

Absolute encoders - singleturn

| | | |
|--|--|-------------------|
| Standard, ATEX/IECEX – mining optical | Sendix 7153 / 7173 (shaft / hollow shaft) | SSI / BiSS |
|--|--|-------------------|



The Sendix 7153 / 7173 absolute singleturn encoders in a compact 70 mm stainless-steel housing, with an SSI or BiSS interface and optical sensor technology have an ATEX/IECEX mining approval.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 17 bits; they are also available with axial and radial cable outlets.



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|-------------|--------------|-----------------------|-----------------------|--------------------------|-----------------------------|----------------------|---------------------|-----------------------------|----------------|
| | | | | | | | | | |
| Ex approval | Safety-Lock™ | High rotational speed | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor |

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- Mining approval.
- “Flame-proof enclosure” construction.
- ATEX with EC type examination certificate.
- IECEX with certificate of conformity (CoC).

Order code 8.7153 . 2 X 2 X . X X 2 1 . XXXX
Shaft version Type a b c d e f g h i ¹⁾

- | | | |
|--|--|---|
| <p>a Flange 2 = clamping / synchronous flange, IP67, ø 70 mm [2.76"]</p> <p>b Shaft (ø x L) 2 = 10 x 20 mm [0.39 x 0.79"], with flat 1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key</p> <p>c Interface / power supply 2 = SSI, BiSS / 10 ... 30 V DC</p> <p>d Type of connection 1 = axial cable, 2 m [6.56'] PUR 2 = radial cable, 2 m [6.56'] PUR A = axial cable, length > 2 m [6.56'] B = radial cable, length > 2 m [6.56']</p> | <p>e Code B = SSI, binary C = BiSS, binary G = SSI, gray</p> <p>f Resolution ²⁾ A = 10 bit 1 = 11 bit 2 = 12 bit 3 = 13 bit 4 = 14 bit 7 = 17 bit</p> | <p>g Inputs / outputs ²⁾ 2 = SET, DIR input additional status output</p> <p>h Options 1 = no option</p> <p>i Cable length in dm ¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21']</p> <p style="text-align: right;"><i>Optional on request</i> - special cable length - other resolutions</p> |
|--|--|---|

1) Not applicable with connection types 1 and 2
 2) Resolution, preset value and counting direction factory-programmable.

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|---|--|--|---|---|---|---|---|------|---|---|------|---|---|---|---|---|---|---|---|------|---|--|---|--|--|--|-----------------------------------|---|--|---|---|--|---|
| Order code Hollow shaft | 8.7173 Type | <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">X</td><td style="padding: 2px 5px;">X</td><td style="padding: 2px 5px;">2</td><td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td><td style="padding: 2px 5px;">X</td><td style="padding: 2px 5px;">2</td><td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">XXXX</td> </tr> <tr> <td style="padding: 2px 5px; font-size: 8px;">a</td><td style="padding: 2px 5px; font-size: 8px;">b</td><td style="padding: 2px 5px; font-size: 8px;">c</td><td style="padding: 2px 5px; font-size: 8px;">d</td> <td style="padding: 2px 5px; font-size: 8px;">e</td><td style="padding: 2px 5px; font-size: 8px;">f</td><td style="padding: 2px 5px; font-size: 8px;">g</td><td style="padding: 2px 5px; font-size: 8px;">h</td> <td style="padding: 2px 5px; font-size: 8px;">i 1)</td> </tr> </table> | X | X | 2 | X | X | X | 2 | 1 | XXXX | a | b | c | d | e | f | g | h | i 1) | <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top; padding: 5px;"> a Flange 2 = with spring element, short 6 = with stator coupling, IP67, ø 65 mm [2.56"] </td> <td style="width: 33%; vertical-align: top; padding: 5px;"> e Code B = SSI, binary C = BiSS, binary G = SSI, gray </td> <td style="width: 33%; vertical-align: top; padding: 5px;"> g Inputs / outputs²⁾ 2 = SET, DIR input additional status output </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> b Blind hollow shaft <i>(insertion depth max. 41.5 mm [1.63"])</i> 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"] </td> <td style="vertical-align: top; padding: 5px;"> f Resolution²⁾ A = 10 bit 1 = 11 bit 2 = 12 bit 3 = 13 bit 4 = 14 bit 7 = 17 bit </td> <td style="vertical-align: top; padding: 5px;"> h Options 1 = no option </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> c Interface / power supply 2 = SSI, BiSS / 10 ... 30 V DC </td> <td></td> <td style="vertical-align: top; padding: 5px;"> i Cable length in dm¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21'] </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> d Type of connection 1 = axial cable, 2 m [6.56'] PUR 2 = radial cable, 2 m [6.56'] PUR A = axial cable, length > 2 m [6.56'] B = radial cable, length > 2 m [6.56'] </td> <td></td> <td style="vertical-align: top; padding: 5px;"> <i>Optional on request</i> - special cable length - other resolutions </td> </tr> </table> | a Flange 2 = with spring element, short 6 = with stator coupling, IP67, ø 65 mm [2.56"] | e Code B = SSI, binary C = BiSS, binary G = SSI, gray | g Inputs / outputs²⁾ 2 = SET, DIR input additional status output | b Blind hollow shaft <i>(insertion depth max. 41.5 mm [1.63"])</i> 1 = ø 12 mm [0.47"] 2 = ø 14 mm [0.55"] | f Resolution²⁾ A = 10 bit 1 = 11 bit 2 = 12 bit 3 = 13 bit 4 = 14 bit 7 = 17 bit | h Options 1 = no option | c Interface / power supply 2 = SSI, BiSS / 10 ... 30 V DC | | i Cable length in dm¹⁾ 0050 = 5 m [16.40'] 0100 = 10 m [32.81'] 0150 = 15 m [49.21'] | d Type of connection 1 = axial cable, 2 m [6.56'] PUR 2 = radial cable, 2 m [6.56'] PUR A = axial cable, length > 2 m [6.56'] B = radial cable, length > 2 m [6.56'] | | <i>Optional on request</i> - special cable length - other resolutions |
| X | X | 2 | X | X | X | 2 | 1 | XXXX | | | | | | | | | | | | | | | | | | | | | | | | | |
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Technical data

| Explosion protection 7153 | |
|---|---------------------------------------|
| ATEX | |
| EC type-examination certificate | IBExU 14 ATEX 1047 X |
| Category | ⊕ I M2 Ex d I/IIC T4 - T6 Mb |
| Relevant standards ATEX guideline 94/9/EC | EN 60079-0:2012; EN 60079-1:2007 |
| IECEX | |
| Certificate of Conformity (CoC) | IECEX IBE 14.0023 X |
| Category | Ex d I/IIC T4 - T6 Mb |
| Relevant standards ATEX guideline 94/9/EC | IEC 60079-0:2011; IEC 60079-1:2007 |

| Explosion protection 7173 | |
|--|--|
| ATEX | |
| EU type-examination certificate | IBExU 15 ATEX 1057 X |
| Category | ⊕ I M2 Ex db I/IIC T4/120°C (T4)/T6 Mb |
| Relevant standards ATEX guideline 2014/34/EU | EN 60079-0:2012 + A11:2013; EN 60079-1:2014 |
| IECEX | |
| Certificate of Conformity (CoC) | IECEX IBE 15.0019 X |
| Category | Ex db I/IIC T4/120°C (T4)/T6 Mb |
| Relevant standards | IEC 60079-0:2011; IEC 60079-1:2014 |

| Mechanical characteristics | | |
|---|---------------------------|--|
| Maximum speed | shaft | 6000 min ⁻¹ (continuous) |
| | hollow shaft | 3000 min ⁻¹ (continuous) |
| Starting torque - at 20°C [68°F] | | < 0.05 Nm |
| Mass moment of inertia | | 4.0 x 10 ⁻⁶ kgm ² |
| Load capacity of shaft | radial | 80 N |
| | axial | 40 N |
| Weight | | approx. 2.8 kg [98.77 oz] |
| Protection acc. to EN 60529 | | IP67 |
| Ambient temperature | | -40°C ... +60°C [-40 ... +140°F] Please note the specifications for temperature class in EC type-examination certificate! |
| Material | shaft | stainless steel |
| | flange / housing | stainless steel |
| | cable | PUR |
| Shock resistance | acc. to EN/IEC 60068-2-27 | 1000 m/s ² , 6 ms |
| Vibration resistance | acc. to EN/IEC 60068-2-6 | 100 m/s ² , 55 ... 2000 Hz |

| Electrical characteristics | |
|---|---|
| Power supply | 10 ... 30 V DC |
| Current consumption (no load) | max. 45 mA |
| Reverse polarity protection for power supply | yes |
| Short-circuit proof outputs | yes ³⁾ |
| CE compliant acc. to | EMC guideline 2014/30/EU RoHS guideline 2011/65/EU |

| EMC | |
|---------------------------|--|
| Relevant standards | EN 55011 class B:2009 / A1:2010 EN 61000-6-2:2005 / AC:2005 EN 61000-6-3:2007 / A1:2011 EN 61326-1:2013 |

1) Not applicable with connection types 1 and 2
 2) Resolution, preset value and counting direction factory-programmable.
 3) Short-circuit with 0 V or output, only one channel at a time, power supply correctly applied.

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| SSI interface | |
|---|--|
| Output driver | RS485 transceiver type |
| Permissible load / channel | max. +/- 20 mA |
| Signal level | HIGH typ 3.8 V LOW at I _{Load} = 20 mA typ 1.3 V |
| Resolution | 10 ... 14 bit and 17 bit |
| Code | binary or gray |
| SSI clock rate | 50 kHz ... 2 MHz |
| Data refresh rate | ST resolution ≤ 14 bit ≤ 1 μs ST resolution ≥ 15 bit 4 μs |
| Monoflop time | ≤ 15 μs |
| Note: if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time. | |

| BiSS interface | |
|--|--|
| Output driver | RS485 transceiver type |
| Permissible load / channel | max. +/- 20 mA |
| Signal level | HIGH typ 3.8 V LOW at I _{Load} = 20 mA typ 1.3 V |
| Resolution | 10 ... 14 bit and 17 bit |
| Code | binary |
| Clock rate | up to 10 MHz |
| Max. update rate | < 10 μs, depends on the clock rate and the data length |
| Data refresh rate | ST resolution ≤ 14 bit ≤ 1 μs ST resolution 17 bit 2.4 μs |
| Note: <ul style="list-style-type: none"> – bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification | |

| Status output | |
|--|---|
| Output driver | open collector, internal pull-up resistor 22 kOhm |
| Permissible load | max. 20 mA |
| Signal level | HIGH +V LOW < 1 V |
| Active at | LOW |
| The status output serves to display various alarm or error messages. The status output is HIGH (open collector with internal pull-up 22 kOhm) in normal operation. | |

Terminal assignment

| Interface | Type of connection | Features | Cable (isolate unused cores individually before initial start-up) | | | | | | | | | | | | |
|-----------|--------------------|----------|---|-----|----|----|----|----|----|-----|-----|------|-------|--------|--|
| | | | Signal: | 0 V | +V | C+ | C- | D+ | D- | SET | DIR | Stat | ⊥ | ⊥ | |
| 2 | 1, 2, A, B | SET, DIR | Core marking: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | YE/GN | shield | |

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply ground GND (0 V)
- C+, C-: Clock signal
- D+, D-: Data signal
- SET: Set input
- DIR: Direction input
- Stat: Status output
- ⊥: Protective earth

| SET input | |
|---|--|
| Input | HIGH active |
| Input type | comparator |
| Signal level (+V = power supply) | HIGH min. 60% of +V max. +V LOW max. 25% of +V |
| Input current | < 0.5 mA |
| Min. pulse duration (SET) | 10 ms |
| Timeout after SET signal | 14 ms |
| The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences. | |

| DIR input | |
|---|------|
| Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This inverted function can also be factory-programmed. If DIR is reversed when the device is already switched on, this will be interpreted as an error. The status output switches to LOW. If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences. | |
| Response time (DIR input) | 1 ms |

| Power-ON | |
|--|--|
| After Power-ON the device requires a time of approx. 150 ms before valid data can be read. | |
| Hot plugging of the encoder should be avoided. | |

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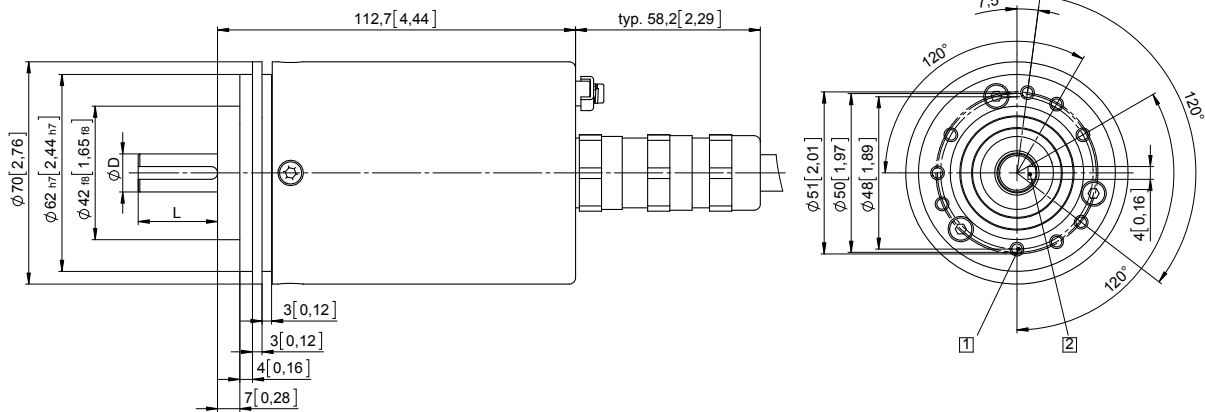
SSI / BiSS

Dimensions shaft version

Dimensions in mm [inch]

Clamping / synchronous flange, \varnothing 70 [2.76]
Shaft type 1 with axial cable outlet

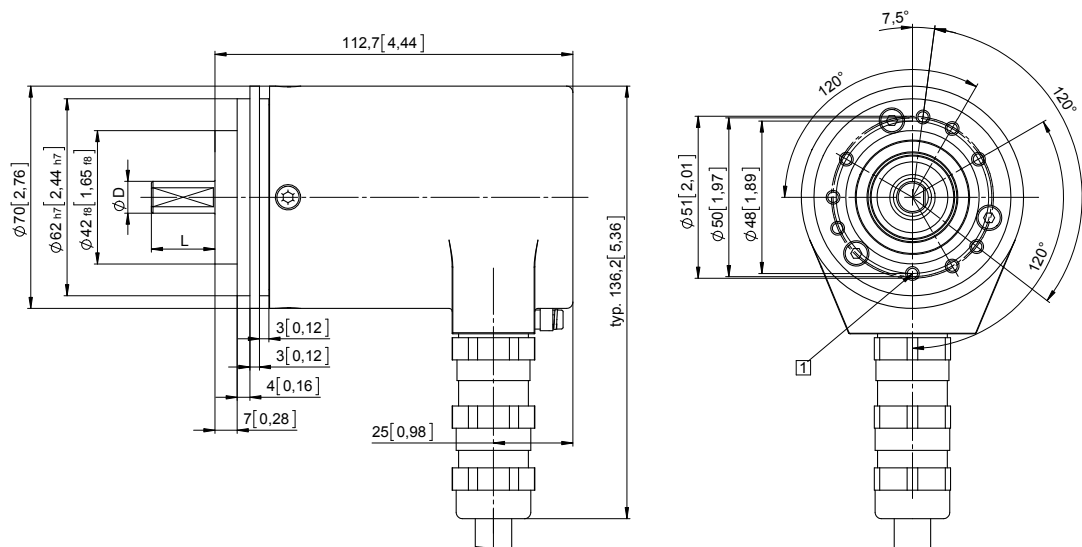
- 1 9 x M4, 10 [0.39] deep
- 2 Keyway for DIN 6885-A-4x4x25 key



| D | Fit | L |
|-----------|-----|-----------|
| 12 [0.47] | g6 | 25 [0.98] |

Clamping / synchronous flange, \varnothing 70 [2.76]
Shaft type 2 with radial cable outlet

- 1 9 x M4, 10 [0.39] deep



| D | Fit | L |
|-----------|-----|-----------|
| 10 [0.39] | f7 | 20 [0.79] |

