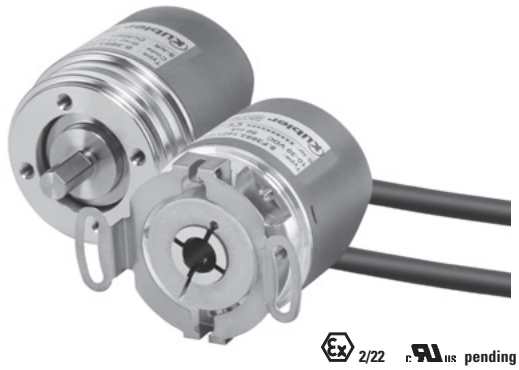
Compact, optical | **Sendix F3663 / F3683 (Shaft / Hollow shaft)** | **SSI / BiSS**



The Sendix F36 multiturn is an optical multiturn encoder in miniature format, without gears and with 100% insensitivity to magnetic fields. With a size of just 36 x 42 mm it offers a through hollow shaft of up to 8 mm or a blind hollow shaft of up to 10 mm.

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

Safety-Lock™ | High rotational speed | Temperature | High IP value | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Reverse polarity protection | SinCos | Optical sensor | Seawater-resistant version on request

Reliable and insensitive

- Electronic multiturn with Intelligent Scan Technology™ 100 % magnetic-field resistant
- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Reduced number of components ensures magnetic insensitivity
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +90°C

Optimised performance

- High precision with data refresh rate of the position value ≤ 1µs
- High resolution feedback in real-time via incremental outputs SinCos and RS422
- Short control cycles, clock frequency with SSI up to 2 MHz / with BISS up to 10 MHz

Order code Shaft version

8.F3663 . X X X X . X X X 2
Type — a b c d — e f g

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, 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 *SSI or BiSS Interface / Power supply*
1 = 5 V DC
2 = 10 ... 30 V DC
3 = 5 V DC and 2048 ppr SinCos track
4 = 10 ... 30 V DC and 2048 ppr SinCos
5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
7 = 5 V DC and 2048 ppr incremental signals RS422
8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

d *Type of connection*
1 = cable, tangential (1 m PUR)
3 = cable, tangential (5 m PUR)
5 = cable, tangential (1 m PUR) with M12 connector, 8-pin [1]

e *Code*
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

f *Resolution (Singleturn)*
A = 10 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST

g *Resolution (Multiturn)*
2 = 12 bit MT
6 = 16 bit MT
4 = 24 bit MT

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

Order code Hollow shaft

8.F3683 . X X X X . X X X 2
Type — a b c d — e f g

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, ø 36 mm, IP65*
1 = with torque stop, short
2 = with stator coupling
3 = with torque stop, long

b *Hollow shaft*
1 = ø 6 mm
2 = ø 6.35 mm (1/4")
3 = ø 8 mm
4 = ø 10 mm
(Blind hollow shaft)

c *SSI or BiSS Interface / Power supply*
1 = 5 V DC
2 = 10 ... 30 V DC
3 = 5 V DC and 2048 ppr SinCos track
4 = 10 ... 30 V DC and 2048 ppr SinCos
5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
7 = 5 V DC and 2048 ppr incremental signals RS422
8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

d *Type of connection*
1 = cable, tangential (1 m PUR)
3 = cable, tangential (5 m PUR)
5 = cable, tangential (1 m PUR) with M12 connector, 8-pin [1]

e *Code*
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

f *Resolution (Singleturn)*
A = 10 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST

g *Resolution (Multiturn)*
2 = 12 bit MT
6 = 16 bit MT
4 = 24 bit MT

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

1) Only with output circuits 1 and 2

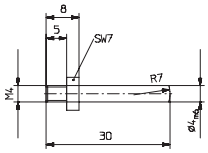
Absolute Encoders – Multiturn

Compact, optical | **Sendix F3663 / F3683 (Shaft / Hollow shaft)** | **SSI / BiSS**

Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	**8.0000.1101.0808**

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, suitable for connection type 8	**05.CMB 8181-0**

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.

Mechanical characteristics

Maximum speed		
Shaft- or blind hollow shaft version without shaft seal (IP65)		12 000 min^{-1} 10 000 min^{-1} (continuous op.)
Shaft version (IP67) or hollow shaft version (IP65) with shaft seal		10 000 min^{-1} 8 000 min^{-1} (continuous op.)
Starting torque	without shaft seal with shaft seal (IP67)	< 0.007 Nm < 0.01 Nm
Shaft load capacity	radial axial	40 N 20 N
Weight		ca. 0.2 kg
Protection to EN 60 529	housing side shaft side	IP 67 IP 65 (solid shaft version opt. IP67)
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +90°C
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast PUR
Shock resistance acc. to EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

General electrical characteristics

Supply voltage		5 V DC ± 5% or 10 ... 30 V DC
Current consumption (no load)	5 V DC 10 ... 30 V DC	max. 60 mA max. 30 mA
Reverse connection of the supply voltage		yes
CE compliant acc. to		EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3
RoHS compliant acc. to		EU guideline 2002/95/EG

Interfaces

General interface characteristics

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
Short-circuit proof outputs		yes [1]

SSI Interface

Resolution, singleturn		10 ... 17 bit
Number of revolutions		max. 24 bit
Code		Binary or Gray
SSI clock rate	≤ 14 bit ≥ 15 bit	50 kHz ... 2 MHz 50 kHz ...125 kHz
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.		
Data refresh rate	up to 14 bit up to 15 ... 17 bit	≤ 1 µs 4 µs
Status and Parity bit		on request

BiSS Interface

Resolution, singleturn	10 ... 17 bit
Number of revolutions	max. 24 bit
Code	Binary
BiSS Clock rate	up to 10 MHz
Max. update rate	< 10 µs, depends on the clock rate and the data length
Data refresh rate	≤ 1 µs

Note:
- Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings
- Multi-cyclic data output, e.g. for temperature
- CRC data verification

Incremental outputs (A/B), 2048 ppr

	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 Vpp (± 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof	yes [1]	yes [1]

1) Short circuit proof to 0V or to output when supply voltage correctly applied

Compact, optical | **Sendix F3663 / F3683 (Shaft / Hollow shaft)** | **SSI / BiSS**

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 or BiSS. 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.

Power-on delay

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.

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The status output will switch to LOW.

Response time (DIR input)	1 ms

Status output

Output driver		Open Collector, internal pull up resistor 22 kOhm
Permissible load		max. 20 mA
Signal level	high low	+V < 1 V
Active		low

The status output serves to display various alarm or error messages. In normal operation the status output is HIGH (Open Collector with int. pull-up 22 kOhm).

An active status output (LOW) displays:
LED fault (failure or ageing) – over-temperature – undervoltage
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Terminal assignment

Interface	Type of connection	Features	Cable										
1, 2	1, 3	SSI or BiSS, SET, DIR, Status	Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	PE
			Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	VT	Shield

Interface	Type of connection	Features	M12 connector									
1, 2	5	SSI or BiSS, SET, DIR	Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
			M12 connector:	1	2	3	4	5	6	7	8	PH

Interface	Type of connection	Features	Cable												
3, 4	1, 3	SSI or BiSS, SET, DIR, 2048 SinCos	Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
			Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield

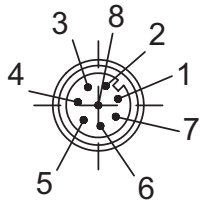
Interface	Type of connection	Features	Cable											
5	1, 3	SSI or BiSS, SET, DIR, Sensor outputs	Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	GND_{sens}	$+V_{sens}$	PE
			Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	VT	RD-BU	Shield

Interface	Type of connection	Features	Cable													
6	1, 3	SSI or BiSS, 2048 SinCos Sensor outputs	Signal:	GND	+V	+C	-C	+D	-D	GND_{sens}	$+V_{sens}$	A	A inv	B	B inv	PE
			Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield

Interface	Type of connection	Features	Cable										
7, 8	1, 3	SSI or BiSS, 2048 incr. RS422	Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	PE
			Cable colour:	WH	BN	GN	YE	GY	PK	BK	VT	GY-PK	RD-BU	Shield

+V: Encoder power supply +V DC
GND: Encoder power supply ground GND (0V)
+C, -C: Clock signal
+D, -D: Data signal
SET: Set input. The current position becomes defined as position zero.
DIR: Direction input: If this input is active, output values are counted backwards (decrease) when the shaft is turning clockwise.
Stat: Status output
PE: Protective earth
PH: Plug connector housing (Shield)
A, A inv: Incremental output channel A
B, B inv: Incremental output channel B

Top view of mating side, male contact base

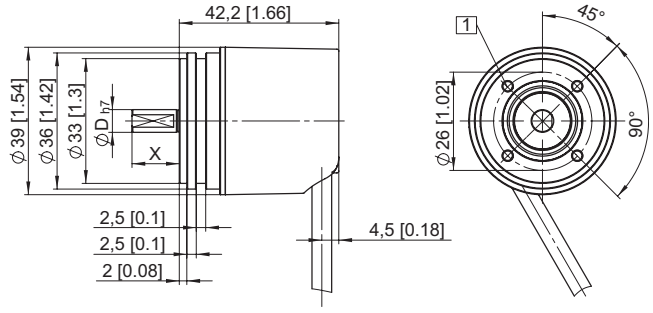


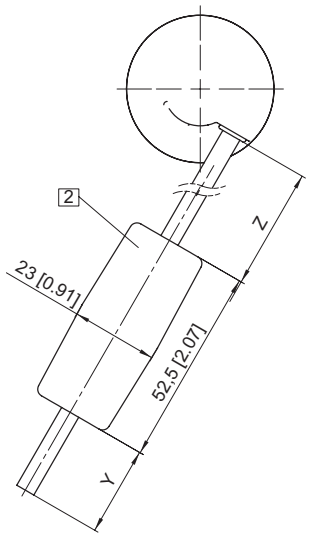
M12 connector, 8-pin

Compact, optical | **Sendix F3663 / F3683 (Shaft / Hollow shaft)** | **SSI / BiSS**

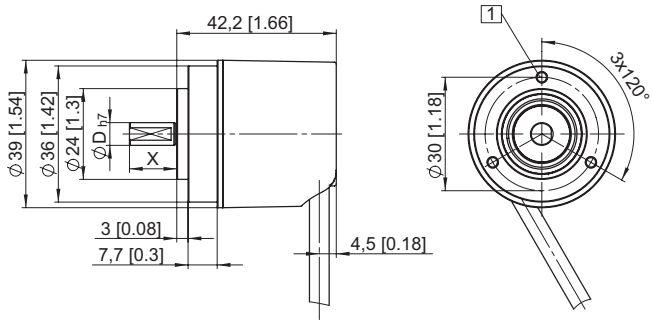
Dimensions shaft version

Synchro flange, ø 36 mm





Clamping flange, ø 36 mm

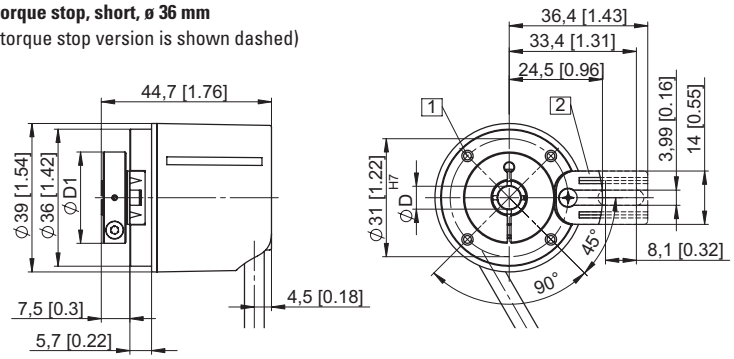


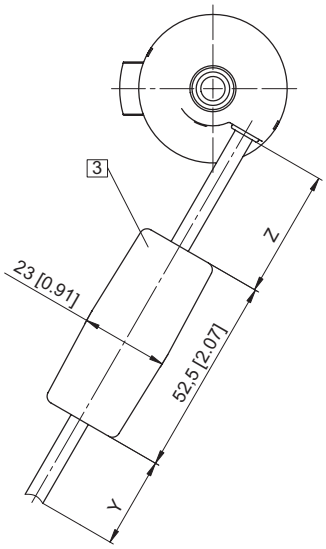
1 M3, 6 [0.24] deep
2 Battery (in the cable)

Y	Z
1 m	150 mm
5 m	150 mm

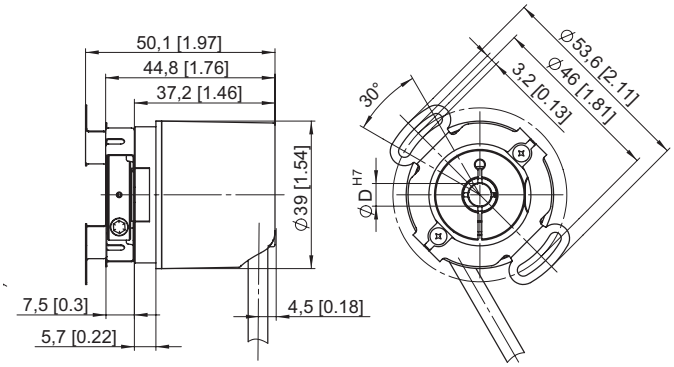
Dimensions hollow shaft version:

With torque stop, short, ø 36 mm
(Long torque stop version is shown dashed)





With stator coupling, ø 36 mm



1 M2.5. 5 [0.2] deep
2 Torque stop slot
Recommendation:
cylindrical pin DIN 7, ø 4 mm
3 Battery (in the cable)

Hollow shaft acc. to order code	D1
1	ø 24 mm
2	ø 24 mm
3	ø 25.5 mm
4	ø 25.5 mm

Y	Z
1 m	150 mm
5 m	150 mm

Insertion depth for blind hollow shaft 14,5 mm