



AFM60A-S1RA262144

AFS/AFM60 SSI

ABSOLUTE ENCODERS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

| Type | Part no. |
|-------------------|----------|
| AFM60A-S1RA262144 | 1052837 |

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

Detailed technical data

Performance

| | |
|---|-----------------------------------|
| Number of steps per revolution (max. resolution) | 262,144 (18 bit) |
| Number of revolutions | 4,096 (12 bit) |
| Max. resolution (number of steps per revolution x number of revolutions) | 18 bit x 12 bit (262,144 x 4,096) |
| 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 + incremental |
| Initialization time | 50 ms ¹⁾ |
| Position forming time | < 1 μ s |
| Code type | Gray |
| Code sequence parameter adjustable | CW/CCW (V/R) parameter adjustable |
| Clock frequency | \leq 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) |
| Pulses per revolution | 1/4 of number of SSI steps per revolution |
| Output frequency | \leq 820 kHz |
| Load current | \leq 30 mA |

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

²⁾ Minimum, LOW level (Clock +): 250 ns.

Electrical data

| | |
|--|--|
| Connection type | Male connector, M23, 12-pin, radial |
| Supply voltage | 4.5 ... 32 V |
| Power consumption | ≤ 0.7 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, Servo flange |
| Shaft diameter | 6 mm |
| Shaft length | 10 mm |
| Weight | 0.3 kg ¹⁾ |
| Shaft material | Stainless steel |
| Flange material | Aluminum |
| Housing material | Aluminum die cast |
| 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 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 | IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529) ²⁾ |
| Permissible relative humidity | 90 % (Condensation not permitted) |
| Operating temperature range | -40 °C ... +100 °C ³⁾ |
| Storage temperature range | -40 °C ... +100 °C, without package |
| Resistance to shocks | 60 g, 6 ms (EN 60068-2-27) |
| Resistance to vibration | 20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6) |

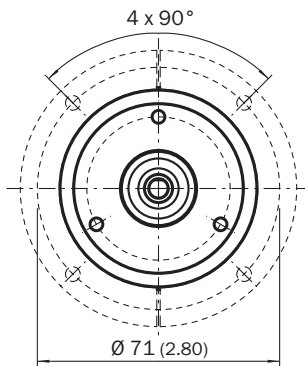
¹⁾ EMC according to the standards quoted is achieved if shielded cables are used.

²⁾ For devices with male connector: with mounted mating connector.

³⁾ Stationary position of the cable.

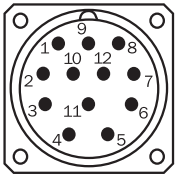
Classifications

| | |
|---------------------|----------|
| ECLASS 5.0 | 27270502 |
| ECLASS 5.1.4 | 27270502 |



PIN assignment

M23 male connector, 12-pin and cable, 12-wire, SSI/Gray + incremental



View of M23 male device connector on encoder

| PIN | Wire colors (cable connection) | Signal Sin/Cos | Explanation |
|-----|--------------------------------|----------------|---|
| 1 | Red | U _S | Operating voltage |
| 2 | Blue | GND | Ground connection |
| 3 | Yellow | Clock + | Interface signals |
| 4 | White | Data + | Interface signals |
| 5 | Orange | SET | Electronic adjustment |
| 6 | Brown | Data - | Interface signals |
| 7 | Violet | Clock - | Interface signals |
| 8 | Black | \bar{B} | Signal wire |
| 9 | Orange-black | CW/CCW (V/R) | Sequence in direction of rotation |
| 10 | Green | \bar{A} | Signal wire |
| 11 | Gray | A | Signal wire |
| 12 | Pink | B | Signal wire |
| | | Screen | Screen connected to housing on encoder side. Connected to ground on control side. |






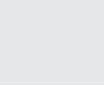


Diagrams







The maximum speed is also dependent on the shaft type.

Recommended accessories

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

| | Brief description | Type | Part no. |
|---|--|------------|----------|
| Programming and configuration tools | | | |
|  | USB programming unit, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders | PGT-08-S | 1036616 |
|  | Programming unit display for programmable SICK DFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoder with DFS60, AFS/AFM60 and AHS/AHM36. Compact dimensions, low weight, and intuitive operation. | PGT-10-Pro | 1072254 |
| Other mounting accessories | | | |
|  | Servo clamps, large, for servo flange (clamps, eccentric fastener), 3 pcs, without mounting material, without mounting hardware | BEF-WK-SF | 2029166 |
| Shaft adaptation | | | |
|  | Bellows coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular +/- 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 |
|  | Cross-slotted coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, -10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub | KUP-0606-S | 2056406 |
|  | Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub | KUP-0608-S | 5314179 |
|  | Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular +/- 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 |
|  | Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially +/- 2,5 mm, axially +/- 3 mm, angle +/- 10 degrees; max. speed 3.000 rpm, -30 to +80 degrees Celsius, torsional spring stiffness of 25 Nm/rad | KUP-0610-D | 5326697 |

| | Brief description | Type | Part no. |
|---|---|-------------------|----------|
|  | Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial +/- 0.3 mm, axial +/- 0.4 mm, angular +/- 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 |
|  | Claw coupling, shaft diameter 6 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular ± 1.3°, max. speed 19,000 rpm, angle of twist max. 10°, -30 °C to +80 °C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane | KUP-0610-J | 2127056 |
|  | Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub | KUP-0610-S | 2056407 |
| Others | | | |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, angled, A-coded • Signal type: HIPERFACE[®], SSI, Incremental • Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: -20 °C ... +130 °C • Connection systems: Solder connection | DOS-2312-W01 | 2072580 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight, A-coded • Signal type: HIPERFACE[®], SSI, Incremental • Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40 °C ... +125 °C • Connection systems: Solder connection | DOS-2312-G02 | 2077057 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight, A-coded • Signal type: HIPERFACE[®], SSI, Incremental • Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: -20 °C ... +130 °C • Connection systems: Solder connection | DOS-2312-G | 6027538 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 3 m, 12-wire • Description: Shielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G03MMD2 | 2062300 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 5 m, 12-wire • Description: Shielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G05MMD2 | 2062301 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 1.5 m, 12-wire • Description: Unshielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G1M5MMD2 | 2062284 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 10 m, 12-wire • Description: Shielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G10MMD2 | 2062302 |

| | Brief description | Type | Part no. |
|---|--|------------------|----------|
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 20 m, 12-wire • Description: Shielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G20MMD2 | 2062303 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Flying leads • Cable: 30 m, 12-wire • Description: Shielded, Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm | DOL-2312-G30MMD2 | 2062304 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 9-pin, straight, A-coded • Signal type: HIPERFACE[®], SSI, Incremental • Description: HIPERFACE[®], SSI, Incremental, shielded, Head A: female connector, M23, 9-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: -20 °C ... +130 °C • Connection systems: Solder connection | DOS-2309-G | 6028533 |
|  | <ul style="list-style-type: none"> • Connection type head A: Female connector, M23, 12-pin, straight • Connection type head B: Male connector, D-Sub, 9-pin, straight • Signal type: SSI + incremental, SSI + Sin/Cos • Cable: 0.5 m, 8-wire, PUR, halogen-free • Description: SSI + incremental, SSI + Sin/Cos, shielded, Programming cable for PGT-08-S and PGT-10-S programming tool • Note: Programming adapter cable for programming tool PGT-10-Pro and PGT-08-S | DSL-3D08-G0M5AC4 | 2059270 |

SICK AT A GLANCE

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