

# Incremental Encoders

**Standard, optical**      **Sendix 5000 / 5020 (Shaft / Hollow shaft)**      **Push-Pull / RS422**



Due to their sturdy bearing construction in Safety Lock™ Design, the Sendix 5000 and 5020 offer high resistance against vibration and installation errors.

The rugged housing, high protection level of up to IP67, as well as the wide temperature range of -40°C up to +85°C, make this product range the perfect encoder for all applications.



Incremental Encoders

Safety-Lock™	High rotational speed	Temperature	High protection level	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

## Robust performance

- Increased resistance against vibrations and tolerance of installation errors, elimination of machine downtime and repairs thanks to sturdy bearing construction in "Safety-Lock™ Design"
- Ensures highest safety against field breakdowns and is thus suitable also for outside use thanks to its resistant die-cast housing and protection up to IP67
- Wide temperature range (-40°C...+85°C)
- Also available in seawater resistant version

## Many variants

- Suitable connection variant for every specific case: Cable connection, M23 connector, M12 connector
- Reliable mounting in a wide variety of installation situations: Comprehensive and proven fixing possibilities
- Compatible with all US and European standards,
- Max. 5000 pulses per revolution

## Order code

### Shaft version

**8.5000** . **XX** **XX** . **XXXX**  
Type      a      b      c      d      e

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

- 5 = synchro flange, ø 50,8 mm, IP67
- 6 = synchro flange, ø 50,8 mm, IP65
- 7 = clamping flange, ø 58 mm, IP67
- 8 = clamping flange, ø 58 mm, IP65**
- A = synchro flange, ø 58 mm, IP67
- B = synchro flange, ø 58 mm, IP65**
- C = square flange, 63.5 mm, IP67
- D = square flange, 63.5 mm, IP65
- G = Euro flange, 115 mm, IP67 <sup>1)</sup>

### b Shaft (ø x L), with flat

- 1 = ø 6 x 10 mm**
- 2 = ø 6,35 x 15,875 mm (1/4" x 5/8")
- 3 = ø 10 x 20 mm**
- 4 = ø 9,5 x 15,875 mm (3/8" x 5/8")
- 5 = ø 12 x 20 mm
- 6 = ø 8 x 15 mm
- B = ø 11 x 33 mm, with feather key shaft slot <sup>2)</sup>

### c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 ... 30 V DC
- 2 = Push-Pull (7272 compatible with inverted signal) / 5 ... 30 V DC
- 4 = RS422 (with inverted signal) / 5 V DC**
- 5 = Push-Pull (with inverted signal) / 10 ... 30 V DC**

### d Type of connection

- 1 = axial cable (1 m PVC cable)
- 2 = radial cable (1 m PVC cable)**
- 3 = M12 connector, 8-pin, axial
- 4 = M12 connector, 8-pin, radial**
- 7 = M23 connector, 12-pin, axial
- 8 = M23 connector, 12-pin, radial**
- Y = MIL connector, 10-pin, radial

### e Pulse rate

- 1, 5, 10, 12, 36, 100, 200, 250, 256, **360**, 400, 500, **512**, 600, 800, **1000**, **1024**, 1200, 2000, **2048**, **2500**, **3600**, **4096**, **5000**
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

### Stock types

8.5000.8358.0200	8.5000.B157.1024
8.5000.8358.0360	8.5000.B157.5000
8.5000.8358.0500	8.5000.8354.1024
8.5000.8358.1000	8.5000.8354.5000
8.5000.8358.5000	

### optional on request

- Ex 2/22
- seawater-resistant
- special cable length

1) Only in conjunction with shaft B  
 2) Only in conjunction with flange G

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<b>Order code</b> <b>Hollow shaft</b>	<b>8.5020</b> Type	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">.</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">.</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">X</td> </tr> <tr> <td style="padding: 2px 5px;">a</td> <td style="padding: 2px 5px;">b</td> <td style="padding: 2px 5px;">c</td> <td style="padding: 2px 5px;">d</td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;">e</td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> <td style="padding: 2px 5px;"></td> </tr> </table>	X	X	X	X	.	X	X	X	X	.	X	X	X	X	a	b	c	d		e									<p>If for each parameter of an encoder the <u>underlined preferred option</u> 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.</p>	
X	X	X	X	.	X	X	X	X	.	X	X	X	X																			
a	b	c	d		e																											
<b>a Flange</b>	<b>c Output circuit / Power supply</b>	<b>e Pulse rate</b>																														
1 = with torque stop, IP67 <b>2 = with torque stop, IP65</b> 3 = with fastening arm, IP67 4 = with fastening arm, IP65 7 = with stator coupling, ø 65 mm, IP67 <b>8 = with stator coupling, ø 65 mm, IP65</b> C = with stator coupling, ø 63 mm, IP67 <b>D = with stator coupling, ø 63 mm, IP65</b>	1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = Push-Pull (7272 compatible with inverted signal) / 5 ... 30 V DC <b>4 = RS422 (with inverted signal) / 5 V DC</b> <b>5 = Push-Pull (with inverted signal) / 10 ... 30 V DC</b>	1, 5, 10, 12, 36, 100, 200, 250, 256, <b>360</b> , 400, 500, <b>512</b> , 600, 800, <b>1000</b> , <b>1024</b> , 1200, 2000, <b>2048</b> , <b>2500</b> , <b>3600</b> , <b>4096</b> , <b>5000</b> (e.g. 100 pulses => 0100) Other pulse rates on request																														
<b>b Hollow shaft</b>	<b>d Type of connection</b>	<b>Stock types</b>																														
1 = ø 6 mm 2 = ø 6,35 mm (1/4") <b>3 = ø 10 mm</b> 4 = ø 9,52 mm (3/8") <b>5 = ø 12 mm</b> 6 = ø 12,75 mm (1/2") 7 = ø 15,875 mm (5/8") <b>8 = ø 15 mm</b> <b>9 = ø 8 mm</b> A = ø 14 mm	1 = radial cable (1 m PVC cable) <b>2 = M12 connector, 8-pin, radial</b> <b>4 = M23 connector, 12-pin, radial</b> 7 = MIL connector, 10-pin, radial <b>E = tangential cable outlet (1 m PVC cable)</b> H = tangential cable outlet (0.3 m PVC cable, including M12 connector for central fastening)	8.5020.2351.1000 8.5020.2351.2500 8.5020.2551.0500 8.5020.8552.1024 8.5020.8552.5000																														
<i>optional on request</i>																																
- Ex 2/22 - seawater-resistant - special cable length																																

## Mounting accessory for shaft encoders

<b>Coupling</b>	Bellows coupling ø 19 mm for shaft 10 mm	<b>8.0000.1101.1010</b>
	Bellows coupling ø 19 mm for shaft 6 mm	<b>8.0000.1101.0606</b>

## Mounting accessory for hollow shaft encoders

<b>Cylindrical pin, long</b> for torque stops		With fixing thread	<b>8.0010.4700.0000</b>
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## Isolation / adapter inserts for hollow shaft encoders

**Thermal and electrical isolation of the encoders (Temperature range -40 ... +115°C)**  
Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.

		<p style="text-align: right;">D1</p> <p style="text-align: right;">Isolation insert</p>	
		6 mm [0.24"]	<b>8.0010.4021.0000</b>
		6.35 mm [0.25"]	<b>8.0010.4022.0000</b>
		8 mm [0.32"]	<b>8.0010.4020.0000</b>
		9.53 mm [0.38"]	<b>8.0010.4024.0000</b>
		10 mm [0.39"]	<b>8.0010.4023.0000</b>
		12 mm [0.47"]	<b>8.0010.4025.0000</b>
		12.7 mm [0.50"]	<b>8.0010.4026.0000</b>

**Tip:**  
By using these adapter inserts you can achieve six different hollow shaft diameters, all on the basis of one encoder with 15 mm hollow shaft.

## Connection Technology

<b>Connector, self-assembly</b>	M12	<b>05.CMB-8181-0</b>
	M23	<b>8.0000.5012.0000</b>
	MIL	<b>8.0000.5062.0000</b>
<b>Cordset, pre-assembled with 2 m PVC cable</b>	M12	<b>05.00.6041.8211.002M</b>
	M23	<b>8.0000.6201.0002</b>

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).

# Incremental Encoders

## Standard, optical      Sendix 5000 / 5020 (Shaft / Hollow shaft)      Push-Pull / RS422

Mechanical characteristics			
<b>Max. Speed</b>	IP65	12 000 min <sup>-1</sup> 6 000 min <sup>-1</sup> (continuous)	<b>Weight</b> ca. 0.4 kg
	IP67	6 000 min <sup>-1</sup> 3 000 min <sup>-1</sup> (continuous)	
<b>Rotor moment of inertia</b>	shaft version	approx. 1.8 x 10 <sup>-6</sup> kgm <sup>2</sup>	<b>Protection to EN 60529</b> without shaft seal IP 65 with shaft seal IP 67
	hollow shaft version	approx. 6 x 10 <sup>-6</sup> kgm <sup>2</sup>	
<b>Starting torque</b>	IP65	< 0.01 Nm	<b>EX approval for hazardous areas</b> optional Zone 2 and 22
	IP67	< 0.05 Nm	
<b>Shaft load capacity</b>	radial	80 N	<b>Working temperature range</b> -40°C <sup>1)</sup> ... +85°C
	axial	40 N	
			<b>Materials</b> shaft stainless steel
			<b>Shock resistance</b> acc. to EN 60068-2-27 2500 m/s <sup>2</sup> , 6 ms
			<b>Vibration resistance</b> acc. to EN 60068-2-6 100 m/s <sup>2</sup> , 10 ... 2000 Hz

Electrical characteristics				
Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-Pull	Push-Pull (7272 compatible)
<b>Supply voltage</b>	5 ... 30 V DC	5 V ±5%	10 ... 30 V DC	5 ... 30 V DC
<b>Power consumption (no load)</b>	typ. 40 mA / max. 90 mA	typ. 40 mA / max. 90 mA	typ. 50 mA / max. 100 mA	typ. 50 mA / max. 100 mA
<b>Permissible load / channel</b>	max. ±20 mA	max. ±20 mA	max. ±20 mA	max. ±20 mA
<b>Pulse frequency</b>	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz <sup>2)</sup>
<b>Signal level</b>	high	min. 2.5 V	min. U <sub>B</sub> - 1 V	min. U <sub>B</sub> - 2.0 V
	low	max. 0.5 V	max. 0.5 V	max. 0.5 V
<b>Rising edge time t<sub>r</sub></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
<b>Falling edge time t<sub>f</sub></b>	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
<b>Short circuit proof outputs<sup>3)</sup></b>	yes <sup>4)</sup>	yes <sup>4)</sup>	yes	yes
<b>Reverse polarity protection of the power supply</b>	yes	no	yes	no
<b>UL approval</b>	File 224618			
<b>CE compliant</b> acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
<b>RoHS compliant</b> acc. to	EU guideline 2002/95/EG			

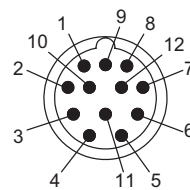
### Terminal assignment - (Isolate unused outputs before initial startup.)

output circuit	Cable	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
1, 2, 4, 5	Signal:											
	Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield
output circuit	M12 connector eurofast, 8-pin	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
1, 2, 4, 5	Signal:											
	Pin:	1	2			3	4	5	6	7	8	PH <sup>5)</sup>
output circuit	M23 connector multifast, 12-pin	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
1, 2, 4, 5	Signal:											
	Pin:	10	12	11	2	5	6	8	1	3	4	PH <sup>5)</sup>
output circuit	MIL connector (MS styled), 10-pin	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$
1, 2, 4, 5	Signal:											
	Pin:	F	D		E	A	G	B	H	C	I	J <sup>5)</sup>

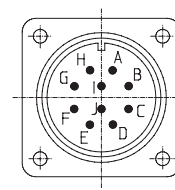
### Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin



MIL connector, 10-pin

1) With connector: -40°C, cable fixed: -30°C, cable moved: -20°C  
 2) Max. recommended cable length 30 m  
 3) If supply voltage correctly applied.

4) Only one channel allowed to be shorted-out:  
 If U<sub>B</sub> = 5 V, short-circuit to channel, 0 V, or +U<sub>B</sub> is permitted.  
 If U<sub>B</sub> = 5 - 30 V, short-circuit to channel or 0 V is permitted.  
 5) Shield is attached to connector housing.

# Incremental Encoders

**Standard, optical**

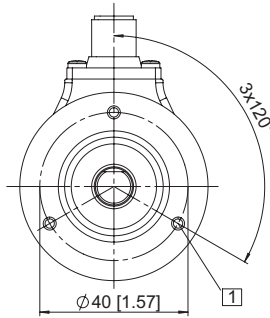
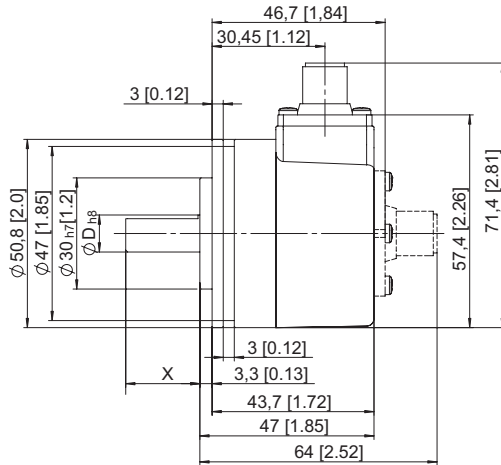
**Sendix 5000 / 5020 (Shaft / Hollow shaft)**

**Push-Pull / RS422**

## Dimensions shaft version

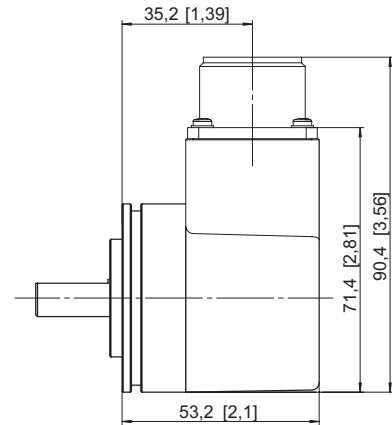
**Synchro flange, ø 50,8 mm [2.0"]**

**Flange type 5 and 6**



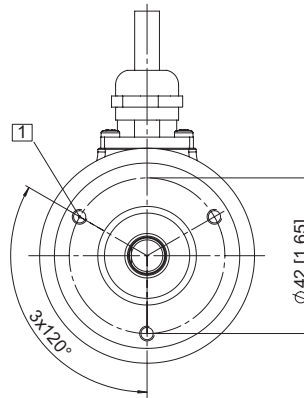
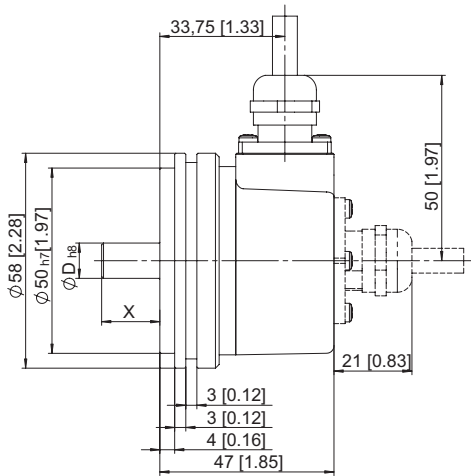
1 M3, 6 [0.24] deep

MIL-connector version



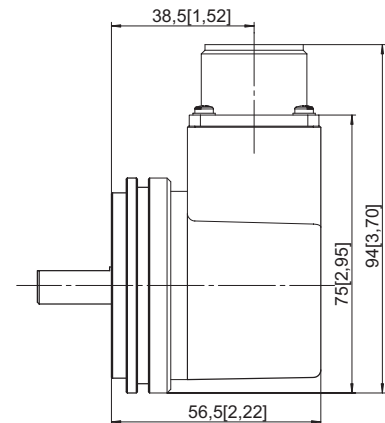
**Synchro flange, ø 50.8 mm [2.0"]**

**Flange type A and B**



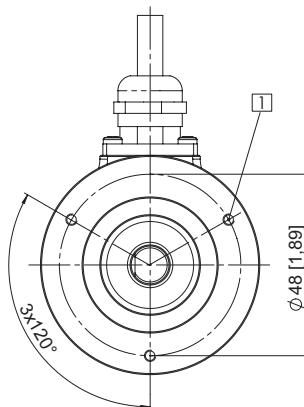
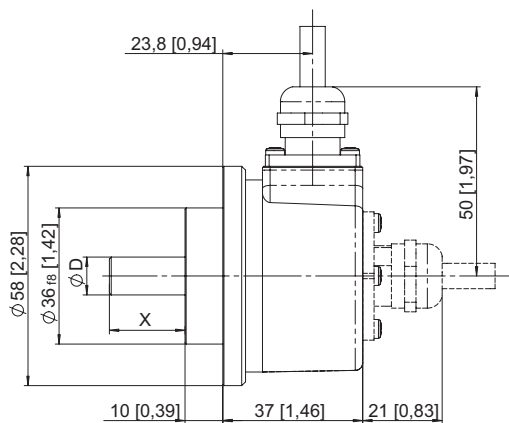
1 M4, 6 [0.24] deep

MIL-connector version



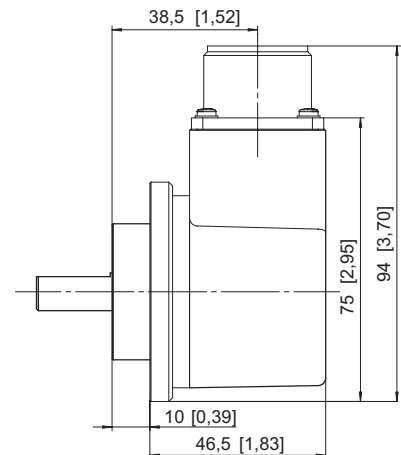
**Clamping flange, ø 58 mm [2.28"]**

**Flange type 7 and 8**



1 M3, 6 [0.24] deep

MIL-connector version



# Incremental Encoders

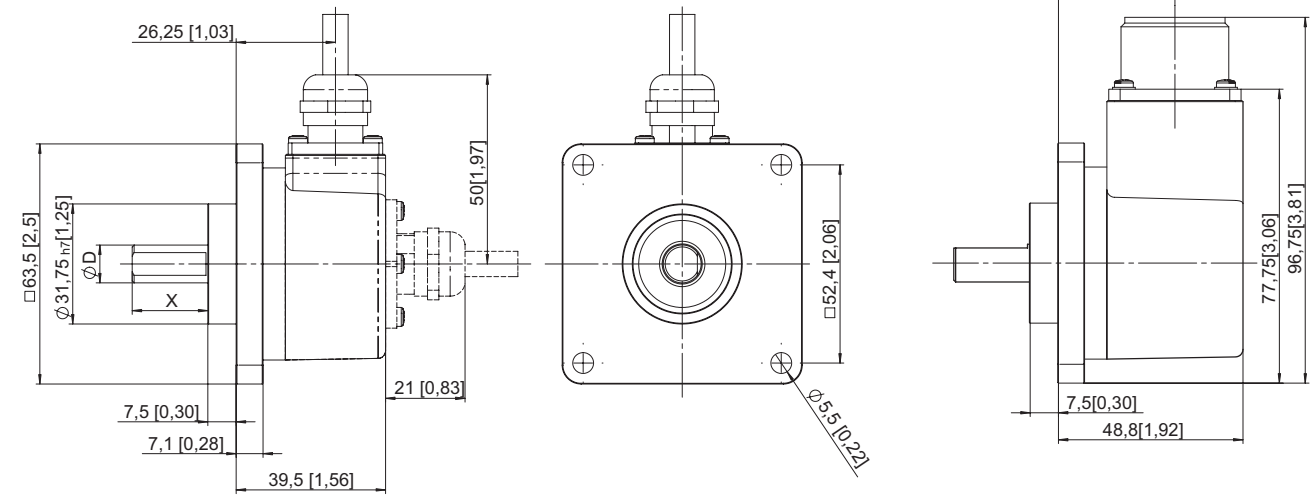
**Standard, optical**      **Sendix 5000 / 5020 (Shaft / Hollow shaft)**      **Push-Pull / RS422**

## Dimensions shaft version

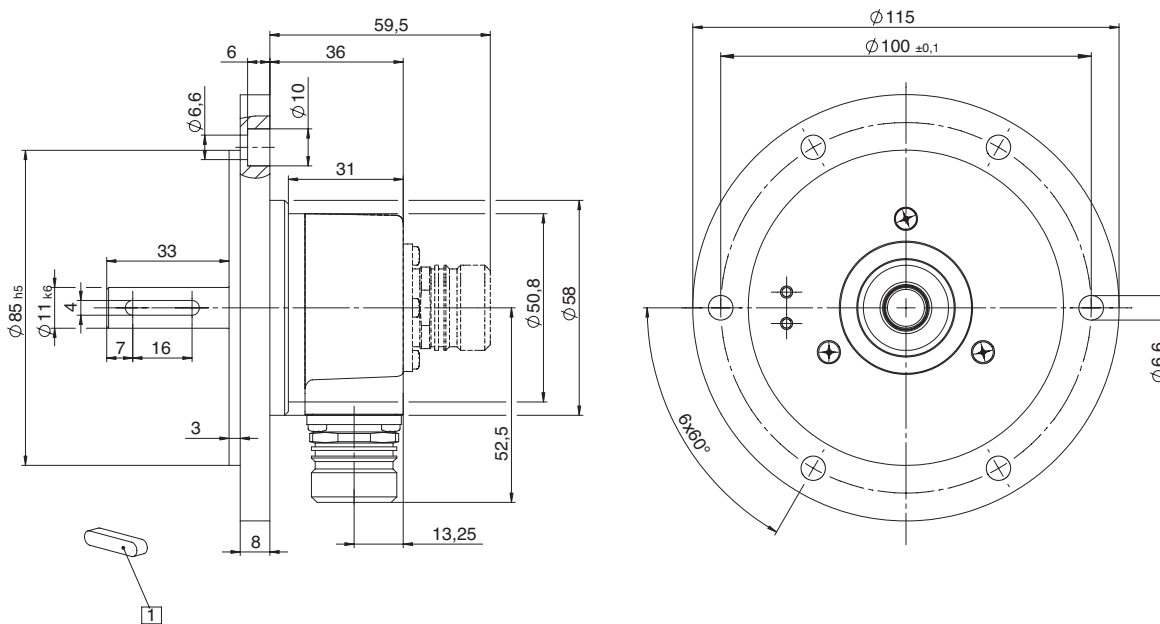
Rectangular flange,  $\square 63.5$  mm [2.5"]

Flange type C and D

MIL-contractor version



Euro flange,  $\varnothing 115$  mm  
Flange type G



1 215342 Set attached

## Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

We recommend the use of suitable couplings (see Accessories section).

Incremental Encoders

# Incremental Encoders

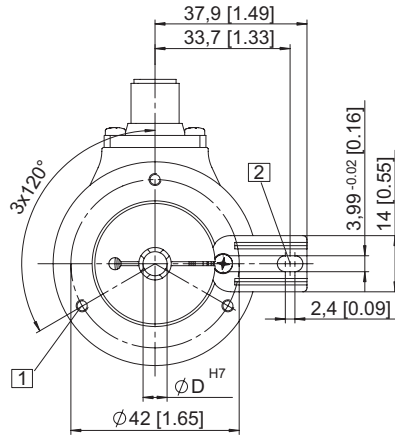
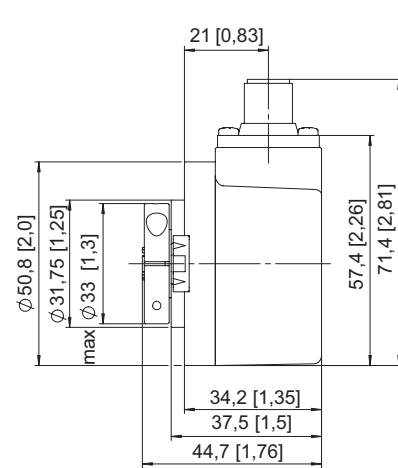
**Standard, optical**

**Sendix 5000 / 5020 (Shaft / Hollow shaft)**

**Push-Pull / RS422**

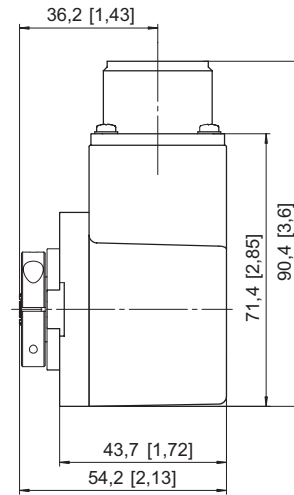
## Dimensions hollow shaft version

Flange with long torque stop,  $\varnothing 50.8$  mm [2.0"]  
Flange type 1 and 2



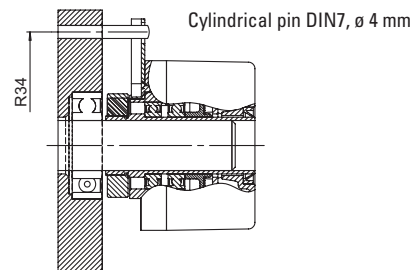
- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,  
Recommendation: Cylindrical pin DIN7,  $\varnothing 4$  mm

MIL-connector version



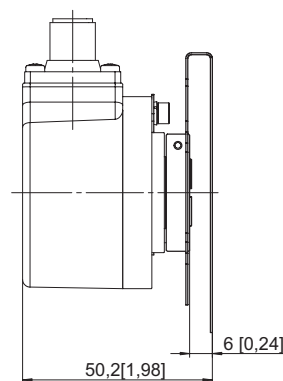
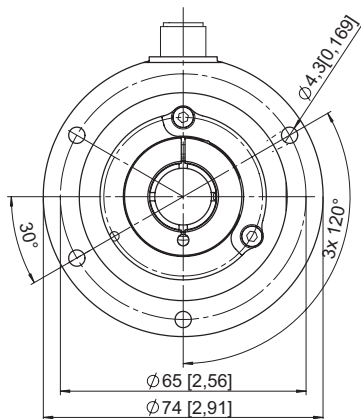
## Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!  
When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque stop slot or a stator coupling.



Flange with stator coupling  
Flange type 7 and 8

Pitch circle 65 mm

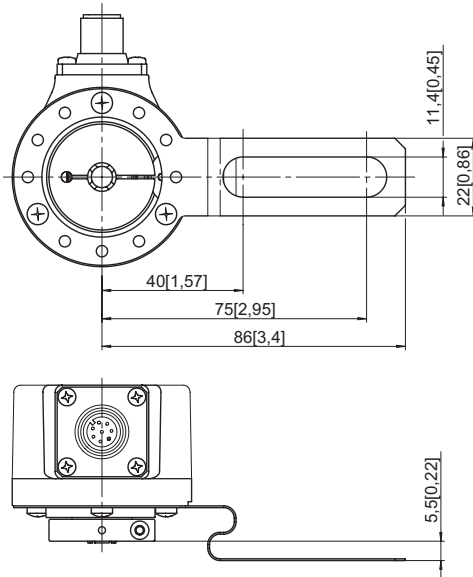


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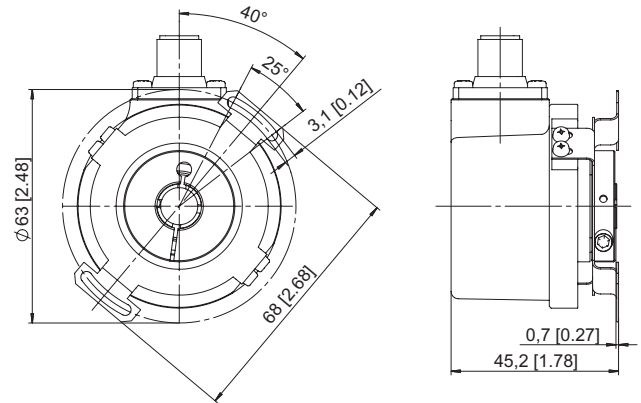
**Standard, optical**      **Sendix 5000 / 5020 (Shaft / Hollow shaft)**      **Push-Pull / RS422**

## Dimensions hollow shaft version

Flange with fastening arm, long  
Flange type 3 and 4

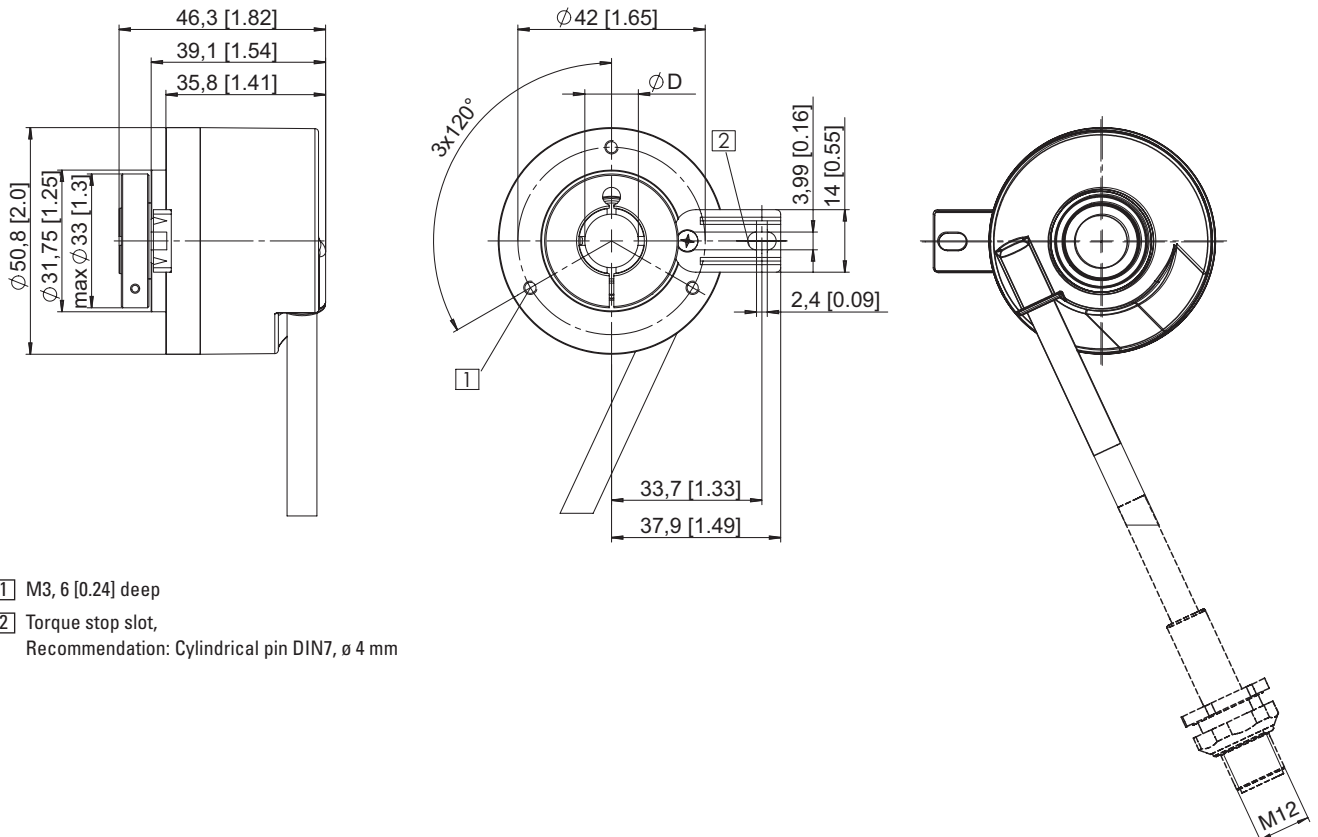


Flange with stator coupling, double-winged,  $\phi$  63 mm  
Flange type C and D



Incremental Encoders

Flange with long torque stop and tangential cable outlet  
Type of connection E



- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,  
Recommendation: Cylindrical pin DIN7,  $\phi$  4 mm