

# Absolute Encoders – Singleturn

**Compact, optical**      **Sendix F3658 / F3678 (Shaft / Hollow shaft)**      **CANopen**



The Sendix F36 singleturn with the patented Intelligent Scan Technology™ and CANopen interface boasts exceptional ruggedness and compact dimensions. With a size of just 36 x 42 mm it offers a shaft or a blind hollow shaft of up to 10 mm.

Its high-precision optical sensor technology can achieve a resolution of up to 16 bits.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.



- Safety-Lock™
- Temperature  
-40° +85°
- High protection level  
IP
- High shaft load capacity
- Shock / vibration resistant
- Magnetic field proof
- Short-circuit proof
- Reverse polarity protection
- Optical sensor
- Seawater-resistant version on request

### Reliable and magnetically insensitive

- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +85°C
- Patented Intelligent Scan Technology™ with all singleturn and multiturn functions on one single OptoAsic - offering highest reliability, a high resolution up to 41 bits and 100% magnetic field insensitivity

### Up-to-the-minute Fieldbus performance

- CANopen with current encoder profile
- LSS services for configuration of the node address and baud rate
- Variable PDO mapping in the memory

Absolute Encoders Singleturn

**Order code**      **8.F3658**      **. XX 2 X . 21 1 2**      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. **10 by 10**

**Shaft version**      Type      a b c d e

- a** Flange, ø 36 mm  
 1 = clamping flange, IP67  
 2 = synchro flange, IP67  
 3 = clamping flange, IP65  
4 = synchro flange, IP65
- b** Shaft (ø x L), with flat  
 1 = ø 6 x 12,5 mm  
 2 = ø 6,35 (1/4") x 12,5 mm  
3 = ø 8 x 15 mm  
 4 = ø 9,5 x 15,875 mm (3/8" x 5/8")  
 5 = ø 10 x 20 mm

- c** Interface / Power supply  
2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- d** Type of connection  
1 = cable, tangential (1 m PUR)  
 3 = cable, tangential (5 m PUR)
- e** Fieldbus profile  
21 = CANopen Encoder profile DS406 V3.2

*optional on request*  
 - Ex 2/22  
 - seawater-resistant  
 - special cable length

**Order code**      **8.F3678**      **. XX 2 X . 21 1 2**      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. **10 by 10**

**Hollow shaft**      Type      a b c d e

- a** Flange, ø 36 mm, IP65  
 1 = with torque stop, short  
2 = with stator coupling  
 3 = with torque stop, long
- b** Blind hollow shaft  
4 = ø 10 mm  
 5 = ø 6 mm  
 6 = ø 6.35 mm (1/4")  
 7 = ø 8 mm

- c** Interface / Power supply  
2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- d** Type of connection  
1 = cable, tangential (1 m PUR)  
 3 = cable, tangential (5 m PUR)
- e** Fieldbus profile  
21 = CANopen Encoder profile DS406 V3.2

*optional on request*  
 - Ex 2/22  
 - seawater-resistant  
 - special cable length

# Absolute Encoders – Singleturn

<b>Compact, optical</b>		<b>Sendix F3658 / F3678 (Shaft / Hollow shaft)</b>	<b>CANopen</b>
<b>Mounting accessory for shaft encoders</b>			
<b>Coupling</b>	Bellows coupling ø 19 mm for shaft 8 mm		<b>8.0000.1101.0808</b>
<b>Mounting accessory for hollow shaft encoders</b>			
<b>Cylindrical pin, long</b> for torque stops		With fixing thread	<b>8.0010.4700.0000</b>
<b>Programming set</b>			
including:	<ul style="list-style-type: none"> <li>- Interface converter USB-CAN</li> <li>- Connection cable from interface converter to encoder</li> <li>- Power supply 90 ... 250 V AC</li> <li>- DVD with Ezturn® software</li> </ul>	<b>Minimum System Requirements:</b> Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	<b>8.0010.9000.0015</b>

Further accessories can be found in the Accessories section or in the Accessories area of our website at: [www.kuebler.com/accessories](http://www.kuebler.com/accessories).  
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: [www.kuebler.com/connection\\_technology](http://www.kuebler.com/connection_technology).

<b>Mechanical characteristics</b>		
<b>Maximum speed</b>		
shaft- or blind hollow shaft version without shaft seal (IP65)		12 000 min <sup>-1</sup> 10 000 min <sup>-1</sup> (continuous op.)
shaft version (IP67) or hollow shaft version (IP65) with shaft seal		10 000 min <sup>-1</sup> 8 000 min <sup>-1</sup> (continuous op.)
<b>Starting torque</b>	without shaft seal with shaft seal (IP67)	< 0.007 Nm < 0.01 Nm
<b>Shaft load capacity</b>	radial axial	40 N 20 N
<b>Weight</b>		ca. 0.2 kg
<b>Protection to EN 60 529</b>	housing side shaft side	IP 67 IP 65 (solid shaft version opt. IP67)
<b>EX approval for hazardous areas</b>		optional Zone 2 and 22
<b>Working temperature range</b>		-40°C ... +85°C
<b>Materials</b>	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast PUR
<b>Shock resistance acc. to EN 60068-2-27</b>		2500 m/s <sup>2</sup> , 6 ms
<b>Vibration resistance acc. to EN 60068-2-6</b>		100 m/s <sup>2</sup> , 55 ... 2000 Hz

<b>Diagnostic LED (two-colour, red/green)</b>		
<b>LED ON or blinking</b>	<b>red</b> <b>green</b>	Error display Status display

<b>General electrical characteristics</b>	
<b>Supply voltage</b>	10 ... 30 V DC
<b>Current consumption (no load)</b>	max. 80 mA
<b>Reverse polarity protection of the power supply (U<sub>B</sub>)</b>	yes
<b>UL approval</b>	File 224618
<b>RoHS compliant acc. to</b>	EU guideline 2002/95/EG
<b>CE compliant acc. to</b>	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3

<b>Interface characteristics CANopen</b>	
<b>Resolution Singleturn</b>	1 ... 65536 (16 bit), scaleable: 1 ... 65536
<b>Default value Singleturn</b>	8192 (13 bit)
<b>Code</b>	Binary
<b>Interface</b>	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
<b>Protocol</b>	CANopen profile DS406 V3.2 with manufacturer-specific add-ons LSS-Service DS305 V2.0
<b>Baud rate</b>	10 ... 1000 kbit/s (Software configurable)
<b>Node address</b>	1 ... 127 (Software configurable)
<b>Termination switchable</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

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

## CANopen Communication Profile DS301 V4.02

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

- NMT Slave
- Heartbeat Protocol
- Identity Object
- Error Behaviour 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 V3.2

The following parameters can be programmed:

- Event mode
- 1 work area with upper and lower limit and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing
- User interface with visual display of bus and failure status 1 LED two colours
- Customer-specific memory - 16 Bytes
- Customer-specific protocol

"Watchdog controlled" device

## LSS Layer Setting Services DS305 V2.0

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

## CANbus Connection

The CANopen encoders are equipped with a Bus trunk line in various lengths 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.

If possible, drop lines should be avoided, as in principle they lead to signal reflections. As a rule the reflections caused by the drop lines are not critical, if they have completely decayed before the point in time when the scanning occurs.

The sum of all the drop lines should not, for a particular baud rate, exceed the maximum length  $L_u$ .

$L_u < 5$  m cable length for 125 Kbit

$L_u < 2$  m cable length for 250 Kbit

$L_u < 1$  m cable length for 1 Mbit

When used as a drop line, the termination resistor should not be activated.

For a network with 3 encoders and 250 Kbit the maximum length of the drop line/encoder must not exceed 70 cm.

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## Terminal assignment

Interface	Type of connection	Features	Cable					
			Signal:	+V	0 V	CAN GND	CAN High	CAN Low
2	1, 3	CANopen	Cable colour:	BN	WH	GY	GN	YE

# Absolute Encoders – Singleturn

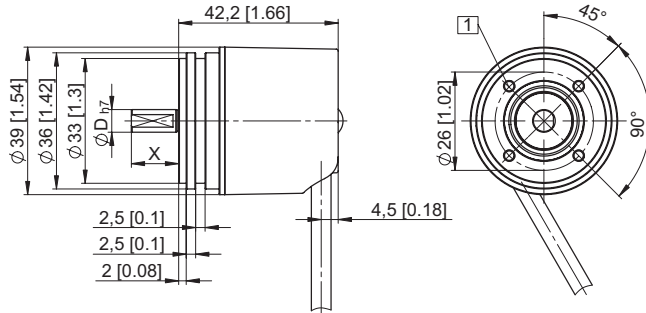
**Compact, optical**

**Sendix F3658 / F3678 (Shaft / Hollow shaft)**

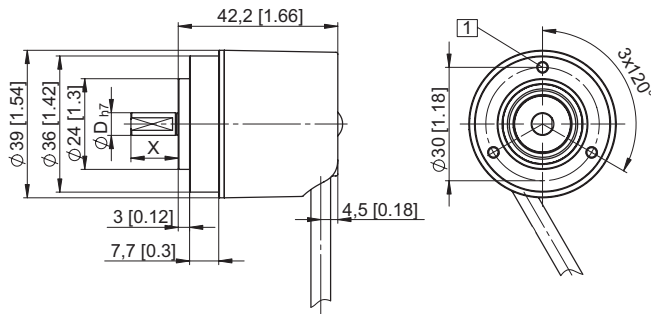
**CANopen**

## Dimensions shaft version

Synchro flange,  $\varnothing$  36 mm



Clamping flange,  $\varnothing$  36 mm

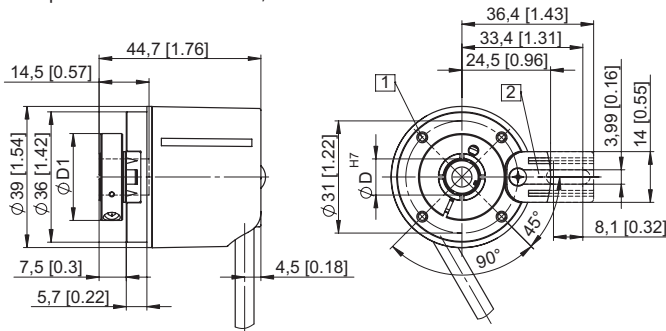


1 M3, 6 [0.24] deep

## Dimensions hollow shaft version

With torque stop, short,  $\varnothing$  36 mm

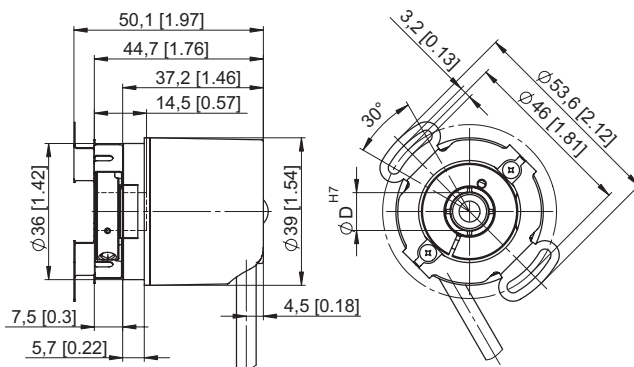
(Long torque stop version is shown dashed)



1 M2.5, 5 [0.2] deep

2 Torque stop slot  
Recommendation:  
Cylindrical pin DIN7,  $\varnothing$  4 mm

With stator coupling,  $\varnothing$  36 mm



Hollow shaft acc. to order code	D1
1	$\varnothing$ 24 mm
2	$\varnothing$ 24 mm
3	$\varnothing$ 25.5 mm
4	$\varnothing$ 25.5 mm

Insertion depth for blind hollow shaft 14,5 mm