



Motor feedback systems rotary incremental with  
commutation  
CFS50

CFS50-AEV12X04



**Model Name** > CFS50-AEV12X04  
**Part No.** > 1060443



*Illustration may differ*

**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 benefits**

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

**Performance**

Number of lines per revolution:	4,096 <sup>1)</sup>
Measuring step:	90 ° /number of lines
Commutation signals:	4 pole pairs
Reference signal, number:	1
Reference signal, position:	90 ° electronically, gated with A and B
Operating speed:	6,000 /min

<sup>1)</sup> Number of lines from 1 ... 1.000 and > 4.096 ... 65.536 on request

**Mechanical data**

Shaft version:	Tapered shaft
Flange type/stator coupling:	Rubber support
Dimensions:	See dimensional drawing
Mass:	0.1 kg
Moment of inertia of the rotor:	10 gcm <sup>2</sup>
Maximum operating speed:	12,000 /min
Maximum angular acceleration:	200,000 rad/s <sup>2</sup>
Operating torque:	0.2 Ncm
Start up torque:	0.4 Ncm
Permissible shaft movement, radial, static:	± 0.5 mm
Permissible shaft movement, radial, dynamic:	± 0.1 mm
Permissible shaft movement, axial, static:	± 0.75 mm
Permissible shaft movement, axial, dynamic:	± 0.2 mm
Life of ball bearings:	3.6 x 10 <sup>9</sup> revolutions

Connection type:	Stranded cable, 15-pin, radial
Angular motion perpendicular to the rotational axis, static:	± 0.005 mm/mm
Angular motion perpendicular to the rotational axis, dynamic:	± 0.002 mm/mm

### Electrical data

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Electrical interface:	TTL/RS422
Operating voltage range/supply Voltage:	4.5 V DC ... 5.5 V DC
Maximum output frequency:	820 kHz
Operating power consumption (no load):	60 mA <sup>1)</sup>

<sup>1)</sup> Without load

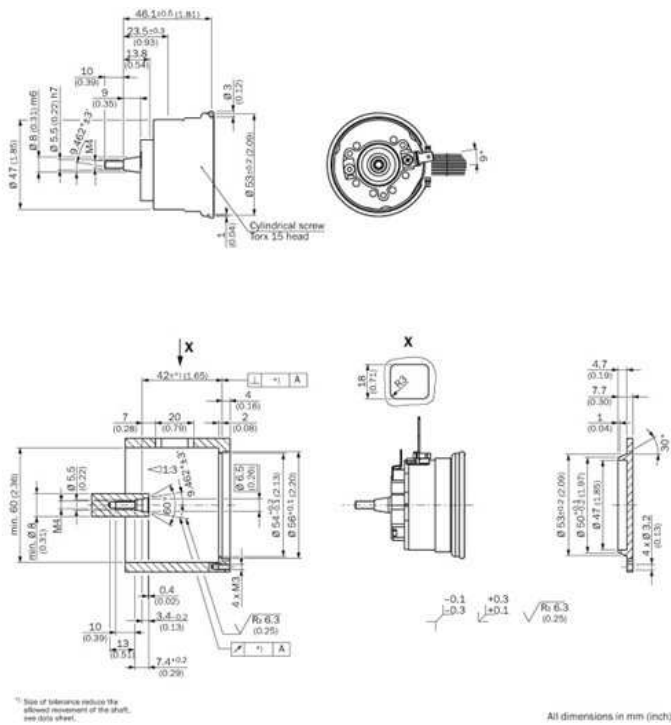
### Ambient data

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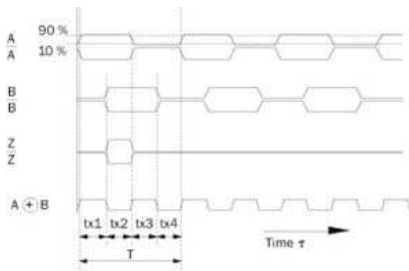
Working temperature range:	-20 °C ... 115 °C
Storage temperature range:	-40 °C ... 125 °C, without package
Relative humidity/Condensation:	90 %, Condensation not permitted
Resistance to shocks:	100 g/10 ms/according to EN 60068-2-27
Resistance to vibration:	20 g/10 Hz/2,000 Hz/according to EN 60068-2-6
EMC:	(according to EN 61000-6-2 and EN 61000-6-3) <sup>1)</sup>
Enclosure rating:	IP 40 (according to IEC 60529)

<sup>1)</sup> 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 power supply voltage is linked to earth. Users must perform their own tests when other screen designs are used.

## Dimensional drawing



## Incremental track



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

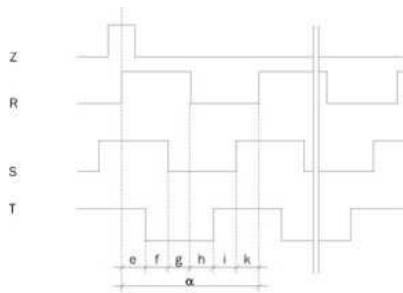
By connecting the two signals A and B, an output signal arises whose period durations tx1 ... tx4 have varying lengths.

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



Polepairs	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  $\pm 1^\circ$ .

## Wire allocation

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

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