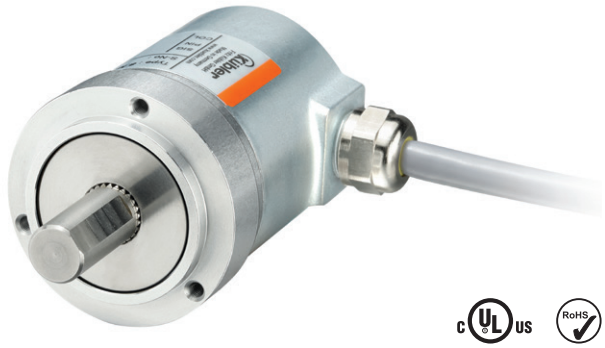
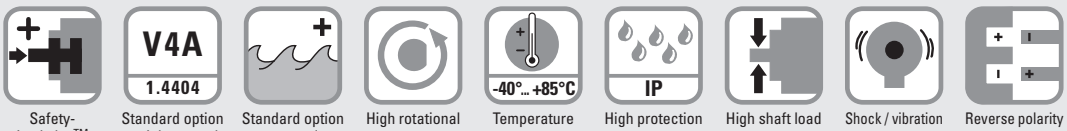
Compact, robust magnetic | **Sendix M3653AR (shaft)** | **SSI**



The Sendix M3653AR are magnetic singleturn encoders in compact design. They are characterized by robustness, reliability and cost-efficiency.

The "R"obust version is particularly suitable for use in harsh environments. Protected up to IP69k, resistance against shock and extreme temperature fluctuations, the Sendix M36 encoders are suitable even for demanding outdoor applications.



Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Protection level IP66, IP67 and IP69k in one device.
- Wide temperature range -40°C ... +85°C.

Application oriented

- Absolute accuracy ±1°.
- Repeat accuracy ±0.2°.
- Short control cycles, clock frequency with SSI up to 2 MHz.
- Max. resolution 14 bit.

Order code Shaft version

8.M3653AR.	X	X	2	X	.	X	X	1	2
Type	a	b	c	d		e	f		

a *Version*
1 = standard [1]
clamping flange ø 42 mm [1.65"]
7 = stainless steel V4A [2]
clamping flange ø 42 mm [1.65"]
all metal parts accessible from outside are out of stainless steel V4A

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"]
E = ø 10 x 20 mm [0.39 x 0.79"], stainless steel V4A

c *Interface / supply voltage*
2 = SSI / 10 ... 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, 8-pin
*) Available special lengths (connection type 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.M3653AR.132B.G312.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
G = SSI, gray

f *Resolution*
A = 10 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit

Optional on request
- Ex 2/22 (only for connection type 4)
- other shaft diameters out of V4A stainless steel

1) Not in conjunction with shaft type "E".
2) Only in conjunction with shaft type "E" + type of connection "4" .

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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** [1]

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56‘] PUR cable	**05.00.6051.8211.002M** [1]
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	**05.CMB 8181-0** [1]
	M12 female connector with coupling nut, 8-pin, A coded, straight (stainless steel V4A)	**8.0000.5136.0000.V4A**

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

1) Not for version “7” (V4A stainless steel)

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Technical data

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)	
Starting torque at 20°C [68°F]		< 0.01 Nm	
Shaft load capacity	radial axial	80 N 40 N	
Weight		approx. 250 g [8.82 oz]	
Protection acc. to EN 60529/DIN 40050-9		IP66, IP67, IP69k	
Working temperature range		-40°C ... +85°C [-40°F ... +185°F]	
Materials		**version "1"** (standard)	**version "7"** (stainless steel)
	shaft	V2A	V4A
	flange	aluminum	V4A
	housing	zinc die-cast	V4A
	cable	PUR	–
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 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]

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 30 mA
Signal level	HIGH LOW with I_{Load} = 20 mA	typ 3.8 V typ 1.3 V
Resolution		10 ... 14 bit
Absolute accuracy [2]		±1°
Repeat accuracy		±0.2°
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate		2 ms
Monoflop time		≤ 15 µs

Note: If the clock cycle starts within the monoflop time a second data transfer begins with the same data. If the clock cycle starts after the monoflop time the cycle begins with the new values. The update rate is dependent on the clock speed, data length and monoflop time.

SET input

Input		active HIGH
Input type		comparator
Signal level (+V = supply voltage)	HIGH LOW	min. 60 % of +V, max: +V max. 30 % of +V
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Input delay		1 ms
New position data readable after		1 ms
Internal processing time		200 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms, after which the new position data can be read via SSI. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.

The SET function should be carried out whilst the encoder is at rest.
If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This inverted function can also be factory-programmed.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

Hot plugging of the encoder should be avoided.

Approvals

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)

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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Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)									
2	2, B	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⏚
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	shield

Interface	Type of connection	Features	M12 connector, 8-pin									
2	4	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⏚
			Pin:	1	2	3	4	5	6	7	8	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base

M12 connector, 8-pin

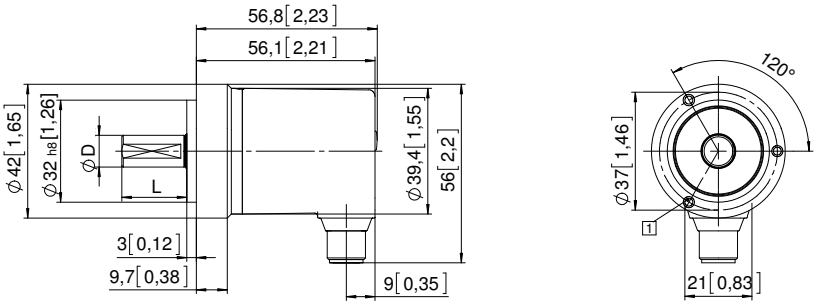
Dimensions

Dimensions in mm [inch]

Aluminum, clamping flange, ø 42 [1.65] version 1

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]



Stainless steel V4A clamping flange, ø 42 [1.65] version 7

1 4 x M4, 8 [0.31] deep

D	Fit	L
10 [0.39]	f7	20 [0.79]