



AFS60A-S4AA131072

AFS/AFM60 SSI

ABSOLUTE ENCODERS

SICK
Sensor Intelligence.



Ordering information

| Type | Part no. |
|-------------------|----------|
| AFS60A-S4AA131072 | 1054929 |

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

Illustration may differ



Detailed technical data

Performance

| | |
|---|----------------------|
| Number of steps per revolution (max. resolution) | 131,072 (17 bit) |
| 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 |
| 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) |

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 | \leq 0.7 W (without load) |
| Reverse polarity protection | ✓ |
| MTTF: 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 | 0.3 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.

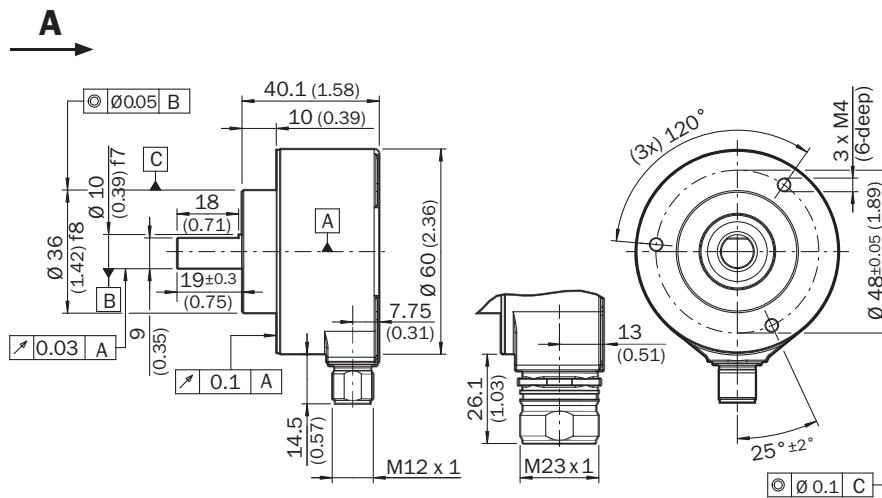
Classifications

| | |
|---------------------|----------|
| eCI@ss 5.0 | 27270502 |
| eCI@ss 5.1.4 | 27270502 |
| eCI@ss 6.0 | 27270590 |
| eCI@ss 6.2 | 27270590 |
| eCI@ss 7.0 | 27270502 |
| eCI@ss 8.0 | 27270502 |
| eCI@ss 8.1 | 27270502 |
| eCI@ss 9.0 | 27270502 |
| eCI@ss 10.0 | 27270502 |
| eCI@ss 11.0 | 27270502 |
| eCI@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))

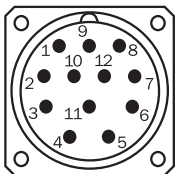
Face mount flange, M12 and M23 radial male connector



General tolerances according to DIN ISO 2768-mk

PIN assignment

M23 male connector, 12-pin, SSI/Gray

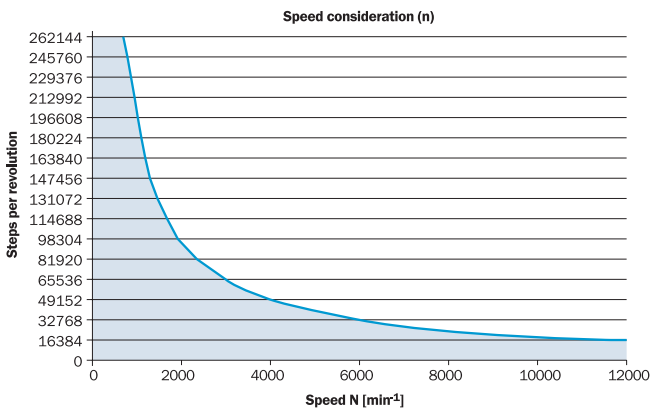


View of M23 male device connector on encoder

| PIN | Signal | Explanation |
|-----|----------------|-------------------|
| 1 | GND | Ground connection |
| 2 | Data + | Interface signals |
| 3 | Clock + | Interface signals |
| 4 | N.C. | Not assigned |
| 5 | N.C. | Not assigned |
| 6 | N.C. | Not assigned |
| 7 | N.C. | Not assigned |
| 8 | U _s | Operating voltage |

| PIN | Signal | Explanation |
|-----|---------|---|
| 9 | SET | Electronic adjustment |
| 10 | Data - | Interface signals |
| 11 | Clock - | Interface signals |
| 12 | V/R | Sequence in direction of rotation |
| | 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. |
|---|--|------------------|----------|
| Flanges | | | |
|  | Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum, Aluminum | BEF-FA-036-100 | 2029161 |
| Other mounting accessories | | | |
|  | Servo clamps, large, for servo flange (clamps, eccentric fastener), 3 pcs, without mounting material, without mounting hardware | BEF-WK-SF | 2029166 |
| Plug connectors and cables | | | |
|  | Head A: cable Head B: Flying leads Cable: SSI, Incremental, HIPERFACE®, PUR, halogen-free, shielded | LTG-2308-MWENC | 6027529 |
|  | Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 3 m | DOL-2308-G03MAA6 | 2048597 |
|  | Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 5 m | DOL-2308-G05MAA6 | 2048598 |

| | Brief description | Type | Part no. |
|---|---|------------------|----------|
|  | Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 0.5 m | DOL-2308-G0M5AA6 | 2048595 |
| | Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 10 m | DOL-2308-G10MAA6 | 2048599 |
| | Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 1.5 m | DOL-2308-G1M5AA6 | 2048596 |
| | Head A: female connector, M23, 9-pin, straight Cable: HIPERFACE®, SSI, Incremental, shielded | DOS-2309-G | 6028533 |
| | Head A: female connector, M23, 12-pin, straight Cable: HIPERFACE®, SSI, Incremental, shielded | DOS-2312-G | 6027538 |
| | | DOS-2312-G02 | 2077057 |
|  | Head A: female connector, M23, 12-pin, angled Cable: HIPERFACE®, SSI, Incremental, shielded | DOS-2312-W01 | 2072580 |
| Shaft adaptation | | | |
|  | Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. speed 10,000 rpm, -30°C to $+120^\circ\text{C}$, 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 |
|  | Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular $\pm 2.5^\circ$; max. speed 12,000 rpm, -10° to $+80^\circ\text{C}$, 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 $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10° , -30°C to $+80^\circ\text{C}$, 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 $\pm 3^\circ$; max. speed 10,000 rpm, -10° to $+80^\circ\text{C}$, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub | KUP-0610-S | 2056407 |
|  | Double loop coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radially ± 0.25 mm, axially ± 0.4 mm, angle ± 4 degrees; max. speed 10,000 rpm, -30 to $+120$ degrees Celsius, torsional spring stiffness of 150 Nm/rad | KUP-0810-D | 5326704 |
|  | Claw coupling, shaft diameter 8 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10° , -30°C to $+80^\circ\text{C}$, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane | KUP-0810-J | 2128267 |
|  | Bar coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radial ± 0.3 mm, axial ± 0.3 mm, angular $\pm 3^\circ$; max. speed 10,000 rpm, -10° to $+80^\circ\text{C}$, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub | KUP-0810-S | 5314178 |
|  | Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. revolutions 10,000 rpm, -30° to $+120^\circ\text{C}$, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs | KUP-1010-B | 5312983 |
|  | Double loop coupling, shaft diameter 10 mm / 10 mm, Maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular $\pm 10^\circ$; max. speed 3,000 rpm, -30° to $+80^\circ\text{C}$, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange | KUP-1010-D | 5326703 |

| | Brief description | Type | Part no. |
|---|---|------------|----------|
|  | Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin | KUP-1010-F | 5312986 |
|  | Claw coupling, shaft diameter 10 mm / 10 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10° , -30° C to $+80^\circ$ C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane | KUP-1010-J | 2127054 |
|  | Bar coupling, shaft diameter 10 mm / 10 mm; maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular $\pm 3^\circ$; speed 10,000 rpm, -10° to $+80^\circ$ Celsius, max. torque 80 Ncm; material: glass fiber-reinforced polyamide, aluminum hub | KUP-1010-S | 2056408 |
|  | Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset, radial ± 1.5 mm, axial ± 1.0 mm, angle $\pm 5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin | KUP-1010-W | 5319914 |
|  | 10 mm / 12 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular $\pm 4^\circ$; max. revolutions 10,000 rpm, -30° to $+120^\circ$ C, max. torque 120 Ncm; material: stainless steel bellows, aluminum clamping hubs | KUP-1012-B | 5312984 |
|  | Double loop coupling, shaft diameter 10 mm / 12 mm, Maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular $\pm 10^\circ$; max. speed 3,000 rpm, -30° to $+80^\circ$ C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange | KUP-1012-D | 5326702 |
|  | Claw coupling, shaft diameter 10 mm / 12 mm, damping element 80 shore blue, maximum shaft offset: radial ± 0.22 mm, axial ± 1 mm angular $\pm 1.3^\circ$, max. speed 19,000 rpm, angle of twist max. 10° , -30° C to $+80^\circ$ C, max. torque 800 Ncm, tightening torque of screws: ISO 4029 150 Ncm, material: aluminum flange, damping element: polyurethane | KUP-1012-J | 2128265 |

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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.

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