



# AFM60A-S1B018x12

AFS/AFM60 Ethernet

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.



### Ordering information

Type	Part no.
AFM60A-S1IB018x12	1055331

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

Illustration may differ



### 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>	0 x 22
<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>	✓

## Electrical data

<b>Connection type</b>	Male connector, 1x, M12, 4-pin, axial <sup>1)</sup> Female connector, 2x, M12, 4-pin, axial <sup>2)</sup>
<b>Supply voltage</b>	10 ... 30 V
<b>Power consumption</b>	≤ 3 W (without load)
<b>Reverse polarity protection</b>	✓
<b>MTTFd: 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>	Solid shaft, Servo flange
<b>Shaft diameter</b>	6 mm
<b>Shaft length</b>	10 mm
<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>	0.5 Ncm (+20 °C)
<b>Operating torque</b>	0.3 Ncm (+20 °C)
<b>Permissible shaft load</b>	80 N / radial 40 N / axial
<b>Operating speed</b>	≤ 9,000 min <sup>-1</sup> <sup>1)</sup>
<b>Moment of inertia of the rotor</b>	6.2 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

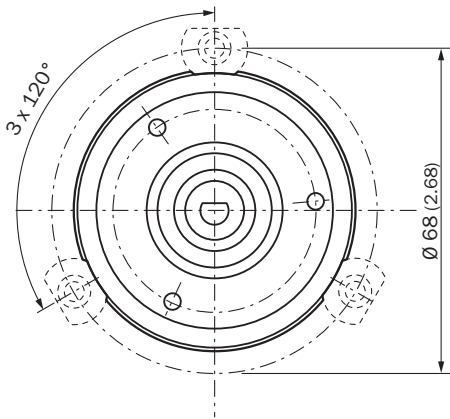
<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3
<b>Enclosure rating</b>	IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529) <sup>1)</sup>
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-40 °C ... +85 °C
<b>Storage temperature range</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.



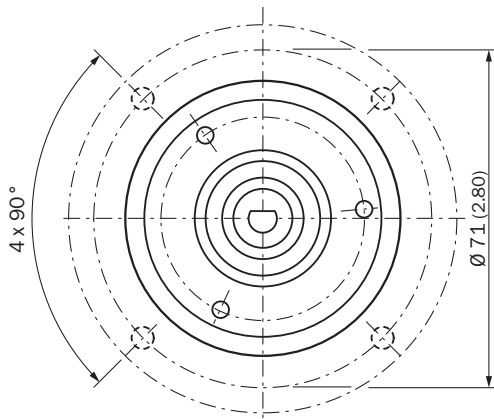
### Attachment specifications

Mounting requirements for small servo clamp



All dimensions in mm (inch)

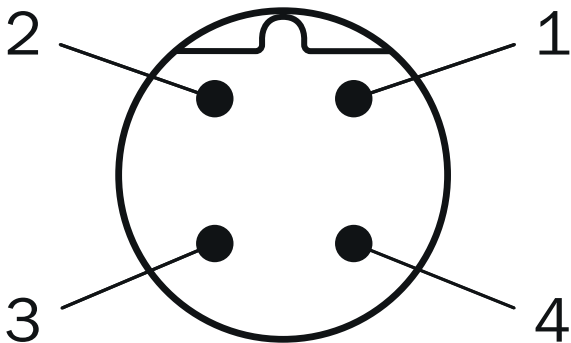
Mounting requirements for half-shell servo clamp



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

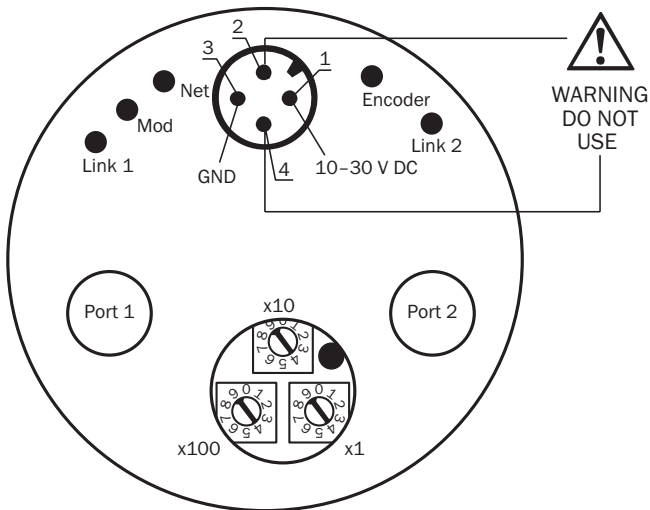
Female connector



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.
Other mounting accessories			
	Mounting bell for encoder with servo flange, 50 mm spigot, mounting kit included	BEF-MG-50	5312987

	Brief description	Type	Part no.
Plug connectors and cables			
	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
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: Flying leads Cable: Ethernet, PUR, halogen-free, shielded, 5 m	STL-1204-W05ME90	6047913
	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, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: Ethernet, PUR, halogen-free, shielded, 2 m	SSL-1204-G02ME90	6045222
	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

	Brief description	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 2 m	SSL-2J04-G02ME60	6047916
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 5 m	SSL-2J04-G05ME60	6047917
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 10 m	SSL-2J04-G10ME60	6047918
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 2 m	SSL-2J04-H02ME	6047911
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 5 m	SSL-2J04-H05ME	6045287
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: Ethernet, PUR, halogen-free, shielded, 10 m	SSL-2J04-H10ME	6045288
	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
<b>Shaft adaptation</b>			
	Bellows coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial $\pm$ 0.25 mm, axial $\pm$ 0.4 mm, angular $\pm$ 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial $\pm$ 0.25 mm, axial $\pm$ 0.4 mm, angular $\pm$ 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial $\pm$ 0.3 mm, axial $\pm$ 0.4 mm, angular $\pm$ 2.5°; max. speed 12,000 rpm, -10° to +80 °C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985

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