

Incremental encoders

Miniature optical

2400 / 2420 (shaft / hollow shaft)

Push-Pull



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.
- Meets the certification requirements of railways standard EN 50121.

Order code Shaft version

05.2400 . **XXXX** . **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

- 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 flat
- 2 = ø 6 x 10 mm [0.24 x 0.39"]
- 4 = ø 1/4" x 10 mm [1/4" x 0.39"], with flat ¹⁾
- 6 = ø 6 x 10 mm [0.24 x 0.39"], with flat ¹⁾

c Output circuit / power supply

- 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**

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)

Stock types

- 05.2400.1122.0050
- 05.2400.1122.0360
- 05.2400.1122.0500
- 05.2400.1122.1000
- 05.2400.1122.1024

Optional on request
- other pulse rates

1) US version.

Incremental encoders

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Order code	Hollow shaft	05.2420	. 1 X X X . 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.	
		Type	a b c d e		
a Flange		1 = <u>ø 24 mm [0.94"]</u>		c Output circuit / power supply	e Pulse rate
				1 = Push-Pull (without inverted signal) / 5 ... 24 V DC	4, 6, 8, 10, 16, 20, 25, 36, 40, 50, 60,
b Blind hollow shaft		insertion depth max. 14 mm [0.55"]		2 = Push-Pull (with inverted signal) / 5 ... 24 V DC	80, <u>100</u> , 120, 125, 180, 200, 250, 300,
		1 = <u>ø 4 mm [0.16"]</u>		3 = Push-Pull (without inverted signal) / 8 ... 30 V DC	<u>360</u> , 400, 500, <u>512</u> , <u>1000</u> , <u>1024</u>
		2 = ø 6 mm [0.24"]		4 = <u>Push-Pull (with inverted signal) / 8 ... 30 V DC</u>	(e.g. 360 pulses => 0360)
		4 = ø 1/4" ¹⁾		d Type of connection	Stock types
				1 = <u>axial cable, 2 m [6.56'] PVC</u>	05.2420.1212.0500
				A = axial cable, special length PVC *)	05.2420.1222.0500
				2 = radial cable, 2 m [6.56'] PVC	05.2420.1222.1000
				B = radial cable, special length PVC *)	05.2420.1222.1024
				*) Available special lengths (connection types A, B):	Optional on request
				3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21']	- other pulse rates
				order code expansion .XXXX = length in dm	
				ex.: 05.2420.122A.1024.0030 (for cable length 3 m)	

Incremental encoders

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

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	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
Shaft load capacity	radial 10 N axial 20 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

Electrical characteristics		
Output circuit	Push-Pull ²⁾ (7272 compatible)	Push-Pull ²⁾ (7272 compatible)
Power supply	5 ... 24 V DC ³⁾	8 ... 30 V DC
Power consumption (no load)	max. 50 mA	max. 50 mA
Permissible load / channel	max. +/- 50 mA	max. +/- 50 mA
Pulse frequency	max. 160 kHz	max. 160 kHz
Signal level	HIGH min. +V - 2.5 V LOW max. 0.5 V	min. +V - 3.0 V max. 0.5 V
Rising edge time t_r	max. 1 µs	max. 1 µs
Falling edge time t_f	max. 1 µs	max. 1 µs
Short circuit proof outputs	yes	yes
UL approval	file 224618	
CE compliant acc. to	EMC guideline 2004/108/EC RoHS guideline 2011/65/EU	

An independent test laboratory (TTI-PG115/96-01) approved by the German Accreditation Council (DAR) certified the compliance with the Railways Standard, according to EN 50121. This means our encoder is compatible with higher electromagnetic noise standards than standard industrial encoders.



You will have a higher quality encoder even in applications with higher EMC noise levels. We will gladly send you a copy of the test report on request. When ordering an encoder to the railway standard, please ensure you state this explicitly on the order.

1) US version.
 2) Max. recommended cable length 30 m [98.4'].
 3) With 24 V DC there is no tolerance above 24 V DC. Please use output circuit 8 ... 30 V DC.

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Terminal assignment

Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)					
1, 3 without inv. signal	1, 2, A, B	Signal:	0 V	+V	A	B	0
		Cable colour:	WH	BN	GN	YE	GY

Output circuit	Type of connection	Cable (isolate unused wires individually before initial start-up)								
2, 4 with inv. signal	1, 2, A, B	Signal:	0 V	+V	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
		Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD

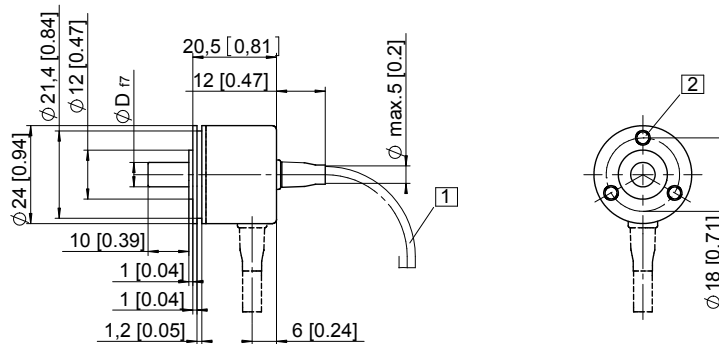
- +V: Encoder power supply +V DC
- 0 V: Encoder power supply ground GND (0 V)
- A, \bar{A} : Incremental output channel A
- B, \bar{B} : Incremental output channel B
- 0, $\bar{0}$: Reference signal

Dimensions shaft version

Dimensions in mm [inch]

Flange type 1, \varnothing 24 [0.94]

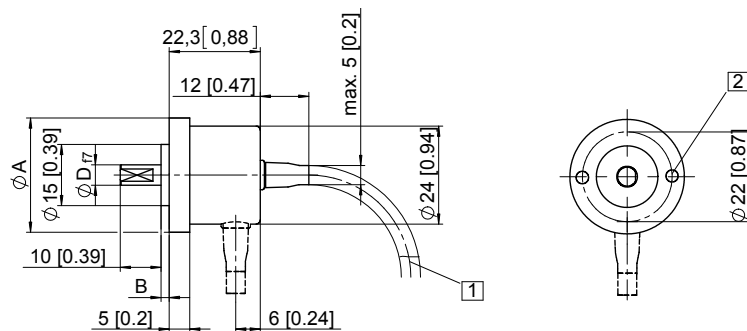
- 1 min R50 [1.97]
- 2 3 x M3, 4 [0.16] deep



Flange type 2, \varnothing 30 [1.18]

Flange type 3, \varnothing 28 [1.10]

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



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

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange type 1, \varnothing 24 [0.94]

- 1 4 x M3 DIN 915 - SW1.5

