

Incremental encoders

Miniature optical	2400 / 2420 (shaft / hollow shaft)	Push-pull, RS422
-------------------	------------------------------------	------------------



The incremental miniature encoders type 2400 / 2420 with their optical sensor technology offer a resolution of up to 1024 pulses per revolution.

With a diameter of just 24 mm this encoder is ideal for use where space is tight.



Reliable

- Robust bearing construction.
- Cable outlet boasts high degree of strain relief thanks to multiple clamping.
- Short-circuit proof outputs.

Versatile

- Ideally suited for use in small devices.

Order code

Shaft version

05.2400

Type

. XXXXX . 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

- 1 = ø 24 mm [0.94"]**
 3 = ø 28 mm [1.10"]
 2 = ø 30 mm [1.18"]

b Shaft (ø x L)

- 1 = ø 4 x 10 mm [0.16 x 0.39"]**
 3 = ø 5 x 10 mm [0.20 x 0.39"], with flat¹⁾
 2 = ø 6 x 10 mm [0.24 x 0.39"]
- 4 = ø 1/4" x 10 mm [1/4" x 0.39"], with flat¹⁾
 6 = ø 6 x 10 mm [0.24 x 0.39"], with flat¹⁾

c Output circuit / supply voltage

- 1 = push-pull (without inverted signal) / 5 ... 24 V DC
2 = push-pull (with inverted signal) / 5 ... 24 V DC
 3 = push-pull (without inverted signal) / 8 ... 30 V DC
 4 = push-pull (with inverted signal) / 8 ... 30 V DC
 6 = RS422 (with inverted signal) / 5 V DC

d Type of connection

- 1 = axial cable, 2 m [6.56'] PVC
 A = axial cable, special length PVC *)
2 = radial cable, 2 m [6.56'] PVC
 B = radial cable, special length PVC *)

*) Available special lengths (connection types A, B):
 3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21']
 order code expansion .XXXX = length in dm
 ex.: 05.2400.122A.1024.0030 (for cable length 3 m)

e Pulse rate

- 4, 6, 8, 10, 16, 20, 25, 36, 40, 50, 60,
 80, **100**, 120, 125, 180, **200**, 250, 300,
360, 400, **500**, 512, **1000**, **1024**
 (e.g. 360 pulses => 0360)

Optional on request
 - other pulse rates

Incremental encoders

Miniature optical	2400 / 2420 (shaft / hollow shaft)	Push-pull, RS422
--------------------------	---	-------------------------

Order code	05.2420	1XXXX.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 d e		
a Flange <u>1 = ø 24 mm [0.94"]</u>	c Output circuit / supply voltage 1 = push-pull (without inverted signal) / 5 ... 24 V DC <u>2 = push-pull (with inverted signal) / 5 ... 24 V DC</u> 3 = push-pull (without inverted signal) / 8 ... 30 V DC 4 = push-pull (with inverted signal) / 8 ... 30 V DC 6 = RS422 (with inverted signal) / 5 V DC		e Pulse rate 4, 6, 8, 10, 16, 20, 25, 36, 40, 50, 60, 80, <u>100</u> , 120, 125, 180, <u>200</u> , 250, 300, <u>360</u> , 400, <u>500</u> , 512, <u>1000</u> , <u>1024</u> (e.g. 360 pulses => 0360)	
b Blind hollow shaft (insertion depth max. 14 mm [0.55"]) 1 = ø 4 mm [0.16"] <u>2 = ø 6 mm [0.24"]</u>	d Type of connection 1 = axial cable, 2 m [6.56'] PVC A = axial cable, special length PVC *) <u>2 = radial cable, 2 m [6.56'] PVC</u> B = radial cable, special length PVC *)		Optional on request - other pulse rates	
4 = ø 1/4" ¹⁾	*) Available special lengths (connection types A, B): 3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 05.2420.122A.1024.0030 (for cable length 3 m)			

Mounting accessory for shaft encoders	Order no.
Coupling	bellows coupling ø 15 mm [0.59"] for shaft 4 mm [0.16"]
	8.0000.1202.0404

1) US version.

Incremental encoders

Miniature optical	2400 / 2420 (shaft / hollow shaft)	Push-pull, RS422
--------------------------	---	-------------------------

Technical data

Mechanical characteristics

Maximum speed	12000 min ⁻¹
Mass moment of inertia	approx. 0.1 x 10 ⁻⁶ kgm ²
Starting torque – at 20 °C [68 °F]	< 0.01 Nm ³⁾
Shaft load capacity	radial 20 N axial 10 N
Weight	approx. 0.06 kg [2.12 oz]
Protection acc. to EN 60529	housing side IP65 flange side IP50 (IP64 on request)
Working temperature range	-20 °C ... +85 °C [-4 °F ... +185 °F]
Materials	shaft stainless steel blind hollow shaft brass
Shock resistance acc. to EN 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Electrical characteristics

Output circuit	Push-pull ¹⁾ (7272 compatible)	Push-pull ¹⁾ (7272 compatible)	RS422 (TTL compatible)
Supply voltage	5 ... 24 V DC ²⁾	8 ... 30 V DC	5 V DC (±5 %)
Power consumption (no load)	max. 50 mA	max. 50 mA	max. 90 mA
Permissible load / channel	max. +/- 50 mA	max. +/- 50 mA	max. +/- 20 mA
Pulse frequency	max. 160 kHz	max. 160 kHz	max. 300 kHz
Signal level	HIGH min. +V - 2.5 V LOW max. 0.5 V	min. +V - 3.0 V max. 0.5 V	min. 2.5 V max. 0.5 V
Rising edge time t_r	max. 1 µs	max. 1 µs	max. 200 ns
Falling edge time t_f	max. 1 µs	max. 1 µs	max. 200 ns
Short circuit proof outputs	yes	yes	yes

Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)								
1, 3 without inv. signal	1, 2, A, B	Signal:	0 V	+V	A	B	0			
		Core color:	WH	BN	GN	YE	GY			
Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)								
2, 4, 6 with inv. signal	1, 2, A, B	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD

+V: Supply voltage encoder <+V DC
 0 V: Supply voltage encoder ground GND (0 V)
 A, $\bar{A}$: Incremental output channel A
 B, $\bar{B}$: Incremental output channel B
 0, $\bar{0}$: Reference signal

1) Max. recommended cable length 30 m [98.4'].

2) With 24 V DC there is no tolerance above 24 V DC. Please use output circuit 8 ... 30 V DC.

3) Also for protection level IP64 on the shaft.

Incremental encoders

Miniature optical

2400 / 2420 (shaft / hollow shaft)

Push-pull, RS422

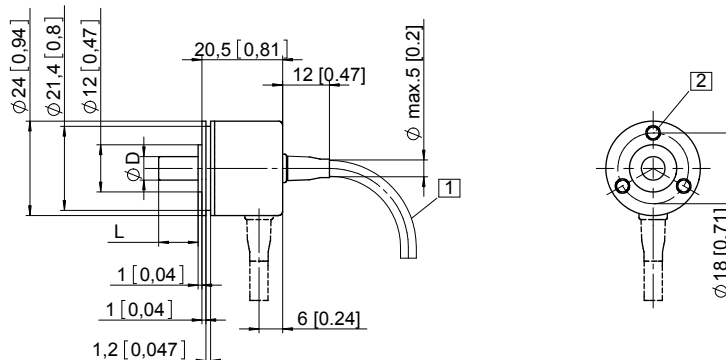
Dimensions shaft version

Dimensions in mm [inch]

Flange type 1, ø 24 [0.94]

- 1 min R50 [1.97]
2 3 x M3, 4 [0.16] deep

D	Fit	L
4 [0.16]	f7	10 [0.39]
5 [0.20]	f7	10 [0.39]
6 [0.24]	f7	10 [0.39]
1/4"	f7	10 [0.39]

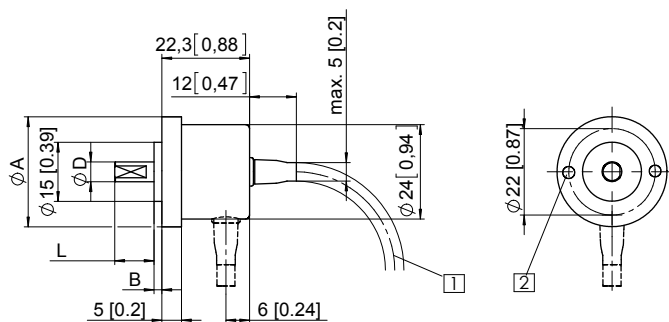


Flange type 2, ø 30 [1.18]

Flange type 3, ø 28 [1.10]

- ① min R50 [1.97]
② 2 x M3, 4 [0.16] deep

D	Fit	L
4 [0.16]	f7	10 [0.39]
5 [0.20]	f7	10 [0.39]
6 [0.24]	f7	10 [0.39]
1/4"	f7	10 [0.39]



Flange type	A	B
2	ø 30 [1.18]	3 [0.12]
3	ø 28 [1.10]	2 [0.08]

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange type 1, ø 24 [0.94]

- 1** 4 x M3 DIN 915 - SW1.5
- Recommended torque for the set screw in the clamping ring 0.1 Nm.
- To ensure optimal clamping by the clamping ring, the customer shaft should be without flat surface.

D	Fit	L
4 [0.16]	H7	14 [0.55]
6 [0.24]	H7	14 [0.55]
1/4"	H7	14 [0.55]

L = insertion depth max. blind hollow shaft

