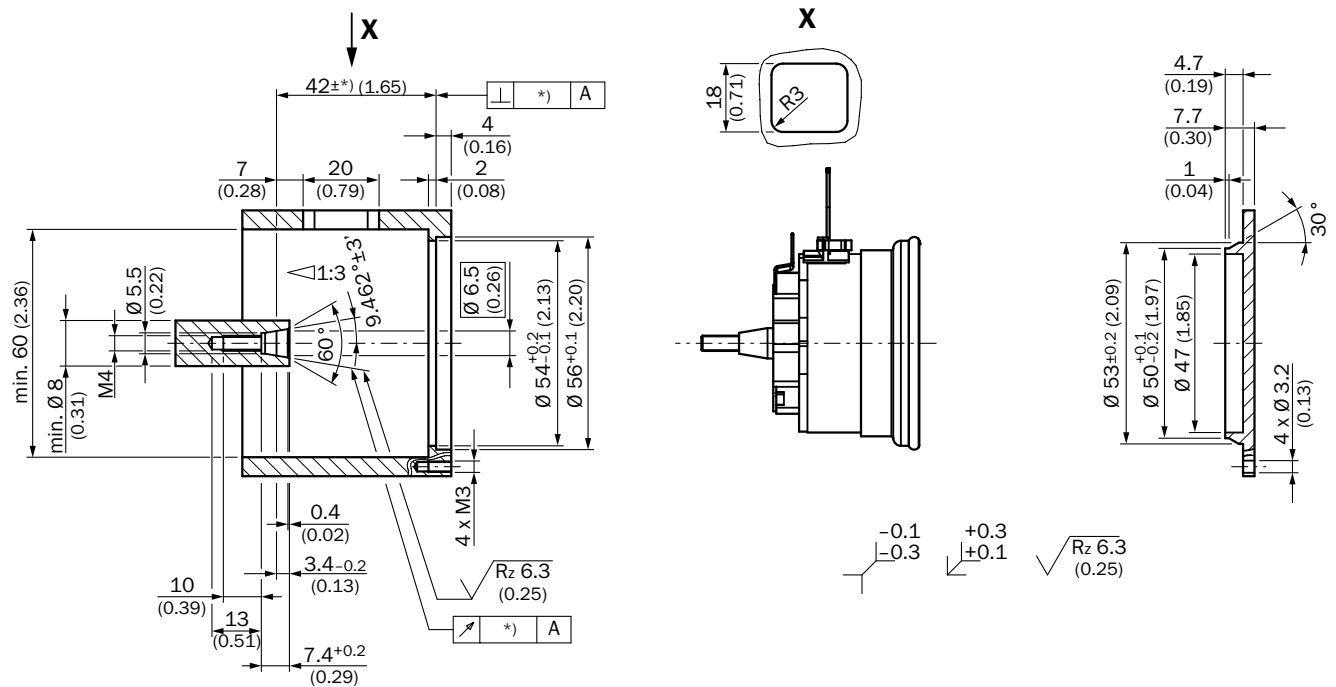
<sup>2)</sup> Polpairs 5, 7 and from larger than 8 ... 32 on request.

### Dimensional drawings

#### CFS50-AEVxxXx



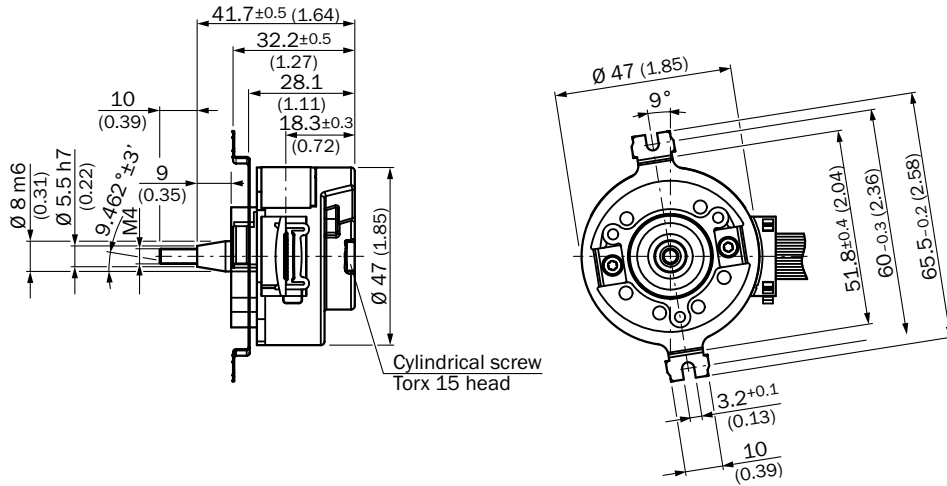
#### Proposed customer fitting for CFS50-AEVxxXx



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

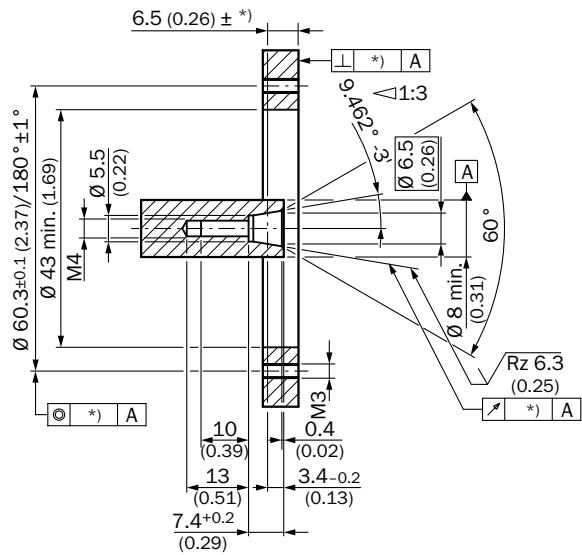
All dimensions in mm (inch)

CFS50-AFVxxXxx



All dimensions in mm (inch)

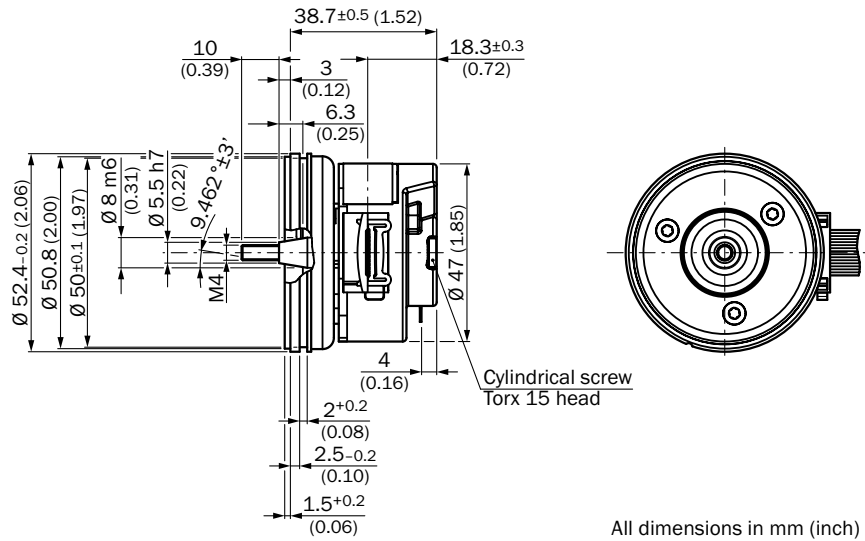
Proposed customer fitting for CFS50-AFVxxXxx



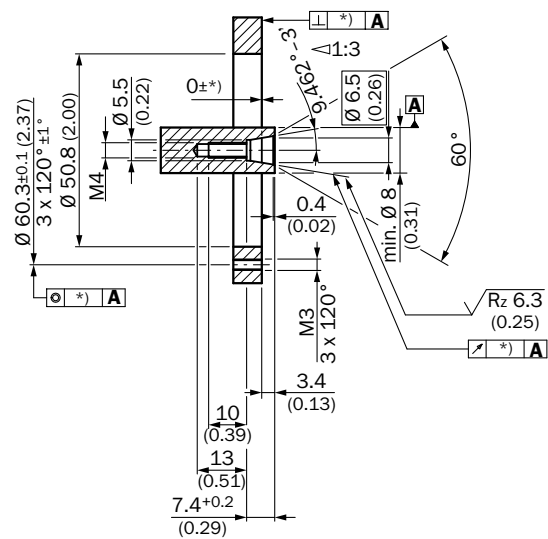
\*) Size of tolerance reduce the allowed movement of the shaft see data sheet.

All dimensions in mm (inch)

**CFS50-AGVxxXxx**



**Proposed customer fitting for CFS50-AGVxxXxx**



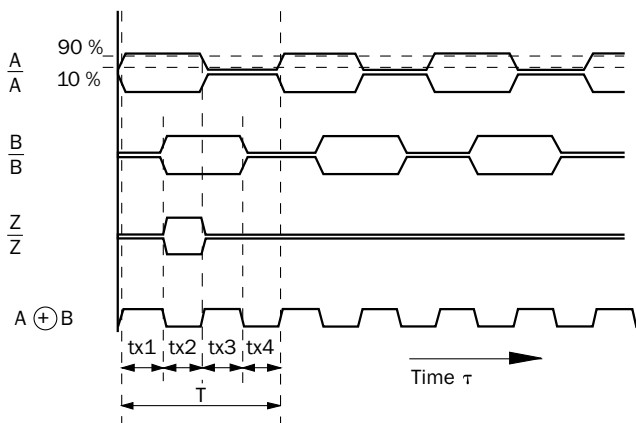
\*) Size of tolerance reduce the allowed movement of the shaft, see data sheet.

All dimensions in mm (inch)

## Wire assignment

Color	Signal
Blue	Ground connection (GND)
Red	Supply voltage $5\text{ V} \pm 10\%$ ( $U_s$ )
Yellow	Reference signal inverted ( $\bar{Z}$ )
Purple	Reference signal (Z)
Brown	Increment signal inverted ( $\bar{A}$ )
White	Increment signal (A)
Black	Increment signal inverted ( $\bar{B}$ )
Pink	Increment signal (B)
White/Red	Commutation signal inverted ( $\bar{T}$ )
White/Gray	Commutation signal (T)
White/Blue	Commutation signal inverted ( $\bar{S}$ )
White/Yellow	Commutation signal (S)
White/Pink	Commutation signal inverted ( $\bar{R}$ )
White/Green	Commutation signal (R)
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  $tx_1 \dots tx_4$  have varying lengths.

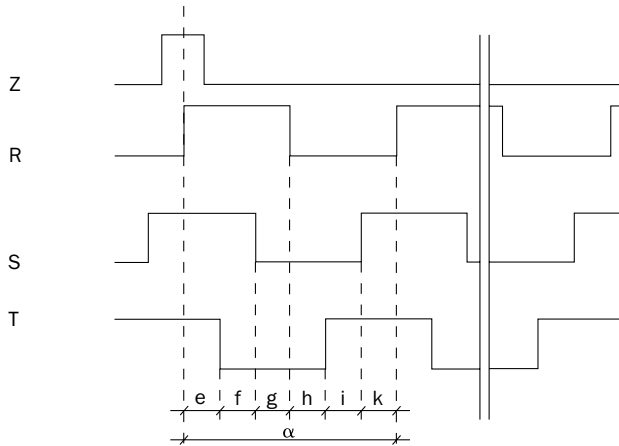
The differences are determined:

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

The times  $tx_1 \dots tx_4$  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  $1.5 \times T/4$ .



## Pulse time diagram

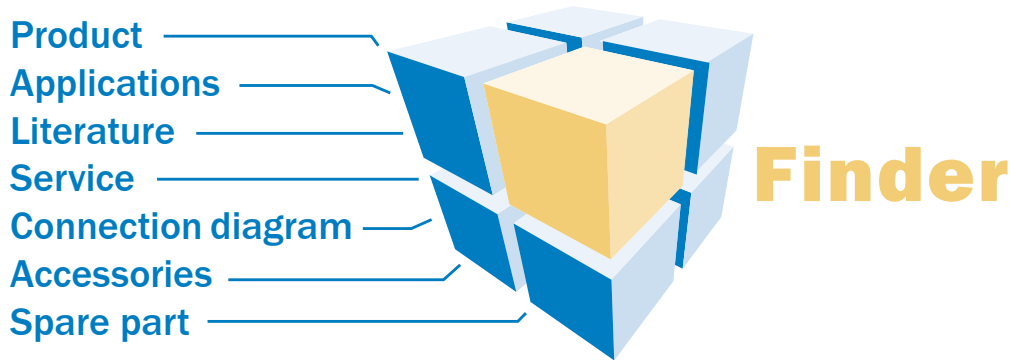


Polpairs	Number of poles	e, f, g, h, i, k	$\alpha$
2	4	30°	180°
3	6	20°	120°
4	8	15°	90°
6	12	10°	60°
8	16	7.5°	45°

The angle information is related to a mechanical shaft rotation. Flank precision of the signals R, S, T  $\pm 1^\circ$ .



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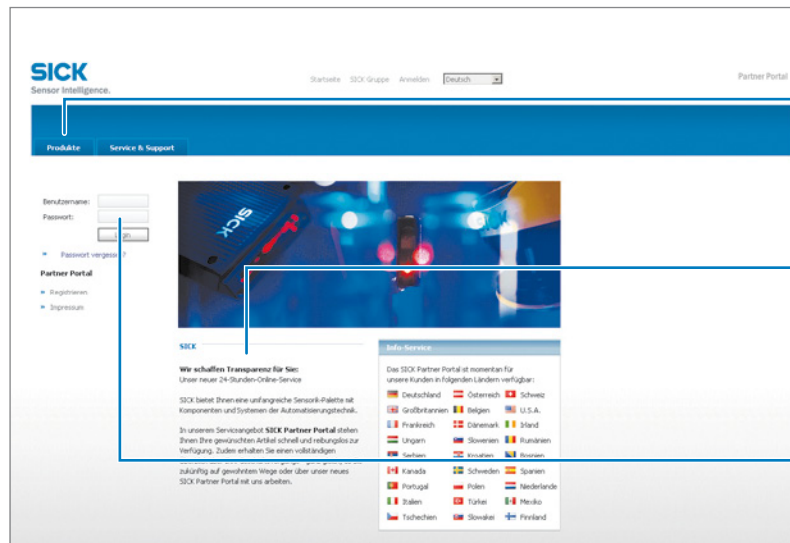
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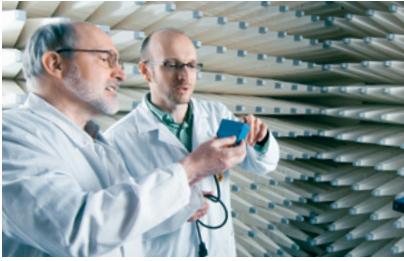
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