

# BTF13-A1ZM10S02

HighLine

**WIRE DRAW ENCODERS**

**SICK**  
Sensor Intelligence.

### Ordering information

| Type            | Part no. |
|-----------------|----------|
| BTF13-A1ZM10S02 | 1138177  |

**Included in delivery:** AHM36A-S3PZ000S23 (1), MRA-F130-110D2 (1)

Product is supplied fully assembled. See individual components for further technical data

Other models and accessories → [www.sick.com/HighLine](http://www.sick.com/HighLine)



### Detailed technical data

#### Features

|                                  |  |
|----------------------------------|--|
| <b>Special device</b>            | ✓  |
| <b>Specialty</b>                 | Integrated encoder: AHM36A-S3PZ000S24, 1138176 |
| <b>Standard reference device</b> | BTF13-A1AM-S02, 1095217                        |

#### Performance

|   |                          |
|---|--------------------------|
| <b>Measurement range</b>                | 0 m ... 10 m             |
| <b>Encoder</b>                          | Absolute encoders        |
| <b>Resolution (wire draw + encoder)</b> | 0.08 mm <sup>1) 2)</sup> |
| <b>Repeatability</b>                    | ≤ 1.5 mm <sup>3)</sup>   |
| <b>Linearity</b>                        | ≤ ± 2 mm <sup>3)</sup>   |
| <b>Hysteresis</b>                       | ≤ 3 mm <sup>3)</sup>     |

<sup>1)</sup> The values shown have been rounded.

<sup>2)</sup> Example calculation based on the BTF08 with PROFINET: 200 mm (wire draw length per revolution - see Mechanical data): 262,144 (number of steps per revolution) = 0.001 mm (resolution of wire draw + encoder combination).

<sup>3)</sup> Value applies to wire draw mechanism.

#### Interfaces

|                                  |     |
|----------------------------------|-----|
| <b>Communication interface</b>   | SSI |
| <b>Programmable/configurable</b> | ✓   |

#### Electrical data

|  |   |
|--|---|
| <b>Connection type</b>                       | Cable, 8-wire, with male connector, M23, 12-pin, universal, 0.1 m |
| <b>Supply voltage</b>                        | 4.5 V ... 32 V  |
| <b>Power consumption</b>                     | ≤ 1.5 W (without load)  |
| <b>MTTFd: mean time to dangerous failure</b> | 230 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.

## Mechanical data

|   |   |
|---|---|
| <b>Weight</b>                                   | 4 kg  |
| <b>Measuring wire material</b>                  | Highly flexible stranded steel 1,4401 stainless steel V4A |
| <b>Measuring wire diameter</b>                  | 1.35 mm   |
| <b>Weight (measuring wire)</b>                  | 7.1 g/m   |
| <b>Housing material, wire draw mechanism</b>    | Aluminum (anodised), plastic                              |
| <b>Spring return force</b>                      | 10 N ... 20 N <sup>1)</sup>                               |
| <b>Length of wire pulled out per revolution</b> | 332.4 mm  |
| <b>Life of wire draw mechanism</b>              | Typ. 1,000,000 cycles <sup>2) 3)</sup>                    |
| <b>Actual wire draw length</b>                  | 10.2 m  |
| <b>Wire acceleration</b>                        | 40 m/s <sup>2</sup>                                       |
| <b>Operating speed</b>                          | 8 m/s   |
| <b>Mounted encoder</b>                          | AHM36 SSI, AHM36A-S3PZ000S24, 1138176                     |
| <b>Mounted mechanic</b>                         | MRA-F130-110D2, 6028627                                   |

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

<sup>2)</sup> Average values, which depend on the application.

<sup>3)</sup> The service life depends on the type of load. This is influenced by environmental conditions, the installation location, the measuring range in use, the traversing speed, and acceleration.

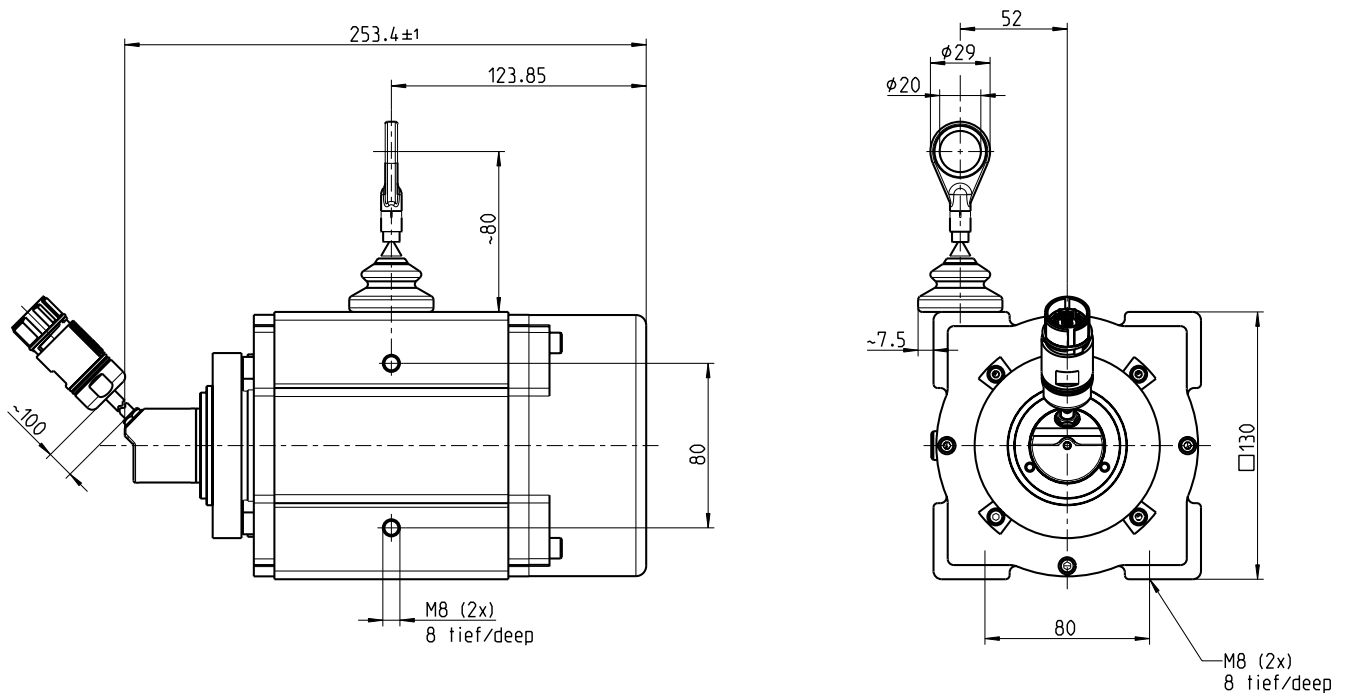
## Ambient data

|                                    |  |
|------------------------------------|--|
| <b>EMC</b>                         | According to EN 61000-6-2 and EN 61000-6-3                                       |
| <b>Enclosure rating</b>            | IP64, mounted mechanic<br>IP66, Encoder (IEC 60529)<br>IP67, Encoder (IEC 60529) |
| <b>Operating temperature range</b> | -20 °C ... +70 °C  |

## Classifications

|                       |          |
|-----------------------|----------|
| <b>ECLASS 5.0</b>     | 27270590 |
| <b>ECLASS 5.1.4</b>   | 27270590 |
| <b>ECLASS 6.0</b>     | 27270590 |
| <b>ECLASS 6.2</b>     | 27270590 |
| <b>ECLASS 7.0</b>     | 27270590 |
| <b>ECLASS 8.0</b>     | 27270590 |
| <b>ECLASS 8.1</b>     | 27270590 |
| <b>ECLASS 9.0</b>     | 27270590 |
| <b>ECLASS 10.0</b>    | 27270613 |
| <b>ECLASS 11.0</b>    | 27270503 |
| <b>ECLASS 12.0</b>    | 27270503 |
| <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



| PIN | Signal | Explanation                       |
|-----|--------|-----------------------------------|
| 1   | GND    | Ground connection                 |
| 2   | Data+  | Interface signal                  |
| 3   | Clock+ | Interface signal                  |
| 4   | n/c    | Not connected                     |
| 5   | n/c    | Not connected                     |
| 6   | n/c    | Not connected                     |
| 7   | n/c    | Not connected                     |
| 8   | Us     | Operating voltage                 |
| 9   | SET    | Electronic adjustment             |
| 10  | Data-  | Interface signal                  |
| 11  | Clock- | Interface signal                  |
| 12  | V/R    | Sequence in direction of rotation |
| -   | Screen | Housing potential                 |

### Recommended accessories

Other models and accessories → [www.sick.com/HighLine](http://www.sick.com/HighLine)

|   | 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  |

|   | Brief description   | Type                                       | Part no. |
|---|---|--|----------|
| Wire draw mechanism   |   |  |          |
|    | HighLine wire draw mechanism for servo flange with 6 mm shaft, measuring range 0 m ... 10 m   | MRA-F130-110D2                             | 6028627  |
| Flanges   |   |  |          |
|    | Flange adapter for HighLine wire draw mechanisms, adaption of face mount flange with centering hub 20 mm to 50 mm servo flange, Aluminum, including 3 countersunk screws M3 x 10  | BEF-FA-020-050WDE                          | 2073776  |
| Other mounting accessories  |   |  |          |
|    | Joint ball for later insertion in wire end ring with 20 mm diameter. The use of this joint ball enables movement in multiple levels of freedom.   | Joint protection for wire rope BTF/PRF/MRA | 5318683  |
|    | Compressed air attachment for MRA-F080... and MRA-F130... HighLine wire draw mechanism  | MRA-F-P                                    | 6073769  |
| Plug 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>Cable:</b> 8-wire, PUR, halogen-free</li> <li><b>Description:</b> SSI, Incremental, HIPERFACE®, shielded</li> </ul>   | LTG-2308-MWENC                             | 6027529  |
|   | <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, TTL, HTL, Incremental</li> <li><b>Cable:</b> 12-wire, UV and saltwater-resistant, PUR, halogen-free</li> <li><b>Description:</b> SSI, TTL, HTL, Incremental, shielded, Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, UV and saltwater resistant, 4 x 2 x 0.25 mm<sup>2</sup> + 2 x 0.5 mm<sup>2</sup> + 2 x 0.14 mm<sup>2</sup>, Ø 7.8 mm</li> </ul> | LTG-2612-MW                                | 6028516  |
|  | <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, SSI, shielded, Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm<sup>2</sup>, Ø 7.0 mm</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, SSI, shielded, Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm<sup>2</sup>, Ø 7.0 mm</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, SSI, shielded, Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm<sup>2</sup>, Ø 7.0 mm</li> <li><b>Connection systems:</b> Flying leads</li> </ul>                             | DOL-1208-G10MAC1                           | 6032868  |

|   | Brief description  | Type             | Part no. |
|---|--|------------------|----------|
|   | <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, SSI, shielded, Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm<sup>2</sup>, Ø 7.0 mm</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, SSI, shielded, Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm<sup>2</sup>, Ø 7.0 mm</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</li> <li>• <b>Connection type head B:</b> Male connector, D-Sub, 9-pin, straight</li> <li>• <b>Signal type:</b> SSI</li> <li>• <b>Cable:</b> 0.5 m, 8-wire, PUR, halogen-free</li> <li>• <b>Description:</b> SSI, shielded, Programming cable for PGT-08-S and PGT-10-S programming tool</li> <li>• <b>Note:</b> Suitable for use with SSI interfaces, not suitable for use with SSI + Incremental interface or SSI + Sin/Cos., programming adapter cable for programming tool PGT-10-Pro and PGT-08-S</li> </ul> | DSL-2D08-G0M5AC2 | 2048439  |
|  | <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, SSI, shielded, Head A: female connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: -40 °C ... +85 °C</li> <li>• <b>Connection systems:</b> IDC quick connection</li> <li>• <b>Permitted cross-section:</b> 0.14 mm<sup>2</sup> ... 0.34 mm<sup>2</sup></li> </ul>                                    | DOS-1208-GA01    | 6045001  |

## 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.

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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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