

Incremental encoders

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.



Safety-Lock™	High rotational speed	Temperature range	High protection level	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Surface protection salt spray-tested optional

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.

Many variants

- Suitable connection variant for every specific case: cable connection, M12, M23 and MIL 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

8.5000

Type

. X X X X . XXXX

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, IP67 \varnothing 50.8 mm [2"]
 - 6 = synchro flange, IP65 \varnothing 50.8 mm [2"]
 - 7 = clamping flange, IP67 \varnothing 58 mm [2.28"]
 - 8 = clamping flange, IP65 \varnothing 58 mm [2.28"]**
 - A = synchro flange, IP67 \varnothing 58 mm [2.28"]
 - B = synchro flange, IP65 \varnothing 58 mm [2.28"]**
 - C = square flange, IP67 \square 63.5 mm [2.5"]
 - D = square flange, IP65 \square 63.5 mm [2.5"]
 - G = euro flange, IP67 \varnothing 115 mm [4.53"]²⁾
-
- 1 = servo flange, IP67 \varnothing 50.8 mm [2"]¹⁾
 - 2 = servo flange, IP65 \varnothing 50.8 mm [2"]¹⁾
 - 3 = square flange, IP67 \square 50.8 mm [2"]¹⁾
 - 4 = square flange, IP65 \square 50.8 mm [2"]¹⁾
 - E = servo flange, IP67 \varnothing 63.5 mm [2.5"]¹⁾
 - F = servo flange, IP65 \varnothing 63.5 mm [2.5"]¹⁾

b Shaft (\varnothing x L), with flut

- 1 = \varnothing 6 x 10 mm [0.24 x 0.39"]** 2 = \varnothing 1/4 x 5/8"
- 6 = \varnothing 8 x 15 mm [0.32 x 0.59"] 4 = \varnothing 3/8 x 5/8"
- 3 = \varnothing 10 x 20 mm [0.39 x 0.79"]**
- B = \varnothing 11 x 33 mm [0.43 x 1.30"]³⁾
with feather key shaft slot³⁾
- 5 = \varnothing 12 x 20 mm [0.47 x 0.79"]
- 7 = \varnothing 1/4 x 7/8"¹⁾
- 8 = \varnothing 3/8 x 7/8"¹⁾

c Output circuit / power supply

- 4 = RS422 (with inverted signal) / 5 V DC**
- 1 = RS422 (with inverted signal) / 5 ... 30 V DC
- 2 = Push-Pull (7272 compatible with inverted signal) / 5 ... 30 V DC
- 5 = Push-Pull (with inverted signal) / 10 ... 30 V DC**
- 3 = Open collector (with inverted signal) / 5 ... 30 V DC¹⁾
- 8 = Push-Pull (7272 with inverted signal), without capacitor / 5 ... 30 V DC¹⁾

d Type of connection

- 1 = axial cable, 1 m [3.28'] PVC
 - A = axial cable, special length PVC *)
 - 2 = radial cable, 1 m [3.28'] PVC**
 - B = radial cable, special length PVC *)
 - 3 = axial M12 connector, 8-pin
 - 4 = radial M12 connector, 8-pin**
 - 7 = axial M23 connector, 12-pin
 - 8 = radial M23 connector, 12-pin**
 - Y = radial MIL connector, 10-pin
 - W = radial MIL connector, 7-pin
 - 9 = radial MIL connector, 6-pin¹⁾
- *) Available special lengths (connection types A, B):
2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5000.814A.1024.0030 (for cable length 3 m)

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)
- Stock types*
- 8.5000.8354.1024
 - 8.5000.8354.5000
 - 8.5000.8358.0200
 - 8.5000.8358.0360
 - 8.5000.8358.0500
 - 8.5000.8358.1000
 - 8.5000.8358.5000
 - 8.5000.B157.1024
- Optional on request*
- other pulse rates
 - Ex 2/22
 - surface protection salt spray tested

1) US version.

2) Only in conjunction with shaft type B.

3) Only in conjunction with flange type G.

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
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Order code	8.5020	.XXXXX	.XXXX	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.
Hollow shaft	Type	a	b	c
<p>a Flange</p> <p>1 = with spring element, long, IP67</p> <p><u>2 = with spring element, long, IP65</u></p> <p>3 = with fastening arm, long, IP67</p> <p>4 = with fastening arm, long, IP65</p> <p>7 = with stator coupling, IP67 \varnothing 65 mm [2.56"]</p> <p><u>8 = with stator coupling, IP65 \varnothing 65 mm [2.56"]</u></p> <p>C = with stator coupling, IP67 \varnothing 63 mm [2.48"]</p> <p><u>D = with stator coupling, IP65 \varnothing 63 mm [2.48"]</u></p> <p>5 = with stator coupling, IP67 \varnothing 57.2 mm [2.25"]¹⁾</p> <p>6 = with stator coupling, IP65 \varnothing 57.2 mm [2.25"]¹⁾</p> <p>b Hollow shaft</p> <p>1 = \varnothing 6 mm [0.24"]</p> <p>2 = \varnothing 1/4"</p> <p><u>9 = \varnothing 8 mm [0.32"]</u></p> <p>4 = \varnothing 3/8"</p> <p><u>3 = \varnothing 10 mm [0.39"]</u></p> <p>6 = \varnothing 1/2"</p> <p><u>5 = \varnothing 12 mm [0.47"]</u></p> <p>7 = \varnothing 5/8"</p> <p>A = \varnothing 14 mm [0.55"]</p> <p><u>8 = \varnothing 15 mm [0.59"]</u></p>	<p>c Output circuit / power supply</p> <p><u>4 = RS422 (with inverted signal) / 5 V DC</u></p> <p>1 = RS422 (with inverted signal) / 5 ... 30 V DC</p> <p>2 = Push-Pull (7272 compatible with inverted signal) / 5 ... 30 V DC</p> <p><u>5 = Push-Pull (with inverted signal) / 10 ... 30 V DC</u></p> <p>3 = open collector (with inverted signal) / 5 ... 30 V DC¹⁾</p> <p>8 = Push-Pull (7272 with inverted signal), without capacitor / 5 ... 30 V DC¹⁾</p> <p>d Type of connection</p> <p>1 = radial cable, 1 m [3.28'] PVC</p> <p>A = radial cable, special length PVC *)</p> <p><u>2 = radial M12 connector, 8-pin</u></p> <p><u>4 = radial M23 connector, 12-pin</u></p> <p>7 = radial MIL connector, 10-pin</p> <p><u>E = tangential cable, 1 m [3.28'] PVC</u></p> <p>F = tangential cable, special length PVC *)</p> <p>H = tangential cable, 0.3 m [0.98'] PVC, including M12 connector for central fastening</p> <p>*) Available special lengths (connection types A, F): 2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5020.234A.1024.0030 (for cable length 3 m)</p>	<p>e Pulse rate</p> <p>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)</p> <p>Stock types</p> <p>8.5020.2351.1000</p> <p>8.5020.2351.2500</p> <p>8.5020.8552.1024</p> <p>Optional on request</p> <ul style="list-style-type: none"> - other pulse rates - Ex 2/22 (not for type of connection E, F, H) - surface protection salt spray tested 		

Mounting accessory for shaft encoders	Order no.
Coupling	
bellows coupling \varnothing 19 mm [0.75"] for shaft 6 mm [0.24"]	8.0000.1102.0606
bellows coupling \varnothing 19 mm [0.75"] for shaft 10 mm [0.39"]	8.0000.1102.1010

Mounting accessory for hollow shaft encoders	Order no.
Cylindrical pin, long	
with fixing thread	8.0010.4700.0000
for torque stops	

Isolation / adapter inserts for hollow shaft encoders	D1	Isolation insert
<p>Thermal and electrical isolation of the encoders (Temperature range -40 ... +115°C [-40°F ... +239°F])</p> <p>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> <div style="display: flex; align-items: center;"> <div style="margin-left: 20px;"> <p>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.</p> </div> </div>	6 mm [0.24"]	8.0010.4021.0000
	8 mm [0.32"]	8.0010.4020.0000
	10 mm [0.39"]	8.0010.4023.0000
	12 mm [0.47"]	8.0010.4025.0000
	1/4"	8.0010.4022.0000
	3/8"	8.0010.4024.0000
1/2"	8.0010.4026.0000	

1) US version.

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
Connection technology		Order no.
Connector, self-assembly (straight)	M12 female connector with coupling nut	05.CMB 8181-0
	M23 female connector with coupling nut	8.0000.5012.0000
	MIL female connector with coupling nut, 10-pin	8.0000.5062.0000
Cordset, pre-assembled	M12 female connector with coupling nut, 2 m [6.56'] PVC cable	05.00.6041.8211.002M
	M23 female connector with coupling nut, 2 m [6.56'] PVC cable	8.0000.6201.0002

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.

Technical data	
Mechanical characteristics	
Maximum speed	IP65 12000 min ⁻¹ 6000 min ⁻¹ (continuous) IP67 6000 min ⁻¹ 3000 min ⁻¹ (continuous)
Mass moment of inertia	shaft version approx. 1.8 x 10 ⁻⁶ kgm ² hollow shaft version approx. 6 x 10 ⁻⁶ kgm ²
Starting torque at 20°C [68°F]	IP65 < 0.01 Nm IP67 < 0.05 Nm
Shaft load capacity	radial 80 N axial 40 N
Weight	approx. 0.4 kg [14.11 oz]
Protection	acc. to EN 60529 without shaft seal IP65 with shaft seal IP67
Working temperature range	-40°C ¹⁾ ... +85°C [-40°F ¹⁾ ... +185°F]
Material	shaft stainless steel
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 , 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
Power supply	5 ... 30 V DC	5 V DC (±5 %)	10 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)	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
Permissible load / channel	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	max. +/- 20 mA	+/- 20 mA sink at 30 V DC
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ²⁾	max. 300 kHz	max. 300 kHz
Signal level	HIGH min. 2.5 V LOW max. 0.5 V	min. 2.5 V max. 0.5 V	min +V - 1.0 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
Rising edge time t_r	max. 200 ns	max. 200 ns	max. 1 μs	max. 1 μs	max. 1 μs	max. 1 μs
Falling edge time t_f	max. 200 ns	max. 200 ns	max. 1 μs	max. 1 μs	max. 1 μs	max. 1 μs
Short circuit proof outputs³⁾	yes ⁴⁾	yes ⁴⁾	yes	yes	yes ⁴⁾	yes
Reverse polarity protection of the power supply	yes	no	yes	no	no	no
UL approval	file 224618					
CE compliant acc. to	EMC guideline 2004/108/EC RoHS 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 power supply correctly applied.
4) Only one channel allowed to be shorted-out:
at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.
at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

Push-Pull / RS422

Terminal assignment

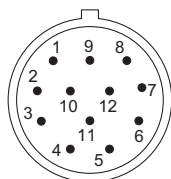
Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)												
1, 2, 3, 4, 5, 8	5000: 1, 2, A, B	Signal:	0 V	+V	0 Vsens	+Vsens	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	\perp	
	5020: 1, A, E, F	Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield	
1, 2, 3, 4,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

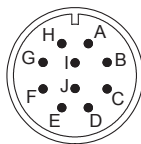
Top view of mating side, male contact base



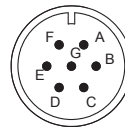
M12 connector, 8-pin



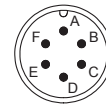
M23 connector, 12-pin



MIL connector, 10-pin



MIL connector, 7-pin



MIL connector, 6-pin

1) PH = shield is attached to connector housing.
2) With type of connection H shield is not attached to connector housing.

Incremental encoders

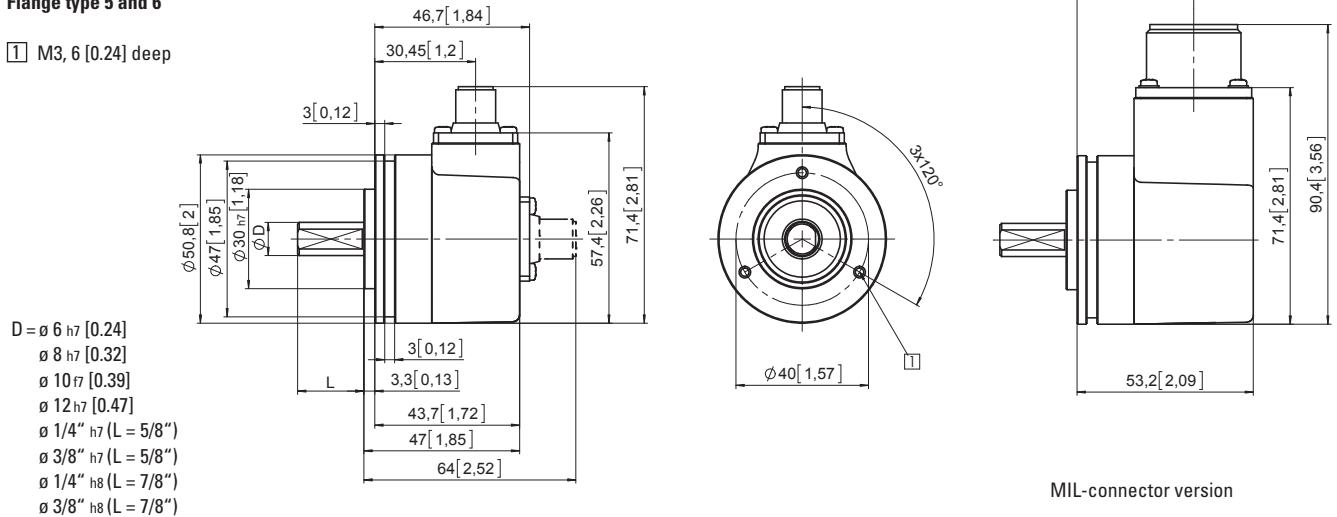
Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
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Dimensions shaft version

Dimensions in mm [inch]

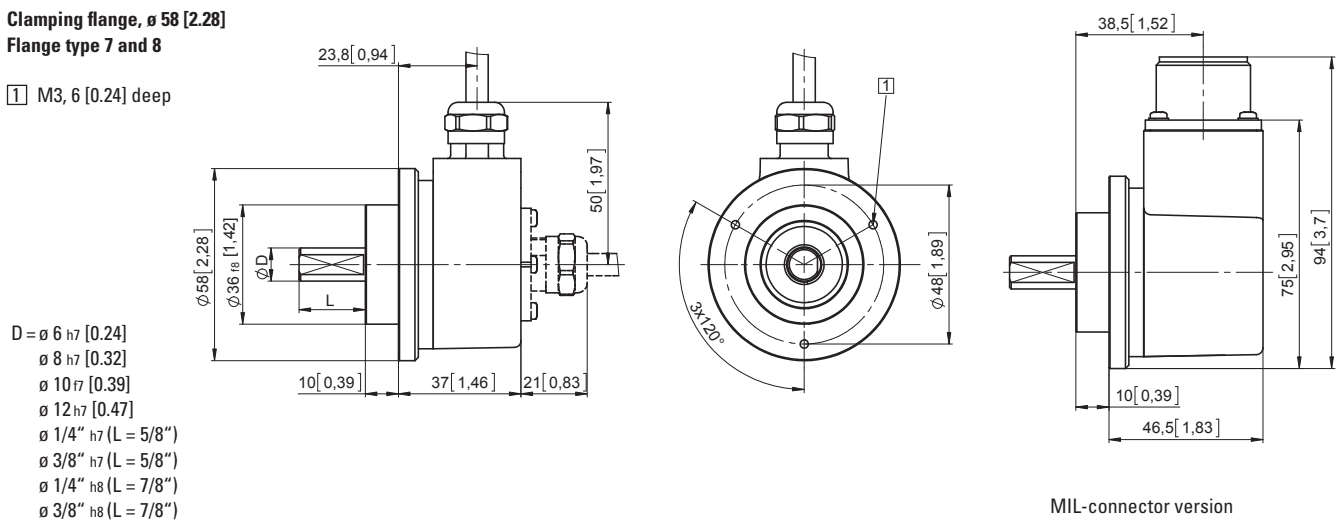
Synchro flange, $\varnothing 50.8$ [2] Flange type 5 and 6

1 M3, 6 [0.24] deep



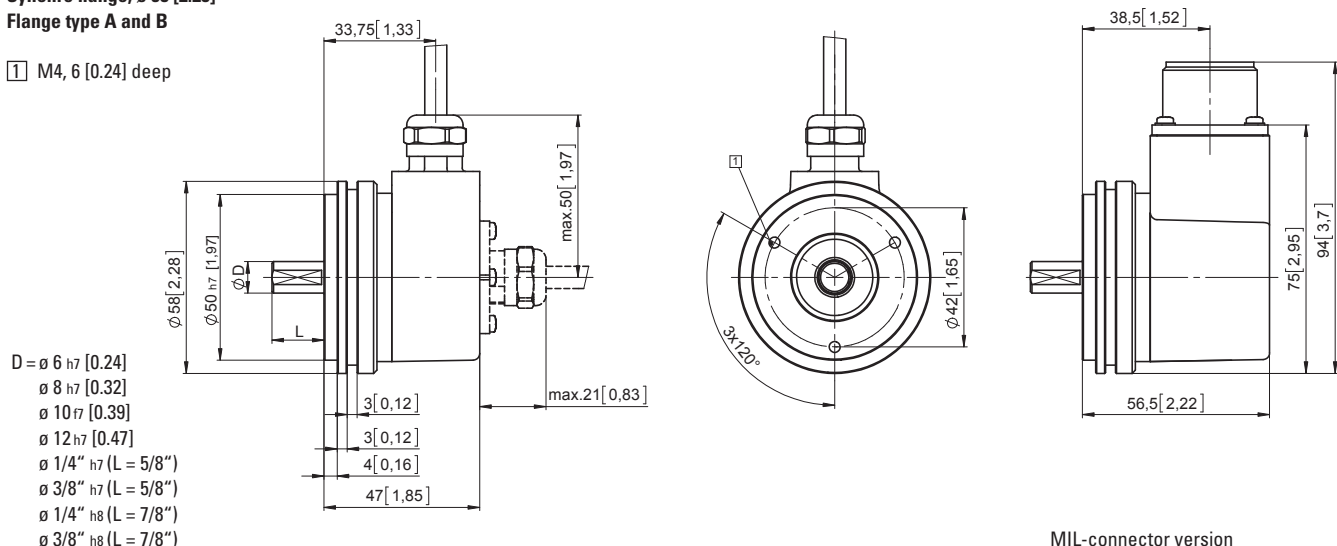
Clamping flange, $\varnothing 58$ [2.28] Flange type 7 and 8

1 M3, 6 [0.24] deep



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

1 M4, 6 [0.24] deep



Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

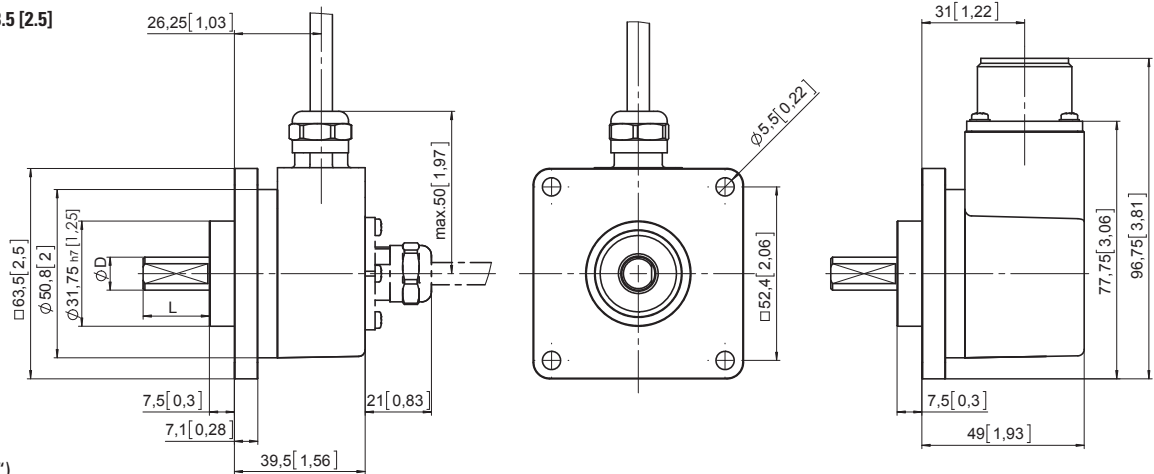
Push-Pull / RS422

Dimensions shaft version

Dimensions in mm [inch]

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

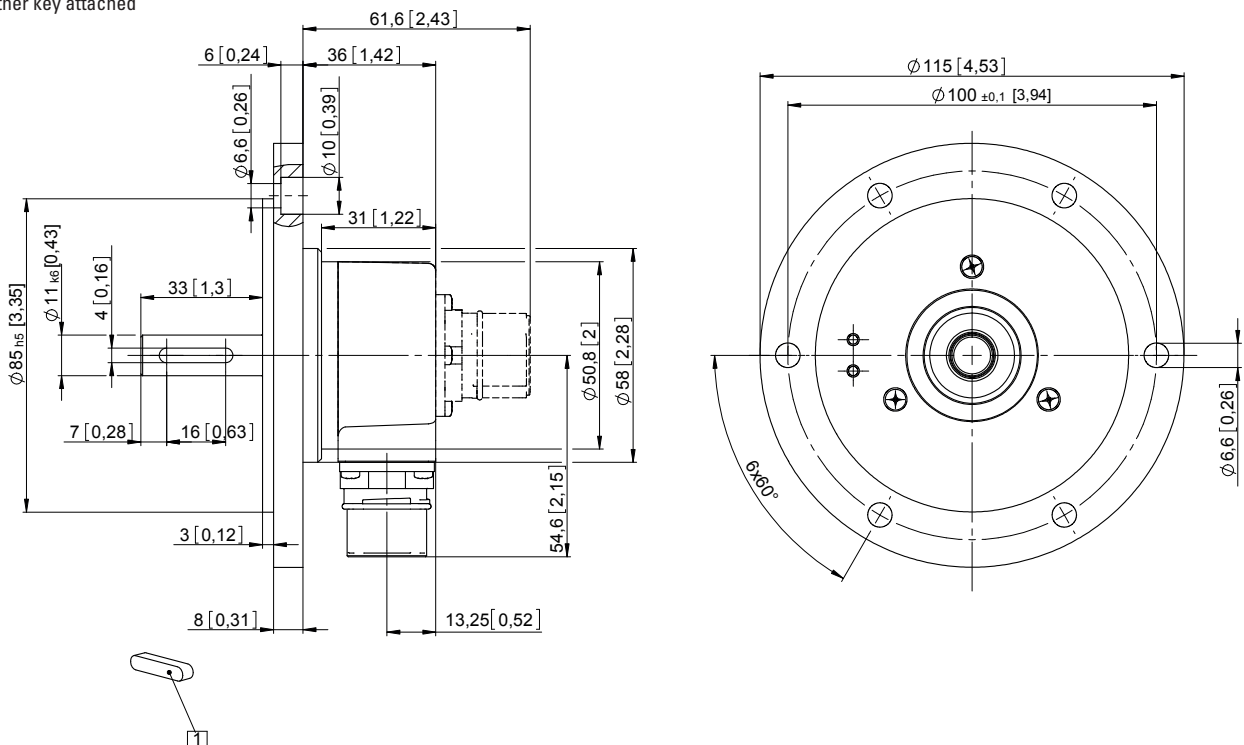
- D = \varnothing 6 h7 [0.24]
- \varnothing 8 h7 [0.32]
- \varnothing 10 h7 [0.39]
- \varnothing 12 h7 [0.47]
- \varnothing 1/4" h7 (L = 5/8")
- \varnothing 3/8" h7 (L = 5/8")
- \varnothing 1/4" h8 (L = 7/8")
- \varnothing 3/8" h8 (L = 7/8")



MIL-connector version

Euro flange, \varnothing 115 [4.53]
Flange type G

1 Feather key attached



Incremental encoders

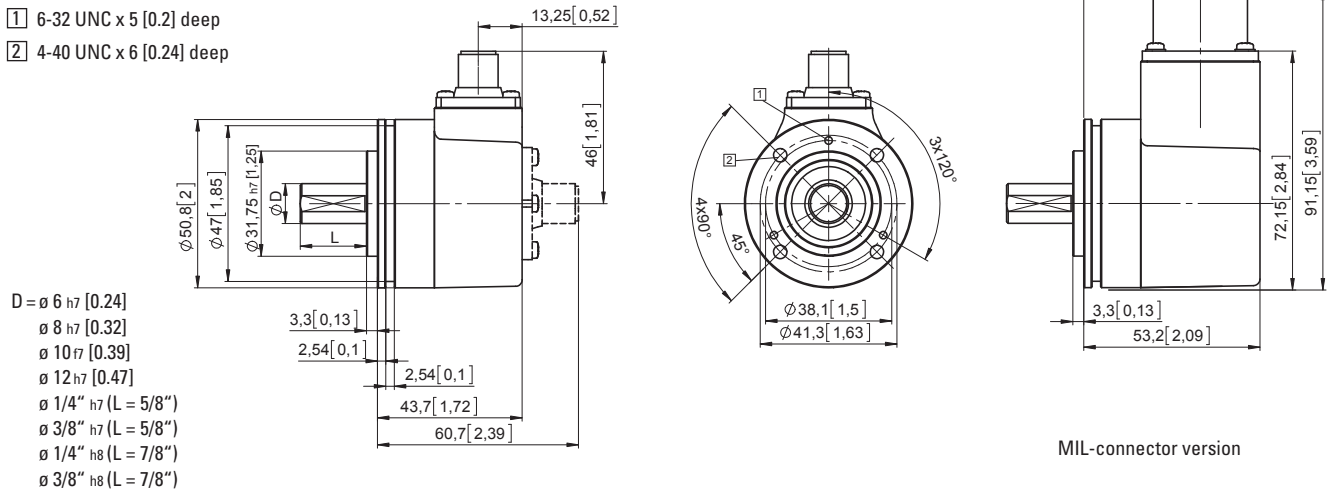
Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
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Dimensions shaft version

Dimensions in mm [inch]

Servo flange, $\varnothing 50.8$ [2] Flange type 1 and 2

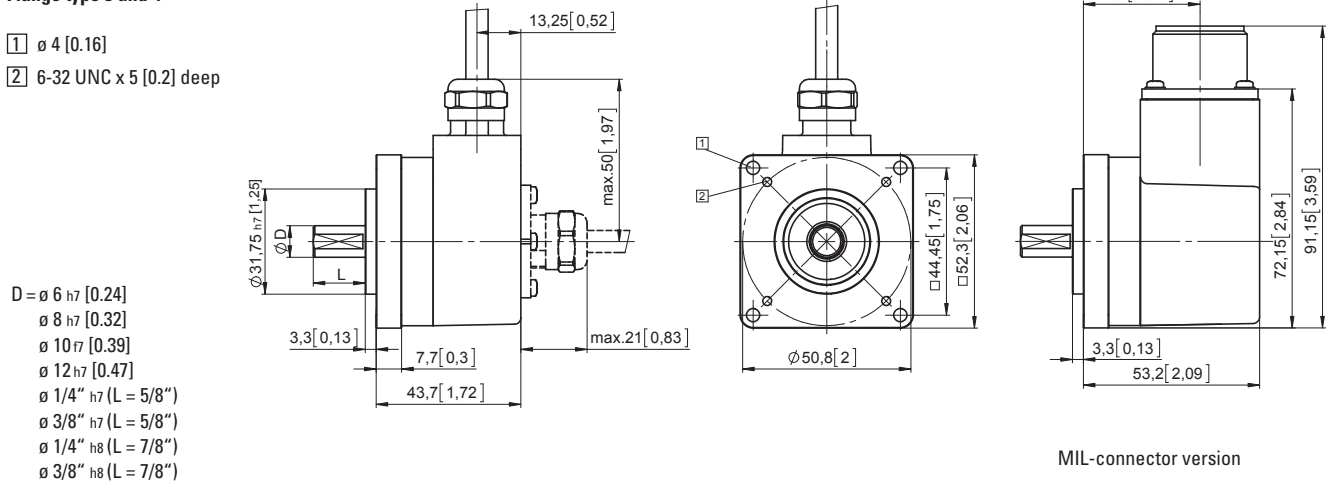
- 1 6-32 UNC x 5 [0.2] deep
- 2 4-40 UNC x 6 [0.24] deep



- D = $\varnothing 6$ h7 [0.24]
- $\varnothing 8$ h7 [0.32]
- $\varnothing 10$ r7 [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")

Square flange, $\square 50.8$ [2] Flange type 3 and 4

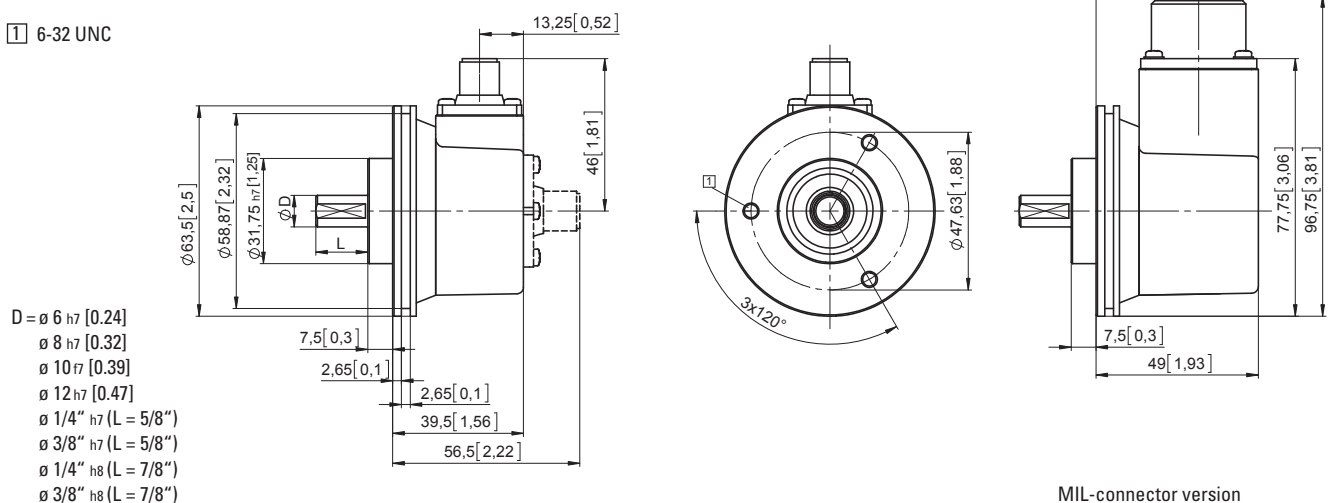
- 1 $\varnothing 4$ [0.16]
- 2 6-32 UNC x 5 [0.2] deep



- D = $\varnothing 6$ h7 [0.24]
- $\varnothing 8$ h7 [0.32]
- $\varnothing 10$ r7 [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")

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]
- $\varnothing 10$ r7 [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")

Incremental encoders

Standard optical

Sendix 5000 / 5020 (shaft / hollow shaft)

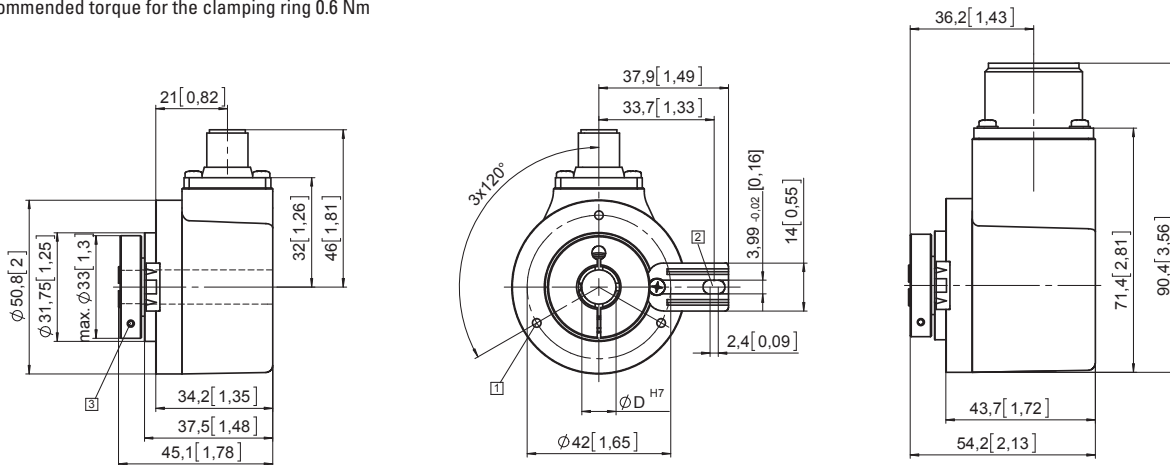
Push-Pull / RS422

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long Flange type 1 and 2

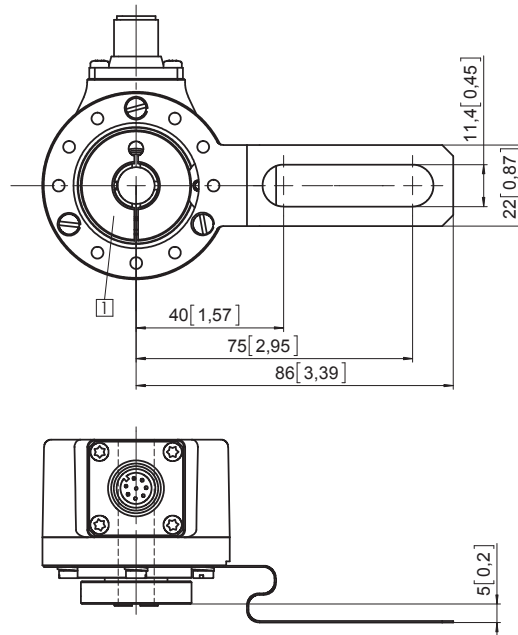
- 1 M3, 6 [0.24] deep
- 2 Torque stop slot, recommendation: cylindrical pin DIN7, 4 [0.16]
- 3 Recommended torque for the clamping ring 0.6 Nm



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

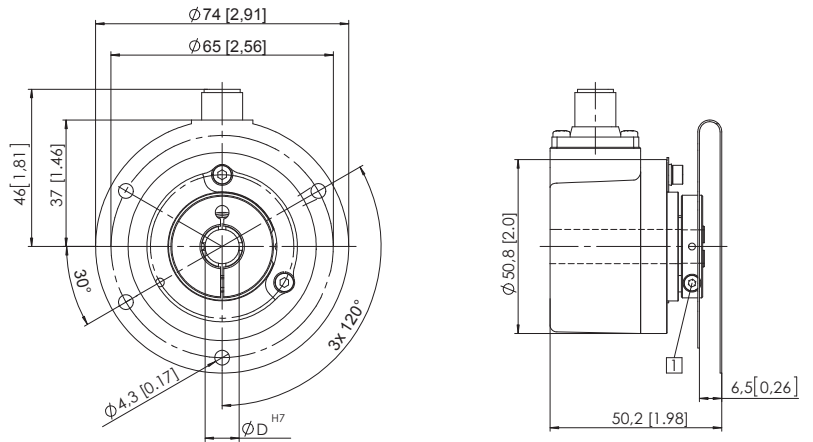
Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
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Dimensions hollow shaft version

Dimensions in mm [inch]

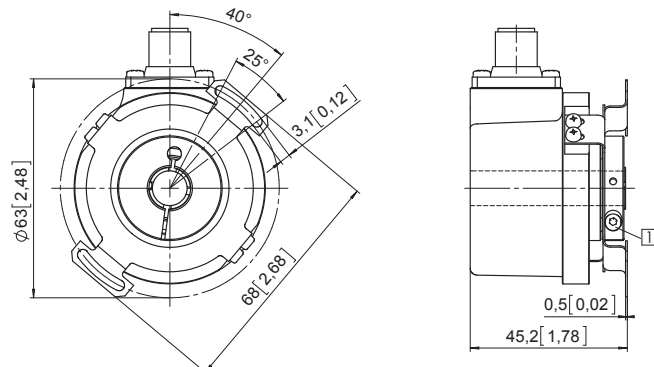
Flange with stator coupling, \varnothing 65 [2.56] Flange type 7 and 8

1 Recommended torque for the clamping ring 0.6 Nm



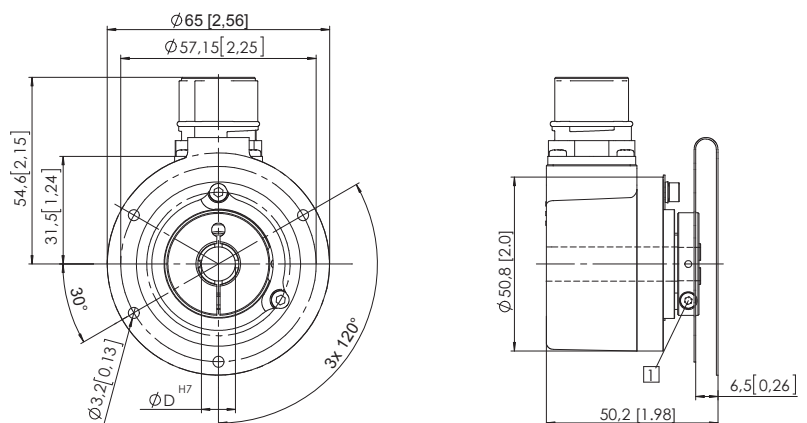
Flange with stator coupling, \varnothing 63 [2.48] Flange type C and D

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

Incremental encoders

Standard optical	Sendix 5000 / 5020 (shaft / hollow shaft)	Push-Pull / RS422
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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

