



AFM60I-S4SK004096

AFS/AFM60 SSI

ABSOLUTE ENCODERS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

Type	Part no.
AFM60I-S4SK004096	1114389

Other models and accessories → www.sick.com/AFS_AFM60_SSI

Detailed technical data

Performance

Number of steps per revolution (max. resolution)	4,096 (12 bit)
Number of revolutions	4,096 (12 bit)
Max. resolution (number of steps per revolution x number of revolutions)	12 bit x 12 bit (4,096 x 4,096)
Measuring step deviation	± 0.008° pulses 100 ... 10,000
Error limits G	0.03° ¹⁾
Repeatability standard deviation σ_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.

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

Interfaces

Communication interface	SSI
Communication Interface detail	SSI + Sin/Cos
Initialization time	50 ms ¹⁾
Position forming time	< 1 µs
Code type	Gray
Code sequence parameter adjustable	CW/CCW (V/R)
Interface signals	Sin+, Sin-, Cos+, Cos-: analog, differential
Clock frequency	2 MHz ²⁾
Set (electronic adjustment)	H-active (L = 0 - 3 V, H = 4,0 - U _s V)
CW/CCW (counting sequence when turning)	L-active (L = 0 - 1,5 V, H = 2,0 - U _s V)
Sine/cosine periods per revolution	1,024

¹⁾ Valid positional data can be read once this time has elapsed.

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

Output frequency	≤ 200 kHz
Load resistance	≥ 120 Ω
Signal before differential generation	0.5 V _{pp} , ± 20 %, 120 Ω
Signal offset before differential generation	2.5 V ± 10 %
Signal after differential generation	1 V _{pp} , ± 20 %, 120 Ω

¹⁾ Valid positional data can be read once this time has elapsed.

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

Electrical data

Connection type	Cable, 12-wire, radial, 1.5 m
Supply voltage	4.5 ... 32 V DC
Power consumption	≤ 0.5 W (without load)
Reverse polarity protection	✓
MTTFd: mean time to dangerous failure	250 years (EN ISO 13849-1) ¹⁾

¹⁾ 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

Mechanical design	Solid shaft, face mount flange
Shaft diameter	10 mm
Shaft length	19 mm
Weight	0.5 kg ¹⁾
Shaft material	Stainless steel V2A
Flange material	Stainless steel V2A
Housing material	Stainless steel V2A
Start up torque	1 Ncm (+20 °C)
Operating torque	0.5 Ncm (+20 °C)
Permissible shaft loading	80 N (radial) 40 N (axial)
Operating speed	9,000 min ⁻¹ ²⁾
Moment of inertia of the rotor	6.2 gcm ²
Bearing lifetime	3.0 x 10 ⁹ revolutions
Angular acceleration	≤ 500,000 rad/s ²

¹⁾ Based on devices with male connector.

²⁾ 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	IP67, shaft side (IEC 60529) IP67, housing side, cable connection (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)

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

²⁾ Stationary position of the cable.

³⁾ Flexible position of the cable.

Operating temperature range	-40 °C ... +100 °C ²⁾ -30 °C ... +100 °C ³⁾
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	10 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

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

²⁾ Stationary position of the cable.

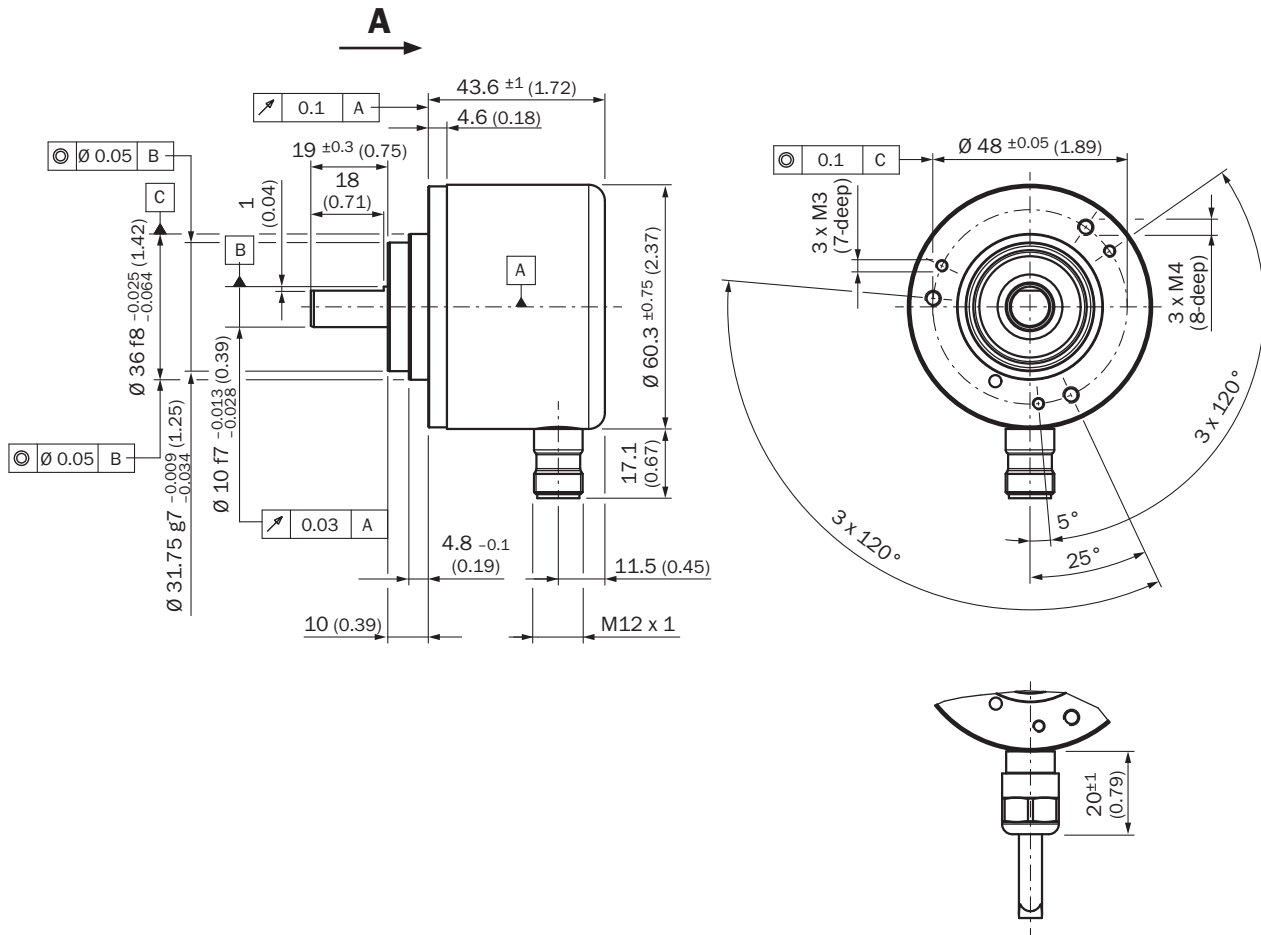
³⁾ Flexible position of the cable.

Classifications

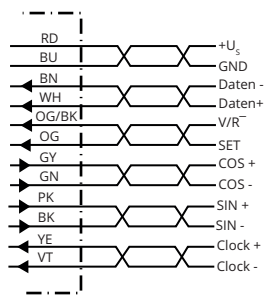
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eCl@ss 5.1.4	27270502
eCl@ss 6.0	27270590
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eCl@ss 7.0	27270502
eCl@ss 8.0	27270502
eCl@ss 8.1	27270502
eCl@ss 9.0	27270502
eCl@ss 10.0	27270502
eCl@ss 11.0	27270502
eCl@ss 12.0	27270502
ETIM 5.0	EC001486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

Dimensional drawing (Dimensions in mm (inch))

Solid shaft, face mount flange



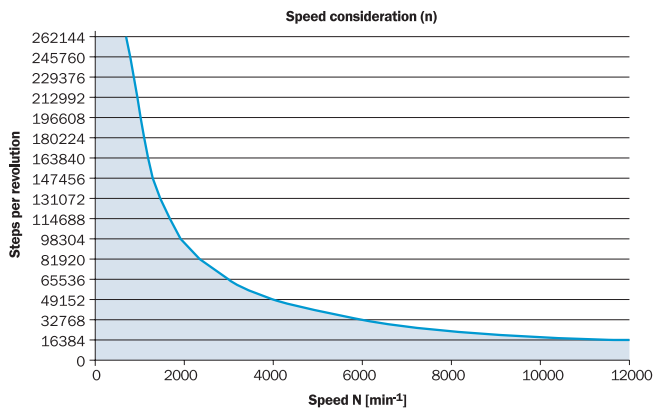
PIN assignment



Male connector M12, 8-pin	Connector M12, 12-pin	Wire colors (cable connection)	Signal Incremental	Signal Sin/Cos	Explanation
3	1	Orange/black	V/R	V/R	Sequence in direction of rotation
2	2	White	Data +	Data +	Interface signals
1	3	Brown	Data -	Data -	Interface signals
6	4	Violet	Clock -	Clock -	Interface signals

Male connector M12, 8-pin	Connector M12, 12-pin	Wire colors (cable connection)	Signal Incremental	Signal Sin/Cos	Explanation
8	5	Red	+U _S	+U _S	Operating voltage
-	6	Gray	A	+ COS	Signal cable
-	7	Green	A ⁻	- COS	Signal cable
4	8	Pink	B	+ SIN	Signal cable
-	9	Black	B ⁻	- SIN	Signal cable
-	10	Orange	SET	SET	Electronic adjustment
5	11	Yellow	Clock +	Clock +	Interface signals
7	12	Blue	GND	GND	Ground connection
			Screen	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

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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