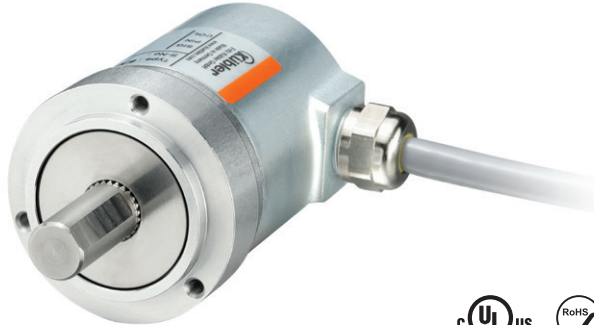


# Absolute encoders – singleturn

|                                 |                               |            |
|---------------------------------|-------------------------------|------------|
| <b>Compact, robust magnetic</b> | <b>Sendix M3653AR (shaft)</b> | <b>SSI</b> |
|---------------------------------|-------------------------------|------------|



The Sendix M3653AR are magnetic singleturn encoders in compact design. They are characterized by robustness, reliability and cost-efficiency.

The "R"obust version is particularly suitable for use in harsh environments. Protected up to IP69k, resistance against shock and extreme temperature fluctuations, the Sendix M36 encoders are suitable even for demanding outdoor applications.



|                  |   |                                    |                       |                                   |                             |                          |                             |                             |
|------------------|---|------------------------------------|-----------------------|-----------------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|
|                  |   |                                    |                       |                                   |                             |                          |                             |                             |
| Safety-Lockplus™ | Standard option stainless steel<br>1.4404 | Standard option seawater resistant | High rotational speed | Temperature range<br>-40°...+85°C | High protection level<br>IP | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection |

## Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Protection level IP66, IP67 and IP69k in one device.
- Wide temperature range -40°C ... +85°C.

## Application oriented

- Angular measurement deviation ±0,5°.
- Repeat accuracy ±0.2°.
- Short control cycles, clock frequency with SSI up to 2 MHz.
- Max. resolution 14 bit.

|                   |                      |                  |                   |
|-------------------|----------------------|------------------|-------------------|
| <b>Order code</b> | <b>Shaft version</b> | <b>8.M3653AR</b> | <b>.XX2X.XX12</b> |
|                   |                      | Type             | a b c d e f       |

|   |  |  |
|---|--|--|
| <p><b>a</b> Version</p> <p>1 = standard <sup>1)</sup><br/>clamping flange ø 42 mm [1.65"]</p> <p>7 = stainless steel V4A <sup>2)</sup><br/>clamping flange ø 42 mm [1.65"]<br/>all metal parts accessible from outside are out of stainless steel V4A</p> <p><b>b</b> Shaft (ø x L), with flat</p> <p>1 = ø 6 x 12.5 mm [0.24 x 0.49"]</p> <p>3 = ø 8 x 15 mm [0.32 x 0.59"]</p> <p>5 = ø 10 x 20 mm [0.39 x 0.79"]</p> <p>2 = ø 1/4" x 12.5 mm [0.49"]</p> <p>E = ø 10 x 20 mm [0.39 x 0.79"], stainless steel V4A</p> | <p><b>c</b> Interface / supply voltage</p> <p>2 = SSI / 10 ... 30 V DC</p> <p><b>d</b> Type of connection</p> <p>2 = radial cable, 1 m [3.28'] PUR</p> <p>B = radial cable, special length PUR *)</p> <p>4 = radial M12 connector, 8-pin</p> <p>*) Available special lengths (connection type B):<br/>2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']<br/>order code expansion .XXXX = length in dm<br/>ex.: 8.M3653AR.132B.G312.0030 (for cable length 3 m)</p> <p><b>e</b> Code</p> <p>B = SSI, binary</p> <p>G = SSI, gray</p> | <p><b>f</b> Resolution</p> <p>A = 10 bit</p> <p>2 = 12 bit</p> <p>3 = 13 bit</p> <p>4 = 14 bit</p> <p><i>Optional on request</i></p> <p>- Ex 2/22 (only for connection type 4)</p> <p>- other shaft diameters out of V4A stainless steel</p> |
|---|--|--|

1) Not in conjunction with shaft type "E".  
2) Only in conjunction with shaft type "E" + type of connection "4".

## Absolute encoders – singleturn

|  |  |                               |   |
|--|--|-------------------------------|---|
| <b>Compact, robust magnetic</b>              |  | <b>Sendix M3653AR (shaft)</b> | <b>SSI</b>                                |
| <b>Mounting accessory for shaft encoders</b> |  |                               | Order no.                                 |
| <b>Coupling</b>                              | Bellows coupling ø 19 mm [0.75"] for shaft 8 mm [0.32"]  |                               | <b>8.0000.1102.0808</b> <sup>1)</sup>     |
| <b>Cables and connectors</b>                 |  |                               | Order no.                                 |
| <b>Preassembled cables</b>                   | M12 female connector with coupling nut, 8-pin, A coded, straight single ended<br>2 m [6.56'] PUR cable |                               | <b>05.00.6051.8211.002M</b> <sup>1)</sup> |
| <b>Connectors</b>                            | M12 female connector with coupling nut, 8-pin, A coded, straight (metal)                               |                               | <b>05.CMB 8181-0</b> <sup>1)</sup>        |
|  | M12 female connector with coupling nut, 8-pin, A coded, straight (stainless steel V4A)                 |                               | <b>8.0000.5136.0000.V4A</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)

1) Not for version "7" (V4A stainless steel)

# Absolute encoders – singleturn

|                                 |                               |            |
|---------------------------------|-------------------------------|------------|
| <b>Compact, robust magnetic</b> | <b>Sendix M3653AR (shaft)</b> | <b>SSI</b> |
|---------------------------------|-------------------------------|------------|

## Technical data

| Mechanical characteristics                       |   |   |
|--|---|---|
| <b>Maximum speed</b>                             | 4000 min <sup>-1</sup><br>2000 min <sup>-1</sup> (continuous) |   |
| <b>Starting torque at 20°C [68°F]</b>            | < 0.01 Nm   |   |
| <b>Shaft load capacity</b>                       | radial  | 80 N                                    |
|  | axial   | 40 N                                    |
| <b>Weight</b>                                    | approx. 250 g [8.82 oz]                                       |   |
| <b>Protection</b> acc. to EN 60529/DIN 40050-9   | IP66, IP67, IP69k   |   |
| <b>Working temperature range</b>                 | -40°C ... +85°C [-40°F ... +185°F]                            |   |
| <b>Materials</b>                                 | <b>version "1"</b><br>(standard)                              | <b>version "7"</b><br>(stainless steel) |
|  | shaft   | V2A                                     |
|  | flange  | aluminum                                |
|  | housing   | zinc die-cast                           |
|  | cable   | PUR                                     |
| <b>Shock resistance</b> acc. to EN 60068-2-27    | 5000 m/s <sup>2</sup> , 4 ms                                  |   |
| <b>Vibration resistance</b> acc. to EN 60068-2-6 | 300 m/s <sup>2</sup> , 10 ... 2000 Hz                         |   |

| Electrical characteristics                               |                   |
|--|-------------------|
| <b>Supply voltage</b>                                    | 10 ... 30 V DC    |
| <b>Current consumption</b> (no load)                     | max. 30 mA        |
| <b>Reverse polarity protection of the supply voltage</b> | yes               |
| <b>Short-circuit proof outputs</b>                       | yes <sup>1)</sup> |

| SSI interface                                      |  |
|--|--|
| <b>Output driver</b>                               | RS485 transceiver type                       |
| <b>Permissible load / channel</b>                  | max. +/- 30 mA                               |
| <b>Signal level</b>                                | HIGH typ 3.8 V                               |
|  | LOW with I <sub>Load</sub> = 20 mA typ 1.3 V |
| <b>Resolution</b>                                  | 10 ... 14 bit                                |
| <b>Angular measurement deviation</b> <sup>2)</sup> | ±0,5°  |
| <b>Repeat accuracy</b>                             | ±0.2°  |
| <b>Code</b>  | binary or gray                               |
| <b>SSI clock rate</b>                              | 50 kHz ... 2 MHz                             |
| <b>Data refresh rate</b>                           | 2 ms   |
| <b>Monoflop time</b>                               | ≤ 15 µs                                      |

**Note:** If the clock cycle starts within the monoflop time a second data transfer begins with the same data. If the clock cycle starts after the monoflop time the cycle begins with the new values. The update rate is dependent on the clock speed, data length and monoflop time.

| SET input                                    |                               |
|--|-------------------------------|
| <b>Input</b>                                 | active HIGH                   |
| <b>Input type</b>                            | comparator                    |
| <b>Signal level</b><br>(+V = supply voltage) | HIGH min. 60 % of +V, max: +V |
|  | LOW max. 30 % of +V           |
| <b>Input current</b>                         | < 0.5 mA                      |
| <b>Min. pulse duration</b> (SET)             | 10 ms                         |
| <b>Input delay</b>                           | 1 ms                          |
| <b>New position data readable after</b>      | 1 ms                          |
| <b>Internal processing time</b>              | 200 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 processing time of approx. 1 ms, after which the new position data can be read via SSI. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.

The SET function should be carried out whilst the encoder is at rest. 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 this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.                                       |      |
| <b>Response time</b> (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.   |  |

| 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) |

1) Short circuit proof to 0 V or to output when supply voltage correctly applied.  
2) Over the whole temperature range.

# Absolute encoders – singleturn

**Compact, robust  
magnetic**

**Sendix M3653AR (shaft)**

**SSI**

## 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 | ⊥      |
| 2         | 2, B               | SET, DIR | Core color:   | WH  | BN | GN | YE | GY | PK | BU  | RD  | shield |

| Interface | Type of connection | Features | M12 connector, 8-pin |     |    |    |    |    |    |     |     |    |
|-----------|--------------------|----------|----------------------|-----|----|----|----|----|----|-----|-----|----|
|           |                    |          | Signal:              | 0 V | +V | C+ | C- | D+ | D- | SET | DIR | ⊥  |
| 2         | 4                  | SET, DIR | Pin:                 | 1   | 2  | 3  | 4  | 5  | 6  | 7   | 8   | PH |

+V: Supply voltage encoder +V DC  
 0 V: Supply voltage encoder ground GND (0 V)  
 C+, C-: Clock signal  
 D+, D-: Data signal  
 SET: Set input  
 DIR: Direction input  
 PH ⊥: Plug connector housing (shield)

Top view of mating side, male contact base



M12 connector, 8-pin

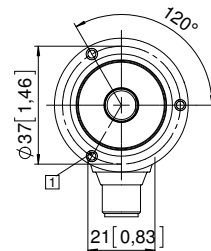
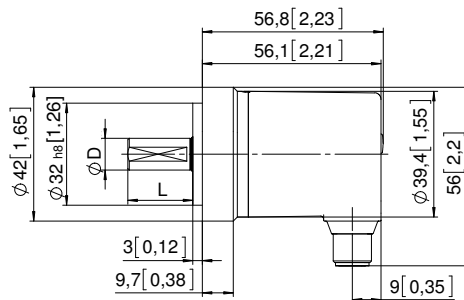
## Dimensions

Dimensions in mm [inch]

**Aluminum,  
clamping flange, ø 42 [1.65]  
version 1**

□ 3 x M3, 6 [0.24] deep

| D         | Fit | L           |
|-----------|-----|-------------|
| 6 [0.24]  | h7  | 12.5 [0.49] |
| 8 [0.32]  | h7  | 15 [0.59]   |
| 10 [0.39] | f7  | 20 [0.79]   |
| 1/4"      | h7  | 12.5 [0.49] |



**Stainless steel V4A  
clamping flange, ø 42 [1.65]  
version 7**

□ 4 x M4, 8 [0.31] deep

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

