

# Incremental encoders

|                         |  |   |
|-------------------------|--|---|
| <b>Standard optical</b> | <b>Sendix 5000 / 5020 (shaft / hollow shaft)</b> | <b>Push-pull / RS422 / Open collector</b> |
|-------------------------|--|---|



Due to their sturdy bearing construction in Safety-Lock™ Design, the Sendix 5000 and 5020 offer high resistance against vibration and installation errors.

The rugged housing, high protection level of up to IP67, as well as the wide temperature range of -40 °C up to +85 °C, make this product range the perfect encoder for all applications.

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

## Robust performance

- Increased resistance against shock, vibrations and tolerance of installation errors, elimination of machine downtime and repairs thanks to sturdy bearing construction in “Safety-Lock™ Design”.
- Ensures highest safety against field breakdowns and is thus suitable also for outside use thanks to its resistant die-cast housing and protection up to IP67.
- Undetachable clamping ring on hollow shaft encoders.
- Wide temperature range, -40 °C ... +85 °C.

## Many variants

- Suitable connection variant for every specific case: cable connection with different standard lengths, M12 (5- or 8-pin), M23 (12-pin), MIL (7- or 10-pin) and Sub-D connector. In addition: Variants with connector fitted in the cable – for error-free electrical connection to your control.
- Reliable mounting in a wide variety of installation situations: comprehensive and proven fixing possibilities.
- Compatible with all US and European standards.
- Wide range of standard pulse ranges up to max. 5000 pulses per revolution.

## Technology in detail

**Robust Safety-Lock™ bearing structure**



**Cables with fitted connector**



**Undetachable clamping ring**

Slotted clamping ring + slotted shaft



**Tangential cable outlet**



# Incremental encoders

**Standard optical**

**Sendix 5000 / 5020 (shaft / hollow shaft)**

**Push-pull / RS422 / Open collector**

**Order code  
Shaft version**

**8.5000 . XXXXX . XXXX**  
Type      a b c d e

**a Flange**

- 5 = synchro flange, IP66/IP67     $\varnothing$  50.8 mm [2"]
- 6 = synchro flange, IP65             $\varnothing$  50.8 mm [2"]
- 7 = clamping flange, IP66/IP67    $\varnothing$  58 mm [2.28"]
- 8 = clamping flange, IP65             $\varnothing$  58 mm [2.28"]
- A = synchro flange, IP66/IP67     $\varnothing$  58 mm [2.28"]<sup>1)</sup>
- B = synchro flange, IP65             $\varnothing$  58 mm [2.28"]<sup>1)</sup>
- C = square flange, IP66/IP67     $\square$  63.5 mm [2.5"]
- D = square flange, IP65             $\square$  63.5 mm [2.5"]
- G = Euro flange, IP66/IP67         $\varnothing$  115 mm [4.53"]<sup>2)</sup>

- 1 = servo flange, IP66/IP67         $\varnothing$  50.8 mm [2"]<sup>3)</sup>
- 2 = servo flange, IP65                 $\varnothing$  50.8 mm [2"]<sup>3)</sup>
- 3 = square flange, IP66/IP67        $\square$  52.3 mm [2.06"]<sup>3)</sup>
- 4 = square flange, IP65                $\square$  52.3 mm [2.06"]<sup>3)</sup>
- E = servo flange, IP66/IP67         $\varnothing$  63.5 mm [2.5"]<sup>3)</sup>
- F = servo flange, IP65                 $\varnothing$  63.5 mm [2.5"]<sup>3)</sup>

**b Shaft ( $\varnothing \times L$ ), with flat**

- 1 =  $\varnothing$  6 x 10 mm [0.24 x 0.39"]
- 2 =  $\varnothing$  1/4 x 5/8" (6.35 x 15.875 mm)
- 6 =  $\varnothing$  8 x 15 mm [0.32 x 0.59"]
- 3 =  $\varnothing$  10 x 20 mm [0.39 x 0.79"]
- 4 =  $\varnothing$  3/8 x 5/8" (9.5 x 15.875 mm)
- B =  $\varnothing$  11 x 33 mm [0.43 x 1.30"], with feather key shaft slot<sup>4)</sup>
- 5 =  $\varnothing$  12 x 20 mm [0.47 x 0.79"]

- 7 =  $\varnothing$  1/4 x 7/8"<sup>3)</sup>
- 8 =  $\varnothing$  3/8 x 7/8"<sup>3)</sup>

**c Output circuit (with inverted signal) / supply voltage**

- 4 = RS422 / 5 V DC
  - 1 = RS422 / 5 ... 30 V DC
  - 2 = push-pull (7272 compatible) / 5 ... 30 V DC
  - 5 = push-pull / 10 ... 30 V DC
- 
- 3 = open collector / 5 ... 30 V DC<sup>3)</sup>
  - 8 = push-pull (7272 compatible), without capacitor / 5 ... 30 V DC<sup>1)3)6)</sup>

**d Type of connection – cable**

- 1 = axial cable, 1 m [3.28'] PVC
- A = axial cable, special length PVC \*)
- 2 = radial cable, 1 m [3.28'] PVC
- B = radial cable, special length PVC \*)

*Type of connection – connector*

- P = axial M12 connector, 5-pin<sup>5)</sup>
  - R = radial M12 connector, 5-pin<sup>5)</sup>
  - 3 = axial M12 connector, 8-pin
  - 4 = radial M12 connector, 8-pin
  - 7 = axial M23 connector, 12-pin
  - 8 = radial M23 connector, 12-pin
  - Y = radial MIL connector, 10-pin
  - W = radial MIL connector, 7-pin<sup>5)</sup>
- 
- 9 = radial MIL connector, 6-pin<sup>3)5)</sup>

*Type of connection – connector with cable*

- L = radial cable with M12 connector, 8-pin, special length PVC \*)
- M = radial cable with M23 connector, 12-pin, special length PVC \*)
- N = radial cable with Sub-D connector, 9-pin, special length PVC \*)

\*) Available special lengths (connection types A, B, L, M, N):  
0.3, 0.5, 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20 m [0.98, 1.64, 3.28, 6.56, 9.84, 13.12, 16.40, 19.69, 26.25, 32.80, 39.37, 49.21, 65.62']  
order code expansion .XXXX = length in dm  
ex.: 8.5000.814A.1024.0030 (for cable length 3 m)

**e Pulse rate**

- 1, 2, 4, 5, 10, 12, 14, 20, 25, 28, 30, 32, 36, 50, 60, 64, 80, 100, 120, 125, 150, 180, 200, 240, 250, 256, 300, 342, 360, 375, 400, 500, 512, 600, 625, 720, 800, 900, 1000, 1024, 1200, 1250, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000  
(e.g. 100 pulses => 0100)

*Optional on request*

- other pulse rates
- Ex 2/22 only for variants with IP66/IP67 and cable connection **d** = 1, 2, A, B<sup>7)</sup>
- surface protection salt spray

*Salt spray tested as standard type (deliverable as from 1 unit)*



8.5000.73X4.XXXX-C

2) Only in conjunction with shaft type B.  
3) US version.  
4) Only in conjunction with flange type G.  
5) Without inverted signal.  
6) Attention: no CE types!  
7) Cable material PUR.

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|-------------------------|--|---|

|                     |               |   |   |   |   |   |   |      |
|---------------------|---------------|---|---|---|---|---|---|------|
| <b>Order code</b>   | <b>8.5020</b> | . | X | X | X | X | . | XXXX |
| <b>Hollow shaft</b> | Type          |   | a | b | c | d |   | e    |

**a Flange**

1 = with spring element, long, IP66/IP67  
 2 = with spring element, long, IP65  
 3 = with torque stop, long, IP66/IP67  
 4 = with torque stop, long, IP65  
 7 = with stator coupling, IP66/IP67     $\varnothing$  65 mm [2.56"]  
 8 = with stator coupling, IP65         $\varnothing$  65 mm [2.56"]  
 C = with stator coupling, IP66/IP67    $\varnothing$  63 mm [2.48"]  
 D = with stator coupling, IP65         $\varnothing$  63 mm [2.48"]

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5 = with stator coupling, IP66/IP67    $\varnothing$  57.2 mm [2.25"]<sup>1)</sup>  
 6 = with stator coupling, IP65         $\varnothing$  57.2 mm [2.25"]<sup>1)</sup>

**b Through hollow shaft**

1 =  $\varnothing$  6 mm [0.24"]  
 2 =  $\varnothing$  1/4"  
 9 =  $\varnothing$  8 mm [0.32"]  
 4 =  $\varnothing$  3/8"  
 3 =  $\varnothing$  10 mm [0.39"]  
 5 =  $\varnothing$  12 mm [0.47"]  
 6 =  $\varnothing$  1/2"  
 A =  $\varnothing$  14 mm [0.55"]  
 8 =  $\varnothing$  15 mm [0.59"]  
 7 =  $\varnothing$  5/8"

**c Output circuit (with inverted signal) / supply voltage**

4 = RS422 / 5 V DC  
 1 = RS422 / 5 ... 30 V DC  
 2 = push-pull (7272 compatible) / 5 ... 30 V DC  
 5 = push-pull / 10 ... 30 V DC

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3 = open collector / 5 ... 30 V DC<sup>1)</sup>  
 8 = push-pull (7272 compatible), without capacitor / 5 ... 30 V DC<sup>1)2)</sup>

**d Type of connection – cable**

1 = radial cable, 1 m [3.28'] PVC  
 A = radial cable, special length PVC \*)  
 E = tangential cable, 1 m [3.28'] PVC  
 F = tangential cable, special length PVC \*)

*Type of connection – connector*

R = radial M12 connector, 5-pin<sup>3)</sup>  
 2 = radial M12 connector, 8-pin  
 4 = radial M23 connector, 12-pin  
 6 = radial MIL connector, 7-pin  
 7 = radial MIL connector, 10-pin

*Type of connection – connector with cable*

H = tangential cable, 0.3 m [0.98'] PVC, incl. M12 connector, 8-pin for central fastening  
 L = tangential cable with M12 connector, 8-pin, special length PVC \*)  
 M = tangential cable with M23 connector, 12-pin, special length PVC \*)  
 N = tangential cable with Sub-D connector, 9-pin, special length PVC \*)

\*) Available special lengths (connection types A, F, L, M, N):  
 0.3, 0.5, 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20 m [0.98, 1.64, 3.28, 6.56, 9.84, 13.12, 16.40, 19.69, 26.25, 32.80, 39.37, 49.21, 65.62']  
 order code expansion .XXXX = length in dm  
 ex.: 8.5020.234A.1024.0030 (for cable length 3 m)

**e Pulse rate**

1, 2, 4, 5, 10, 12, 14, 20, 25, 28, 30, 32, 36, 50, 60, 64, 80, 100, 120, 125, 150, 180, 200, 240, 250, 256, 300, 342, 360, 375, 400, 500, 512, 600, 625, 720, 800, 900, 1000, 1024, 1200, 1250, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000  
 (e.g. 100 pulses => 0100)

*Optional on request*

- other pulse rates
- Ex 2/22 only for variants with IP66/IP67 and cable connection **d** = 1, A<sup>4)</sup>
- surface protection salt spray

*Salt spray tested as standard type (deliverable as from 1 unit)*

8.5020.18X2.XXXX-C

8.5020.1AX2.XXXX-C

1) US version.  
 2) Attention: no CE types!  
 3) Without inverted signal.  
 4) Cable material PUR.

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| Mounting accessory for shaft encoders |  | Order no.               |
|---------------------------------------|--|-------------------------|
| <b>Coupling</b>                       | bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]  | <b>8.0000.1102.0606</b> |
|                                       | bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"] | <b>8.0000.1102.1010</b> |

| Mounting accessory for hollow shaft encoders          |                    | Dimensions in mm [inch] | Order no.               |
|---|--------------------|-------------------------|-------------------------|
| <b>Torque pin, ø 4 mm</b>                             | with fixing thread |                         | <b>8.0010.4700.0000</b> |
| for flange with spring element<br>(flange type 1 + 2) |                    |                         |                         |

| Isolation / adapter inserts for hollow shaft encoders<br>order code<br><b>8.5020.X8XX.XXXX</b> | <b>Thermal and electrical isolation of the encoders</b><br><b>(Temperature range -40 °C ... +115 °C [-40 °F ... +239 °F])</b><br>Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder. | D1<br>6 mm<br>8 mm<br>10 mm<br>12 mm<br>1/4"<br>3/8"<br>1/2" | Isolation insert |
|--|---|--|------------------|
|  |   |  |                  |

| Cables and connectors      |  | Order no.                   |
|----------------------------|--|-----------------------------|
| <b>Preassembled cables</b> | M12 female connector with coupling nut, 8-pin, A coded, straight single ended<br>2 m [6.56'] PVC cable | <b>05.00.6041.8211.002M</b> |
|                            | M23 female connector with coupling nut, 12-pin, cw single ended<br>2 m [6.56'] PVC cable               | <b>8.0000.6901.0002</b>     |
| <b>Connectors</b>          | M12 female connector with coupling nut, 8-pin, A coded, straight (metal)                               | <b>05.CMB 8181-0</b>        |
|                            | M23 female connector with coupling nut, 12-pin, cw   | <b>8.0000.5012.0000</b>     |
|                            | MIL female connector with coupling nut, 10-pin   | <b>8.0000.5062.0000</b>     |

Further Kübler accessories can be found at: [kuebler.com/accessories](http://kuebler.com/accessories)  
 Further Kübler cables and connectors can be found at: [kuebler.com/connection-technology](http://kuebler.com/connection-technology)

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| <b>Standard optical</b> | <b>Sendix 5000 / 5020 (shaft / hollow shaft)</b> | <b>Push-pull / RS422 / Open collector</b> |
|-------------------------|--|---|

## Technical data

| Mechanical characteristics                       |                      |  |
|--|----------------------|--|
| <b>Maximum speed</b>                             | IP65                 | 12000 min <sup>-1</sup><br>6000 min <sup>-1</sup> (continuous)     |
|  | IP66/IP67            | 6000 min <sup>-1</sup><br>3000 min <sup>-1</sup> (continuous)      |
|  |                      |  |
| <b>Mass moment of inertia</b>                    | shaft version        | approx. 1.8 x 10 <sup>-6</sup> kgm <sup>2</sup>                    |
|  | hollow shaft version | approx. 6 x 10 <sup>-6</sup> kgm <sup>2</sup>                      |
| <b>Starting torque</b><br>at 20 °C [68 °F]       | IP65                 | < 0.01 Nm  |
|  | IP66/IP67            | < 0.05 Nm  |
| <b>Shaft load capacity</b>                       | radial               | 100 N  |
|  | axial                | 50 N   |
| <b>Weight</b>                                    |                      | approx. 0.4 kg [14.11 oz]  |
| <b>Protection</b> acc. to EN 60529               | without shaft seal   | IP65   |
|  | with shaft seal      | IP66/IP67  |
| <b>Working temperature range</b>                 |                      | -40 °C <sup>1)</sup> ... +85 °C [-40 °F <sup>1)</sup> ... +185 °F] |
| <b>Material</b>                                  | shaft                | stainless steel  |
| <b>Shock resistance</b> acc. to EN 60068-2-27    |                      | 3000 m/s <sup>2</sup> , 6 ms <sup>2)</sup>                         |
| <b>Vibration resistance</b> acc. to EN 60068-2-6 |                      | 300 m/s <sup>2</sup> , 10 ... 2000 Hz <sup>3)</sup>                |

| Approvals                              |                                   |
|--|-----------------------------------|
| <b>UL compliant</b> in accordance with | File no. E224618                  |
| <b>CE compliant</b> in accordance with |                                   |
| EMC Directive                          | 2014/30/EU                        |
| RoHS Directive                         | 2011/65/EU                        |
| ATEX Directive                         | 2014/34/EU (for Ex 2/22 variants) |

| Electrical characteristics                               |                          |                          |                           |  |                           |                          |
|--|--------------------------|--------------------------|---------------------------|--|---------------------------|--------------------------|
| Output circuit   | RS422 (TTL compatible)   |                          | Push-pull                 | Push-pull (HTL/TTL universal, 7272 compatible) |                           | Open collector (7273)    |
|  | Order code               |                          |                           |  |                           |                          |
|  | <b>1</b>                 | <b>4</b>                 | <b>5</b>                  | <b>2</b>                                       | <b>8</b>                  | <b>3</b>                 |
| <b>Supply voltage</b>                                    | 5 ... 30 V DC            | 5 V DC (±5 %)            | 10 ... 30 V DC            | 5 ... 30 V DC                                  | 5 ... 30 V DC             | 5 ... 30 V DC            |
| <b>Power consumption</b> (no load)                       | typ. 40 mA<br>max. 90 mA | typ. 40 mA<br>max. 90 mA | typ. 50 mA<br>max. 100 mA | typ. 50 mA<br>max. 100 mA                      | typ. 50 mA<br>max. 100 mA | 100 mA                   |
| <b>Permissible load / channel</b>                        | max. +/- 20 mA           | max. +/- 20 mA           | max. +/- 20 mA            | max. +/- 20 mA                                 | max. +/- 20 mA            | 20 mA sink<br>at 30 V DC |
| <b>Pulse frequency</b>                                   | max. 300 kHz             | max. 300 kHz             | max. 300 kHz              | max. 300 kHz <sup>4)</sup>                     | max. 300 kHz              | max. 300 kHz             |
| <b>Signal level</b>                                      | HIGH                     | min. 2.5 V               | min. 2.5 V                | min. +V - 1.0 V                                | min. +V - 2.0 V           | min. +V - 2.0 V          |
|  | LOW                      | max. 0.5 V               | max. 0.5 V                | max. 0.5 V                                     | max. 0.5 V                | max. 0.5 V               |
| <b>Rising edge time t<sub>r</sub></b>                    | max. 200 ns              | max. 200 ns              | max. 1 μs                 | max. 1 μs                                      | max. 1 μs                 |                          |
| <b>Falling edge time t<sub>f</sub></b>                   | max. 200 ns              | max. 200 ns              | max. 1 μs                 | max. 1 μs                                      | max. 1 μs                 |                          |
| <b>Short circuit proof outputs</b> <sup>5)</sup>         | yes <sup>6)</sup>        | yes <sup>6)</sup>        | yes                       | yes  | yes <sup>6)</sup>         | yes                      |
| <b>Reverse polarity protection of the supply voltage</b> | yes                      | no                       | yes                       | no   | no                        | no                       |

1) With connector: -40 °C [-40 °F], cable fixed: -30 °C [-22 °F], cable moved: -20 °C [-4 °F].  
 2) For MIL connectors: 2500 m/ s<sup>2</sup>  
 3) For MIL connectors: 100 m/ s<sup>2</sup>  
 4) Max. recommended cable length 30 m [98.43'].  
 5) If supply voltage correctly applied.  
 6) Only one channel allowed to be shorted-out:  
 at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.  
 at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

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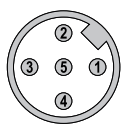
## Terminal assignment

| Output circuit   | Type of connection           | Cable (isolate unused cores individually before initial start-up) |     |    |         |           |           |                  |           |           |                  |           |                  |  |
|------------------|------------------------------|---|-----|----|---------|-----------|-----------|------------------|-----------|-----------|------------------|-----------|------------------|--|
| 1, 2, 3, 4, 5, 8 | 5000: 1, 2, A, B             | Signal:   | 0 V | +V | 0 Vsens | +Vsens    | A         | $\bar{A}$        | B         | $\bar{B}$ | 0                | $\bar{0}$ | $\perp$          |  |
|                  | 5020: 1, A, E, F             | Core color:   | WH  | BN | GY PK   | RD BU     | GN        | YE               | GY        | PK        | BU               | RD        | shield           |  |
| Output circuit   | Type of connection           | M12 connector, 5-pin  |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 2, 3, 4, 5, 8 | 5000: P, R                   | Signal:   | 0 V | +V | A       | B         | 0         | $\perp$          |           |           |                  |           |                  |  |
|                  | 5020: R                      | Pin:  | 1   | 2  | 3       | 4         | 5         | PH <sup>1)</sup> |           |           |                  |           |                  |  |
| Output circuit   | Type of connection           | M12 connector, 8-pin  |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 2, 3, 4, 5, 8 | 5000: 3, 4, L                | Signal:   | 0 V | +V | A       | $\bar{A}$ | B         | $\bar{B}$        | 0         | $\bar{0}$ | $\perp$          |           |                  |  |
|                  | 5020: 2, H <sup>2)</sup> , L | Pin:  | 1   | 2  | 3       | 4         | 5         | 6                | 7         | 8         | PH <sup>1)</sup> |           |                  |  |
| Output circuit   | Type of connection           | M23 connector, 12-pin   |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 2, 3, 4, 5, 8 | 5000: 7, 8, M                | Signal:   | 0 V | +V | 0 Vsens | +Vsens    | A         | $\bar{A}$        | B         | $\bar{B}$ | 0                | $\bar{0}$ | $\perp$          |  |
|                  | 5020: 4, M                   | Pin:  | 10  | 12 | 11      | 2         | 5         | 6                | 8         | 1         | 3                | 4         | PH <sup>1)</sup> |  |
| Output circuit   | Type of connection           | MIL connector, 10-pin   |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 2, 3, 4, 5, 8 | 5000: Y                      | Signal:   | 0 V | +V | +Vsens  | A         | $\bar{A}$ | B                | $\bar{B}$ | 0         | $\bar{0}$        | $\perp$   |                  |  |
|                  | 5020: 7                      | Pin:  | F   | D  | E       | A         | G         | B                | H         | C         | I                | J         |                  |  |
| Output circuit   | Type of connection           | MIL connector, 7-pin  |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 3, 4, 5, 8    | 5000: W                      | Signal:   | 0 V | +V | +Vsens  | A         | B         | 0                | $\perp$   |           |                  |           |                  |  |
|                  | 5020: 6                      | Pin:  | F   | D  | E       | A         | B         | C                | G         |           |                  |           |                  |  |
| Output circuit   | Type of connection           | MIL connector, 6-pin  |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 3, 4, 5, 8    | 5000: 9                      | Signal:   | 0 V | +V | A       | B         | 0         | $\perp$          |           |           |                  |           |                  |  |
|                  |                              | Pin:  | A   | B  | E       | D         | C         |                  |           |           |                  |           |                  |  |
| Output circuit   | Type of connection           | Sub-D connector, 9-pin  |     |    |         |           |           |                  |           |           |                  |           |                  |  |
| 1, 2, 3, 4, 5, 8 | 5000: N                      | Signal:   | 0 V | +V | A       | $\bar{A}$ | B         | $\bar{B}$        | 0         | $\bar{0}$ | $\perp$          |           |                  |  |
|                  | 5020: N                      | Pin:  | 9   | 5  | 1       | 6         | 2         | 7                | 3         | 8         | PH <sup>1)</sup> |           |                  |  |

+V: Supply voltage encoder +V DC  
 0 V: Supply voltage encoder ground GND (0 V)  
 0 Vsens / +Vsens: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.

A,  $\bar{A}$ : Incremental output channel A  
 B,  $\bar{B}$ : Incremental output channel B  
 0,  $\bar{0}$ : Reference signal  
 PH  $\perp$ : Plug connector housing (shield)

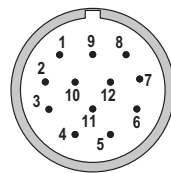
## Top view of mating side, male contact base



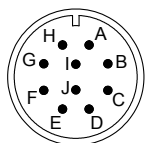
M12 connector, 5-pin



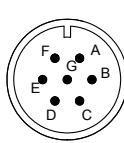
M12 connector, 8-pin



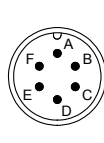
M23 connector, 12-pin



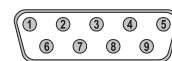
MIL connector, 10-pin



MIL connector, 7-pin



MIL connector, 6-pin



Sub-D connector, 9-pin

1) PH = shield is attached to connector housing.  
 2) With type of connection H shield is not attached to connector housing.

# Incremental encoders

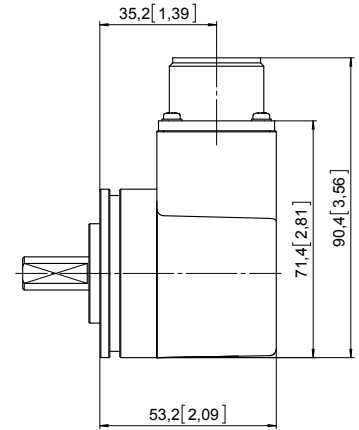
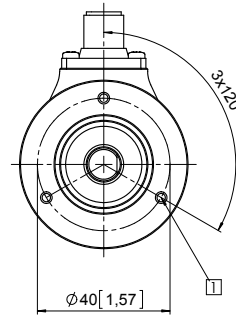
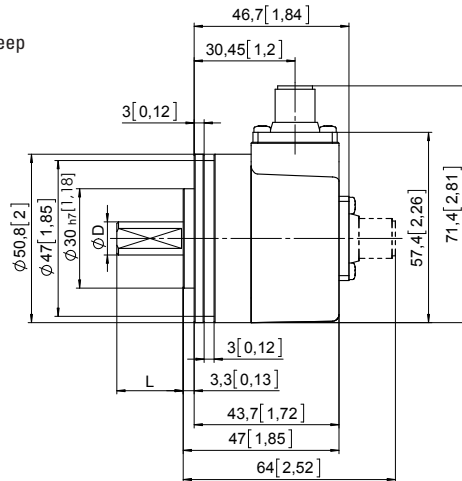
|                         |  |   |
|-------------------------|--|---|
| <b>Standard optical</b> | <b>Sendix 5000 / 5020 (shaft / hollow shaft)</b> | <b>Push-pull / RS422 / Open collector</b> |
|-------------------------|--|---|

## Dimensions shaft version

Dimensions in mm [inch]

### Synchro flange, $\varnothing$ 50.8 [2] Flange type 5 and 6

1 3 x M3, 6 [0.24] deep

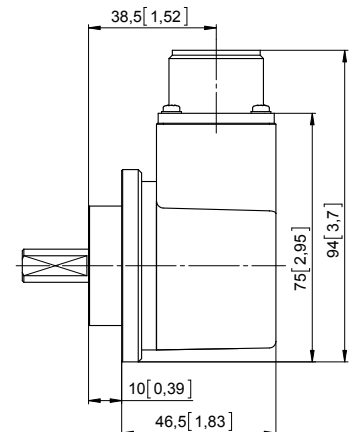
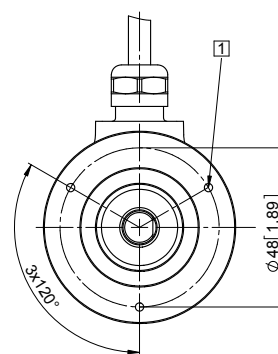
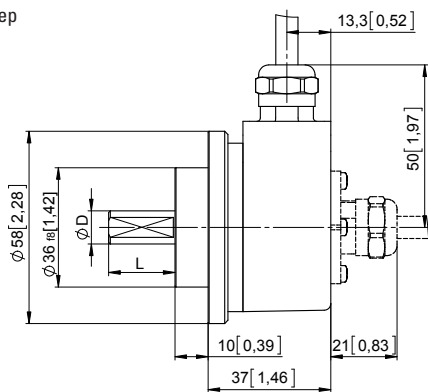


MIL-connector version

| D         | Fit | L         |
|-----------|-----|-----------|
| 6 [0.24]  | h7  | 10 [0.39] |
| 8 [0.32]  | h7  | 15 [0.59] |
| 10 [0.39] | h7  | 20 [0.79] |
| 12 [0.47] | h7  | 20 [0.79] |
| 1/4"      | h7  | 5/8"      |
| 3/8"      | h7  | 5/8"      |
| 1/4"      | h8  | 7/8"      |
| 3/8"      | h8  | 7/8"      |

### Clamping flange, $\varnothing$ 58 [2.28] Flange type 7 and 8

1 3 x M3, 6 [0.24] deep



MIL-connector version

| D         | Fit | L         |
|-----------|-----|-----------|
| 6 [0.24]  | h7  | 10 [0.39] |
| 8 [0.32]  | h7  | 15 [0.59] |
| 10 [0.39] | h7  | 20 [0.79] |
| 12 [0.47] | h7  | 20 [0.79] |
| 1/4"      | h7  | 5/8"      |
| 3/8"      | h7  | 5/8"      |
| 1/4"      | h8  | 7/8"      |
| 3/8"      | h8  | 7/8"      |

# Incremental encoders

**Standard optical**

**Sendix 5000 / 5020 (shaft / hollow shaft)**

**Push-pull / RS422 / Open collector**

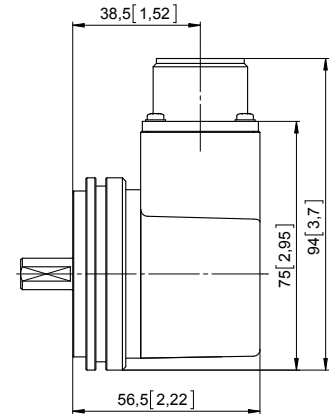
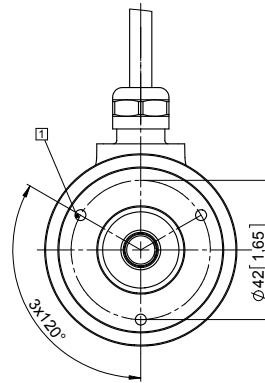
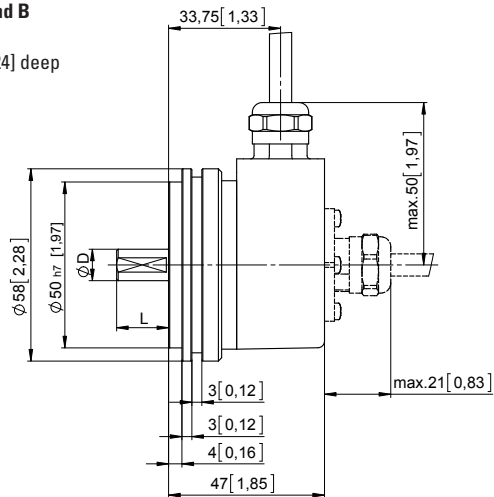
## Dimensions shaft version

Dimensions in mm [inch]

### Synchro flange, $\varnothing$ 58 [2.28]

Flange type A and B

1 3 x M4, 6 [0.24] deep

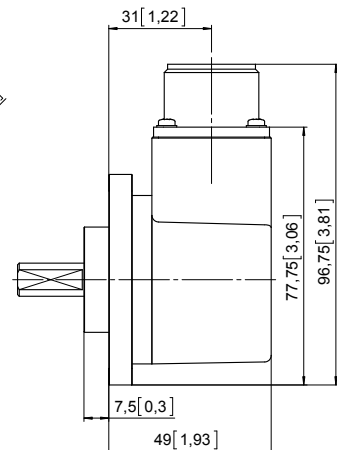
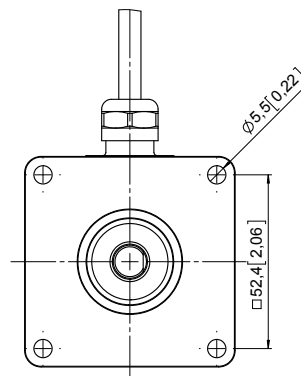
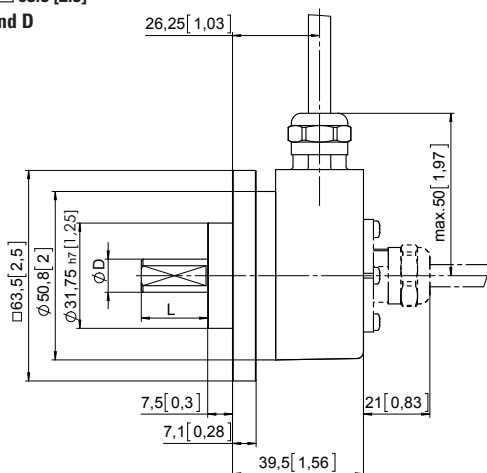


MIL-connector version

| D         | Fit | L         |
|-----------|-----|-----------|
| 6 [0.24]  | h7  | 10 [0.39] |
| 8 [0.32]  | h7  | 15 [0.59] |
| 10 [0.39] | h7  | 20 [0.79] |
| 12 [0.47] | h7  | 20 [0.79] |
| 1/4"      | h7  | 5/8"      |
| 3/8"      | h7  | 5/8"      |
| 1/4"      | h8  | 7/8"      |
| 3/8"      | h8  | 7/8"      |

### Square flange, $\square$ 63.5 [2.5]

Flange type C and D



MIL-connector version

| D         | Fit | L         |
|-----------|-----|-----------|
| 6 [0.24]  | h7  | 10 [0.39] |
| 8 [0.32]  | h7  | 15 [0.59] |
| 10 [0.39] | h7  | 20 [0.79] |
| 12 [0.47] | h7  | 20 [0.79] |
| 1/4"      | h7  | 5/8"      |
| 3/8"      | h7  | 5/8"      |
| 1/4"      | h8  | 7/8"      |
| 3/8"      | h8  | 7/8"      |







# Incremental encoders

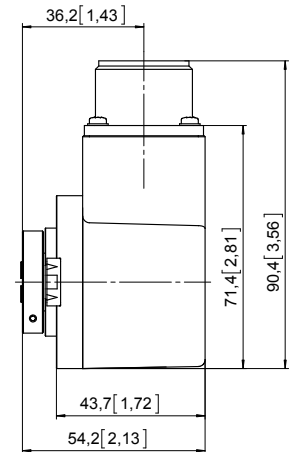
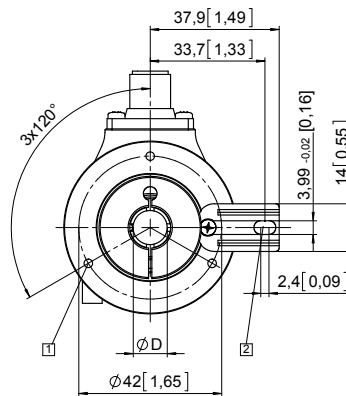
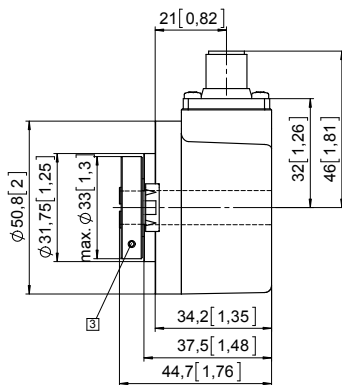
|                         |  |   |
|-------------------------|--|---|
| <b>Standard optical</b> | <b>Sendix 5000 / 5020 (shaft / hollow shaft)</b> | <b>Push-pull / RS422 / Open collector</b> |
|-------------------------|--|---|

## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element, long Flange type 1 and 2

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm



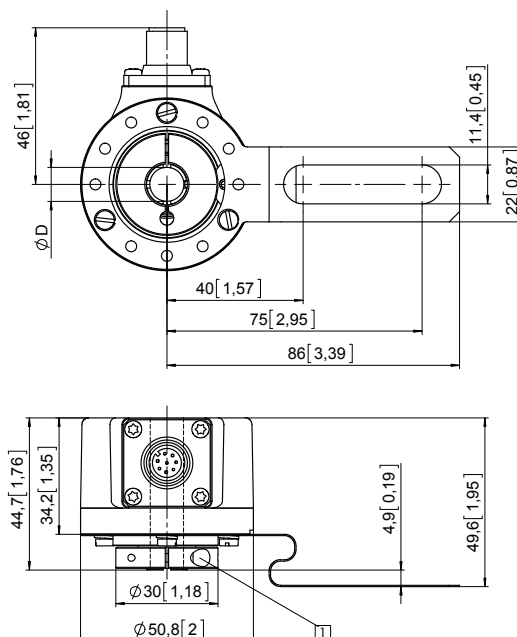
MIL-connector version

| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.

### Flange with torque stop, long Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm



| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.

# Incremental encoders

## Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

Push-pull / RS422 / Open collector

### Dimensions hollow shaft version

Dimensions in mm [inch]

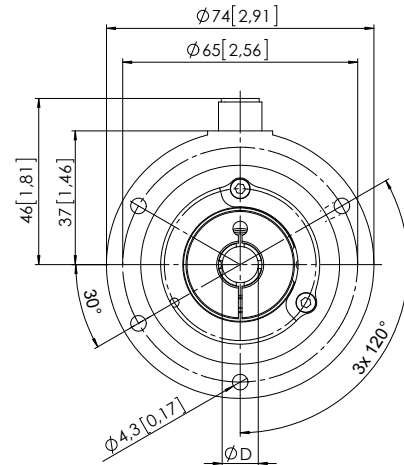
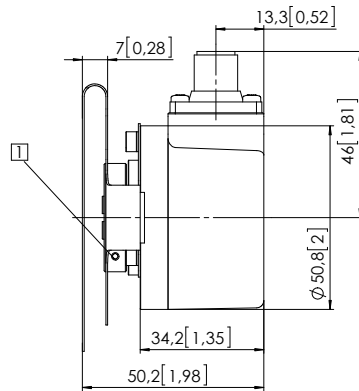
#### Flange with stator coupling, $\varnothing 65$ [2.56]

Flange type 7 and 8

- 1 Recommended torque for the clamping ring 0.6 Nm

| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.



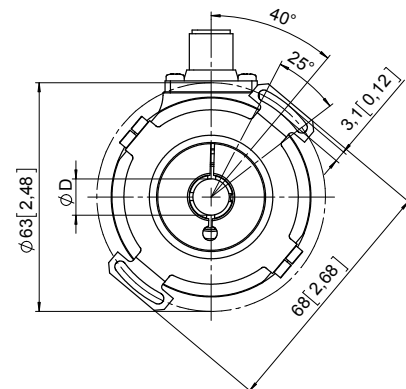
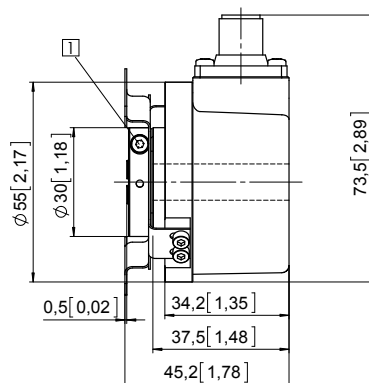
#### Flange with stator coupling, $\varnothing 63$ [2.48]

Flange type C and D

- 1 Recommended torque for the clamping ring 0.6 Nm

| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.



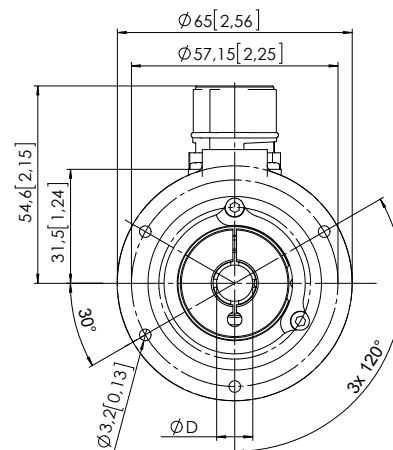
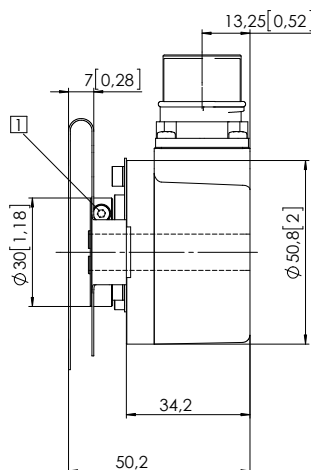
#### Flange with stator coupling, $\varnothing 57.2$ [2.25]

Flange type 5 and 6

- 1 Recommended torque for the clamping ring 0.6 Nm

| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.



# Incremental encoders

|                         |  |   |
|-------------------------|--|---|
| <b>Standard optical</b> | <b>Sendix 5000 / 5020 (shaft / hollow shaft)</b> | <b>Push-pull / RS422 / Open collector</b> |
|-------------------------|--|---|

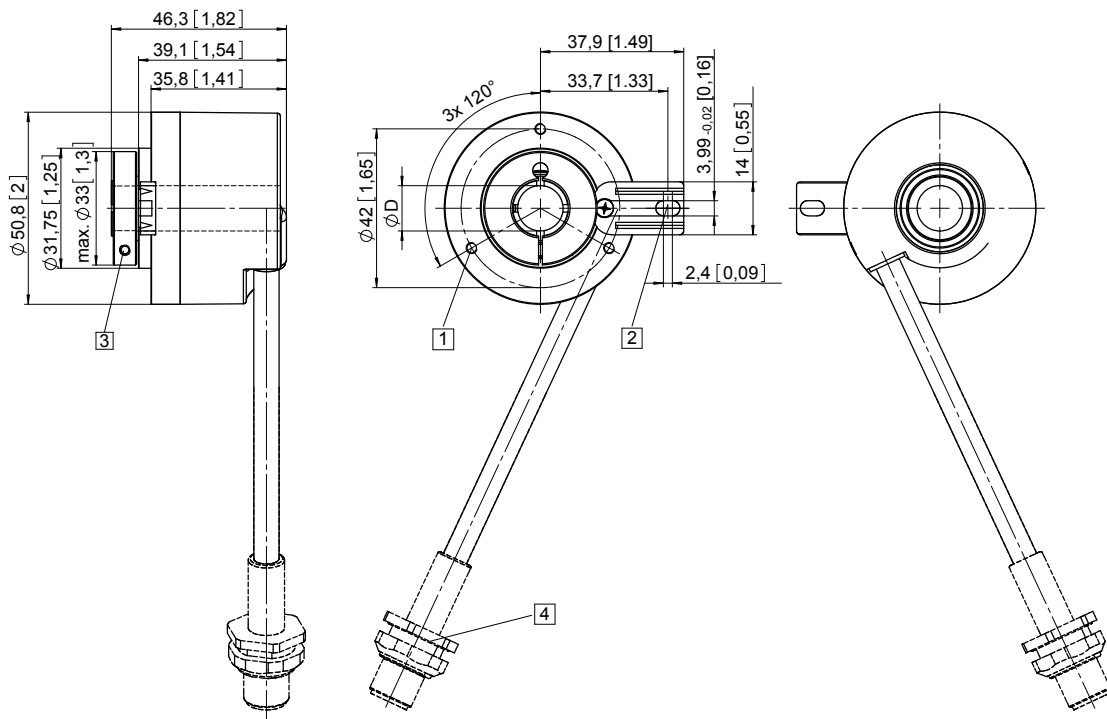
## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element, long and tangential cable outlet

Type of connection E, F and H

- 1 3 x M3, 6 [0.24] deep
- 2 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm
- 4 Shield is not applied on connector



| D         | Fit |
|-----------|-----|
| 6 [0.24]  | H7  |
| 8 [0.32]  | H7  |
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/4"      | H7  |
| 3/8"      | H7  |
| 1/2"      | H7  |
| 5/8"      | H7  |

Recommended fit for shaft on customer side is g6.