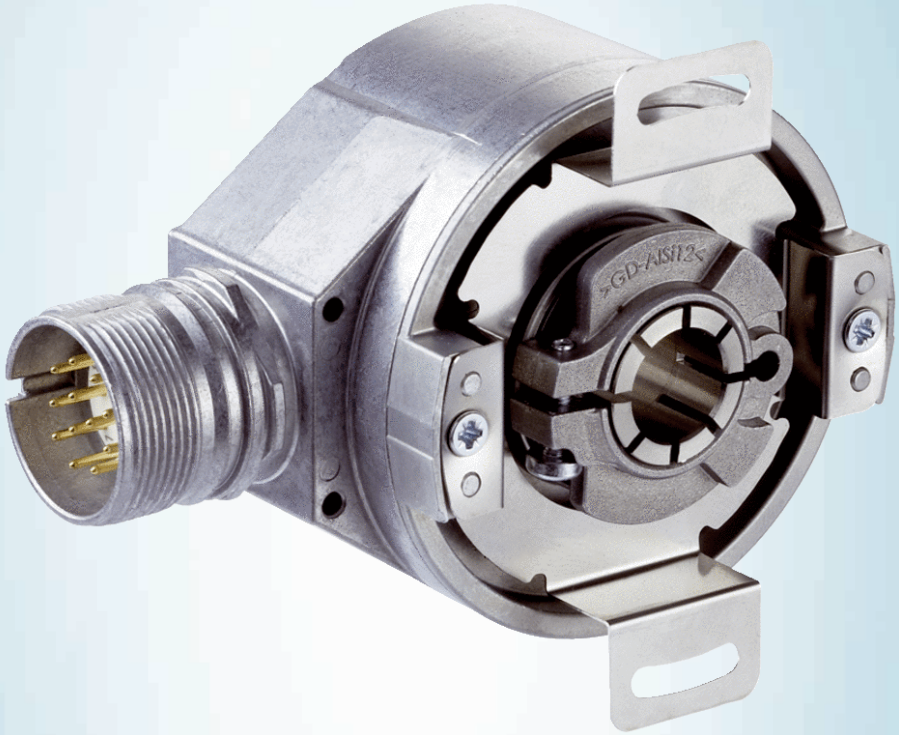
Data sheet



# AFM60A-TBAA032768

## AFS/AFM60 SSI

**ABSOLUTE ENCODERS**

SICK
Sensor Intelligence.

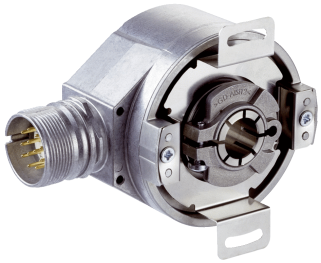


Illustration may differ

## Ordering information

| Type | part no. |
|---|---|
| AFM60A-TBAA032768 | 1086779 |

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

## Detailed technical data

### Safety-related parameters

| | |
|---|---|
| **$MTTF_D$ (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.

### Performance

| | |
|---|---|
| **Number of steps per revolution (max. resolution)** | 32,768 (15 bit) |
| **Number of revolutions** | 4,096 (12 bit) |
| **Max. resolution (number of steps per revolution x number of revolutions)** | 15 bit x 12 bit (32,768 x 4,096) |
| **Error limits G** | 0.03 ° [1] |
| **Repeatability standard deviation $\sigma_r$** | 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.
[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 µs |
| **Code type** | Gray |
| **Code sequence parameter adjustable** | CW/CCW (V/R) parameter adjustable |
| **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 - Us V) |

[1] Valid positional data can be read once this time has elapsed.
[2] Minimum, LOW level (Clock +): 250 ns.

## Electronics

| | |
|---|---|
| **Connection type** | Male connector, M23, 12-pin, radial |
| **Supply voltage** | 4.5 ... 32 V |
| **Power consumption** | ≤ 0.7 W (without load) |
| **Reverse polarity protection** | ✓ |

## Mechanics

| | |
|---|---|
| **Mechanical design** | Through hollow shaft |
| **Shaft diameter** | 8 mm |
| **Characteristics of the shaft** | Front clamp |
| **Weight** | 0.2 kg [1] |
| **Shaft material** | Stainless steel |
| **Flange material** | Aluminum |
| **Housing material** | Aluminum die cast |
| **Start up torque** | < 0.8 Ncm (+20 °C) |
| **Operating torque** | < 0.6 Ncm (+20 °C) |
| **Permissible movement static** | ± 0.5 mm (axial)<br>± 0.3 mm (radial) |
| **Permissible movement dynamic** | ± 0.1 mm (axial)<br>± 0.05 mm (radial) |
| **Operating speed** | ≤ 9,000 $min^{-1}$ [2] |
| **Moment of inertia of the rotor** | 40 $gcm^2$ |
| **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)<br>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.

## Certificates

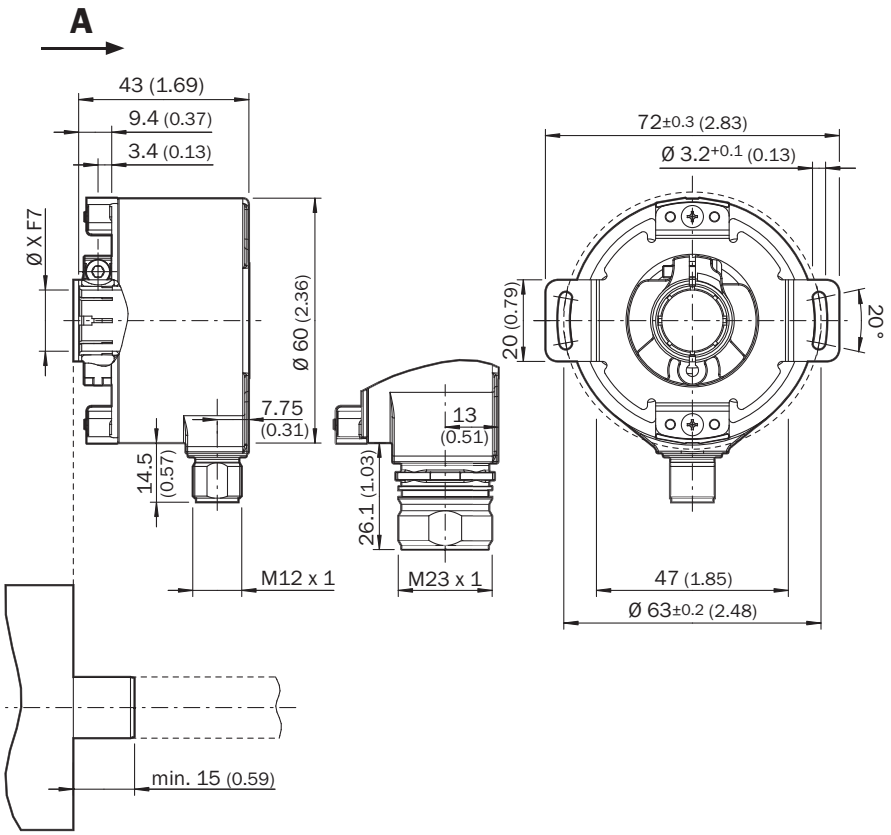
| | |
|---|---|
| **EU declaration of conformity** | ✓ |
| **UK declaration of conformity** | ✓ |
| **ACMA declaration of conformity** | ✓ |
| **Moroccan declaration of conformity** | ✓ |

| | |
|---|---|
| **China-RoHS** | ✓ |
| **cULus certificate** | ✓ |
| **Information according to Art. 3 of Data Act (Regulation EU 2023/2854)** | ✓ |

## Classifications

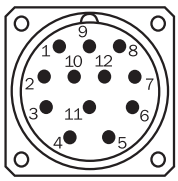
| | |
|---|---|
| **ECLASS 5.0** | 27270502 |
| **ECLASS 5.1.4** | 27270502 |
| **ECLASS 6.0** | 27270590 |
| **ECLASS 6.2** | 27270590 |
| **ECLASS 7.0** | 27270502 |
| **ECLASS 8.0** | 27270502 |
| **ECLASS 8.1** | 27270502 |
| **ECLASS 9.0** | 27270502 |
| **ECLASS 10.0** | 27270502 |
| **ECLASS 11.0** | 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)
① cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

## PIN assignment M23 male connector, 12-pin, SSI/Gray

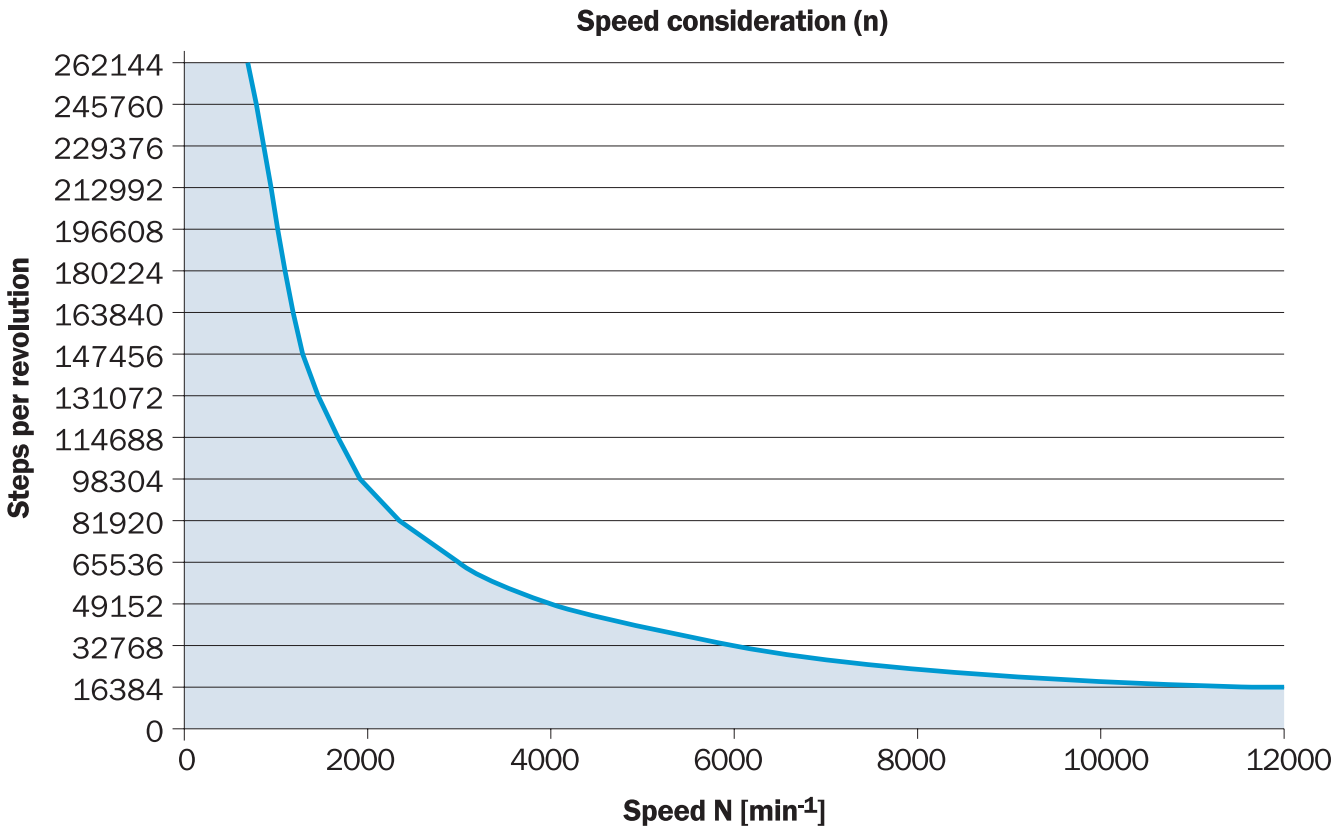



view of M23 male device connector on encoder

| 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 |
| 9 | SET | Electronic adjustment |

| PIN | Signal | Explanation |
|---|---|---|
| 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. |
|---|---|---|---|
| connectors and cables | | | |
|  | • **Connection type head A:** Flying leads<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI, Incremental, HIPERFACE®<br>• **Items supplied:** By the meter<br>• **Cable:** 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded, Incremental, HIPERFACE® | LTG-2308-MWENC | 6027529 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, angled, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental<br>• **Connection systems:** Solder connection | DOS-2312-W01 | 2072580 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental<br>• **Connection systems:** Solder connection | DOS-2312-G02 | 2077057 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental<br>• **Connection systems:** Solder connection | DOS-2312-G | 6027538 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI<br>• **Cable:** 0.5 m, 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded | DOL-2308-G0M5AA6 | 2048595 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI<br>• **Cable:** 3 m, 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded | DOL-2308-G03MAA6 | 2048597 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI<br>• **Cable:** 5 m, 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded | DOL-2308-G05MAA6 | 2048598 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI<br>• **Cable:** 1.5 m, 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded | DOL-2308-G1M5AA6 | 2048596 |
|  | • **Connection type head A:** Female connector, M23, 12-pin, straight<br>• **Connection type head B:** Flying leads<br>• **Signal type:** SSI<br>• **Cable:** 10 m, 8-wire, PUR, halogen-free<br>• **Description:** SSI, shielded | DOL-2308-G10MAA6 | 2048599 |
|  | • **Connection type head A:** Female connector, M23, 9-pin, straight, A-coded<br>• **Signal type:** HIPERFACE®, SSI, Incremental<br>• **Description:** HIPERFACE®, shieldedSSIIncremental<br>• **Connection systems:** Solder connection | DOS-2309-G | 6028533 |

# SICK AT A GLANCE

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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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