Absolute Encoders - Singleturn

Compact Magnetic	Sendix M3658 / M3678 (Shaft / Hollow shaft)	CANopen

The Sendix M3658 and Sendix M3678 absolute encoders - Singleturn with CANopen interface and magnetic sensor technology boast a resolution of 14 bits.

With a protection rating of up to IP69k, these encoders are resistant to shock and to extreme fluctuations in temperature, making them ideal for use in the most demanding outdoor applications.

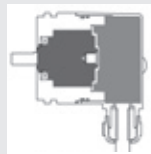| Safety-Lock™	High rotational speed	Temperature range -40°... +85°C	High protection level IP	High shaft load capacity	Shock / vibration resistant	Short-circuit proof	Reverse polarity protection	Magnetic sensor	Seawater-resistant version on request

Safe technology

- Increased resistance against vibration and installation errors
- Sturdy bearing construction in Safety-Lock™ Design
- Resistant die-cast-housing and protection up to IP69k

Versatile applications

- CANopen Encoder profile DS406 V3.2
- Fast determination of the operating status via two-colour LED
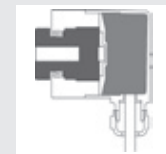- With M12 connector or cable connection

Safety-Lockplus™

IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal

Sensor-Protect™

Fully encapsulated electronics, separate mechanical bearing assembly

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Order code Shaft version

8.M3658 . 2XCX . 21 1X
Type
ⓐⓑⓒⓓ ⓔ ⓕ

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.

ⓐ Flange
2 = synchro flange, ø 36 mm [1.42"]

ⓑ Shaft (ø x L), with flat
3 = ø 6 x 12.5 mm [0.24 x 0.49"]
6 = ø 8 x 12.5 mm [0.32 x 0.49"]
5 = ø 1/4" x 12.5 mm [0.49"]

ⓒ Interface / Power supply
C = CANopen DS301 V4.02 / 8 ... 30 V DC

ⓓ Type of connection
2 = radial cable, 1 m [3.28] PUR
4 = M12 connector, 5-pin, radial

ⓔ Fieldbus profile
21 = CANopen Encoderprofil DS406 V3.2

ⓕ Protection
1 = IP67
2 = IP69k

optional on request
- seawater-resistant
- special cable length

Order code Hollow shaft

8.M3678 . XXCX . 21 1X
Type
ⓐⓑⓒⓓ ⓔ ⓕ

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.

ⓐ Flange
2 = with spring element long
5 = with stator coupling, ø 46 mm [1.81"]

ⓑ Hollow shaft
2 = ø 6 mm [0.24"]
4 = ø 8 mm [0.32"]
6 = ø 10 mm [0.39"]
3 = ø 1/4"

ⓒ Interface / Power supply
C = CANopen DS301 V4.02 / 8 ... 30 V DC

ⓓ Type of connection
2 = radial cable, 1 m [3.28] PUR
4 = M12 connector, 5-pin, radial

ⓔ Fieldbus profile
21 = CANopen Encoderprofil DS406 V3.2

ⓕ Protection
1 = IP67
2 = IP69k

optional on request
- seawater-resistant
- special cable length

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Mounting accessory for shaft encoders		Order No.
Coupling	Bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	8.0000.1101.0606

Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops	With fixing thread	8.0010.4700.0000

Connection technology		
Connector, self-assembly (straight)	M12 female connector with coupling nut	8.0000.5116.0000
Cordset, pre-assembled	M12 female connector with coupling nut, 6 m [19.69'] PVC cable	05.00.6091.A211.006M

Programming set		
Including: - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software	Minimum system requirements: Operating system: WinXP SP3 or higher Processor: 1 GHz RAM: 512 MB Required disk space: 500 MB	8.0010.9000.0015

Further accessories can be found in the accessories section or in the accessories area of our website at: 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

Technical data

Mechanical characteristics

Max. speed		6000 min^{-1}
Starting torque - at 20°C [68°F]		< 0.06 Nm
Load capacity of shaft	radial	40 N
	axial	20 N
Weight		approx. 0.2 kg [7.06 oz]
Protection acc. to EN 60529/DIN 40050-9		IP67 / IP69k
Working temperature range		-40°C ... +85°C [-40°F ... +185°F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PUR
Shock resistance acc. EN 60068-2-27		5000 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz
Permanent shock resistance acc. EN 60068-2-27		1000 m/s^2, 2 ms
Vibration (broad-band random) acc. EN 60068-2-64		5 ... 2500 Hz, 100 m/s^2 - rms

Interface characteristics CANopen

Resolution	1 ... 16384 (14 bit), (scaleable: 1 ... 16384)
Default value	16384 (14 bit)
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons LSS-Service DS305 V2.0
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Termination	Software configurable
LSS Protocol	CIA LSS protocol DS305 Global command support for node address and baud rate Selective commands via attributes of the identity object

Electrical characteristics

Power supply	8 ... 30 V DC
Current consumption (no load)	max. 25 mA
Reverse polarity protection of the power supply (+V)	yes
Measuring range	360°
Absolute accuracy, 25°C [77°F]	±1°
Repeat accuracy, 25°C [77°F]	±0.2°
Data refresh rate	400 µs
CE compliant acc. to	EMC guideline 2004/108/EC
RoHS compliant acc. to	guideline 2011/65/EU

Diagnostic LED (two-colour, red/green)

LED ON or blinking

	red	Error display
	green	Status display

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General information about CANopen

The CANopen encoders of the M3658 and M3678 series 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 are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

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 CANbus, 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 Protocol Profile 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 Lu.

Lu < 5 m [16.40'] cable length for 125 Kbit

Lu < 2 m [6.56'] cable length for 250 Kbit

Lu < 1 m [3.28'] 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.

Terminal assignment

Interface	Type of connection	Cable (Isolate unused wires individually before initial start-up)				
C	2	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Cable colour:	BN	WH	GY	GN	YE

Interface	Type of connection	M12 connector				
C	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
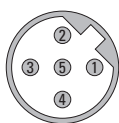
M12 connector, 5-pin

Compact
Magnetic

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Dimensions shaft version
Dimensions in mm [inch]

Synchro flange, ø 36 [1.42]
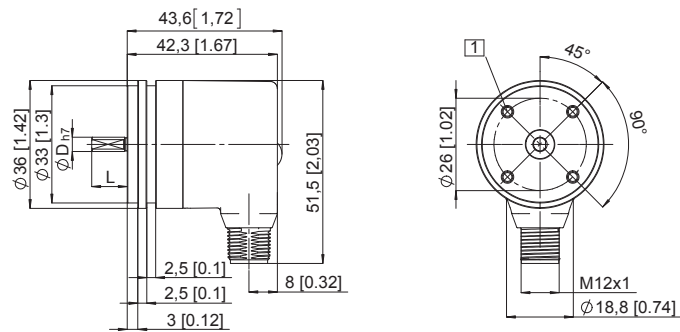**Flange type 2**
(Drawing with cable)

[1] 4 x M3, 6 [0.24] deep
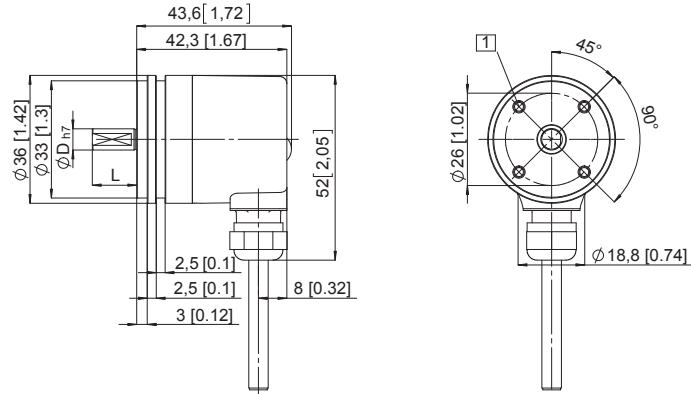
Synchro flange, ø 36 [1.42]
Flange type 2
(Drawing with M12 connector)

[1] 4 x M3, 6 [0.24] deep

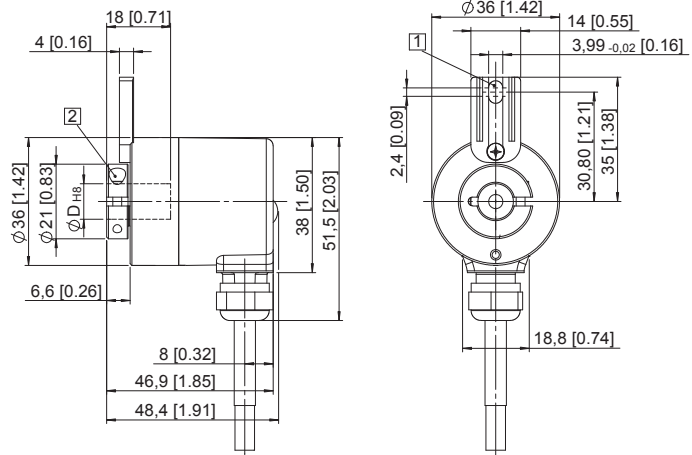| D	L	Fit
6 [0.24]	12.5 [0.49]	h7
8 [0.32]	12.5 [0.49]	h7
1/4"	12.5 [0.49]	h7

Dimensions hollow shaft version
Dimensions in mm [inch]

Flange with spring element long
Flange type 2

[1] Torque stop slot,
  Recommendation:
  Cylindrical pin DIN 7, ø 4 [0.16]
[2] Recommended torque for the
  clamping ring 0.7 Nm

Flange with stator coupling, ø 46 [1.81]
Flange type 5

[1] Recommended torque for the
  clamping ring 0.7 Nm