

# AFM60I-BDAC004096

AFS/AFM60 SSI

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.



Illustration may differ



### Ordering information

Type	Part no.
AFM60I-BDAC004096	1104957

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_SSI](http://www.sick.com/AFS_AFM60_SSI)

### Detailed technical data

#### Performance

<b>Number of steps per revolution (max. resolution)</b>	4,096 (12 bit)
<b>Number of revolutions</b>	4,096 (12 bit)
<b>Max. resolution (number of steps per revolution x number of revolutions)</b>	12 bit x 12 bit (4,096 x 4,096)
<b>Measuring step deviation</b>	± 0.008° pulses 100 ... 10,000
<b>Error limits G</b>	0.03° <sup>1)</sup>
<b>Repeatability standard deviation <math>\sigma_r</math></b>	0.002° <sup>2)</sup>

<sup>1)</sup> In accordance with DIN ISO 1319-1, position of the upper and lower error limit depends on the installation situation, specified value refers to a symmetrical position, i.e. deviation in upper and lower direction is the same.

<sup>2)</sup> In accordance with DIN ISO 55350-13; 68.3% of the measured values are inside the specified area.

#### Interfaces

<b>Communication interface</b>	SSI
<b>Initialization time</b>	50 ms <sup>1)</sup>
<b>Position forming time</b>	< 1 $\mu$ s
<b>Code type</b>	Gray
<b>Code sequence parameter adjustable</b>	CW/CCW (V/R)
<b>Interface signals</b>	Clock +, Clock -, Data +, Data -
<b>Clock frequency</b>	2 MHz <sup>2)</sup>
<b>Set (electronic adjustment)</b>	H-active (L = 0 - 3 V, H = 4,0 - U <sub>s</sub> V)
<b>CW/CCW (counting sequence when turning)</b>	L-active (L = 0 - 1,5 V, H = 2,0 - U <sub>s</sub> V)

<sup>1)</sup> Valid positional data can be read once this time has elapsed.

<sup>2)</sup> SSI max. clock frequency 2 MHz, and min. LOW level (Clock+): 500 ns.

## Electrical data

<b>Connection type</b>	Male connector, M12, 8-pin, radial
<b>Supply voltage</b>	4.5 ... 32 V DC
<b>Power consumption</b>	≤ 0.5 W (without load)
<b>Reverse polarity protection</b>	✓
<b>MTTFd: mean time to dangerous failure</b>	250 years (EN ISO 13849-1) <sup>1)</sup>

<sup>1)</sup> This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

## Mechanical data

<b>Mechanical design</b>	Blind hollow shaft
<b>Shaft diameter</b>	10 mm
<b>Weight</b>	0.5 kg <sup>1)</sup>
<b>Shaft material</b>	Stainless steel V2A
<b>Flange material</b>	Stainless steel V2A
<b>Housing material</b>	Stainless steel V2A
<b>Start up torque</b>	1 Ncm (+20 °C)
<b>Operating torque</b>	0.5 Ncm (+20 °C)
<b>Permissible movement static</b>	± 0.3 mm (radial) ± 0.5 mm (axial)
<b>Permissible movement dynamic</b>	± 0.1 mm (radial) ± 0.1 mm (axial)
<b>Operating speed</b>	6,000 min <sup>-1</sup> <sup>2)</sup>
<b>Moment of inertia of the rotor</b>	40 gcm <sup>2</sup>
<b>Bearing lifetime</b>	3.0 x 10 <sup>9</sup> revolutions
<b>Angular acceleration</b>	≤ 500,000 rad/s <sup>2</sup>

<sup>1)</sup> Based on devices with male connector.

<sup>2)</sup> Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3 <sup>1)</sup>
<b>Enclosure rating</b>	IP67, shaft side (IEC 60529) IP67, Housing side, male connector (IEC 60529) <sup>2)</sup>
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-40 °C ... +100 °C <sup>3)</sup> -30 °C ... +100 °C <sup>4)</sup>
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>	100 g, 6 ms (EN 60068-2-27)
<b>Resistance to vibration</b>	10 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

<sup>1)</sup> EMC according to the standards quoted is achieved if shielded cables are used.

<sup>2)</sup> With mating connector fitted.

<sup>3)</sup> Stationary position of the cable.

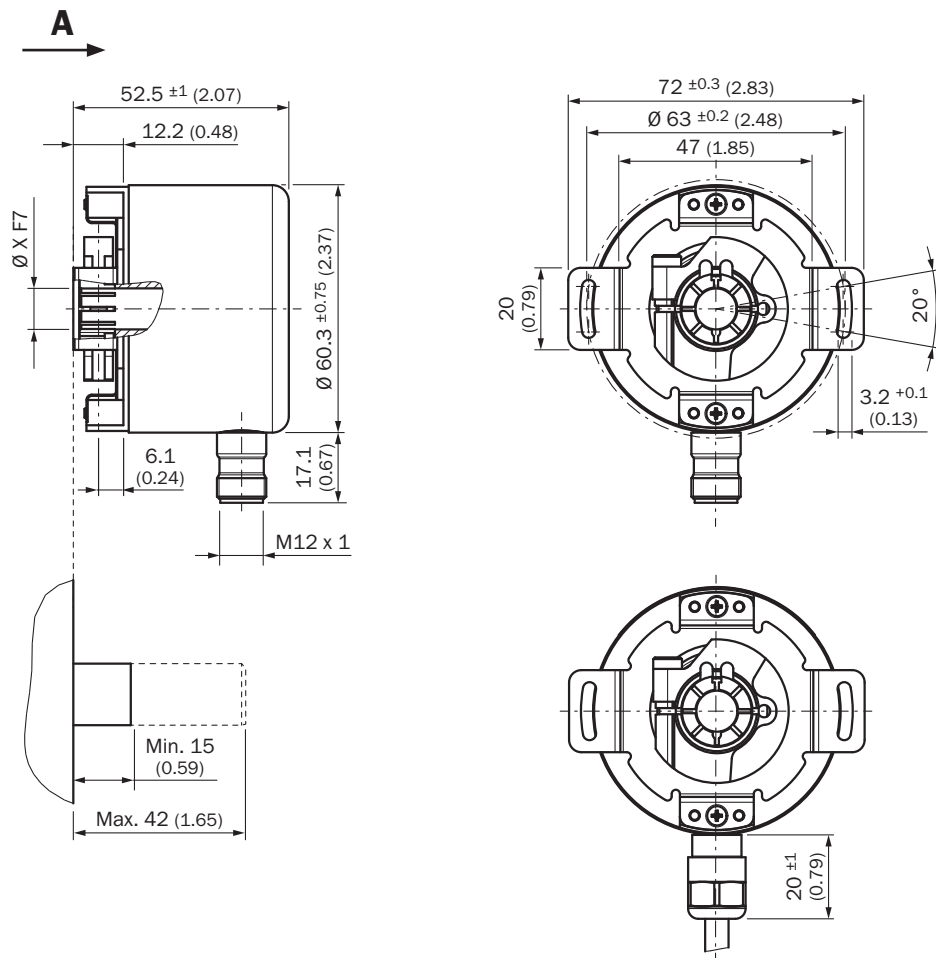
<sup>4)</sup> Flexible position of the cable.

## Classifications

<b>eCl@ss 5.0</b>	27270502
<b>eCl@ss 5.1.4</b>	27270502
<b>eCl@ss 6.0</b>	27270590
<b>eCl@ss 6.2</b>	27270590
<b>eCl@ss 7.0</b>	27270502
<b>eCl@ss 8.0</b>	27270502
<b>eCl@ss 8.1</b>	27270502
<b>eCl@ss 9.0</b>	27270502
<b>eCl@ss 10.0</b>	27270502
<b>eCl@ss 11.0</b>	27270502
<b>eCl@ss 12.0</b>	27270502
<b>ETIM 5.0</b>	EC001486
<b>ETIM 6.0</b>	EC001486
<b>ETIM 7.0</b>	EC001486
<b>ETIM 8.0</b>	EC001486
<b>UNSPSC 16.0901</b>	41112113

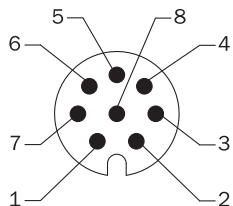
Dimensional drawing (Dimensions in mm (inch))

Blind hollow shaft



PIN assignment

M12 male connector, 8-pin and cable, 8-wire, SSI/Gray

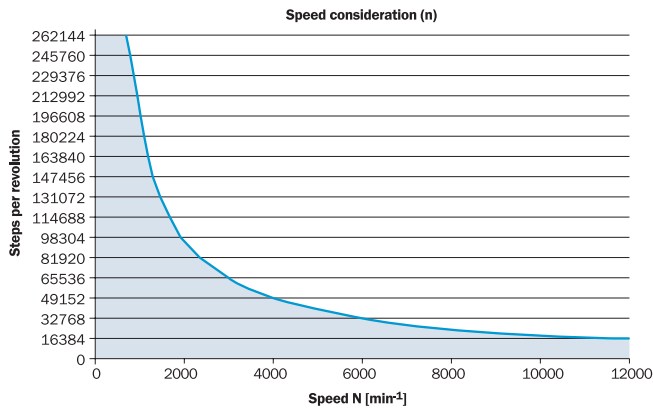


View of M12 male device connector on encoder

PIN	Wire colors (cable connection)	Signal	Explanation
1	Brown	Data -	Interface signals
2	White	Data +	Interface signals
3	Black	V/R	Sequence in direction of rotation
4	Pink	SET	Electronic adjustment Interface signals

PIN	Wire colors (cable connection)	Signal	Explanation
5	Yellow	Clock +	Interface signals
6	Purple	Clock -	Interface signals
7	Blue	GND	Ground connection
8	Red	U <sub>S</sub>	Operating voltage
		Screen	Screen connected to housing on encoder side. Connected to ground on control side.

### Diagrams



The maximum speed is also dependent on the shaft type.

## SICK AT A GLANCE

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