

AFS60A-S1EB262144

AFS/AFM60 Ethernet

ABSOLUTE ENCODERS





Ordering information

Туре	Part no.
AFS60A-S1EB262144	1059072

Other models and accessories → www.sick.com/AFS_AFM60_Ethernet

Illustration may differ



Detailed technical data

Performance

Number of steps per revolution (max. resolution)	262,144 (18 bit)
Error limits G	0.03° ¹⁾
Repeatability standard deviation $\boldsymbol{\sigma_{r}}$	0.002° ²⁾

¹⁾ 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.

Interfaces

Communication interface	EtherCAT [®]
Communication Interface detail	CoE (CAN over EtherCAT®)
Encoder profile	CiA DS-406
Data transmission rate (baud rate)	10 Mbit/s, 100 Mbit/s
Transmission medium	CAT-5e cable
Initialization time	6 s
Cycle time	125 μs 100 ms
Parameterising data	Number of steps per revolution PRESET Counting direction Sampling rate for speed calculation Unit for output of the speed value Singleturn or multiturn access mode Quicker data exchange mode
Available diagnostics data	Minimum and maximum temperature Maximumspeed Position monitoring Power-on counter Operatinghours counter power-on/motion Counter of direction changes/number of movements cw/number of movements ccw Minimum andmaximum operating voltage Signal monitoring for singleturn and multiturn

 $^{^{2)}\,\}mbox{ln}$ accordance with DIN ISO 55350-13; 68.3% of the measured values are inside the specified area.

Electrical data

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

¹⁾ A-coded.

Mechanical data

Mechanical design	Solid shaft, Servo flange
Shaft diameter	6 mm
Shaft length	10 mm
Weight	0.2 kg
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Start up torque	0.5 Ncm (+20 °C)
Operating torque	0.3 Ncm (+20 °C)
Permissible shaft loading	80 N (radial) 40 N (axial)
Operating speed	≤ 9,000 min ^{-1 1)}
Moment of inertia of the rotor	6.2 gcm ²
Bearing lifetime	3 x 10^9 revolutions
Angular acceleration	≤ 500,000 rad/s²

 $^{^{1)}}$ Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3 1)
Enclosure rating	IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529) ²⁾
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-40 °C +85 °C
Storage temperature range	-40 °C +100 °C, without package
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	30 g, 10 Hz 2,000 Hz (EN 60068-2-6)

 $^{^{1)}}$ The EMC according to the standards quoted is achieved if screened cables are used.

Classifications

ECLASS 5.0	27270502
ECLASS 5.1.4	27270502

²⁾ D-coded.

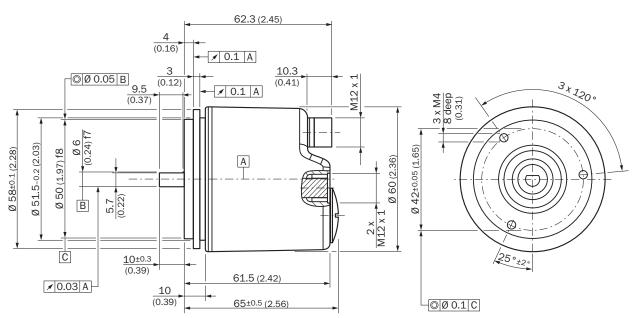
³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40°C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

²⁾ With mating connector fitted.

ECLASS 6.0	27270590
ECLASS 6.2	27270590
ECLASS 7.0	27270502
ECLASS 8.0	27270502
ECLASS 8.1	27270502
ECLASS 9.0	27270502
ECLASS 10.0	27270502
ECLASS 11.0	27270502
ECLASS 12.0	27270502
ETIM 5.0	EC001486
ETIM 6.0	EC001486
ETIM 7.0	EC001486
ETIM 8.0	EC001486
UNSPSC 16.0901	41112113

Dimensional drawing (Dimensions in mm (inch))

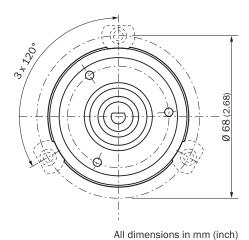
Solid shaft, servo flange



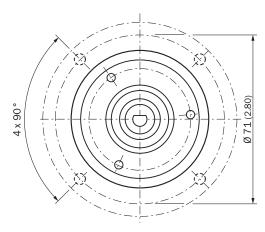
Diameter x f7 corresponds to the shaft diameter

Attachment specifications

Mounting requirements for small servo clamp



Mounting requirements for half-shell servo clamp



All dimensions in mm (inch)

PIN assignment

Male connector



Supply voltage

PIN	Wire color	Signal
1	Brown	U _S 10 V 30 V
2	White	Not assigned
3	Blue	GND
4	Black	Not assigned

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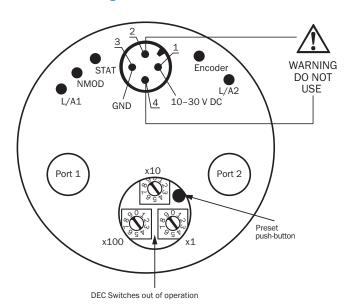
Female connector



Port 1. Port 2

PIN	Wire color	Signal
1	Yellow	T x D+
2	White	R x D+
3	Orange	T x D-
4	Blue	R x D-

Connection diagram



Recommended accessories

Other models and accessories → www.sick.com/AFS_AFM60_Ethernet

	Brief description	Туре	Part no.
Flanges			
	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 M3 x 10	BEF-FA-036-050	2029160
8 8	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

	Brief description	Туре	Part no.
	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 M3 x 10	BEF-FA-036-063REC	2034225
Other mounting	ng accessories		
(a)	Plastic measuring wheel with smooth plastic surface (Hytrel), for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
0	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Plastic measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Aluminium measuring wheel with 0-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 0-ring (NBR70) for 10 mm solid shaft, circumference 200 mm $$	BEF-MR010020R	2055224
	Aluminium measuring wheel with 0-ring (NBR70) for 10 mm solid shaft, circumference 300 mm $$	BEF-MR010030R	2049278
	Measuring wheel with 0-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), 2x O-ring	BEF-OR-083-050	2064076
	Mounting bell for encoder with servo flange, 50 mm spigot, mounting kit included	BEF-MG-50	5312987
	Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub	BEF-WG-SF050	2029165
	Servo clamps, large, for servo flange (clamps, eccentric fastener), 3 pcs, without mounting material, without mounting hardware	BEF-WK-SF	2029166
Others			
	Connection type head A: Female connector, M12, 4-pin, angled, A-coded Description: Unshielded, Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm 6.5 mm Head B: - Connection systems: Screw-type terminals Permitted cross-section: ≤ 0.75 mm²	DOS-1204-W	6007303
0	 Connection type head A: Female connector, M12, 4-pin, D-coded Connection type head B: Female connector, RJ45, 8-pin Signal type: Ethernet Cable: CAT5, CAT5e Description: Ethernet, shielded Note: Cabinet through 	Feedthrough fe- male connector Ethernet RJ45	6048180

	Brief description	Туре	Part no.
	 Connection type head A: Female connector, M12, 4-pin, straight, D-coded Signal type: PROFINET Cable: CAT5, CAT5e Description: PROFINET, shielded, Head A: female connector, M12, 4-pin, straight, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm 8 mm Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² 0.34 mm² 	DOS-1204-GZ	6048263
	 Connection type head A: Female connector, M12, 4-pin, angled, D-coded Signal type: PROFINET Cable: CAT5, CAT5e Description: PROFINET, shielded, Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm 8 mm Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² 0.34 mm² 	DOS-1204-WZ	6048264
10p 10p	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: PROFINET Cable: 5 m, 4-wire, CAT5, CAT5e, PUR, halogen-free Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, angled, D coded Cable: PUR, halogen-free, shielded, 4 x 0.34 mm², Ø 6.5 mm 	SSL-1204-W05MZ	6050636
	 Connection type head A: Male connector, RJ45, 4-pin, straight Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: PROFINET, EtherCAT[®] Cable: 30 m, 4-wire, CAT5, CAT5e, PVC Description: PROFINET, EtherCAT[®], shielded 	SSL-2J04-F30MZ	6059450
	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: PROFINET Cable: 5 m, 4-wire, CAT5, CAT5e, PVC Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, RJ45, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm 	SSL-2J04-G05MZ60	6048245
	 Connection type head A: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: CAT5, CAT5e Description: Ethernet, PROFINET, shielded, Head A: male connector, RJ45, 4-pin, straight, shielded, PROFINET, EtherCAT, for cable diameter 4.5 mm 8 mm Connection systems: IDC quick connection Permitted cross-section: 4 mm² 8 mm² 	STE-0J04-GZ	6048260
Co	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Signal type: PROFINET Cable: CAT5, CAT5e Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, straight, D coded, shielded, for cable diameter 4 mm 8 mm Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² 0.34 mm² 	STE-1204-GZ	6048261
	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Signal type: PROFINET Cable: CAT5, CAT5e Description: PROFINET, shielded, Head A: male connector, M12, 4-pin, angled, D coded, shielded, for cable diameter 4 mm 8 mm Connection systems: IDC quick connection Permitted cross-section: 0.14 mm² 0.34 mm² 	STE-1204-WZ	6048262
	 Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 2 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YF2A14- 020UB3XLEAX	2095607

Brief description	Туре	Part no.
 Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YF2A14- 050UB3XLEAX	2095608
 Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 10 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YF2A14- 100UB3XLEAX	2095609
 Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 25 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YF2A14- 250UB3XLEAX	2095615
 Connection type head A: Female connector, M12, 4-pin, angled, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 2 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YG2A14- 020UB3XLEAX	2095766
 Connection type head A: Female connector, M12, 4-pin, angled, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YG2A14- 050UB3XLEAX	2095767
 Connection type head A: Female connector, M12, 4-pin, angled, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 10 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YG2A14- 100UB3XLEAX	2095768
 Connection type head A: Female connector, M12, 4-pin, angled, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 25 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Zones with oils and lubricants, Drag chain operation, Robot 	YG2A14- 250UB3XLEAX	2095771
 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 25 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 250PN1XLEAX	2106180
 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 100PN1XLEAX	2106176
 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 5 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 050PN1XLEAX	2106175

	Brief description	Туре	Part no.
	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 020PN1XLEAX	2106174
	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 100PN1XLEAX	2106173
	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 5 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 050PN1XLEAX	2106172
	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Flying leads Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 020PN1XLEAX	2106171
	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 100PN1N2D24	2106170
	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 020PN1N2D24	2106168
8 8	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, straight, D-coded Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 100PN1M2D24	2106161
8 8	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, straight, D-coded Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 020PN1M2D24	2106159
	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 100PN1N2D24	2106167
6.0	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: Ethernet, PROFINET Cable: 5 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 050PN1N2D24	2106166

	Brief description	Туре	Part no.
6.6	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, angled, D-coded Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 020PN1N2D24	2106165
P &	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 020PN1MRJA4	2106182
88	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 100PN1MRJA4	2106185
96	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 10 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 100PN1MRJA4	2106164
96	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 5 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 050PN1MRJA4	2106163
36	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 2 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 020PN1MRJA4	2106162
8 8	 Connection type head A: Male connector, M12, 4-pin, straight, D-coded Connection type head B: Male connector, M12, 4-pin, straight, D-coded Signal type: Ethernet, PROFINET Cable: 5 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YM2D24- 050PN1M2D24	2106160
96	 Connection type head A: Male connector, M12, 4-pin, angled, D-coded Connection type head B: Male connector, RJ45, 4-pin, straight Signal type: Ethernet, PROFINET Cable: 3 m, 4-wire, PUR, halogen-free Description: Ethernet, PROFINET, shielded Application: Drag chain operation, Zones with oils and lubricants 	YN2D24- 030PN1MRJA4	2144265

SICK AT A GLANCE

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