

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.



| | | | | | |
|-----------------------|-----------------------------------|-----------------------------|---------------------|----------------------|----------------|
| | | | | | |
| High rotational speed | Temperature range -20°...+85°C | Shock / vibration resistant | Short-circuit proof | Magnetic field proof | Optical sensor |

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 | . X X X X . | 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 / 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

1) US version.

Incremental encoders

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

| | | | | | | | | | |
|---|---|---|--|----------|---|----------|--|--|--|
| Order code | 05.2420 | 1 | X | 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. | |
| Hollow shaft | Type | a | b | c | d | e | | | |
| a Flange | 1 = ø 24 mm [0.94"] | 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 | | 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) | | |
| b Blind hollow shaft (insertion depth max. 14 mm [0.55"]) | 1 = ø 4 mm [0.16"] 2 = ø 6 mm [0.24"] <hr/> 4 = ø 1/4" ¹⁾ | 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 *) | | <i>Optional on request</i> - other pulse rates | | | | |
| | | *) 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 |

Further Kübler accessories can be found at: kuebler.com/accessories
 Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

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 |
| UKCA compliant in accordance with | |
| EMC Regulations | S.I. 2016/1091 |
| RoHS Regulations | S.I. 2012/3032 |

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

