Absolute Encoders – Multiturn

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

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

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

Ex 2/22 c UL us RoHS CANopen CANopen LIFT

Mechanical drive	Safety-Lock™	High rotational speed	Temperature range -40°... +80°C	High protection level IP	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

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
- Universal Scaling Function

Order code
Shaft version

8.5868 . X X X X . X X 2 X
Type ⓐⓑⓒⓓ ⓔ ⓕ

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

ⓐ *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28"]
3 = clamping flange, IP67 ø 58 mm [2.28"]
2 = synchro flange, IP65 ø 58 mm [2.28"]
4 = synchro flange, IP67 ø 58 mm [2.28"]
5 = square flange, IP65 □ 63.5 mm [2.5"]
7 = square flange, IP67 □ 63.5 mm [2.5"]

ⓑ *Shaft (ø x L), with flat*
1 = 6 x 10 mm [0.24 x 0.39"] [1]
2 = 10 x 20 mm [0.39 x 0.79"] [2]
3 = 1/4" x 7/8"
4 = 3/8" x 7/8"

ⓒ *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) [3]

ⓓ *Type of connection*
removable bus terminal cover
1 = cable gland radial
2 = 2 x M12 connector
    Fixed connection without bus terminal cover
A = cable, radial, length 2 m [6.56'] PVC
E = 1 x M12 connector, 5-pin, radial
F = 2 x M12 connector, 5-pin, radial
I = 1 x M23 connector, 12-pin, radial
J = 2 x M23 connector, 12-pin, radial
K = 1 x D-Sub connector, 9-pin

ⓔ *Fieldbus profile* [4]
21 = CANopen Encoder-Profile DS406 V3.2
22 = CANlift DS417 V1.01

ⓕ *Options (Service)*
2 = no options
3 = SET button

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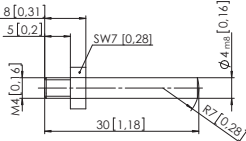- Ex 2/22
- seawater-resistant
- special cable length

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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 mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

| Order code Hollow shaft | 8.5888 . XXXX . XX2X 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. 10 by 10 |

a *Flange with torque stop*
1 = with spring element long, IP65
2 = with spring element long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56"]
4 = with stator coupling, IP67 ø 65 mm [2.56"]
5 = with stator coupling, IP65 ø 63 mm [2.48"]
6 = with stator coupling, IP67 ø 63 mm [2.48"]

b *Blind hollow shaft*
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
6 = ø 15 mm [0.59"]
8 = ø 3/8"
9 = ø 1/2"

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) [1]

d *Type of connection*
   removable bus terminal cover
1 = cable gland radial
2 = 2 x M12 connector
   Fixed connection without bus terminal cover
A = cable, radial, length 2 m [6.56'] PVC
E = 1 x M12 connector, 5-pin, radial
F = 2 x M12 connector, 5-pin, radial
I = 1 x M23 connector, 12-pin, radial
J = 2 x M23 connector, 12-pin, radial
K = 1 x D-Sub connector, 9-pin

e *Fieldbus profile* [2]
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

Mounting accessory for shaft encoders		Order No.
Coupling	Bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1101.0606**
	Bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1101.1010**

Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops	8 [0.31] 5 [0,2] SW7 [0,28] M4 [0,16] 30 [1,18] ø4 m6 [0,16] R7 [0,28] With fixing thread	**8.0010.4700.0000**

Connection technology		
Connector, self-assembly (straight)	Coupling M12 for Bus in	**8.0000.5116.0000**
	Connector M12 for Bus out	**8.0000.5111.0000**
Cordset, pre-assembled	M12, for Bus in, 6 m [19.68'] PVC cable	**05.00.6091.A211.006M**
	M12, for Bus out, 6 m [19.68'] PVC cable	**05.00.6091.A411.006M**

Programming set		
Including: - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software	Minimum system requirements: Operating system: WinXP SP3 or higher 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
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

[1] Only in conjunction with connection type 2
[2] CAN parameters can also be factory pre-set

Absolute Encoders – Multiturn

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Technical data

Mechanical characteristics

Max. speed	IP65 up to 70°C [158°F]	9 000 min^{-1}, 7 000 min^{-1} (continuous)
	IP65 up to T$_{max}$	7 000 min^{-1}, 4 000 min^{-1} (continuous)
	IP67 up to 70°C [158°F]	8 000 min^{-1}, 6 000 min^{-1} (continuous)
	IP67 up to T$_{max}$	6 000 min^{-1}, 3 000 min^{-1} (continuous)
Starting torque - at 20°C [68°F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Moment of inertia		
	Shaft version	4.0 x 10^{-6} kgm^2
	Hollow shaft version	7.5 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	approx. 0.57 kg [20.11 oz]
	with fixed connection	approx. 0.52 kg [18.34 oz]
Protection acc. to EN 60529		
	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C [1]
		[-40°F ... +176°F] [1]
Material	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC
Shock resistance acc. EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Power supply	10 ... 30 V DC
Power consumption (no load)	max. 100 mA
Reverse polarity protection of the power supply (+V)	yes
UL approval	File 224618
CE compliant acc. to	EMC guideline 2004/108/EC
RoHS compliant acc. to	guideline 2011/65/EU

Interface characteristics CANopen/CANopenLift

Singleturn resolution	1 ... 65536 (16 bit), scaleable
Default value	8192 (13 bit)
Multiturn resolution	max. 4096 (12 bit) scalable only via the total resolution
Total resolution	1 ... 268 435 456 (28 bit) Default: 25 bit
Code	Binary
Interface	CAN High-Speed acc. to ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B
Protocol	CANopen Profile DS406 V3.2 with manufacturer-specific add-ons or CANlift Profile DS417 V1.1
Baud rate	10 ... 1000 kbit/s (can be set via DIP switches / software configurable)
Node address	1 ... 127 (can be set via rotary switches / software configurable)
Termination switchable	can be set via DIP switches, software configurable

Incremental track characteristics

Output driver		RS422 (TTL-compatible)
Permissible load / channel		max. 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW	typ. 1.3 V
Short circuit proof outputs		yes [2]
Resolution		2048 ppr

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)

LED is ON with the following fault conditions

Sensor error (internal code or LED error) too low voltage, over-temperature

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1) Cable version: -30°C ... +75°C [-22°F ... +167°F]
2) Short circuit to 0 V or to output, only one channel at a time, power supply correctly applied

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

General information about CANopen / CANopenLift

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. 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 are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

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 power supply 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.

Universal Scaling Function

At the end of the physical resolution of an encoder, **when scaling is active**, an error appears if the division of the physical limit (GP_U) by the programmed total resolution (TMR) does not produce an integer.

The Universal Scaling Function remedies this problem.

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 posititon in absolute measuring steps (steps)
• 1 virtual device delivers the posititon 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
• "Watchdog controlled" device

All profiles stated here: Key-features
The object 6003h "Preset" is assigned to an integrated key, accessible from the outside.

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Terminal assignment

Interface	Type of connection	Cable gland (Bus terminal cover with terminal box)									
2, 5	1		Bus OUT					Bus IN			
		Signal:	CAN_GND	CAN_L	CAN_H	0 V power supply	+V power supply	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND
		Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

Interface	Type of connection	Cable (isolate unused wires individually before initial start-up)				
2, 5	A		Bus IN			
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND
		Cable colour:	WH	BN	YE	GN	GY

Interface	Type of connection	2 x M12 connector (3 x M12 connector with interface 5)					
2, 5	2, F		Bus OUT					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H)	CAN_GND	
		Pin:	3	2	5	4	1	
			Bus IN					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	
		Pin:	3	2	5	4	1	
5	2		Incremental track					
		Signal:	A	$\overline{A}$	B	$\overline{B}$	0 V	
		Pin:	1	2	3	4	5	

Interface	Type of connection	1 x M12 connector					
2, 5	E		Bus IN					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	
		Pin:	3	2	5	4	1	

Interface	Type of connection	2 x M23 connector					
2, 5	J		Bus OUT					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	2 x
		Pin:	10	12	2	7	3	
			Bus IN					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	
		Pin:	10	12	2	7	3	

Interface	Type of connection	1 x M23 connector					
2, 5	I		Bus IN					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	
		Pin:	10	12	2	7	3	

Interface	Type of connection	D-Sub connector					
2, 5	K		Bus IN					
		Signal:	0 V power supply	+V power supply	CAN_L	CAN_H	CAN_GND	
		Pin:	6	9	2	7	3	

Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Dimensions shaft version, with removable bus terminal cover
Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(Drawing with 2 x M12 connector)

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

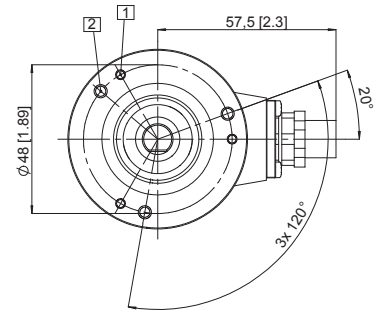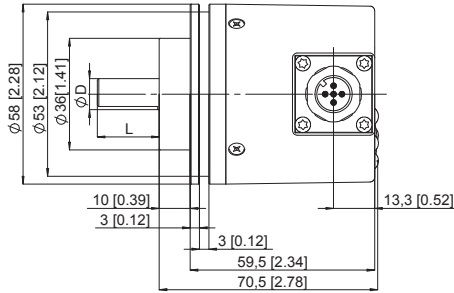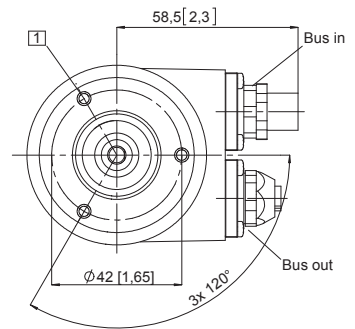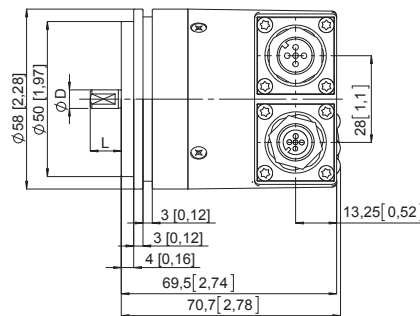| D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7
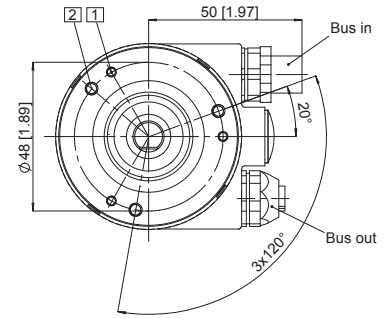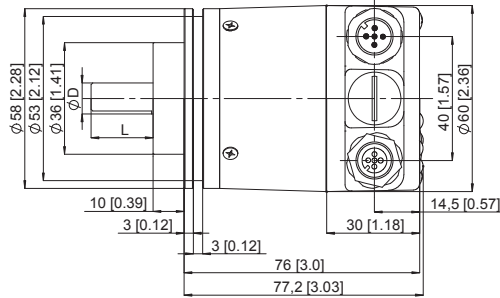
Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(Drawing with cable)

1 M4, 6 [0.24] deep

D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7
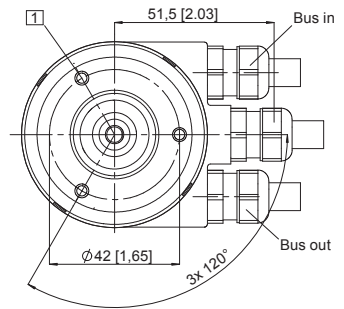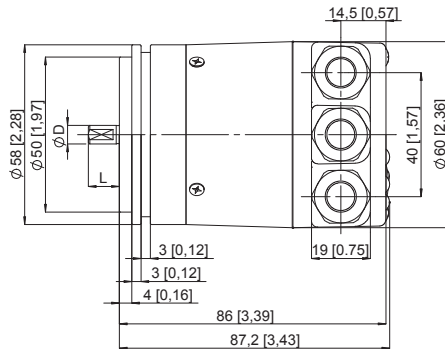
Square flange, □ 63.5 [2.5]
Flange type 5 and 7
(Drawing with cable)

D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7
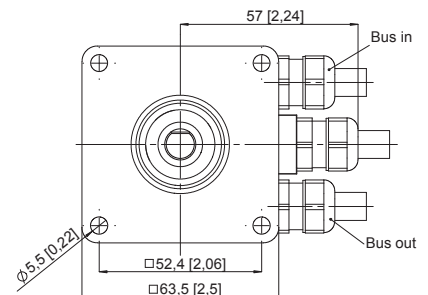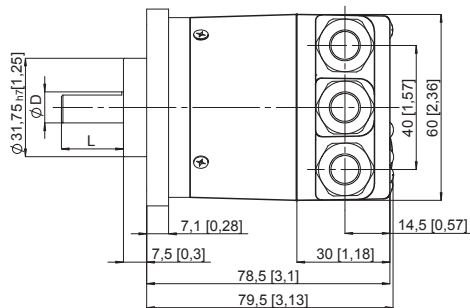
Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Dimensions shaft version, with fixed connection
Dimensions in mm [inch]

Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(Drawing with M23 connector)

1 M4, 6 [0.24] deep
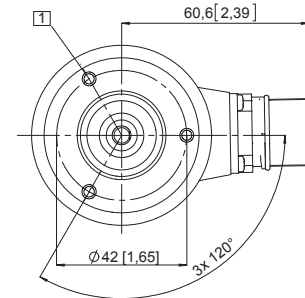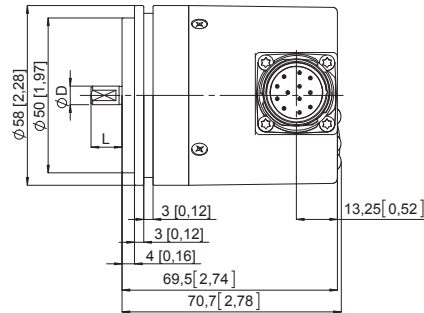
D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(Drawing with D-Sub connector)

1 M4, 6 [0.24] deep
2 2 x 4/40 UNC; 3.0 [0.12] deep
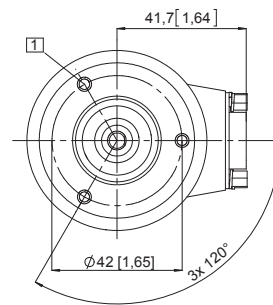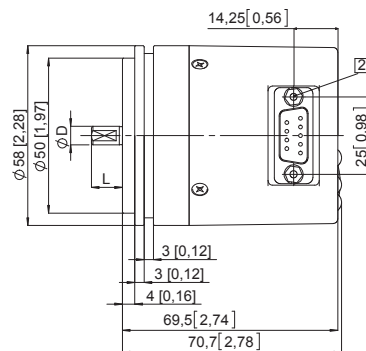
D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Square flange, ☐ 63.5 [2.5]
Flange type 5 and 7
(Drawing with 2 x M23 connector)
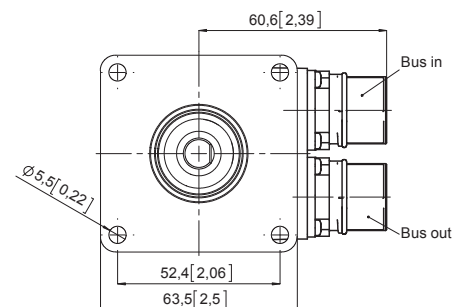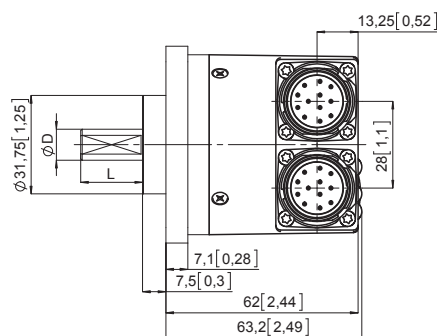
D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Absolute Encoders
Multiturn

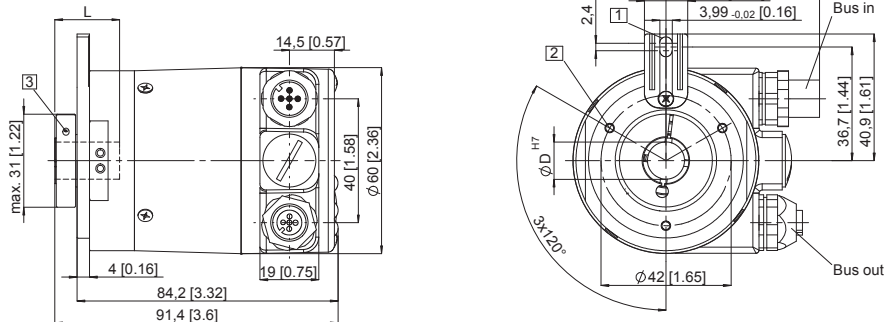| Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Dimensions shaft version, with fixed connection
Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(Drawing with 1 x M12 connector)

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

D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(Drawing with M12 connector)

1 M4, 8 [0.32] deep

D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(Drawing cable)

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

D	L	Fit
6 [0.24]	10 [0.39]	h7
10 [0.39]	20 [0.79]	f7
1/4"	7/8"	h7
3/8"	7/8"	h7

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover
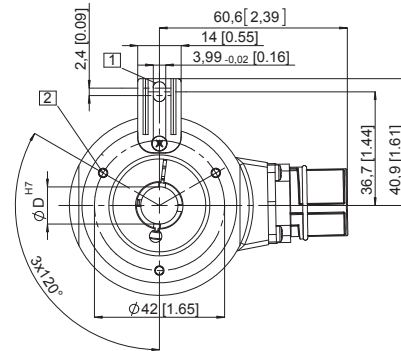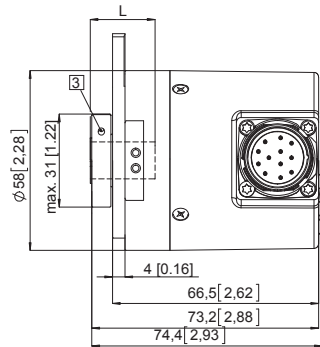
Dimensions in mm [inch]

Flange with spring element long
Flange type 1 and 2
(drawing with 2 x M12 connector)

1 Torque stop slot,
   Recommendation:
   Cylindrical pin DIN 7, ø 4 [0.16]

2 M3, 5.5 [0.21] deep

3 Recommended torque for the
   clamping ring 0.6 Nm
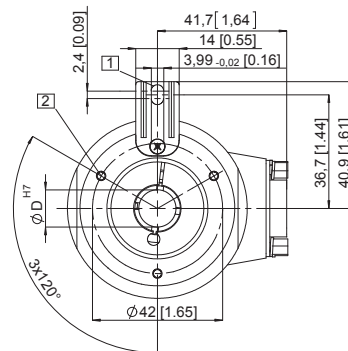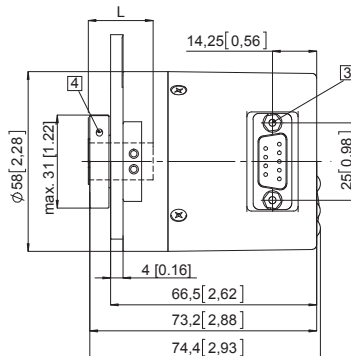
L: Insertion depth for blind
   hollow shaft: 30 [1.18]

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 [2.48]
(Drawing with cable)

1 Recommended torque for the
   clamping ring 0.6 Nm

L: Insertion depth for blind
   hollow shaft: 30 [1.18]

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(Drawing with 2x M12 connector)

1 Recommended torque for the
   clamping ring 0.6 Nm

L: Insertion depth for blind
   hollow shaft: 30 [1.18]

Absolute Encoders
Multiturn

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

Dimensions hollow shaft version (blind hollow shaft), with fixed connection
Dimensions in mm [inch]

Flange with spring element long
Flange type 1 and 2
(drawing with M23 connector)

1 Torque stop slot,
  Recommendation:
  Cylindrical pin DIN 7, ø 4 [0.16]

2 M3, 5.5 [0.21] deep

3 Recommended torque for the
  clamping ring 0.6 Nm

L: Insertion depth for blind
  hollow shaft: 30 [1.18]

Flange with spring element long
Flange type 1 and 2
(drawing with D-Sub connector)

1 Torque stop slot,
  Recommendation:
  Cylindrical pin DIN 7, ø 4 [0.16]

2 M3, 5.5 [0.21] deep

3 2 x 4/40 UNC; 3.0 [0.21] deep

4 Recommended torque for the
  clamping ring 0.6 Nm
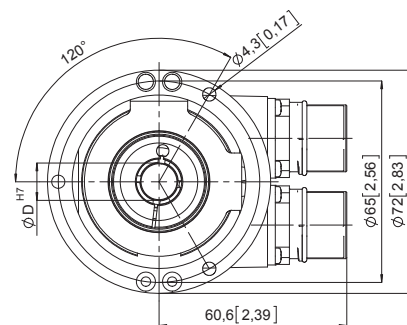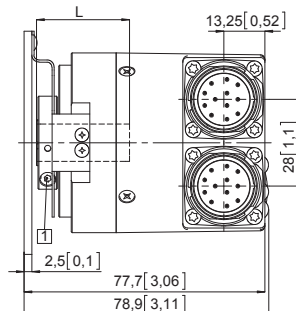
L: Insertion depth for blind
  hollow shaft: 30 [1.18]

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(drawing with 2 x M23 connector)

1 Recommended torque for the
  clamping ring 0.6 Nm

L: Insertion depth for blind
  hollow shaft: 30 [1.18]

Standard mechanical Multiturn, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANopenLift

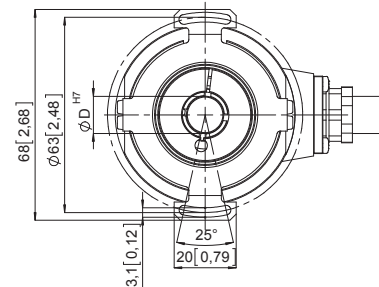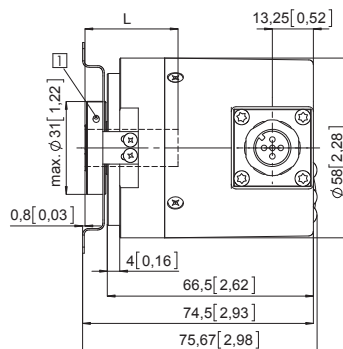## Dimensions hollow shaft version (blind hollow shaft), with fixed connection
Dimensions in mm [inch]

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 [2.48]
(drawing with M12 connector)

1 Recommended torque for the
clamping ring 0.6 Nm
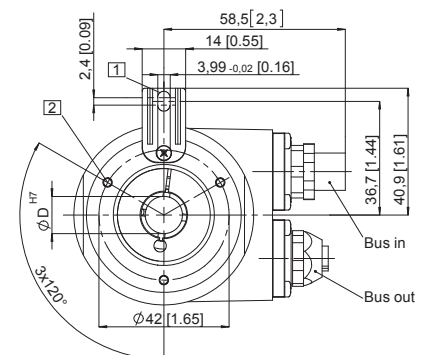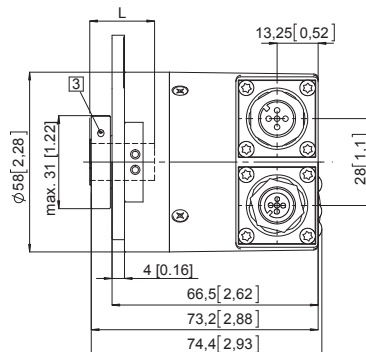L: Insertion depth for blind
hollow shaft: 30 [1.18]

Flange with spring element long
Flange type 1 and 2
(drawing with 2 x M12 connector)

1 Torque stop slot,
Recommendation:
Cylindrical pin DIN 7, ø 4 [0.16]
2 M3, 5.5 [0.21] deep
3 Recommended torque for the
clamping ring 0.6 Nm
L: Insertion depth for blind
hollow shaft: 30 [1.18]

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(Drawing with cable)

1 Recommended torque for the
clamping ring 0.6 Nm
L: Insertion depth for blind
hollow shaft: 30 [1.18]

Absolute Encoders
Multiturn