

# Absolute encoders – multiturn

**Compact  
electronic multiturn, magnetic**

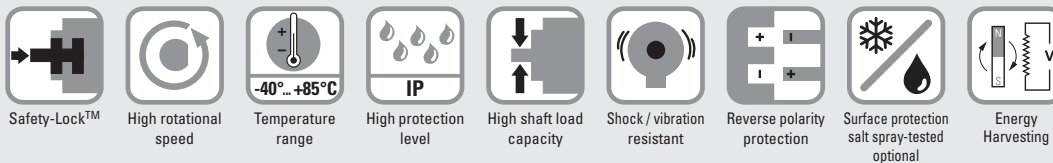
**Sendix M3668 / M3688 (shaft / hollow shaft)**

**CANopen**



The Sendix M36 with Energy Harvesting Technology is an electronic multiturn encoder in compact design, without gear and without battery.

It is characterized by robustness, reliability and cost-efficiency.



## Reliable and insensitive

- Sturdy bearing construction in Safety-Lock™ design for resistance against vibration and installation errors.
- Reduced number of components ensures magnetic insensitivity.
- IP67 protection and wide temperature range -40 °C ... +85 °C.
- Without gear and without battery, thanks to the Energy Harvesting technology.

## Up-to-the-minute fieldbus performance

- LSS services for configuration of the node address and baud rate.
- Variable PDO mapping in the memory.
- Configuration management (bootloader).

**Order code** 8.M3668 . XX 2 X . 21 22  
**Shaft version** Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



### a Flange

- 1 = clamping flange, IP67, ø 36 mm [1.42"]
- 3 = clamping flange, IP65, ø 36 mm [1.42"]
- 2 = synchro flange, IP67, ø 36 mm [1.42"]
- 4 = synchro flange, IP65, ø 36 mm [1.42"]

### b Shaft (ø x L), with flat

- 1 = ø 6 x 12.5 mm [0.24 x 0.49"]
- 3 = ø 8 x 15 mm [0.32 x 0.59"]
- 5 = ø 10 x 20 mm [0.39 x 0.79"]
- 2 = ø 1/4" x 12.5 mm [0.49"]

### c Interface / supply voltage

- 2 = CANopen DS301 V4.2 / 10 ... 30 V DC

### d Type of connection

- 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 \*)
- 3 = axial M12 connector, 5-pin
- 4 = radial M12 connector, 5-pin

\*) Available special lengths (connection types A, B):  
 2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']  
 order code expansion .XXXX = length in dm  
 ex.: 8.M3668.432A.2122.0030 (for cable length 3 m)

### e Fieldbus profile

- 21 = CANopen

### Optional on request

- Ex 2/22 (only for connection types 3 and 4)
- surface protection salt spray tested

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<b>Order code</b> <b>Hollow shaft</b>	<b>8.M3688</b> Type	<b>.XX2X</b> a b c d	<b>.2122</b> e	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	<b>10 by 10</b>
<b>a Flange</b> <u>2 = with stator coupling, IP65, ø 46 mm [1.81"]</u> 3 = with spring element, long, IP65 5 = with stator coupling, IP67, ø 46 mm [1.81"] 6 = with spring element, long, IP67	<b>b Blind hollow shaft</b> (insertion depth max. 18.5 mm [0.73"]) 1 = ø 6 mm [0.24"] 3 = ø 8 mm [0.32"] <u>4 = ø 10 mm [0.39"]</u> 2 = ø 1/4"	<b>c Interface / supply voltage</b> <u>2 = CANopen DS301 V4.2 / 10 ... 30 V DC</u>	<b>d Type of connection</b> 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 *) 3 = axial M12 connector, 5-pin <u>4 = radial M12 connector, 5-pin</u> *) Available special lengths (connection types A, B): 2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.M3688.242A.2122.0030 (for cable length 3 m)	<b>e Fieldbus profile</b> <u>21 = CANopen</u>  <i>Optional on request</i> - Ex 2/22 (only for connection types 3 and 4) - surface protection salt spray tested	

Mounting accessory for shaft encoders		Order no.
<b>Coupling</b>	Bellows coupling ø 19 mm [0.75"] for shaft 8 mm [0.32"]	<b>8.0000.1102.0808</b>

Mounting accessory for hollow shaft encoders		Dimensions in mm [inch]	Order no.
<b>Torque pin, ø 4 mm</b> for flange with spring element (flange type 3 + 6)	with fixing thread		<b>8.0010.4700.0000</b>

Cables and connectors			Order no.
<b>Preassembled cables</b>	M12 female connector with coupling nut, 5-pin, A coded, straight open ended 5 m [16.40'] PVC cable	Bus in	<b>05.00.6091.A211.005M</b>
	M12 female connector with coupling nut, 5-pin, A coded, straight Deutsch connector DT04, male contacts, 6-pin, straight 1 m [3.28'] PVC cable	Bus in	<b>05.00.6091.22C7.001M</b>
<b>Connectors</b>	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	Bus in	<b>8.0000.5116.0000</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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## Technical data

Mechanical characteristics		
<b>Maximum speed</b>		
shaft or blind hollow shaft version without shaft seal (IP65)		6000 min <sup>-1</sup> 3000 min <sup>-1</sup> (continuous)
shaft or blind hollow shaft version with shaft seal (IP67)		4000 min <sup>-1</sup> 2000 min <sup>-1</sup> (continuous)
<b>Starting torque at 20 °C [68 °F]</b>		
	without shaft seal	< 0.007 Nm
	with shaft seal (IP67)	< 0.01 Nm
<b>Shaft load capacity</b>	radial	40 N
	axial	20 N
<b>Weight</b>		approx. 210 g [7.41 oz]
<b>Protection</b> acc. to EN 60529		IP65 or IP67
<b>Working temperature range</b>		-40 °C ... +85 °C [-40 °F ... +185 °F]
<b>Materials</b>	shaft / hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC
<b>Shock resistance</b> acc. to EN 60068-2-27		2500 m/s <sup>2</sup> , 6 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>

Interface characteristics CANopen	
<b>Resolution singleturn (MUR)</b>	scalable 1 ... 16 384 (14 bit) default 16 384 (14 bit)
<b>Number of revolutions (NDR)</b>	1 ... 536 870 912 (29 bit) scalable only via the total resolution
<b>Total resolution (TMR)</b>	raw value max. 8 796 093 022 208 (43 bit) scalable 1 ... 4 294 967 296 (32 bit) default 4 294 967 296 (32 bit)
<b>Angular measurement deviation</b> <sup>2)</sup>	±0,5°
<b>Repeat accuracy</b>	±0.2°
<b>Interface</b>	CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN specification 2.0 B
<b>Protocol</b>	CANopen profile DS406 V4.0 with manufacturer-specific add-ons, LSS-Service, bootloader
<b>Power-ON time</b>	< 1200 ms
<b>SDO timeout</b>	< 1000 ms
<b>Baud rate</b>	10 ... 1000 kbit/s software configurable
<b>Node address</b>	1 ... 127 software configurable
<b>Termination</b>	software configurable
<b>LSS protocol</b>	CIA LSS protocol DS305, global command support for node address and baud rate, selective commands via attributes of the identity object
<b>Bootloader</b>	configuration management CIA DS 302-3

Approvals	
<b>E1 compliant</b> in accordance with	ECE guideline
<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.

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## General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device-specific profiles like the encoder profile DS406 V3.2, DS305 (LSS) and DS302 (Bootloader) are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CANbus. When switching the device on, all parameters, which have been saved on a flash memory to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration** as well as the **status of the working area**.

The encoders are available with a connector or a cable connection.

The device address and baud rate can be set/modified by means of the software.

The two-color LED located on the back indicates the operating or fault status of the CAN-bus, as well as the status of the internal diagnostics.

## CANbus connection

The CANopen encoders are equipped with a bus trunk line in various lengths or a M12 connector and can be terminated in the device.

The devices do not have an integrated T-coupler nor they are looped internally and must therefore only be used as end devices.

## LSS layer setting services DS305 V2.0

- Global support of node-ID and baud rate.
- Selective protocol via identity object (1018h).

## CANopen communication profile DS301 V4.2

Among others, the following functionality is integrated. (Class C2 functionality):

- NMT Slave.
- Heartbeat Protocol.
- Identity Object.
- Error Behavior Object.
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's.
- Node address, baud rate and CANbus / programmable termination.

## CANopen encoder profile DS406 V4.0

The following parameters can be programmed:

- Event mode, start optional.
- 1 work area with upper and lower limit and the corresponding output states.
- Variable PDO mapping for position, speed, work area status, error and acceleration.
- Extended failure management for position sensing.
- User interface with visual display of bus and failure status 1 LED two colors.
- Customer-specific protocol.
- "Watchdog controlled" device.

## Bootloader functionality DS302-3

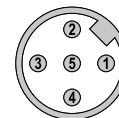
Configuration Management:

- Program download.
- Program start.
- Program erase.

## Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
2	1, 2, A, B	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Core color:	BN	WH	GY	GN	YE
Interface	Type of connection	M12 connector, 5-pin					
2	3, 4	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Pin:	2	3	1	4	5

Top view of mating side, male contact base



M12 connector, 5-pin

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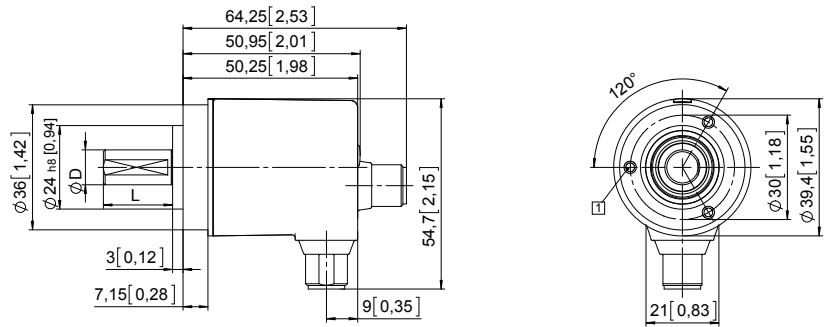
## Dimensions shaft version

Dimensions in mm [inch]

### Clamping flange, $\varnothing$ 36 [1.42]

#### Flange type 1 and 3

1 3 x M3, 6 [0.24] deep

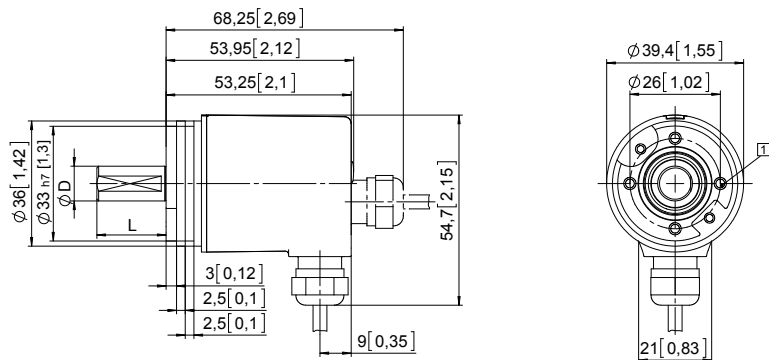


D	Fit	L
6 [0.24]	h7	12.5 [0.49]
8 [0.32]	h7	15 [0.59]
10 [0.39]	f7	20 [0.79]
1/4"	h7	12.5 [0.49]

### Synchro flange, $\varnothing$ 36 [1.42]

#### Flange type 2 and 4

1 4 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]

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### Dimensions hollow shaft version

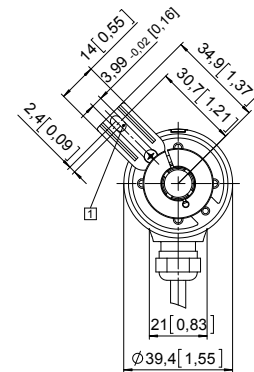
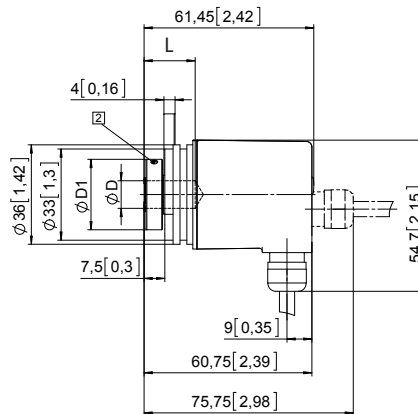
Dimensions in mm [inch]

#### Flange with spring element, long Flange type 3 and 6

- 1 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 2 Recommended torque for the clamping ring 0.7 Nm

D	Fit	L	D1
6 [0.24]	H7	18.5 [0.73]	24 [0.94]
8 [0.32]	H7	18.5 [0.73]	25.5 [1.00]
10 [0.39]	H7	18.5 [0.73]	25.5 [1.00]
1/4"	H7	18.5 [0.73]	24 [0.94]

L = insertion depth max. blind hollow shaft



#### Flange with stator coupling, $\varnothing$ 46 [1.81] Flange type 2 and 5

- 1 Recommended torque for the clamping ring 0.7 Nm

D	Fit	L	D1
6 [0.24]	H7	18.5 [0.73]	24 [0.94]
8 [0.32]	H7	18.5 [0.73]	25.5 [1.00]
10 [0.39]	H7	18.5 [0.73]	25.5 [1.00]
1/4"	H7	18.5 [0.73]	24 [0.94]

L = insertion depth max. blind hollow shaft

