

# Absolute Encoders – Multiturn

Standard, optical

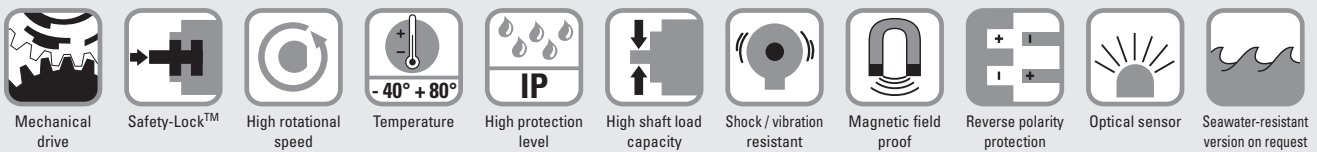
Sendix 5868 / 5888 (Shaft / Hollow shaft)

CANopen/CANlift



The Sendix multiturn encoders 5868 and 5888 with CANopen or CANlift interface and optical sensor technology are the right encoders for all CANopen or CANlift applications.

With a maximum resolution of 28 bits these encoders offer an optional additional RS422 incremental track with 2048 pulses.



## Reliable

- Tried-and-tested in applications with the highest demands, such as in mobile automation or medical technology.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +80°C

## Flexible

- Node address can be set via rotary switches or software
- Baud rate and termination can be set via DIP switches or software
- With bus terminal cover or fixed connection, as well as M12 connectors or cable connection

## Order code Shaft version

8.5868 . XXXX . XX1X  
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

- 1 = clamping flange, ø 58 mm, IP65
- 2 = synchro flange, ø 58 mm, IP65
- 3 = clamping flange, ø 58 mm, IP67
- 4 = synchro flange, ø 58 mm, IP67
- 5 = square flange, 63.5 mm (2.5"), IP65
- 7 = square flange, 63.5 mm (2.5"), IP67

### b Shaft (ø x L), with flat

- 1 = 6 x 10 mm <sup>1)</sup>
- 2 = 10 x 20 mm <sup>2)</sup>
- 3 = 6,35 x 22,2 mm (1/4" x 7/8")
- 4 = 9,5 x 22,2 mm (3/8" x 7/8")

### c Interface / Power supply

- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC
  - 5 = CANopen DS301 V4.02 / 10 ... 30 V DC
- mit 2048 ppr incremental track (TTL-compatible) <sup>3)</sup>

### d Type of connection

- removable bus terminal cover
- 1 = cable gland radial
- 2 = 2 x M12 connectors
- Fixed connection without bus terminal cover
- A = cable outlet PVC, radial, 2m
- E = 1 x M12 connector, radial
- F = 2 x M12 connector, radial
- I = 1 x M23 connector, radial
- J = 2 x M23 connector, radial
- K = 1 x SUB-D connector, 9 pin

### e Fieldbus profile <sup>4)</sup>

- 21 = CANopen encoder profile DS406 V3.2
- 22 = CANlift DS417 V1.01

### f Options (Service)

- 2 = no options
  - 3 = SET button
- optional on request  
- Ex 2/22  
- seawater-resistant  
- special cable length

## Order code Hollow shaft

8.5888 . XXXX . XX1X  
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

- 1 = with torque stop set, IP65
- 2 = with torque stop set, IP67
- 3 = with stator coupling, ø 65, IP65
- 4 = with stator coupling, ø 65, IP67
- 5 = with stator coupling, ø 63, IP65
- 6 = with stator coupling, ø 63, IP67

### b Blind hollow shaft

- 3 = ø 10 mm
- 4 = ø 12 mm
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8 = ø 9.5 mm [3/8"]
- 9 = ø 12.7 mm [1/2"]

### c Interface / Power supply

- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC
  - 5 = CANopen DS301 V4.02 / 10 ... 30 V DC
- with 2048 ppr incremental track (TTL-compatible) <sup>3)</sup>

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### e Fieldbus profile <sup>4)</sup>

- 21 = CANopen encoder profile DS406 V3.2
- 22 = CANlift DS417 V1.01

### f Options (Service)

- 2 = no options
  - 3 = SET button
- optional on request  
- Ex 2/22  
- seawater-resistant  
- special cable length

1) Preferred type only in conjunction with Flange type 2  
2) Preferred type only in conjunction with Flange type 1

3) Only in conjunction with connection type 2  
4) CAN parameters can also be factory pre-set

# Absolute Encoders – Multiturn

Standard, optical		Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
<b>Mounting accessory for shaft encoders</b>			
<b>Coupling</b>		Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
		Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
<b>Mounting accessory for hollow shaft encoders</b>			
<b>Cylindrical pin, long</b>		With fixing thread	8.0010.4700.0000
for torque stops			
<b>Connection Technology</b>			
<b>Connector, self-assembly</b> (straight)		Coupling M12 for Bus in	8.0000.5116.0000
		Connector M12 for Bus out	8.0000.5111.0000
<b>Cordset, pre-assembled with 2 m PVC cable</b>		Bus in	05.00.6091.A211.002M
		Bus out	05.00.6091.A411.002M
<b>Programming set</b>			
including:	<ul style="list-style-type: none"> <li>- Interface converter USB-CAN</li> <li>- Connection cable from interface converter to encoder</li> <li>- Power supply 90 ... 250 V AC</li> <li>- DVD with Ezturn® software</li> </ul>	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015

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)

Mechanical characteristics		
<b>Max. speed</b>		
without shaft seal (IP65) up to 70°C		9 000 min <sup>-1</sup> , 7 000 min <sup>-1</sup> (continuous)
without shaft seal (IP65) up to T <sub>max</sub>		7 000 min <sup>-1</sup> , 4 000 min <sup>-1</sup> (continuous)
with shaft seal (IP67) up to 70°C		8 000 min <sup>-1</sup> , 6 000 min <sup>-1</sup> (continuous)
with shaft seal (IP67) up to T <sub>max</sub>		6 000 min <sup>-1</sup> , 3 000 min <sup>-1</sup> (continuous)
<b>Starting torque</b>		
without shaft seal (IP65)		< 0.01 Nm
with shaft seal (IP67)		< 0.03 Nm
<b>Rotor moment of inertia</b>		
shaft version		4.0 x 10 <sup>-6</sup> kgm <sup>2</sup>
hollow shaft version		7.5 x 10 <sup>-6</sup> kgm <sup>2</sup>
<b>Load capacity of shaft</b>	radial	80 N
	axial	40 N
<b>Weight</b>	with bus terminal cover	ca. 0.57 kg
	with fixed connection	ca. 0.52 kg
<b>Protection EN 60529</b>	housing side	IP67
	shaft side	IP65, opt. IP67
<b>EX approval for hazardous areas</b>		optional Zone 2 and 22
<b>Working temperature range</b>		-40°C ... +80°C <sup>1)</sup>
<b>Materials</b>	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC
<b>Shock resistance</b> acc. EN 60068-2-27		2500 m/s <sup>2</sup> , 6 ms
<b>Vibration resistance</b> acc. EN 60068-2-6		100 m/s <sup>2</sup> , 55 ... 2000 Hz

General electrical characteristics	
<b>Power supply</b>	10 ... 30 V DC
<b>Power consumption</b> (no load)	max. 100 mA
<b>Reverse polarity protection of the power supply (U<sub>B</sub>)</b>	yes
<b>UL-certified</b>	File 224618
<b>CE compliant</b> acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
<b>RoHS compliant</b> acc. to	EU-guideline 2002/95/EG

SET button (Zero or defined value, option)
Protection against accidental activation. Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)
<b>LED is ON with the following fault conditions</b>
Sensor error (internal code or LED error), too low voltage, over-temperature

Incremental track characteristics	
<b>Output driver</b>	RS422 (TTL-compatible)
<b>Permissible load / channel</b>	max. 20 mA
<b>Signal level</b>	high typ. 3.8 V low typ. 1.3 V
<b>Short circuit proof outputs</b>	yes <sup>2)</sup>
<b>Resolution</b>	2048 ppr

1) Cable version: -30°C ... +75°C

2) Short circuit to 0 V or to output, only one channel at a time, supply voltage correctly applied

# Absolute Encoders – Multiturn

<b>Standard, optical</b>	<b>Sendix 5868 / 5888 (Shaft / Hollow shaft)</b>	<b>CANopen/CANlift</b>
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Interface characteristics CANopen/CANlift:	
<b>Singleturn resolution</b>	1 ... 65536 (16 bit), scaleable
<b>Default value</b>	8192 (13 bit)
<b>Total resolution</b>	1 ... 268 435 456 (28 bit) Default: 25 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>	CANopen Profile DS406 V3.2 with manufacturer-specific add-ons or CANlift Profile DS417 V1.1
<b>Baud rate</b>	10 ... 1000 kbit/s (can be set via DIP switches / software configurable)
<b>Node address</b>	1 ... 127 (can be set via rotary switches / software configurable)
<b>Termination switchable</b>	can be set via DIP switches, software configurable

## General information about CAN/CANlift

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device specific profiles such as encoder profile DS406 V3.2 and DS417 V1.1 (for lift applications) are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN bus.

When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration** as well as the **status of the working area**.

As competitively priced alternatives, encoders are also available with a connector or a cable connection, where the device address and baud rate can be changed and configured by means of the software. The models with bus terminal cover and integrated T-coupler allow for extremely simple installation: the bus and supply voltage can be easily connected via M12 connectors. The device address can be set via 2 rotary hex switches. Furthermore, another DIP switch allows for the setting of the baud rate and switching on a termination resistor. Three LEDs located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

## CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated.

Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping
- Self-start programmable (Power on to operational)
- 3 Sending PDO's
- Node address, baud rate and CANbus
- Programmable termination

## CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- Units for speed selectable (steps/sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 ... 32
- 2 working areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- Optional - 32 CAMs programmable
- Customer-specific memory - 16 Bytes

## CANopen Lift Profile DS417 V1.1

Among others, the following functionality is integrated:

- Car Position Unit
- 2 virtual devices
- 1 virtual device delivers the position in absolute measuring steps (steps)
- 1 virtual device delivers the position as an absolute travel information in mm
- Lift number programmable
- Independent setting of the node address in relation with the CAN identifier
- Factor for speed calculation (e.g. measuring wheel periphery)
- Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, acceleration, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's

All profiles stated here: Key-features

The object 6003h "Preset" is assigned to an integrated key, accessible from the outside  
"Watchdog controlled" device

# Absolute Encoders – Multiturn

**Standard, optical**      **Sendix 5868 / 5888 (Shaft / Hollow shaft)**      **CANopen/CANlift**

## Terminal assignment

Bus terminal cover with terminal box (type of connection 1)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+U <sub>B</sub> power supply	0 V power supply	+U <sub>B</sub> power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

Cable connection (type of connection A) and SUB-D-9 connector (type of connection K)

Direction	IN				
Signal	0 Volt power supply	+U <sub>B</sub> power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
Cable colour	WH	BN	YE	GN	GY
SUB-D 9:	6	9	2	7	3

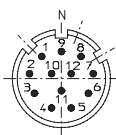
Bus terminal cover with Connectors 2 x M12 (type of connection 2, F or J)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+U power supply	0 V power supply	+U <sub>B</sub> power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG
M23 PIN assignment	3	2	7	10	12	10	12	2	7	3
M12 PIN-assignment	1	5	4	3	2	3	2	5	4	1

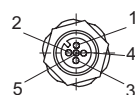
Connector M23 (type of connection I) or M12 (type of connection E)

Direction	IN				
Signal	0 Volt power supply	+U <sub>B</sub> power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
M23 PIN assignment	10	12	2	7	3
M12 PIN assignment	3	2	5	4	1

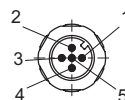
Bus in and out M23:



Bus out M12:

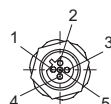


Bus in M12:



Terminal assignment incremental track

Signal	A	$\bar{A}$	B	$\bar{B}$	0 V
PIN-	1	2	3	4	5



# Absolute Encoders – Multiturn

**Standard, optical**

**Sendix 5868 / 5888 (Shaft / Hollow shaft)**

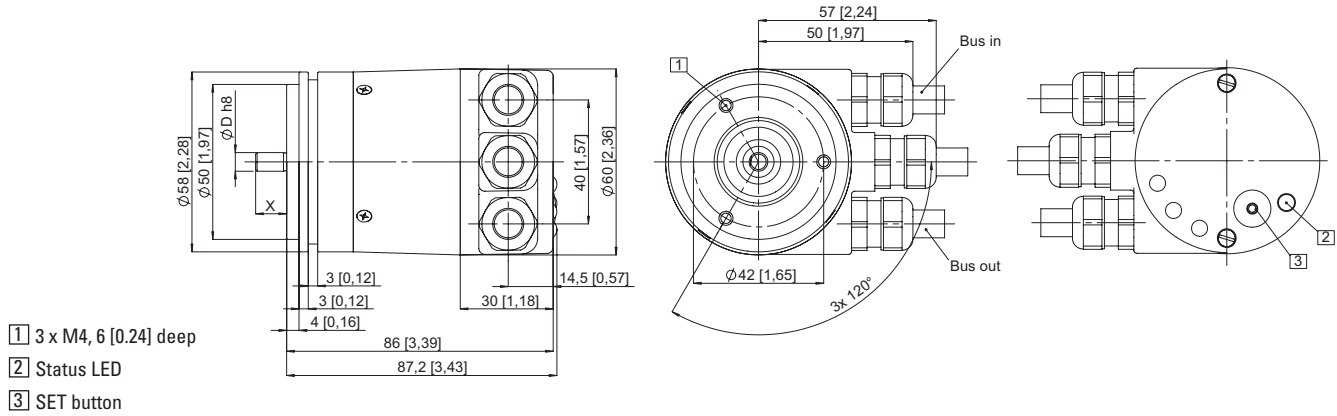
**CANopen/CANlift**

## Dimensions shaft version, with removable bus terminal cover

**Synchro flange, ø 58 mm**

**Flange type 2 and 4**

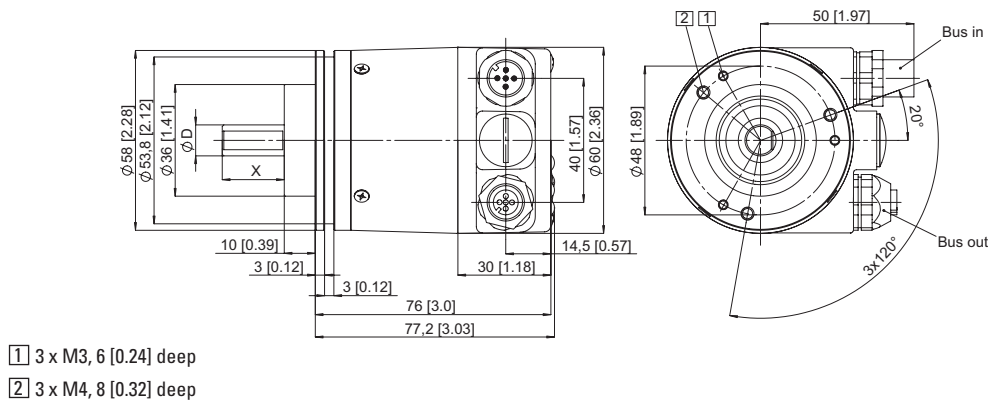
(Drawing with cable)



**Clamping flange, ø 58 mm**

**Flange type 1 and 3**

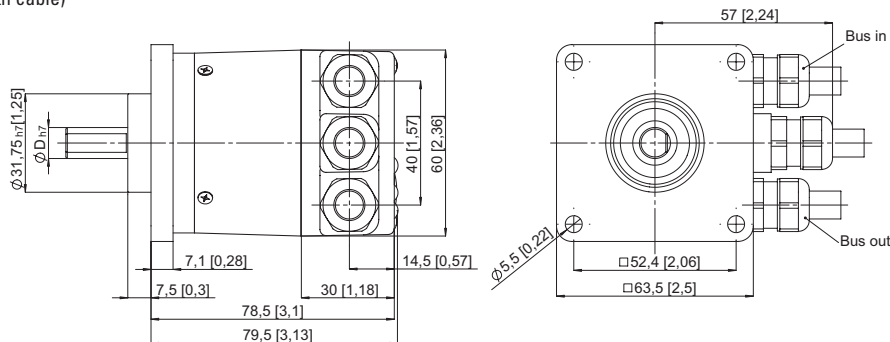
(Drawing with 2 x M12 connector)



**Square flange, □ 63.5 mm**

**Flange type 5 and 7**

(Drawing with cable)



# Absolute Encoders – Multiturn

<b>Standard, optical</b>	<b>Sendix 5868 / 5888 (Shaft / Hollow shaft)</b>	<b>CANopen/CANlift</b>
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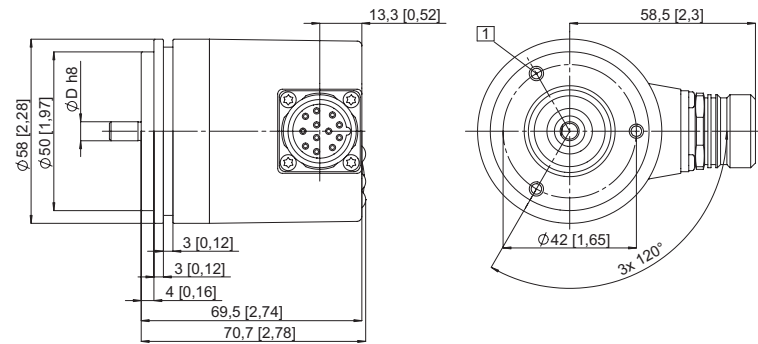
## Dimensions shaft version, with fixed connection

**Synchro flange,  $\varnothing$  58 mm**

**Flange type 2 and 4**

(Drawing with M23 connector)

1 3 x M4, 6 [0.24] deep



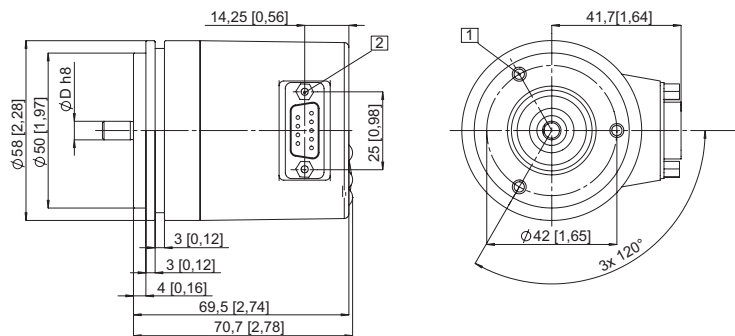
**Synchro flange,  $\varnothing$  58 mm**

**Flange type 2 and 4**

(Drawing with SUB-D connector)

1 3 x M4, 8 [0.32] deep

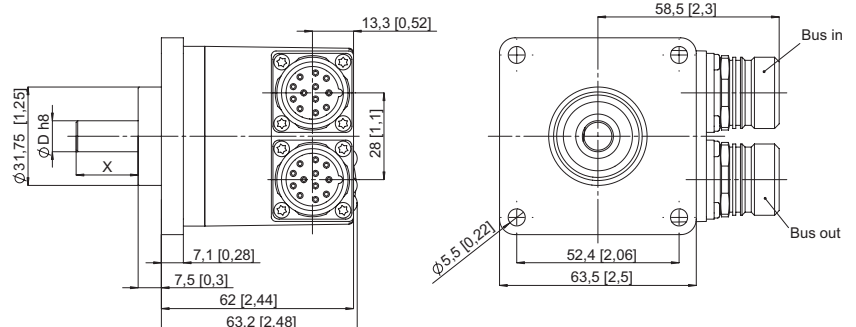
2 2 x 4/40 UNC; 3.0 [0.12] deep



**Square flange,  $\square$  63.5 mm**

**Flange type 5 and 7**

(Drawing with 2 x M23 connector)



# Absolute Encoders – Multiturn

**Standard, optical**

**Sendix 5868 / 5888 (Shaft / Hollow shaft)**

**CANopen/CANlift**

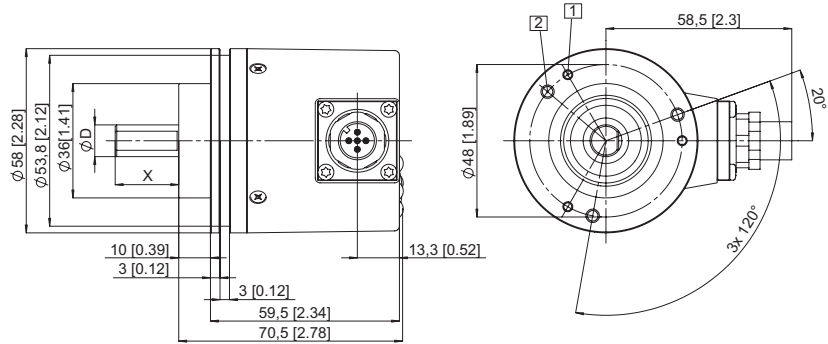
## Dimensions shaft version, with fixed connection

**Clamping flange, ø 58 mm**

**Flange type 1 and 3**

(Drawing with M12 connector)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep

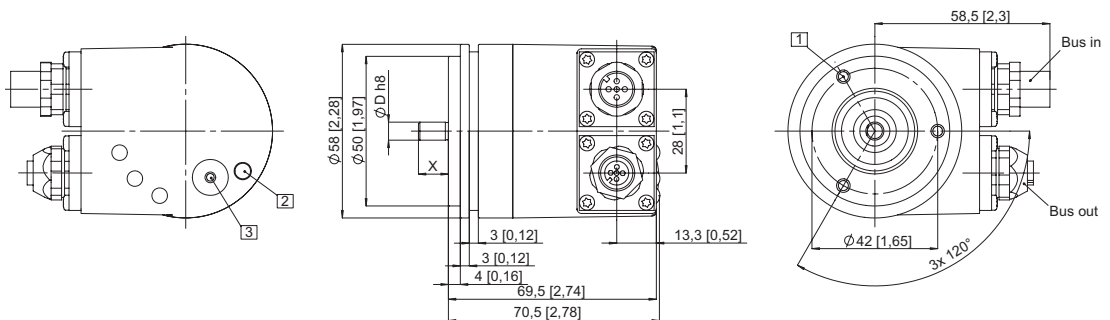


**Synchro flange, ø 58 mm**

**Flange type 2 and 4**

(Drawing with M12 connector)

- 1 3 x M4, 6 [0.24] deep
- 2 Status LED
- 3 SET button

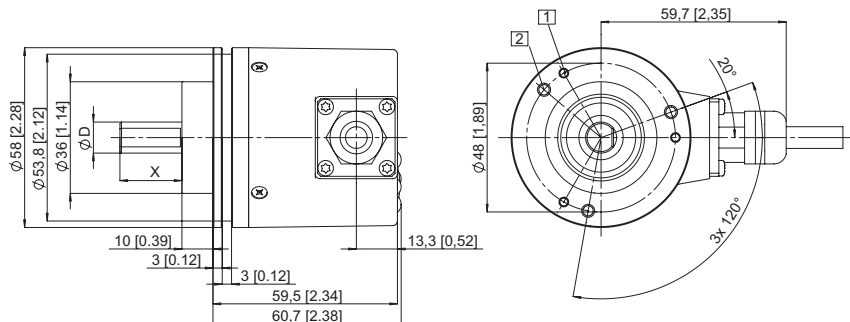


**Clamping flange, ø 58 mm**

**Flange type 1 and 3**

(Drawing with cable)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



# Absolute Encoders – Multiturn

<b>Standard, optical</b>	<b>Sendix 5868 / 5888 (Shaft / Hollow shaft)</b>	<b>CANopen/CANlift</b>
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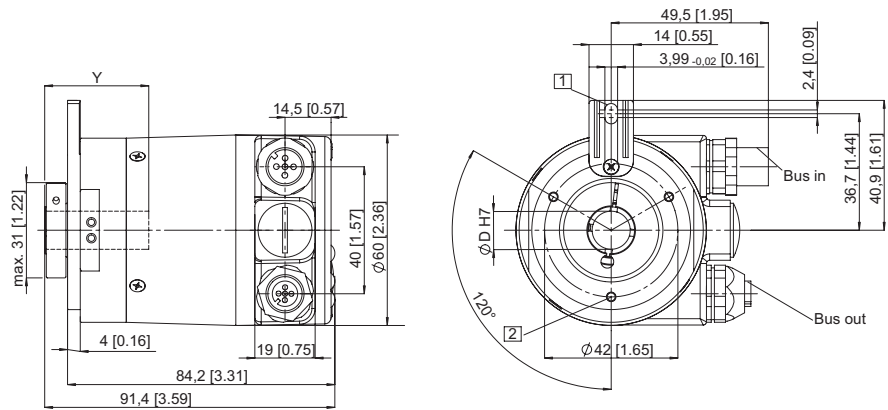
## Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set long,  $\varnothing$  58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,  
Recommendation: Cylindrical pin DIN7,  $\varnothing$  4 mm
- 2 3 x M3, 5.5 [0.21] deep



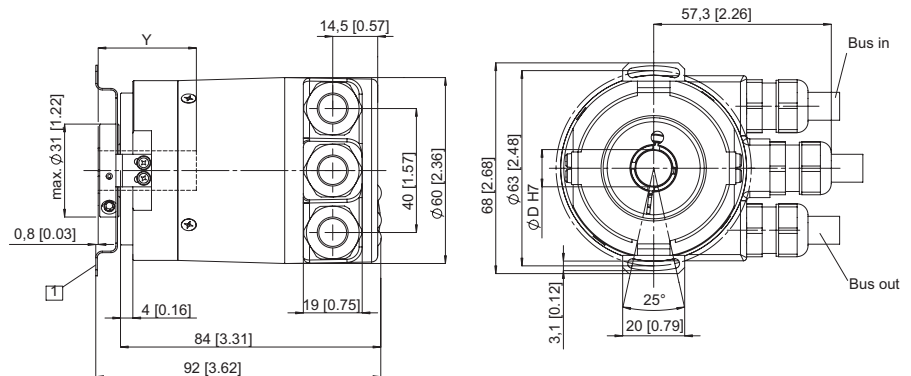
Flange with stator coupling,  $\varnothing$  58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with cable)

- 1 Fixing screws DIN 912 M3 x 8  
(Washer included in delivery)

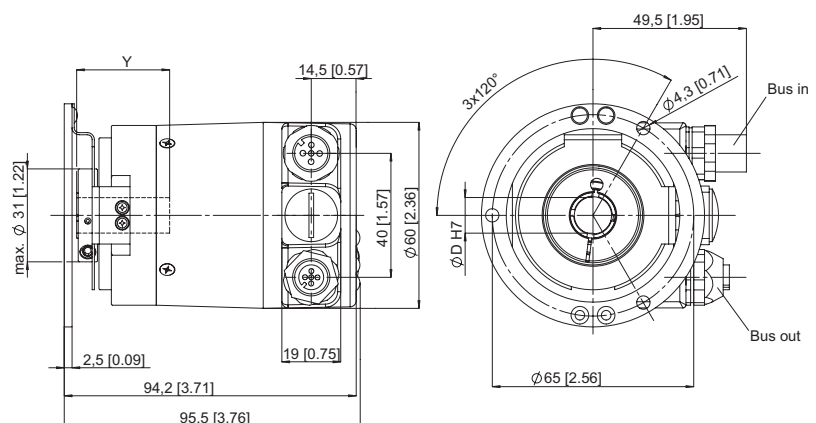


With stator coupling,  $\varnothing$  58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with 2 x M12 connector)



Y: Insertion depth for blind hollow shaft: 30 mm



# Absolute Encoders – Multiturn

**Standard, optical**

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**CANopen/CANlift**

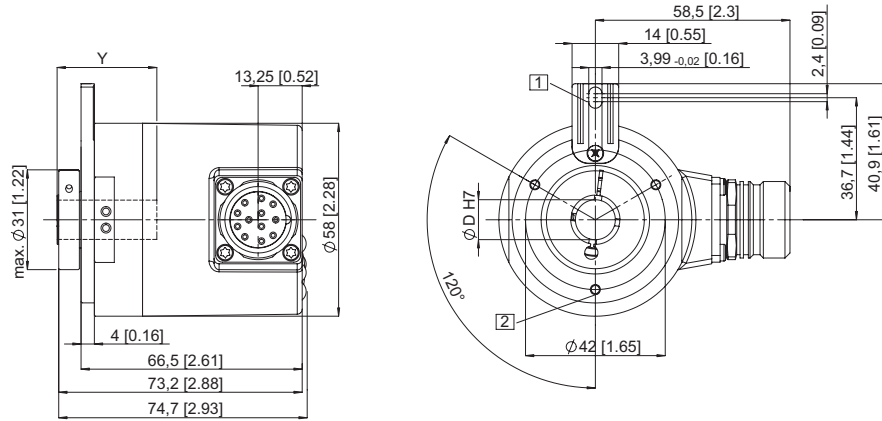
**Dimensions hollow shaft version (blind hollow shaft), with fixed connection**

**Flange with torque stop set long, ø 58 mm**

**Flange type 1 and 2**

(Drawing with M23 connector)

- 1 Torque stop slot,  
Recommendation:  
Cylindrical pin DIN7, ø 4 mm
- 2 3 x M3, 5.5 [0.21] deep

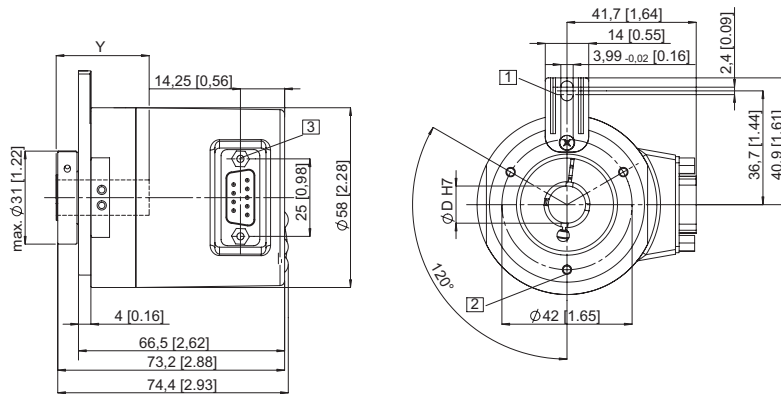


**Flange with torque stop set long, ø 58 mm**

**Flange type 1 and 2**

(Drawing with SUB-D connector)

- 1 Torque stop slot,  
Recommendation:  
Cylindrical pin DIN7, ø 4 mm
- 2 3xM3, 6 [0.24] deep
- 3 2 x 4/40 UNC; 3.0 [0.21] deep

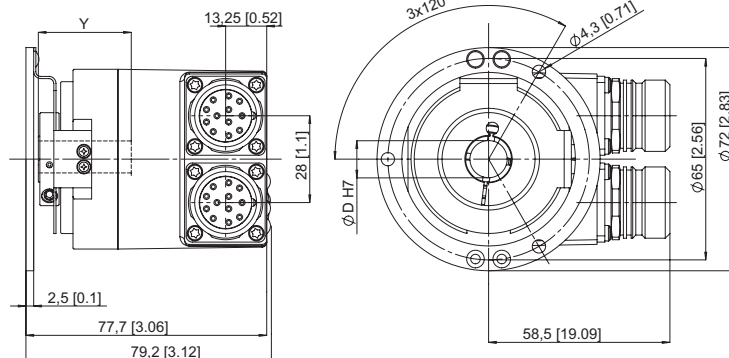


**Flange with stator coupling, ø 58 mm**

**Flange type 3 and 4**

Pitch circle diameter for fixing screws 65 mm

(Drawing with 2x M23-connectors)



Y: Insertion depth for blind hollow shaft: 30 mm

# Absolute Encoders – Multiturn

<b>Standard, optical</b>	<b>Sendix 5868 / 5888 (Shaft / Hollow shaft)</b>	<b>CANopen/CANlift</b>
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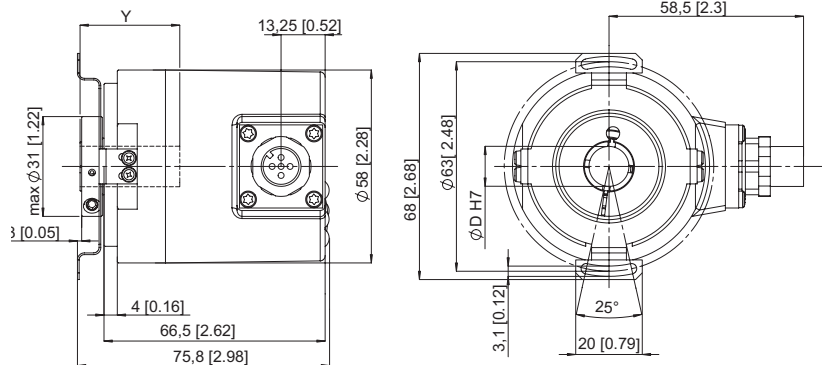
## Dimensions hollow shaft version (blind hollow shaft), with fixed connection

### Flange with stator coupling, ø 58 mm

#### Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with M12 connector)

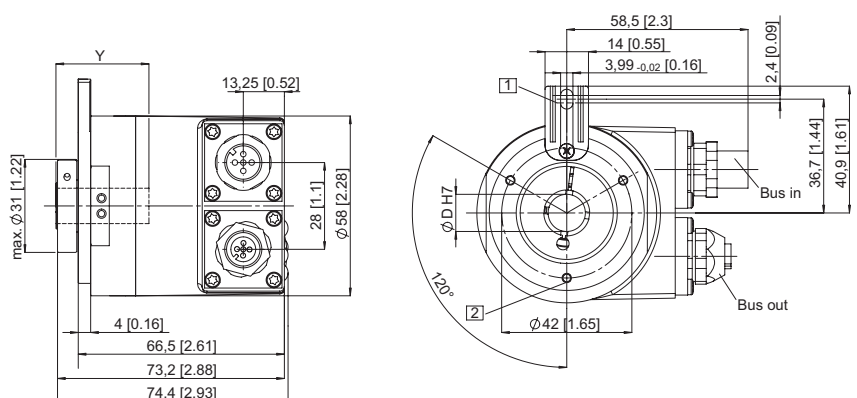


### Flange with torque stop set long, ø 58 mm

#### Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,  
Recommendation: Cylindrical pin DIN7, ø 4 mm
- 2 3xM3, 6 [0.24] deep

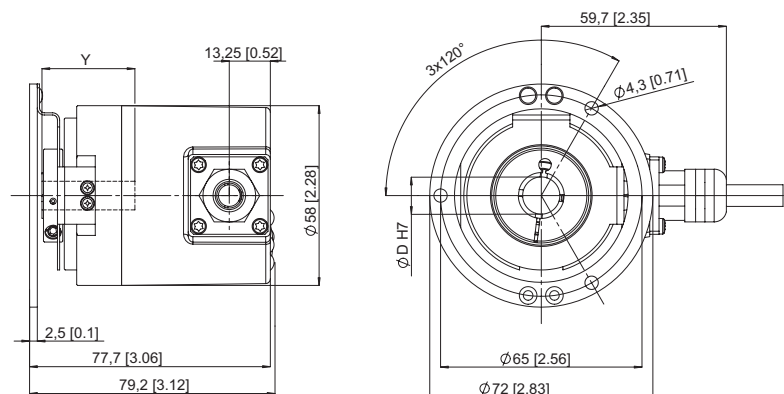


### Flange with stator coupling, ø 58 mm

#### Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with cable)



Y: Insertion depth for blind hollow shaft: 30 mm