

# Absolute encoders - singleturn

**Compact magnetic**

**Sendix M3658 / M3678 (shaft / hollow shaft) SAE J1939**



The absolute Sendix encoders M3658 and M3678 with SAE J1939 interface support all common requirements of the special protocol for utility vehicles and make a considerable contribution to the comprehensive system diagnostics or to fast fault localisation.

The encoders offer fast, error-free start-up with no need to set switches; the encoder address is assigned automatically via Address Claiming (ACL).



**SAE J1939**



Safety-Lockplus™



High rotational speed



Temperature range  
-40°...+85°C



High protection level



High shaft load capacity



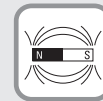
Shock / vibration resistant



Short-circuit proof



Reverse polarity protection



Magnetic sensor



Surface protection salt spray-tested optional

## Safe technology

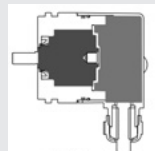
- Increased resistance against vibration and installation errors.
- Sturdy bearing construction in Safety-Lockplus™ Design.
- Resistant die cast housing and protection up to IP69k.

## Versatile applications

- Up-to-the-minute fieldbus performance in the application: SAE J1939 with CAN-highspeed to ISO 11898.
- Fast determination of the operating status via two-colour LED.
- Fast, error-free start up with no need to set switches; with automatic address claiming (ACL).

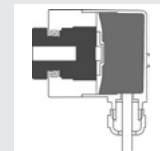
## Safety-Lockplus™

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.



**Order code**  
**Shaft version**

**8.M3658** . **2XCX** . **321X**  
Type                      a b c d e f

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**

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

**b** 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"]

**c** Interface / Power supply  
C = CAN Highspeed / 8 ... 30 V DC

**d** Type of connection  
2 = radial cable, 1 m [3.28] PUR  
B = radial cable, special length PUR \*)  
4 = radial M12 connector, 5-pin

\*) Available special lengths (connection type B):  
2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21']  
order code expansion .XXXX = length in dm  
ex.: 8.M3658.23CB.3211.0030 (for cable length 3 m)

**e** Fieldbus profile  
32 = J1939

**f** Protection  
1 = IP67  
2 = IP69k

*Optional on request*

- Ex 2/22 (only for type of connection 4)
- surface protection salt spray tested

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<b>Compact magnetic</b>	<b>Sendix M3658 / M3678 (shaft / hollow shaft)</b>	<b>SAE J1939</b>
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<b>Order code</b> Hollow shaft	<b>8.M3678</b> Type	<table border="1" style="font-size: small;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> <td style="text-align: center;">C</td> <td style="text-align: center;">X</td> <td style="text-align: center;">.</td> <td style="text-align: center;">32</td> <td style="text-align: center;">1</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">a</td> <td style="text-align: center;">b</td> <td style="text-align: center;">c</td> <td style="text-align: center;">d</td> <td style="text-align: center;">e</td> <td style="text-align: center;">f</td> <td colspan="2"></td> </tr> </table>	X	X	C	X	.	32	1	X	a	b	c	d	e	f			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.
X	X	C	X	.	32	1	X												
a	b	c	d	e	f														
<b>a Flange</b> 2 = with spring element, long <u>5 = with stator coupling, ø 46 mm [1.81"]</u>		<b>c Interface / Power supply</b> <u>C = CAN Highspeed / 8 ... 30 V DC</u>		<b>e Fieldbus profile</b> <u>32 = J1939</u>															
<b>b Hollow shaft</b> <u>2 = ø 6 mm [0.24"]</u> <u>4 = ø 8 mm [0.32"]</u> 6 = ø 10 mm [0.39"] 3 = ø 1/4"		<b>d Type of connection</b> 2 = radial cable, 1 m [3.28] PUR B = radial cable, special length PUR *) <u>4 = radial M12 connector, 5-pin</u>		<b>f Protection</b> <u>1 = IP67</u> 2 = IP69k															
		*) Available special lengths (connection type B): 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21"] order code expansion .XXXX = length in dm ex.: 8.M3678.52CB.3211.0030 (for cable length 3 m)		<b>Optional on request</b> - Ex 2/22 (only for type of connection 4) - surface protection salt spray tested															

Mounting accessory for shaft encoders	Order no.
<b>Coupling</b> <span style="float: right;">bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]</span>	<b>8.0000.1102.0606</b>

Mounting accessory for hollow shaft encoders	Order no.
<b>Cylindrical pin, long</b> <span style="float: right;">with fixing thread</span> for torque stops	<b>8.0010.4700.0000</b>

Connection technology	Order no.
<b>Connector, self-assembly (straight)</b>	M12 female connector with coupling nut <b>8.0000.5116.0000</b>
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 6 m [19.69'] PVC cable <b>05.00.6091.A211.006M</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).

## Technical data

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

Electrical characteristics	
<b>Power supply</b>	8 ... 30 V DC
<b>Current consumption (no load)</b>	max. 25 mA
<b>Reverse polarity protection of the power supply</b>	yes
<b>Measuring range</b>	360°
<b>Absolute accuracy, 25°C [77°F]</b>	±1°
<b>Repeat accuracy, 25°C [77°F]</b>	±0.2°
<b>Data refresh rate</b>	400 µs
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

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

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Interface characteristics CANopen	
<b>Resolution</b>	1 ... 16384 (14 bit), scalable default: 16384 (14 bit)
<b>Code</b>	binary
<b>Interface</b>	CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN specification 2.0 B
<b>Protocol</b>	SAE J1939
<b>Node address</b>	1 ... 255 via address claiming
<b>Baud rate</b>	250 kbit/s
<b>Termination</b>	software configurable

### General information concerning SAE J1939

The protocol J1939 originates from the international Society of Automotive Engineers (SAE) and operates on the physical layer with high speed CAN as per ISO11898. The application emphasis lies in the area of the power train and chassis of commercial vehicles. It serves to transfer diagnostic data (for example, motor speed, position, temperature) and control information. Type series M3658 and M3678 encoders support the total functionality of J1939.

This protocol is a multimaster system with decentralised network management that does not involve channel-based communication.

It supports up to 254 logic nodes and 30 physical control devices per segment. The information is described as parameters (signals) and combined on 4 memory pages (data pages) into parameter groups (PGs). Each parameter group can be identified via a unique number, the parameter group number (PGN). Independently of this, each signal is assigned a unique SPN (suspect parameter number).

The major part of the communication occurs cyclically and can be received by all control devices without the explicit request for data (Broadcast). Furthermore the parameter groups are optimised to a length of 8 data bytes. This enables very efficient utilization of the CAN protocol. If greater amounts of data need to be transferred, then transport protocols (TP) can be used: BAM (broadcast announce message) and CMDT (connection mode data transfer). With BAM TP the transfer of data occurs as a broadcast.

### Encoder implementation SAE J1939

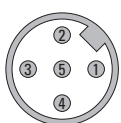
- PGNs that are adaptable to the customer's application.
- Resolution of address conflicts -> Address Claiming (ACL).
- Continuous checking whether control addresses have been assigned twice within a network.
- Change of control device addresses during run-time.
- Unique identification of a control device with the help of a name that is unique worldwide. This name serves to identify the functionality of a control device in the network.
- Predefined PGs for position, speed and alarm.
- 250 kbit/s, 29 bit identifier.
- Watchdog controlled device.

A two-colour LED, located on the rear of the encoder, signals the operating and fault status of the J1939 protocol, as well as the status of the internal sensor diagnostics.

### Terminal assignment

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

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## Dimensions shaft version

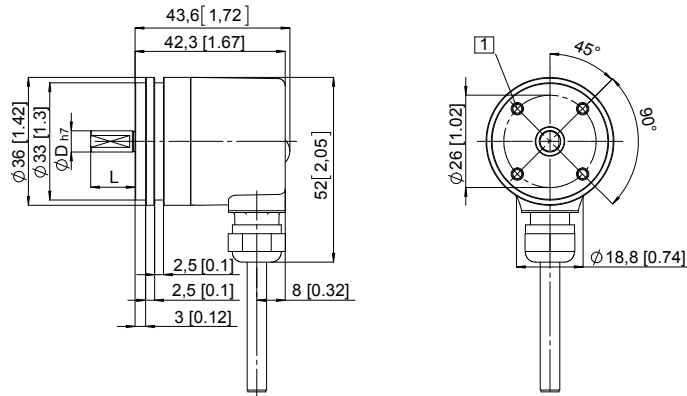
Dimensions in mm [inch]

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

#### Flange type 2

(drawing with cable)

- 1 4 x M3, 6 [0.24] deep

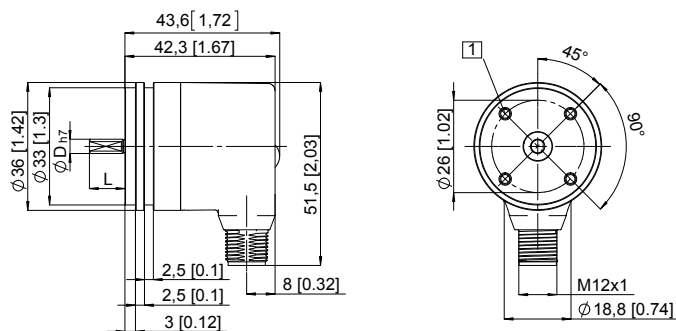


### Synchro flange, $\varnothing$ 36 [1.42]

#### 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

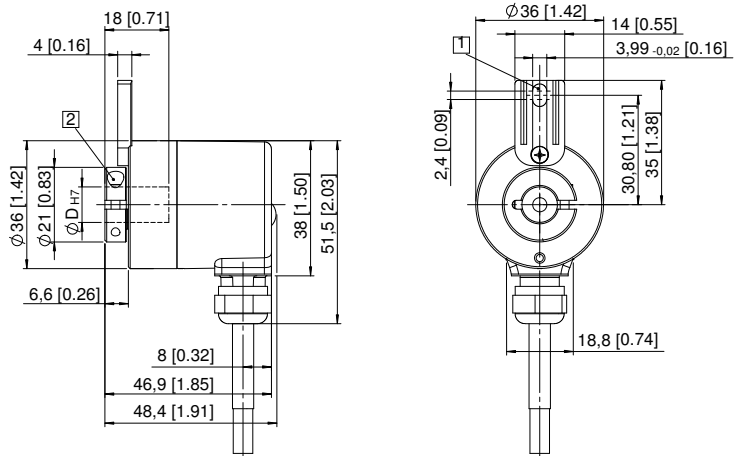
## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element, long

#### Flange type 2

- 1 Torque stop slot, recommendation: cylindrical pin DIN 7,  $\varnothing$  4 [0.16]
- 2 Recommended torque for the clamping ring 0.7 Nm



### Flange with stator coupling, $\varnothing$ 46 [1.81]

#### Flange type 5

- 1 Recommended torque for the clamping ring 0.7 Nm

