

Absolute encoders – multiturn

Compact electronic multiturn, magnetic	Sendix M3668 / M3688 (shaft / hollow shaft)	SAE J1939
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The Sendix M36 with Energy Harvesting Technology is an electronic multiturn encoder in a compact design, without gear and without battery.

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

SAE J1939

Safety-Lock™	High rotational speed	Temperature range -40°... +85°C	High protection level IP	High shaft load capacity	Shock / vibration resistant	Reverse polarity protection	Surface protection salt spray-tested optional	Energy Harvesting

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

- Up-to-the-minute fieldbus performance in the application: SAE J1939 with CAN-highspeed to ISO 11898.
- Universal Scaling Function.
- Fast determination of the operating status via two-color LED.

Order code 8.M3668 . XX3X . 32 2 2
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

- 3 = SAE J1939 / 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.M3668.433A.3222.0030 (for cable length 3 m)

e Fieldbus profile

- 32 = SAE J1939

Optional on request

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

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Order code	8.M3688	.XX3X	.3222	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.	
Hollow shaft	Type	a b c d e	e		
a Flange	2 = with stator coupling, IP65, ø 46 mm [1.81"]		c Interface / supply voltage		
	3 = with spring element, long, IP65		3 = SAE J1939 / 10 ... 30 V DC		
	5 = with stator coupling, IP67, ø 46 mm [1.81"]		e Fieldbus profile		
	6 = with spring element, long, IP67		32 = SAE J1939		
b Blind hollow shaft	1 = ø 6 mm [0.24"]		d Type of connection		
	3 = ø 8 mm [0.32"]		1 = axial cable, 1 m [3.28'] PVC		
	4 = ø 10 mm [0.39"]		A = axial cable, special length PVC *)		
	2 = ø 1/4"		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.M3688.243A.3222.0030 (for cable length 3 m)		
			<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.

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

Torque pin, ø 4 mm	with fixing thread	8.0010.4700.0000
for flange with spring element (flange type 3 + 6)		

Connection technology Order no.

Cordset, pre-assembled	M12 female connector with coupling nut, 5-pin, A coded, straight open ended 5 m [16.40'] PVC cable	Bus in	05.00.6091.A211.005M
	M12 female connector with coupling nut, 5-pin, A coded, straight Deutsch connector DT04, Stift, 6-pin, straight 1 m [3.28'] PVC cable	Bus in	05.00.6091.22C7.001M
Connector, self-assembly	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	Bus in	8.0000.5116.0000

Further Kübler accessories can be found at: kuebler.com/accessories
Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

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SAE J1939

Technical data

Mechanical characteristics

Maximum speed	
shaft or blind hollow shaft version without shaft seal (IP65)	6000 min ⁻¹ 3000 min ⁻¹ (continuous)
shaft or blind hollow shaft version with shaft seal (IP67)	4000 min ⁻¹ 2000 min ⁻¹ (continuous)
Starting torque at 20°C [68°F]	
without shaft seal	< 0.007 Nm
with shaft seal (IP67)	< 0.01 Nm
Shaft load capacity	radial 40 N axial 20 N
Weight	approx. 210 g [7.41 oz]
Protection acc. to EN 60529	IP65 or IP67
Working temperature range	-40°C ... +85°C [-40°F ... +185°F]
Materials	shaft / hollow shaft stainless steel flange aluminum housing zinc die-cast cable PVC
Shock resistance acc. to EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	300 m/s ² , 10 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 30 mA
Reverse polarity protection of the supply voltage	yes
Short-circuit proof outputs	yes ¹⁾

Interface characteristics SAE J1939

Resolution singleturn (MUR)	
scalable	1 ... 16 384 (14 bit)
default	16 384 (14 bit)
Number of revolutions (NDR)	
	1 ... 536 870 912 (29 bit) scalable only via the total resolution
Total resolution (TMR)	
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)
Angular measurement deviation ²⁾	±0,5°
Repeat accuracy	±0.2°
Interface	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B
Protocol	SAE J1939
Power-ON time	< 1200 ms
Baud rate	250 kbit/s switchable by software to 500 kbit/s
Node address	software configurable
Termination	software configurable

Approvals

E1 compliant in accordance with	ECE guideline
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
UKCA compliant in accordance with	
EMC Regulations	S.I. 2016/1091
RoHS Regulations	S.I. 2012/3032
UKEX Regulations	S.I. 2016/1107 (for Ex 2/22 variants)

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 decentralized 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 optimized 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 CMTD (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-color 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.

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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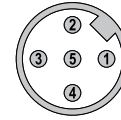
SAE J1939

Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
3	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					
3	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

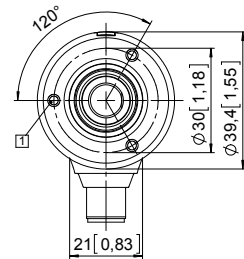
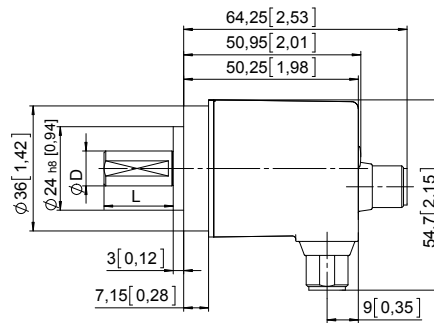
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, \varnothing 36 [1.42] Flange type 1 and 3

1 3 x M3, 6 [0.24] deep

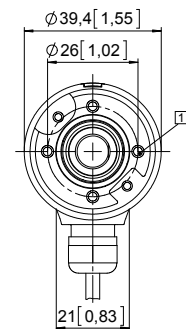
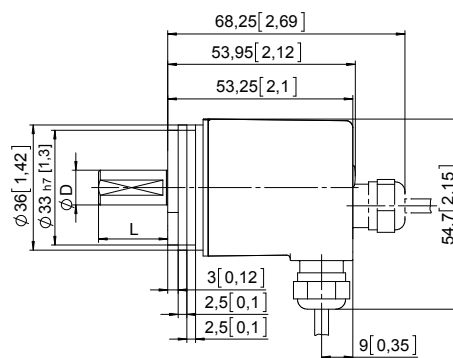
D	Fit	L
6 [0.24]	h7	12.5 [0.49]
8 [0.32]	h7	15 [0.59]
10 [0.39]	f7	20 [0.79]
1/4"	h7	12.5 [0.49]



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

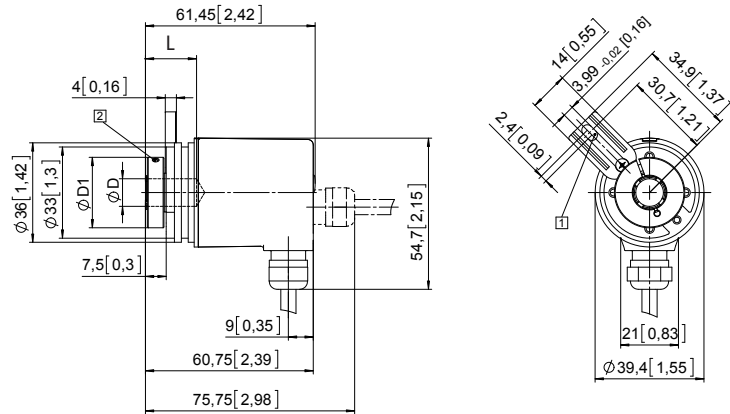
Dimensions in mm [inch]

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

