

Absolute Encoders – Singleturn

Compact, optical

Sendix F3653 / F3673 (Shaft / Hollow shaft)

SSI / BiSS



The Sendix F36 singleturn with SSI or BiSS interface boasts exceptional ruggedness and compact dimensions. 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. Its high-precision optical sensor technology can achieve a resolution of up to 17 bits.

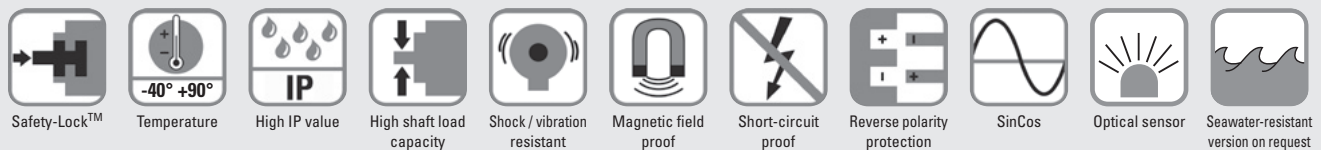


Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.

Ex 2/22 cULus pending



SSI / BiSS INTERFACE



Reliable and magnetically insensitive

- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +90°C

Optimised performance

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

Order code

Shaft version

8.F3653 . XXXX . XX 12
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.



- 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)
8 = M12 connector, 8-pin, axial ¹⁾

- f** Resolution
A = 10 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST
- optional on request
- Ex 2/22
- seawater-resistant
- special cable length

Order code

Hollow shaft

8.F3673 . XXXX . XX 12
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.



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

1) Only with output circuits 1 and 2
2) Only with output circuits 1 and 2 in combination with blind hollow shaft 10 mm

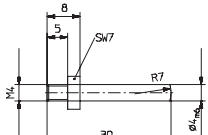
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 8 mm	8.0000.1101.0808
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	M12, suitable for connection type 8	05.CMB 8181-0
Cordset, pre-assembled with 2 m PVC cable	M12, suitable for connection type 8	05.WAKS8-2/P00

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 \pm 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. \pm 30 mA
Signal level	high typ 3.8 V low with I _{Load} = 20 mA typ 1.3 V
Short-circuit proof outputs	yes ¹⁾

SSI interface

Resolution, singleturn	10 ... 17 bit
Code	Binary or Gray
SSI clock rate	\leq 14 bit 50 kHz ... 2 MHz \geq 15 bit 50 kHz ... 125 kHz
Monoflop time	\leq 15 μ s
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 \leq 1 μ s up to 15 ... 17 bit 4 μ s
Status and Parity bit	on request

BiSS interface

Resolution, singleturn	10 ... 17 bit
Code	Binary
BiSS Clock rate	up to 10 MHz
Max. update rate	< 10 μ s, depends on the clock rate and the data length
Data refresh rate	\leq 1 μ s
Note: – Bi-directional, programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification	

Incremental outputs (A/B), 2048 ppr

	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 V _{pp} (\pm 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

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SET input

Input	active high	
Input type	comparator	
Signal level (+V = supply voltage)	high	min. 60 % of +V, max: +V
	low	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

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
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Status output

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

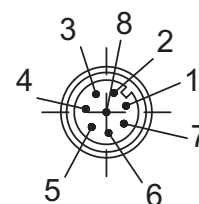
An active status output (LOW) displays:
LED fault (failure or ageing) – over-temperature – undervoltage
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

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
1, 2	8	SSI or BiSS, SET, DIR	M12 connector
			M12 connector: 1 2 3 4 5 6 7 8 PH
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
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
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
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:



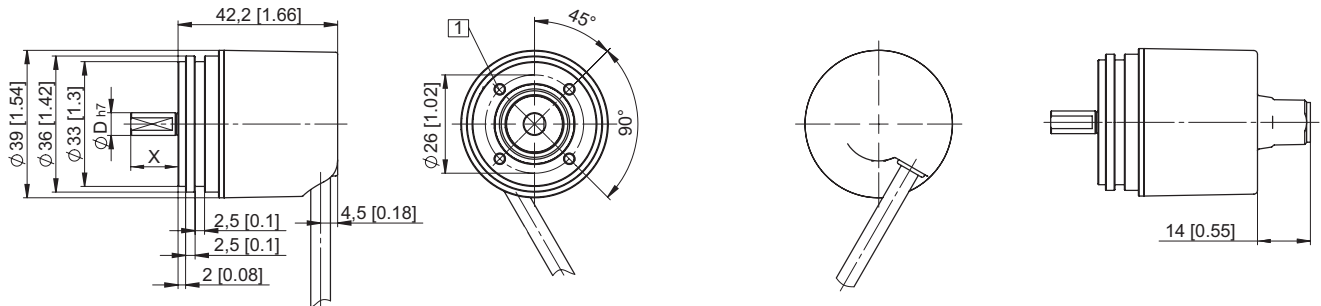
M12 connector, 8-pin

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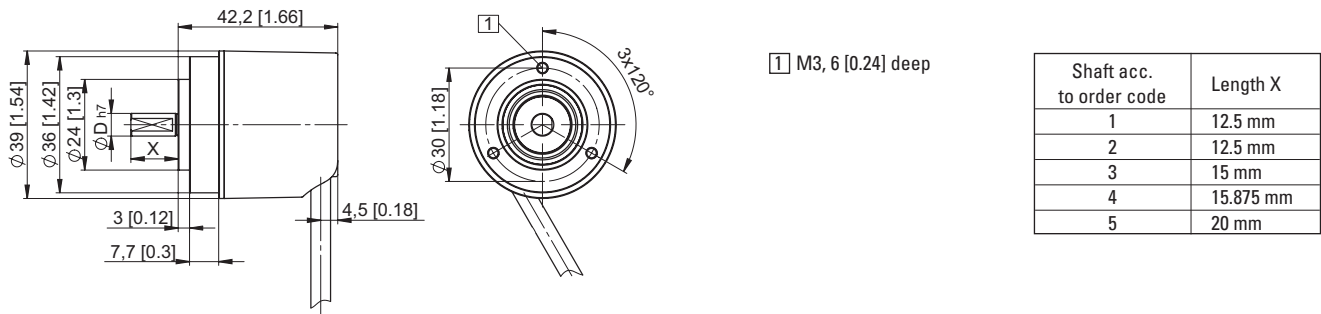
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Dimensions shaft version:

Synchro flange, \varnothing 36 mm



Clamping flange, \varnothing 36 mm

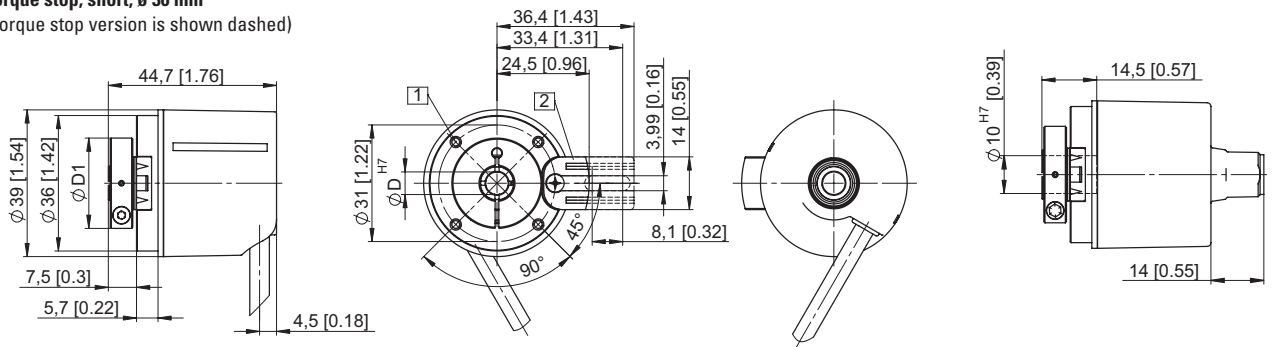


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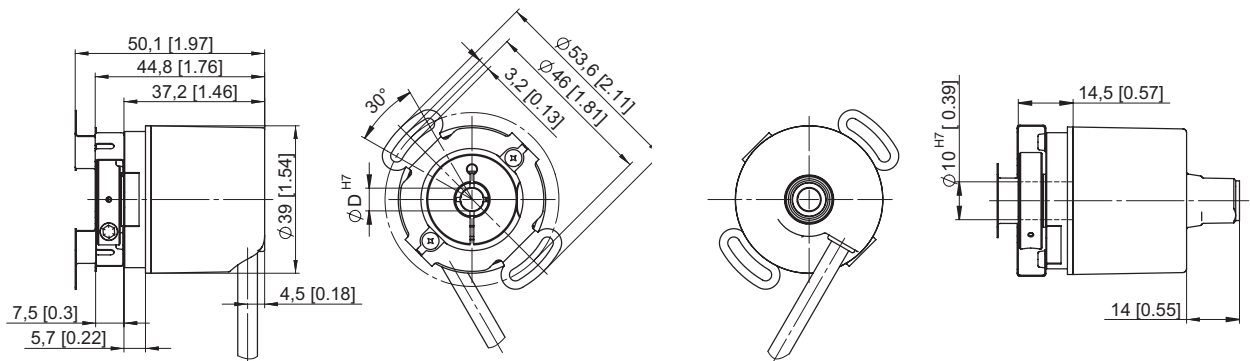
Dimensions hollow shaft version:

With torque stop, short, \varnothing 36 mm

(Long torque stop version is shown dashed)



With stator coupling, \varnothing 36 mm



Insertion depth for blind hollow shaft 14,5 mm

- 1 M2.5, 5 [0.2] deep
- 2 Torque stop slot, Recommendation: Cylindrical pin DIN7, \varnothing 4 mm

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