



## AFM60A-BFEB018x12

AFS/AFM60 EtherCAT®

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.



Illustration may differ



### Ordering information

Type	Part no.
AFM60A-BFEB018x12	1059055

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_EtherCAT](http://www.sick.com/AFS_AFM60_EtherCAT)

### Detailed technical data

#### Performance

<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>	EtherCAT®
<b>Communication Interface detail</b>	CoE (CAN over EtherCAT®)
<b>Encoder profile</b>	CiA DS-406
<b>Data transmission rate (baud rate)</b>	10 Mbit/s 100 Mbit/s
<b>Transmission medium</b>	CAT-5e cable
<b>Parameterising data</b>	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling-rate for speed monitoring, unit for output of the speed value, round axis functionality (multi-turnversion only), single or multi access mode, fast dataexchange mode
<b>Available diagnostics data</b>	Current, minimum and maximum temperature, maximum speed, positioning monitoring, power-on counter, operating hours counter for power-on/motion, counter of direction changes/number of movements cw/number of movements ccw, minimum and maximum operating voltage, signal monitoring for single and multiturn
<b>Initialization time</b>	Approx. 6 s
<b>Cycle time</b>	125 µs ... 100 ms

#### Electrical data

<b>Connection type</b>	Male connector, 1x, M12, 4-pin, axial Female connector, 2x, M12, 4-pin, axial
<b>Supply voltage</b>	10 ... 30 V DC
	Male connector, M12, 4-pin Female connector, M12, 4-pin
<b>MTTFd: mean time to dangerous failure</b>	80 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>	1/2"
<b>Weight</b>	0.2 kg
<b>Shaft material</b>	Stainless steel
<b>Housing material</b>	Aluminum
<b>Start up torque</b>	0.8 Ncm
<b>Operating torque</b>	0.6 Ncm
<b>Permissible shaft movement, axial static/dynamic</b>	± 0.5 mm, ± 0.1 mm
<b>Permissible shaft movement, radial static/dynamic</b>	± 0.3 mm, ± 0.05 mm
<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>

## Ambient data

<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3 <sup>1)</sup>
<b>Enclosure rating</b>	IP65, shaft side (according to IEC 60529) IP67, housing side (according to IEC 60529) <sup>2)</sup>
<b>Permissible relative humidity</b>	90 % (condensation of the optical scanning 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 (according to EN 60068-2-27)
<b>Resistance to vibration</b>	30 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)

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

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

## 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>ETIM 5.0</b>	EC001486
<b>ETIM 6.0</b>	EC001486
<b>ETIM 7.0</b>	EC001486
<b>UNSPSC 16.0901</b>	41112113



## PIN assignment

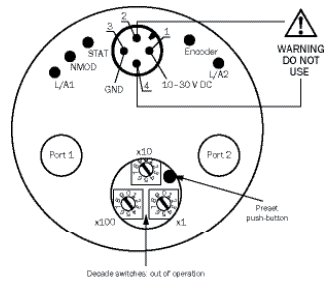
M12 - 4-pin (D coding)



Port 1				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue

Port 2				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue



M12 - 4-pin (A coding)








Power supply				
Signal	U <sub>s</sub> 10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4
Color wires	Brown	White	Blue	Black









## Recommended accessories

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_EtherCAT](http://www.sick.com/AFS_AFM60_EtherCAT)

	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
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M4 x 10	BEF-FA-036-050	2029160
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 60 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8, Aluminum, including 3 countersunk screws M4 x 8	BEF-FA-036-060REC	2029162
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum, Aluminum	BEF-FA-036-060RSA	2029163
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 63 mm square mounting plate, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M4 x 10	BEF-FA-036-063REC	2034225
<b>Other mounting accessories</b>			
	Plastic measuring wheel with smooth plastic surface (Hytrel), for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

	Brief description	Type	Part no.
	Plastic measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	O-ring for measuring wheels (circumference 200 mm)	BEF-OR-053-040	2064061
	O-ring for measuring wheels (circumference 300 mm)	BEF-OR-083-050	2064076
	<b>Plug connectors and cables</b>		
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 2 m	STL-1204-G02MZ90	6048247
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 5 m	STL-1204-G05MZ90	6048248
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 10 m	STL-1204-G10MZ90	6048249
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 2 m	STL-1204-W02MZ90	6048256
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 5 m	STL-1204-W05MZ90	6048257
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 10 m	STL-1204-W10MZ90	6048258
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: PROFINET, PVC, shielded, 25 m	STL-1204-W25MZ90	6048259
	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

	Brief description	Type	Part no.
	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: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 2 m	SSL-1204-F02MZ90	6048250
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 5 m	SSL-1204-F05MZ90	6048251
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 10 m	SSL-1204-F10MZ90	6048252
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 2 m	SSL-1204-G02MZ90	6048241
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 5 m	SSL-1204-G05MZ90	6048242
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, PVC, shielded, 10 m	SSL-1204-G10MZ90	6048243
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, PUR, halogen-free, shielded, 2 m	SSL-1204-W02MZ	6050635
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, PUR, halogen-free, shielded, 5 m	SSL-1204-W05MZ	6050636
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT®, PUR, halogen-free, shielded, 10 m	SSL-1204-W10MZ	6050637
	Head A: male connector, RJ45, 4-pin, straight Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT®, PVC, shielded, 2 m	SSL-2J04-F02MZ	6048253
	Head A: male connector, RJ45, 4-pin, straight Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT®, PVC, shielded, 5 m	SSL-2J04-F05MZ	6048254
	Head A: male connector, RJ45, 4-pin, straight Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT®, PVC, shielded, 10 m	SSL-2J04-F10MZ	6048255
	Head A: male connector, RJ45, 4-pin, straight Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT®, PVC, shielded, 30 m	SSL-2J04-F30MZ	6059450
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, PVC, shielded, 2 m	SSL-2J04-G02MZ60	6048244
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, PVC, shielded, 5 m	SSL-2J04-G05MZ60	6048245
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, PVC, shielded, 10 m	SSL-2J04-G10MZ60	6048246

	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, D-coded Cable: PROFINET, shielded	DOS-1204-GZ	6048263
	Head A: female connector, M12, 4-pin, angled Head B: - Cable: unshielded	DOS-1204-W	6007303
	Head A: female connector, M12, 4-pin, angled, D-coded Cable: PROFINET, shielded	DOS-1204-WZ	6048264
	Head A: male connector, RJ45, 4-pin, straight Cable: Ethernet, PROFINET, EtherCAT®, shielded	STE-0J04-GZ	6048260
	Head A: male connector, M12, 4-pin, straight, D-coded Cable: PROFINET, shielded	STE-1204-GZ	6048261
	Head A: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, shielded	STE-1204-WZ	6048262
 	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

## SICK AT A GLANCE

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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