



# AFM60A-BKIB018x12

AFS/AFM60 Ethernet

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.



Illustration may differ



### Ordering information

Type	Part no.
AFM60A-BKIB018x12	1081418

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_Ethernet](http://www.sick.com/AFS_AFM60_Ethernet)

### Detailed technical data

#### Performance

<b>Number of steps per revolution (max. resolution)</b>	262,144 (18 bit)
<b>Number of revolutions</b>	4,096 (12 bit)
<b>Max. resolution (number of steps per revolution x number of revolutions)</b>	18 bit x 12 bit (262,144 x 4,096)
<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>	EtherNet/IP™
<b>Encoder profile</b>	V4.1 class3
<b>Data transmission rate (baud rate)</b>	10 Mbit/s, 100 Mbit/s
<b>Transmission medium</b>	CAT-5e cable
<b>Initialization time</b>	Approx. 10 s
<b>RPI (requested packet interval)</b>	5 ms ... 750 ms
<b>Parameterising data</b>	Number of steps per revolution Number of revolutions PRESET Counting direction Sampling rate for speed calculation Unit for output of speed, acceleration and temperature value Output of scalable limit values such as: position ranges, speed, acceleration, start-up of the CW/CCW directions of rotation, change of direction of rotation, operating hours and hours of shaft movement (motion) Round axis functionality Heartbeat
<b>Available diagnostics data</b>	Minimum and maximum temperature Maximum speed Power-on counter Operating hours counter power-on/motion Counter of direction changes/number of movements cw/number of movements ccw Number of changes of direction Minimum and maximum operating voltage Signal monitoring for singleturn and multiturn

<b>DLR (Device Level Ring)</b>	✓
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## Electrical data

<b>Connection type</b>	Male connector, Female connector, 1x, 2x, M12, M12, 4-pin, 4-pin, axial, axial <sup>1) 2)</sup>
<b>Supply voltage</b>	10 ... 30 V
<b>Power consumption</b>	≤ 3 W (without load)
<b>Reverse polarity protection</b>	✓
<b>MTTF: mean time to dangerous failure</b>	80 years (EN ISO 13849-1) <sup>3)</sup>

<sup>1)</sup> A-coded.

<sup>2)</sup> D-coded.

<sup>3)</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>	1/4"
<b>Weight</b>	0.2 kg
<b>Shaft material</b>	Stainless steel
<b>Flange material</b>	Aluminum
<b>Housing material</b>	Aluminum
<b>Start up torque</b>	0.8 Ncm (+20 °C)
<b>Operating torque</b>	0.6 Ncm (+20 °C)
<b>Permissible movement static</b>	± 0.3 mm (radial) ± 0.5 mm (axial)
<b>Permissible movement dynamic</b>	± 0.05 mm (radial) ± 0.1 mm (axial)
<b>Operating speed</b>	≤ 6,000 min <sup>-1</sup> <sup>1)</sup>
<b>Moment of inertia of the rotor</b>	40 gcm <sup>2</sup>
<b>Bearing lifetime</b>	3 x 10 <sup>9</sup> revolutions
<b>Angular acceleration</b>	≤ 500,000 rad/s <sup>2</sup>

<sup>1)</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
<b>Enclosure rating</b>	IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529) <sup>1)</sup>
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-40 °C ... +85 °C
<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>	30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

<sup>1)</sup> With mating connector fitted.

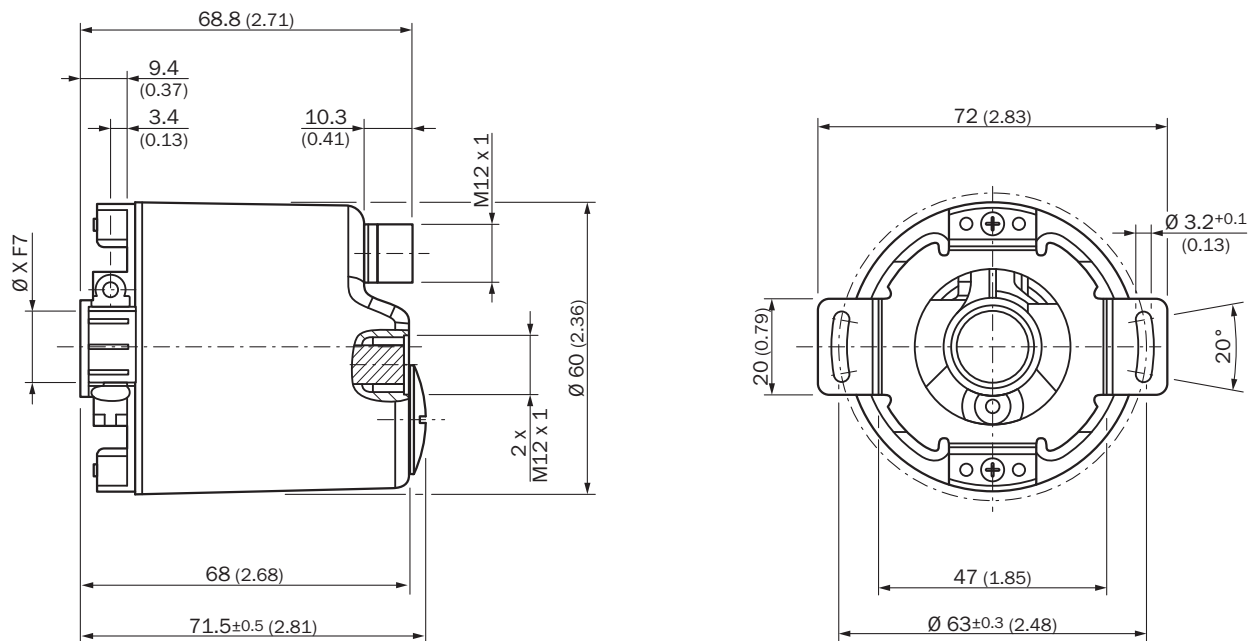
## Classifications

<b>eCl@ss 5.0</b>	27270502
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<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))

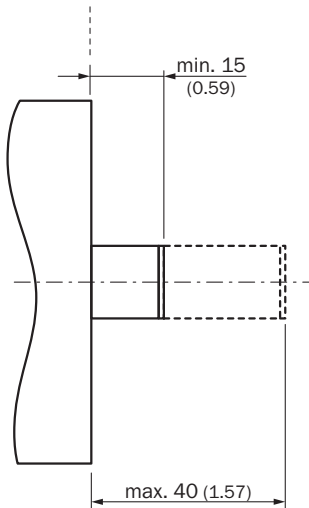
Blind hollow shaft



Diameter x f7 corresponds to the shaft diameter

## Attachment specifications

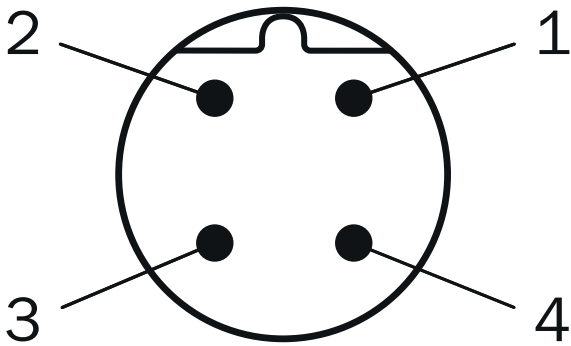
Blind hollow shaft



All dimensions in mm (inch)

## PIN assignment

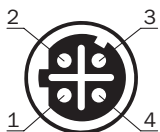
Male connector



Supply voltage

PIN	Signal
1	10 V ... 30 V
2	Not assigned
3	GND
4	Not assigned

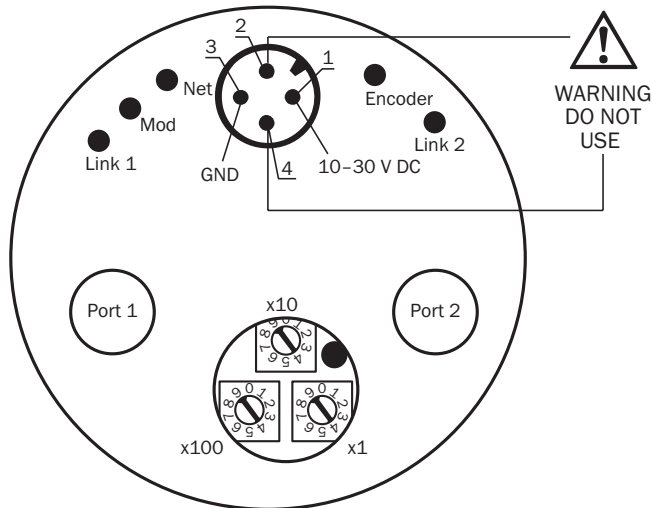
Female connector



Port 1, Port 2


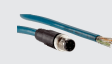
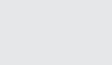
PIN	Signal
1	T x D+
2	R x D+
3	T x D-
4	R x D-

### Connection diagram



### Recommended accessories

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_Ethernet](http://www.sick.com/AFS_AFM60_Ethernet)

	Brief description	Type	Part no.
<b>Flanges</b>			
	One-sided stator coupling, slot, slot radius 33 mm to 211.9 mm, slot width 5.1 mm	BEF-DS03DFS/VFS	2047431
<b>Plug connectors and cables</b>			
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 2 m	STL-1204-G02ME90	6045284
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 5 m	STL-1204-G05ME90	6045285
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 10 m	STL-1204-G10ME90	6045286
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 2 m	STL-1204-W02ME90	6047912

	Brief description	Type	Part no.
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 10 m	STL-1204-W10ME90	6047914
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 25 m	STL-1204-W25ME90	6047915
	Head A: female connector, M12, 4-pin, straight, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 2 m	YF2A14-020UB3XLEAX	2095607
	Head A: female connector, M12, 4-pin, straight, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 5 m	YF2A14-050UB3XLEAX	2095608
	Head A: female connector, M12, 4-pin, straight, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 10 m	YF2A14-100UB3XLEAX	2095609
	Head A: female connector, M12, 4-pin, straight, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 25 m	YF2A14-250UB3XLEAX	2095615
	Head A: female connector, M12, 4-pin, angled, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 2 m	YG2A14-020UB3XLEAX	2095766
	Head A: female connector, M12, 4-pin, angled, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 5 m	YG2A14-050UB3XLEAX	2095767
	Head A: female connector, M12, 4-pin, angled, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 10 m	YG2A14-100UB3XLEAX	2095768
	Head A: female connector, M12, 4-pin, angled, A-coded Head B: Flying leads Cable: Sensor/actuator cable, PUR, halogen-free, unshielded, 25 m	YG2A14-250UB3XLEAX	2095771
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 5 m	YN2D24-050PN1XLEAX	2106175
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: Ethernet, PUR, halogen-free, shielded, 5 m	SSL-1204-G05ME90	6045277
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: Ethernet, PUR, halogen-free, shielded, 10 m	SSL-1204-G10ME90	6045279
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 2 m	YM2D24-020PN1M2D24	2106159
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 2 m	YM2D24-020PN1MRJA4	2106182
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 2 m	YM2D24-020PN1N2D24	2106165
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, twisted pair, PUR, halogen-free, shielded, 5 m	YM2D24-050EA1MRJA4	6034415
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 5 m	YM2D24-050PN1MRJA4	2106184

	Brief description	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 5 m	YM2D24-050PN1N2D24	2106166
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 10 m	YM2D24-100PN1MRJA4	2106185
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 10 m	YM2D24-100PN1N2D24	2106167
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 2 m	YN2D24-020PN1MRJA4	2106162
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 2 m	YN2D24-020PN1N2D24	2106168
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 5 m	YN2D24-050PN1MRJA4	2106163
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, PUR, halogen-free, shielded, 10 m	YN2D24-100PN1MRJA4	2106164
	Head A: female connector, M12, 4-pin, straight, D-coded Cable: Ethernet, shielded	DOS-1204-GE	6048153
	Head A: female connector, M12, 4-pin, angled Cable: unshielded	DOS-1204-W	6007303
	Head A: female connector, M12, 4-pin, angled, D-coded Cable: Ethernet, shielded	DOS-1204-WE	6048154
	Head A: male connector, RJ45, 8-pin, straight Cable: EtherNet/IP™, shielded	STE-0J08-GE	6048150
	Head A: male connector, M12, 4-pin, straight, D-coded Cable: Ethernet, shielded	STE-1204-GE01	6048151
	Head A: male connector, M12, 4-pin, angled, D-coded Cable: Ethernet, shielded	STE-1204-WE	6048152
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: Ethernet, shielded Cabinet through	Feedthrough female connector Ethernet RJ45	6048180



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SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

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