

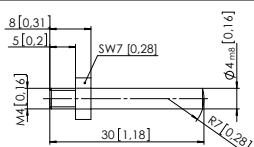


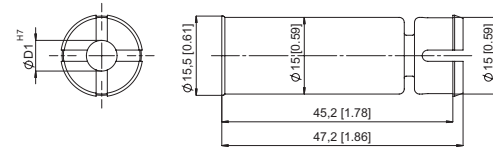

# Incremental Encoders

<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

<b>Order code</b> Hollow shaft	<b>8.5020</b> Type	. <b>XXXX</b> . <b>XXXX</b> 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>
<b>a Flange</b>	<b>c Output circuit / Power supply</b>	<b>e Pulse rate</b>	<b>10 By 10</b>
1 = with spring element long, IP67 <u>2 = with spring element long, IP65</u> 3 = with fastening arm long, IP67 4 = with fastening arm long, IP65 7 = with stator coupling, IP67 $\varnothing$ 65 mm [2.56"] <u>8 = with stator coupling, IP65 <math>\varnothing</math> 65 mm [2.56"]</u> C = with stator coupling, IP67 $\varnothing$ 63 mm [2.48"] <u>D = with stator coupling, IP65 <math>\varnothing</math> 63 mm [2.48"]</u>	<u>4 = RS422 (with inverted signal) / 5 V DC</u> 1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = Push-Pull (7272 compatible with inverted signal) / 5 ... 30 V DC <u>5 = Push-Pull (with inverted signal) / 10 ... 30 V DC</u>  3 = Open collector (with inverted signal) / 5 ... 30 V DC <sup>1)</sup> 8 = Push-Pull (7272 with inverted signal), without capacitor / 5 ... 30 V DC <sup>1)</sup>	1, 5, 10, 12, 36, 100, 200, 250, 256, <u>360, 400, 500, 512, 600, 800, 1000,</u> <u>1024, 1200, 2000, 2048, 2500, 3600,</u> <u>4096, 5000</u> (e.g. 100 pulses => 0100) Other pulse rates on request  <i>optional on request</i> - Ex 2/22 - seawater-resistant - special cable length  <i>Stock types</i> 8.5020.2351.1000    8.5020.8552.1024 8.5020.2351.2500    8.5020.8552.5000 8.5020.2551.0500	Incremental Encoders
<b>b Hollow shaft</b>	<b>d Type of connection</b>		
1 = $\varnothing$ 6 mm [0.24"]                      2 = $\varnothing$ 1/4" <u>9 = <math>\varnothing</math> 8 mm [0.32"]</u> 4 = $\varnothing$ 3/8" <u>3 = <math>\varnothing</math> 10 mm [0.39"]</u> 6 = $\varnothing$ 1/2" <u>5 = <math>\varnothing</math> 12 mm [0.47"]</u> 7 = $\varnothing$ 5/8" A = $\varnothing$ 14 mm [0.55"] <u>8 = <math>\varnothing</math> 15 mm [0.59"]</u>	<b>1</b> = radial cable, 1 m [3.28'] PVC cable <u><b>2</b> = M12 connector, 8-pin, radial</u> <u><b>4</b> = M23 connector, 12-pin, radial</u> 7 = MIL connector, 10-pin, radial <u><b>E</b> = tangential cable, 1 m [3.28'] PVC cable</u> H = tangential cable, 0.3 m [0.98'] PVC cable, including M12 connector for central fastening		

Mounting accessory for shaft encoders	Order No.
<b>Coupling</b>	
Bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 6 mm [0.24"]	<b>8.0000.1101.0606</b>
Bellows coupling $\varnothing$ 19 mm [0.75"] for shaft 10 mm [0.39"]	<b>8.0000.1101.1010</b>

Mounting accessory for hollow shaft encoders	Order No.
<b>Cylindrical pin, long</b> for torque stops	
	with fixing thread
	<b>8.0010.4700.0000</b>

Isolation / adapter inserts for hollow shaft encoders	D1	Isolation insert
<b>Thermal and electrical isolation of the encoders</b> (Temperature range -40 ... +115°C [-40°F ... +239°F]) 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.		
		6 mm [0.24"] <b>8.0010.4021.0000</b> 8 mm [0.32"] <b>8.0010.4020.0000</b> 10 mm [0.39"] <b>8.0010.4023.0000</b> 12 mm [0.47"] <b>8.0010.4025.0000</b> 1/4" <b>8.0010.4022.0000</b> 3/8" <b>8.0010.4024.0000</b> 1/2" <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 the encoder 8.5020.X8XX.XXXX.		

Connection technology		Order No.
<b>Connector, self-assembly (straight)</b>	M12 female connector with coupling nut	<b>05.CMB 8181-0</b>
	M23 female connector with coupling nut	<b>8.0000.5012.0000</b>
	MIL female connector with coupling nut, 10-pin	<b>8.0000.5062.0000</b>
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 2 m [6.56'] PVC cable	<b>05.00.6041.8211.002M</b>
	M23 female connector with coupling nut, 2 m [6.56'] PVC cable	<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)

1) US version

# Incremental Encoders

<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

## Technical data

Mechanical characteristics	
<b>Max. Speed</b>	IP65 12 000 min <sup>-1</sup> 6 000 min <sup>-1</sup> (continuous) IP67 6 000 min <sup>-1</sup> 3 000 min <sup>-1</sup> (continuous)
<b>Moment of inertia</b>	shaft version approx. 1.8 x 10 <sup>-6</sup> kgm <sup>2</sup> hollow shaft version approx. 6 x 10 <sup>-6</sup> kgm <sup>2</sup>
<b>Starting torque at 20°C [68°F]</b>	IP65 < 0.01 Nm IP67 < 0.05 Nm
<b>Shaft load capacity</b>	radial 80 N axial 40 N
<b>Weight</b>	approx. 0.4 kg [14.11 oz]
<b>Protection acc. to EN 60529</b>	without shaft seal IP65 with shaft seal IP67
<b>EX approval for hazardous areas</b>	optional Zone 2 and 22
<b>Working temperature range</b>	-40°C <sup>1)</sup> ... +85°C [-40°F <sup>1)</sup> ... +185°F]
<b>Material</b>	shaft stainless steel
<b>Shock resistance acc. to EN 60068-2-27</b>	2500 m/s <sup>2</sup> , 6 ms
<b>Vibration resistance acc. to EN 60068-2-6</b>	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)	Push-Pull (7272, without capacitor)	Open collector (7273)
Ordercode	1	4	5	2	8	3
<b>Power supply</b>	5 ... 30 V DC	5 V DC ±5%	10 ... 30 V DC	5 ... 30 V DC	5 ... 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	typ. 50 mA max. 100 mA	100 mA
<b>Permissible load / channel</b>	max. ±20 mA	max. ±20 mA	max. ±20 mA	max. ±20 mA	max. ±20 mA	20 mA sink at 30 V DC
<b>Pulse frequency</b>	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz <sup>2)</sup>	max. 300 kHz	max. 300 kHz
<b>Signal level</b>	HIGH min. 2.5 V LOW max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	min. +V - 2.0 V max. 0.5 V	min. +V - 2.0 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	max. 1 µs	
<b>Falling edge time t<sub>f</sub></b>	max. 200 ns	max. 200 ns	max. 1 µs	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	yes <sup>4)</sup>	yes
<b>Reverse polarity protection of the power supply</b>	yes	no	yes	no	no	no
<b>UL approval</b>	File 224618					
<b>CE compliant acc. to</b>	EMC guideline 2004/108/EC					
<b>RoHS compliant acc. to</b>	guideline 2011/65/EU					

1) With connector: -40°C [-40°F], cable fixed: -30°C [-22°F], cable moved: -20°C [-4°F]  
 2) Max. recommended cable length 30 m [98.43']  
 3) If supply voltage correctly applied  
 4) Only one channel allowed to be shorted-out:  
 If +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.  
 If +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

# Incremental Encoders

<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

## Terminal assignment

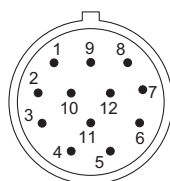
Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)												
1, 2, 3, 4, 5, 8	5000: 1, 2	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
	5020: 1, E	Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield	
1, 2, 3, 4, 5, 8	5000: 3, 4	M12 connector, 8-pin												
	5020: 2, H	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
1, 2, 3, 4, 5, 8	5000: 7, 8	M23 connector, 12-pin												
	5020: 4	Pin:	10	12	11	2	5	6	8	1	3	4	PH <sup>1)</sup>	
1, 2, 3, 4, 5, 8	5000: Y	MIL connector, 10-pin												
	5020: 7	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
1, 2, 3, 4, 5, 8	5000: W	MIL connector, 7-pin												
	5020: 7	Pin:	F	D		E	A		B		C		G	
1, 3, 4, 5, 8	5000: 9	MIL connector, 6-pin												
	5020: 9	Signal:	0 V	+V	0 Vsens	+Vsens	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$	$\perp$	
1, 3, 4, 5, 8	5000: 9	Pin:	A	B			E		D		C			

- +V: Encoder power supply +V DC
- 0 V: Encoder power supply ground GND (0 V)
- 0 Vsens / +Vsens: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
- A,  $\bar{A}$ : Incremental output channel A
- B,  $\bar{B}$ : Incremental output channel B
- 0,  $\bar{0}$ : Reference signal
- PH  $\perp$ : Plug connector housing (Shield)

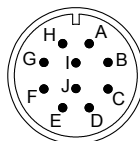
## Top view of mating side, male contact base



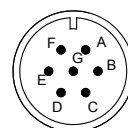
M12 connector, 8-pin



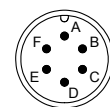
M23 connector, 12-pin



MIL connector, 10-pin



MIL connector, 7-pin



MIL connector, 6-pin

1) PH = Shield is attached to connector housing

# Incremental Encoders

**Standard  
Optical**

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

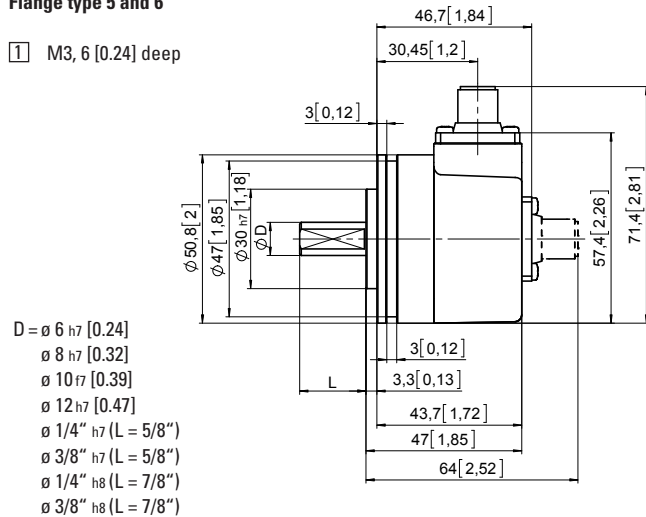
**Push-Pull / RS422**

## Dimensions shaft version

Dimensions in mm [inch]

### Synchro flange, $\varnothing 50.8$ [2] Flange type 5 and 6

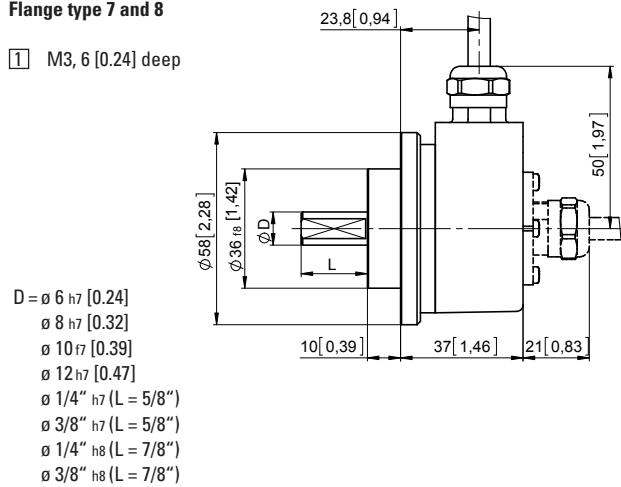
1 M3, 6 [0.24] deep



MIL-connector version

### Clamping flange, $\varnothing 58$ [2.28] Flange type 7 and 8

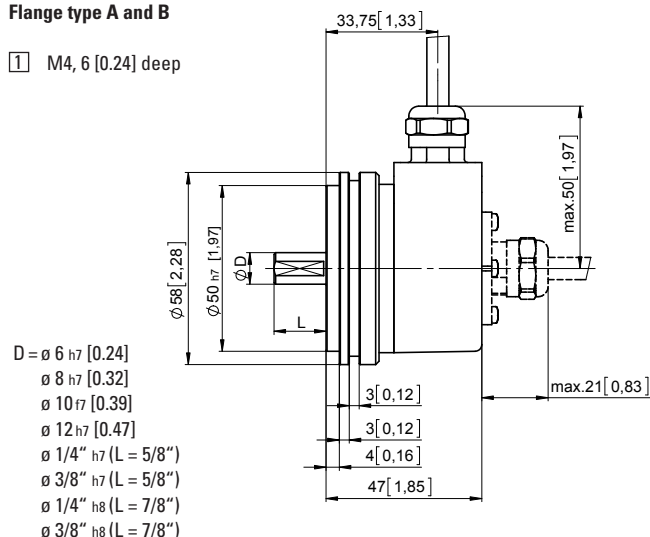
1 M3, 6 [0.24] deep



MIL-connector version

### Synchro flange, $\varnothing 58$ [2.28] Flange type A and B

1 M4, 6 [0.24] deep



MIL-connector version

# Incremental Encoders

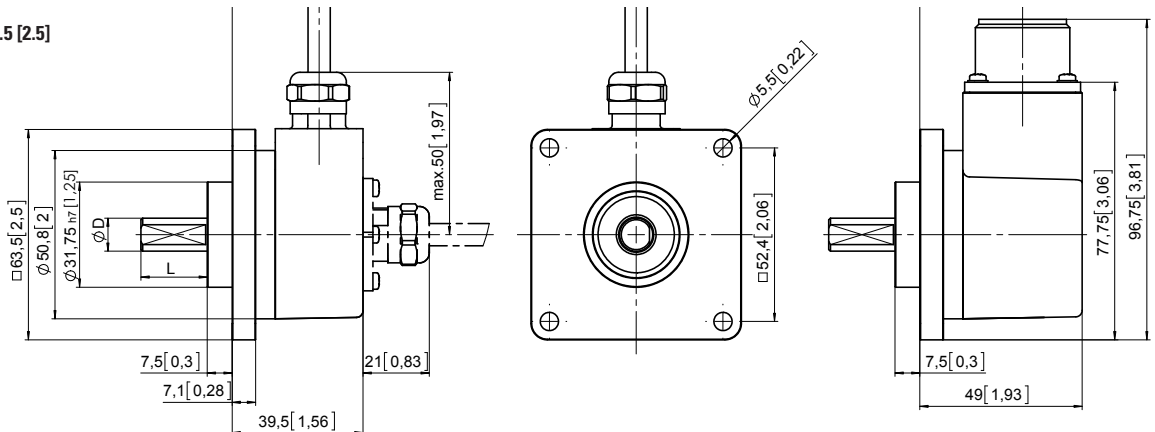
<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

## Dimensions shaft version

Dimensions in mm [inch]

**Square flange, □ 63.5 [2.5]**  
**Flange type C and D**

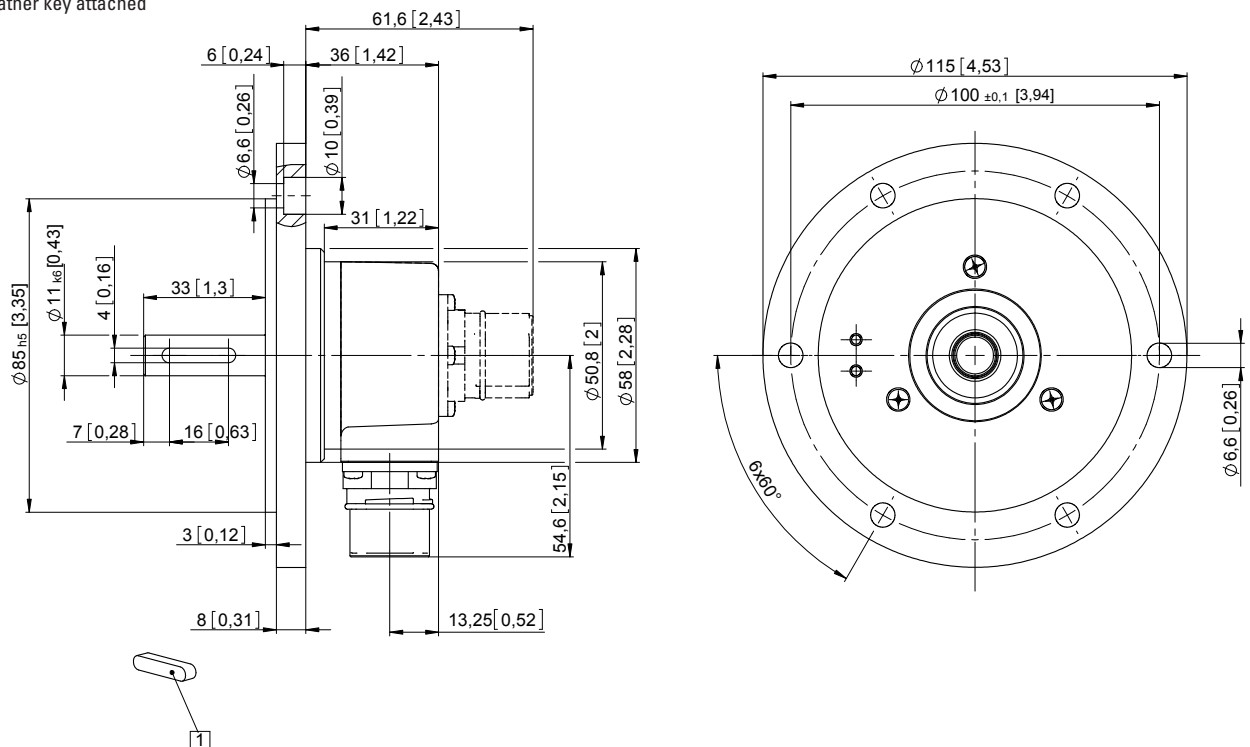
- D = ø 6 h7 [0.24]
- ø 8 h7 [0.32]
- ø 10 h7 [0.39]
- ø 12 h7 [0.47]
- ø 1/4" h7 (L = 5/8")
- ø 3/8" h7 (L = 5/8")
- ø 1/4" h8 (L = 7/8")
- ø 3/8" h8 (L = 7/8")



MIL-connector version

**Euro flange, ø 115 [4.53]**  
**Flange type G**

1 Feather key attached



# Incremental Encoders

**Standard  
Optical**

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

**Push-Pull / RS422**

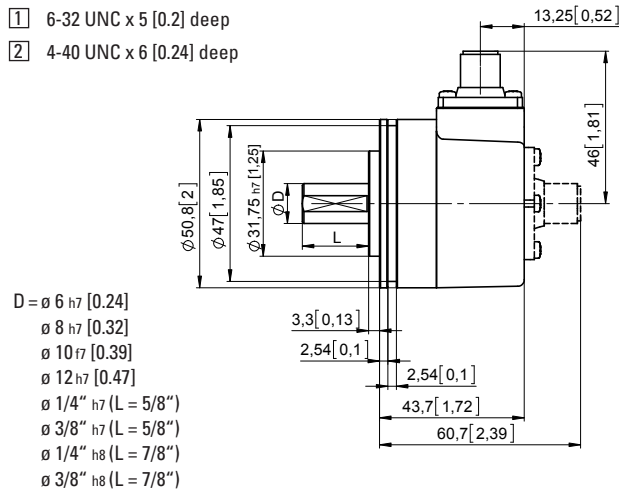
## Dimensions shaft version

Dimensions in mm [inch]

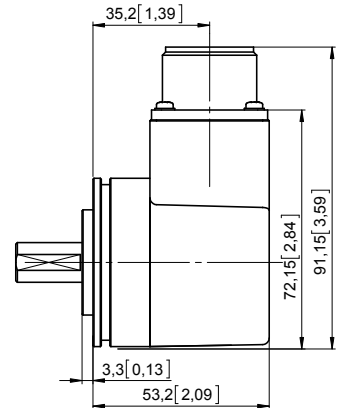
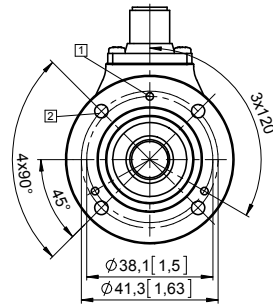
### Servo flange, $\varnothing$ 50.8 [2]

#### Flange type 1 and 2

- 1 6-32 UNC x 5 [0.2] deep
- 2 4-40 UNC x 6 [0.24] deep



- D =  $\varnothing$  6 h7 [0.24]
- $\varnothing$  8 h7 [0.32]
- $\varnothing$  10 f7 [0.39]
- $\varnothing$  12 h7 [0.47]
- $\varnothing$  1/4" h7 (L = 5/8")
- $\varnothing$  3/8" h7 (L = 5/8")
- $\varnothing$  1/4" h8 (L = 7/8")
- $\varnothing$  3/8" h8 (L = 7/8")

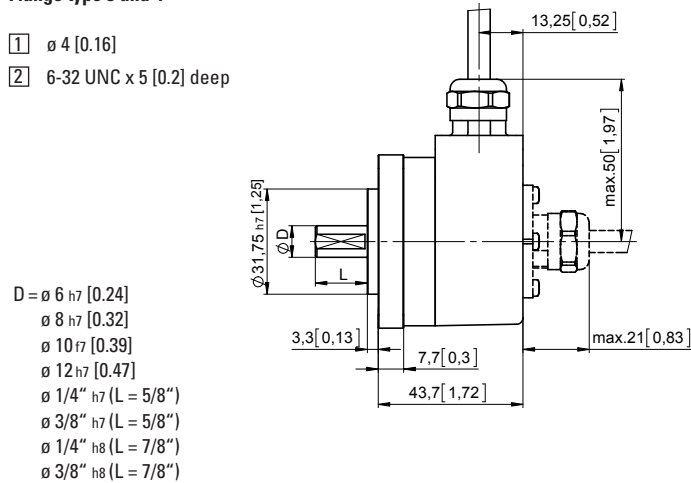


MIL-connector version

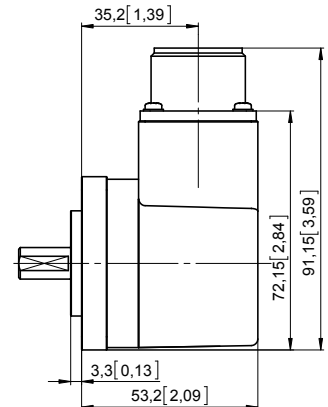
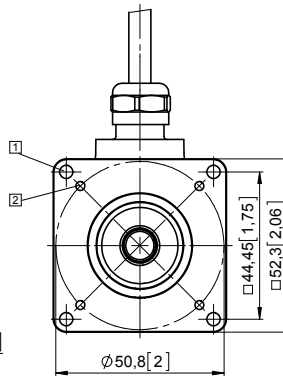
### Square flange, $\square$ 50.8 [2]

#### Flange type 3 and 4

- 1  $\varnothing$  4 [0.16]
- 2 6-32 UNC x 5 [0.2] deep



- D =  $\varnothing$  6 h7 [0.24]
- $\varnothing$  8 h7 [0.32]
- $\varnothing$  10 f7 [0.39]
- $\varnothing$  12 h7 [0.47]
- $\varnothing$  1/4" h7 (L = 5/8")
- $\varnothing$  3/8" h7 (L = 5/8")
- $\varnothing$  1/4" h8 (L = 7/8")
- $\varnothing$  3/8" h8 (L = 7/8")

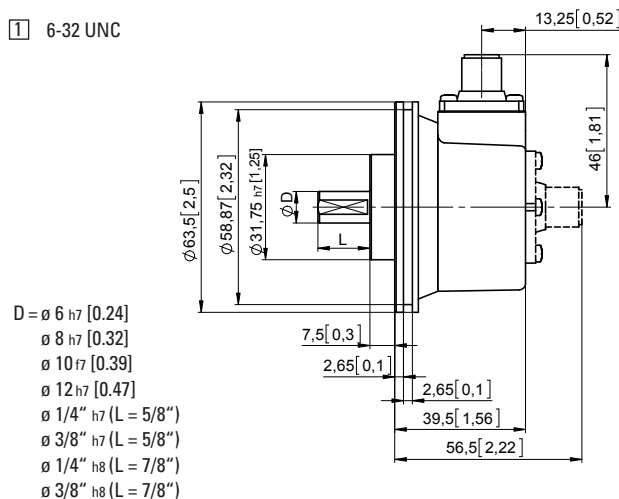


MIL-connector version

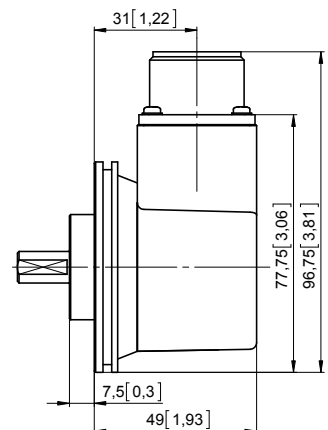
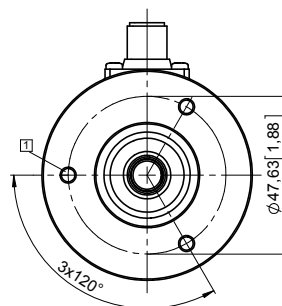
### Servo flange, $\varnothing$ 63.5 [2.5]

#### Flange type E and F

- 1 6-32 UNC



- D =  $\varnothing$  6 h7 [0.24]
- $\varnothing$  8 h7 [0.32]
- $\varnothing$  10 f7 [0.39]
- $\varnothing$  12 h7 [0.47]
- $\varnothing$  1/4" h7 (L = 5/8")
- $\varnothing$  3/8" h7 (L = 5/8")
- $\varnothing$  1/4" h8 (L = 7/8")
- $\varnothing$  3/8" h8 (L = 7/8")



MIL-connector version

# Incremental Encoders

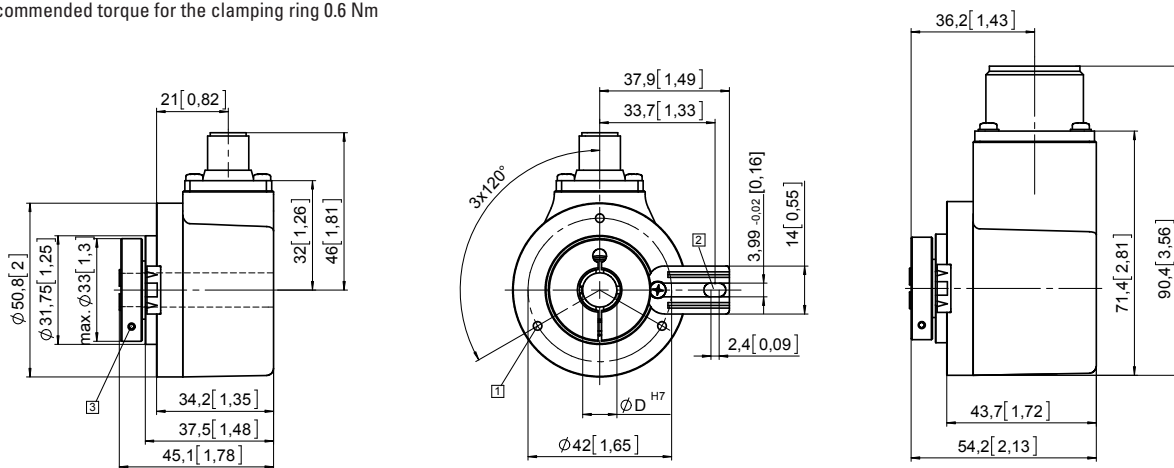
<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

## Dimensions hollow shaft version

Dimensions in mm [inch]

### Flange with spring element long Flange type 1 and 2

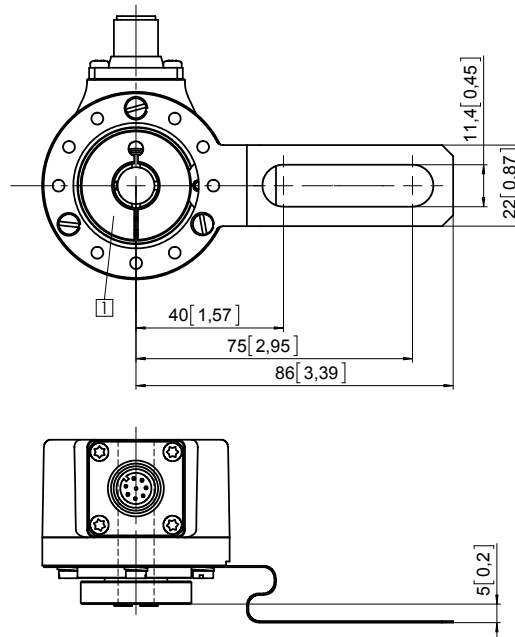
- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,  
Recommendation: Cylindrical pin DIN7, 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm



MIL-connector version

### Flange with fastening arm long Flange type 3 and 4

- 1 Recommended torque for the clamping ring 0.6 Nm





# Incremental Encoders

**Standard  
Optical**

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

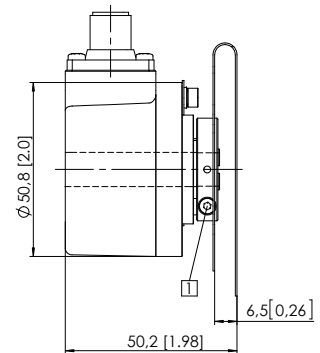
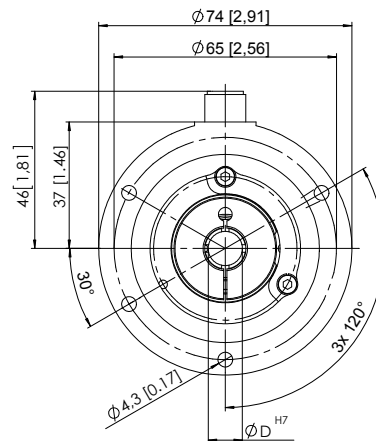
**Push-Pull / RS422**

## Dimensions hollow shaft version

Dimensions in mm [inch]

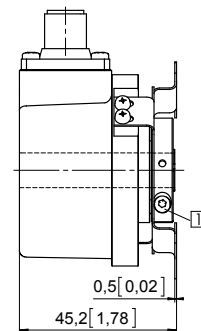
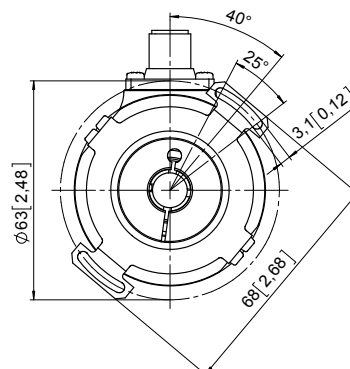
**Flange with stator coupling,  $\varnothing$  65 [2.56]**  
**Flange type 7 and 8**

1 Recommended torque for the clamping ring 0.6 Nm



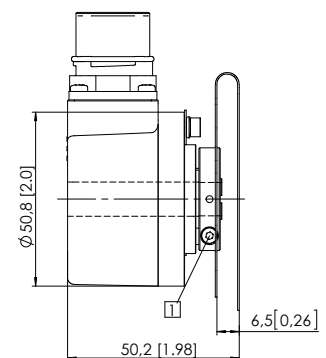
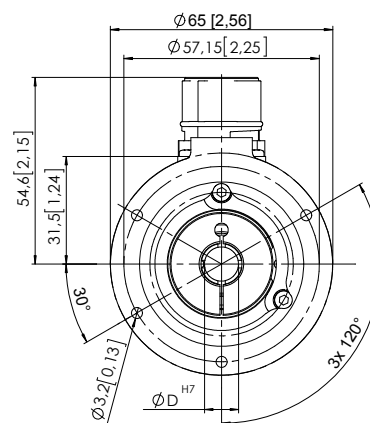
**Flange with stator coupling,  $\varnothing$  63 [2.48]**  
**Flange type C and D**

1 Recommended torque for the clamping ring 0.6 Nm



**Flange with stator coupling,  $\varnothing$  57.2 [2.25]**  
**Flange type 5 and 6**

1 Recommended torque for the clamping ring 0.6 Nm



# Incremental Encoders

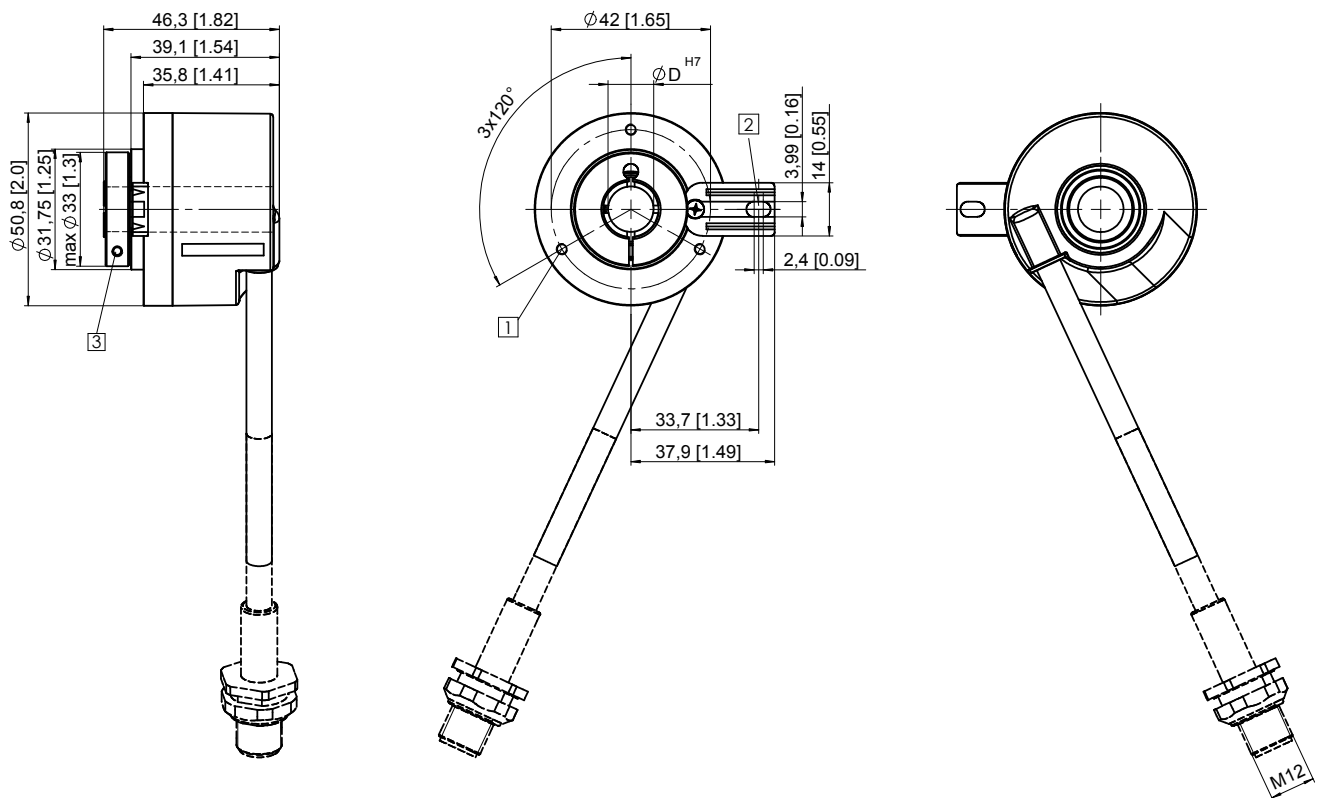
<b>Standard Optical</b>	<b>Sendix 5000 / 5020 (Shaft / Hollow shaft)</b>	<b>Push-Pull / RS422</b>
-------------------------	--	--------------------------

## Dimensions hollow shaft version

Dimensions in mm [inch]

**Flange with spring element long and tangential cable outlet**  
**Type of connection E and H**

- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,  
Recommendation: Cylindrical pin DIN7, 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm



Incremental Encoders