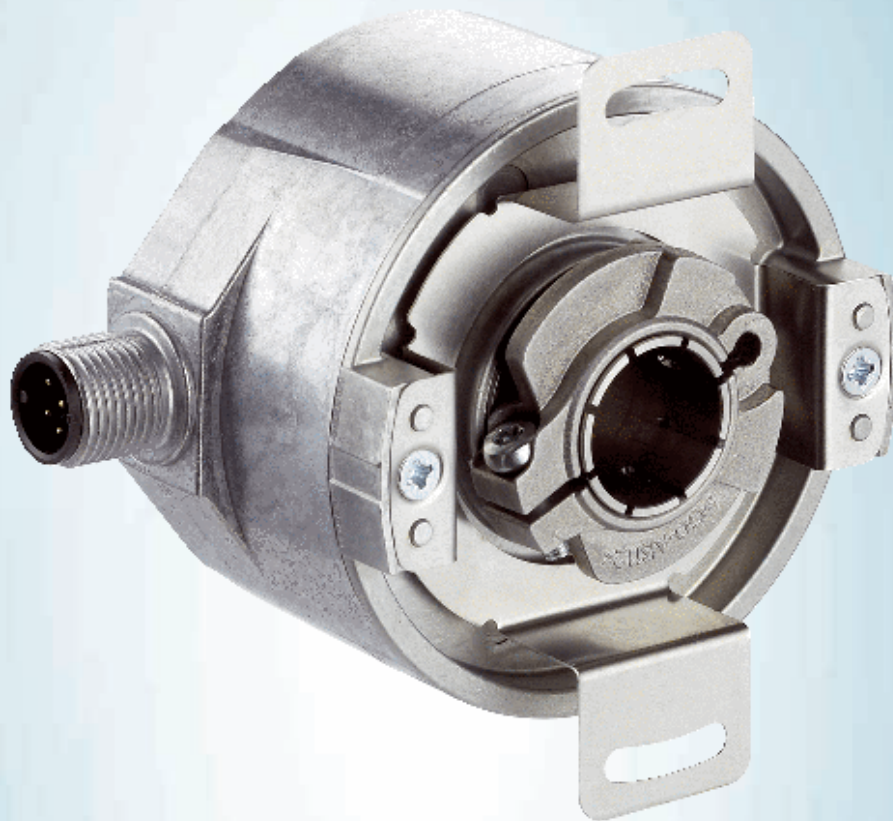




# AFM60B-BGAC032768

AFS/AFM60 SSI

**ABSOLUTE ENCODERS**

**SICK**  
Sensor Intelligence.

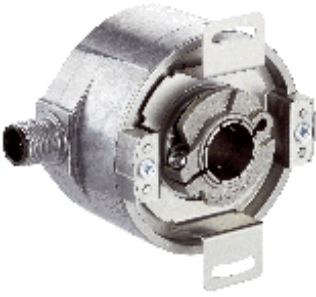


Illustration may differ

## Ordering information

| Type              | part no.   |
|-------------------|------------|
| AFM60B-BGAC032768 | On request |

Other models and accessories → [www.sick.com/AFS\\_AFM60\\_SSI](http://www.sick.com/AFS_AFM60_SSI)

## Detailed technical data

## Safety-related parameters

|                                                          |                                          |
|----------------------------------------------------------|------------------------------------------|
| <b>MTTF<sub>D</sub> (mean time to dangerous failure)</b> | 250 years (EN ISO 13849-1) <sup>1)</sup> |
|----------------------------------------------------------|------------------------------------------|

<sup>1)</sup> 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

|                                                                                 |                                  |
|---------------------------------------------------------------------------------|----------------------------------|
| <b>Number of steps per revolution (max. resolution)</b>                         | 32,768 (15 bit)                  |
| <b>Number of revolutions</b>                                                    | 4,096 (12 bit)                   |
| <b>Max. resolution (number of steps per revolution x number of revolutions)</b> | 15 bit x 12 bit (32,768 x 4,096) |
| <b>Error limits G</b>                                                           | 0.05 ° <sup>1)</sup>             |
| <b>Repeatability standard deviation <math>\sigma_r</math></b>                   | 0.002 ° <sup>2)</sup>            |

<sup>1)</sup> 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.

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

## Interfaces

|                                                |                                                      |
|------------------------------------------------|------------------------------------------------------|
| <b>Communication interface</b>                 | SSI                                                  |
| <b>Initialization time</b>                     | 50 ms <sup>1)</sup>                                  |
| <b>Position forming time</b>                   | < 1 µs                                               |
| <b>Code type</b>                               | Gray                                                 |
| <b>Code sequence parameter adjustable</b>      | CW/CCW (V/R) parameter adjustable                    |
| <b>Clock frequency</b>                         | ≤ 2 MHz <sup>2)</sup>                                |
| <b>Set (electronic adjustment)</b>             | H-active (L = 0 - 3 V, H = 4,0 - U <sub>s</sub> V)   |
| <b>CW/CCW (counting sequence when turning)</b> | L-active (L = 0 - 1,5 V, H = 2,0 - U <sub>s</sub> V) |

<sup>1)</sup> Valid positional data can be read once this time has elapsed.

<sup>2)</sup> Minimum, LOW level (Clock +): 250 ns.

## Electronics

|                        |                                    |
|------------------------|------------------------------------|
| <b>Connection type</b> | Male connector, M12, 8-pin, radial |
| <b>Supply voltage</b>  | 4.5 ... 32 V                       |

|                                    |                        |
|------------------------------------|------------------------|
| <b>Power consumption</b>           | ≤ 0.7 W (without load) |
| <b>Reverse polarity protection</b> | ✓                      |

## Mechanics

|                                       |                                         |
|---------------------------------------|-----------------------------------------|
| <b>Mechanical design</b>              | Blind hollow shaft                      |
| <b>Shaft diameter</b>                 | 14 mm                                   |
| <b>Characteristics of the shaft</b>   | Front clamp                             |
| <b>Weight</b>                         | 0.2 kg <sup>1)</sup>                    |
| <b>Shaft material</b>                 | Stainless steel                         |
| <b>Flange material</b>                | Aluminum                                |
| <b>Housing material</b>               | Aluminum die cast                       |
| <b>Start up torque</b>                | < 0.8 Ncm (+20 °C)                      |
| <b>Operating torque</b>               | < 0.6 Ncm (+20 °C)                      |
| <b>Permissible movement static</b>    | ± 0.3 mm (radial)<br>± 0.5 mm (axial)   |
| <b>Permissible movement dynamic</b>   | ± 0.1 mm (radial)<br>± 0.2 mm (axial)   |
| <b>Operating speed</b>                | ≤ 6,000 min <sup>-1</sup> <sup>2)</sup> |
| <b>Moment of inertia of the rotor</b> | 40 gcm <sup>2</sup>                     |
| <b>Bearing lifetime</b>               | 3.0 x 10 <sup>9</sup> revolutions       |
| <b>Angular acceleration</b>           | ≤ 500,000 rad/s <sup>2</sup>            |

<sup>1)</sup> Based on devices with male connector.

<sup>2)</sup> Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

## Ambient data

|                                      |                                                                              |
|--------------------------------------|------------------------------------------------------------------------------|
| <b>EMC</b>                           | According to EN 61000-6-2 and EN 61000-6-3 <sup>1)</sup>                     |
| <b>Enclosure rating</b>              | IP65, shaft side (IEC 60529)<br>IP67, housing side (IEC 60529) <sup>2)</sup> |
| <b>Permissible relative humidity</b> | 90 % (Condensation not permitted)                                            |
| <b>Operating temperature range</b>   | -40 °C ... +100 °C <sup>3)</sup>                                             |
| <b>Storage temperature range</b>     | -40 °C ... +100 °C, without package                                          |
| <b>Resistance to shocks</b>          | 70 g, 6 ms (EN 60068-2-27)                                                   |
| <b>Resistance to vibration</b>       | 30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)                                      |

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

<sup>2)</sup> For devices with male connector: with mounted mating connector.

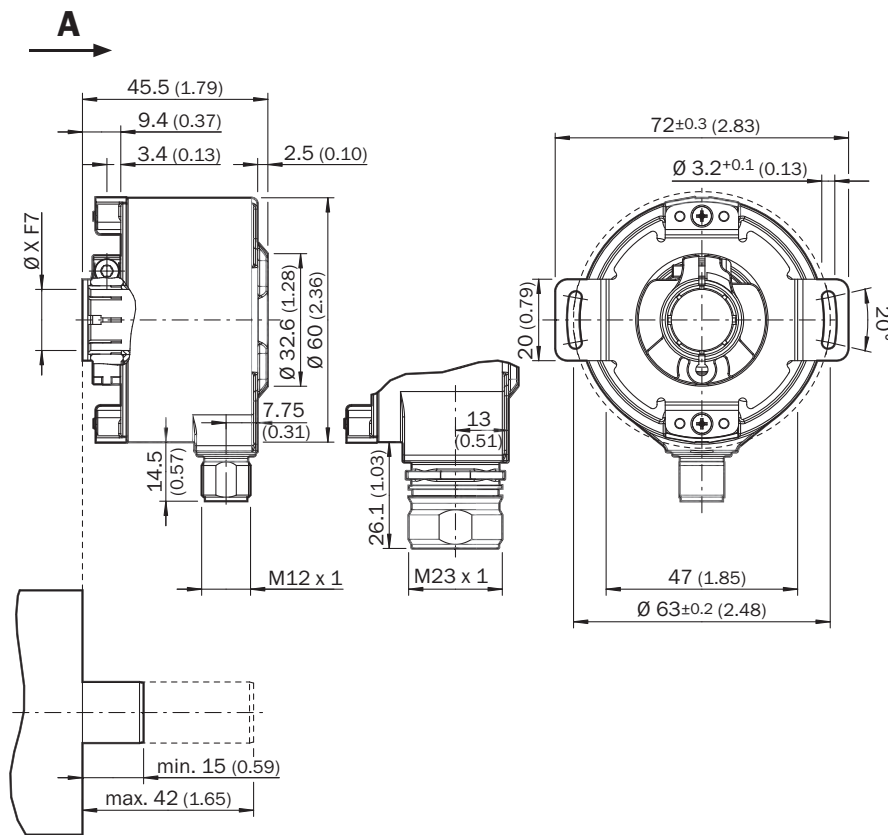
<sup>3)</sup> Stationary position of the cable.

## Classifications

|                     |          |
|---------------------|----------|
| <b>ECLASS 5.0</b>   | 27270502 |
| <b>ECLASS 5.1.4</b> | 27270502 |
| <b>ECLASS 6.0</b>   | 27270590 |
| <b>ECLASS 6.2</b>   | 27270590 |
| <b>ECLASS 7.0</b>   | 27270502 |
| <b>ECLASS 8.0</b>   | 27270502 |
| <b>ECLASS 8.1</b>   | 27270502 |

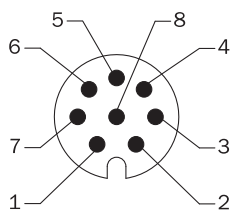
|                       |          |
|-----------------------|----------|
| <b>ECLASS 9.0</b>     | 27270502 |
| <b>ECLASS 10.0</b>    | 27270502 |
| <b>ECLASS 11.0</b>    | 27270502 |
| <b>ECLASS 12.0</b>    | 27270502 |
| <b>ETIM 5.0</b>       | EC001486 |
| <b>ETIM 6.0</b>       | EC001486 |
| <b>ETIM 7.0</b>       | EC001486 |
| <b>ETIM 8.0</b>       | EC001486 |
| <b>UNSPSC 16.0901</b> | 41112113 |

### Dimensional drawing



Dimensions in mm (inch)

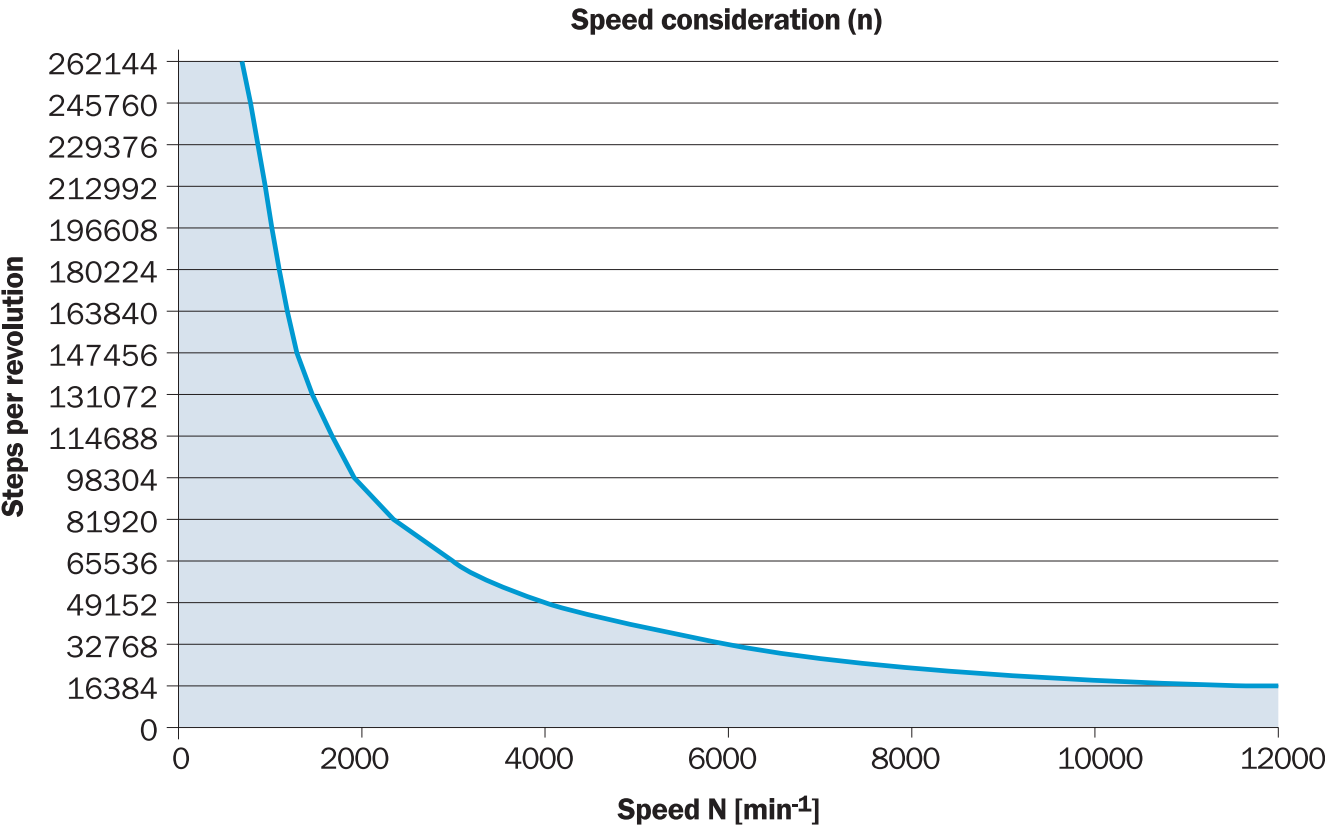
### PIN assignment M12 male connector, 8-pin and cable, 8-wire, SSI/Gray



view of M12 male device connector on encoder

| PIN | Wire colors (cable connection) | Signal         | Explanation                                                                                 |
|-----|--------------------------------|----------------|---------------------------------------------------------------------------------------------|
| 1   | Brown                          | Data -         | Interface signals                                                                           |
| 2   | White                          | Data +         | Interface signals                                                                           |
| 3   | Black                          | V/R            | Sequence in direction of rotation                                                           |
| 4   | Pink                           | SET            | Electronic adjustment<br>Interface signals                                                  |
| 5   | Yellow                         | Clock +        | Interface signals                                                                           |
| 6   | Purple                         | Clock -        | Interface signals                                                                           |
| 7   | Blue                           | GND            | Ground connection                                                                           |
| 8   | Red                            | U <sub>S</sub> | Operating voltage                                                                           |
| -   | -                              | Screen         | Screen connected to hous-<br>ing on encoder side. Connect-<br>ed 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](http://www.sick.com/AFS_AFM60_SSI)

|                                                                                     | Brief description                                                                                                                                                                                                                                                                                                                                                                                            | Type             | part no. |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|
| connectors and cables                                                               |                                                                                                                                                                                                                                                                                                                                                                                                              |                  |          |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Flying leads</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> SSI, Incremental, HIPERFACE®</li> <li>• <b>Items supplied:</b> By the meter</li> <li>• <b>Cable:</b> 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, shielded, Incremental, HIPERFACE®</li> </ul>                   | LTG-2308-MWENC   | 6027529  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 2 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>         | DOL-1208-G02MAC1 | 6032866  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 5 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>         | DOL-1208-G05MAC1 | 6032867  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 10 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>        | DOL-1208-G10MAC1 | 6032868  |
|    | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 20 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>        | DOL-1208-G20MAC1 | 6032869  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> 25 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> Flying leads</li> </ul>        | DOL-1208-G25MAC1 | 6067859  |
|  | <ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, M12, 8-pin, straight, A-coded</li> <li>• <b>Signal type:</b> Incremental, SSI</li> <li>• <b>Cable:</b> CAT5, CAT5e</li> <li>• <b>Description:</b> Incremental, shielded SSI</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm² ... 0.34 mm²</li> </ul> | DOS-1208-GA01    | 6045001  |

## 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.

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