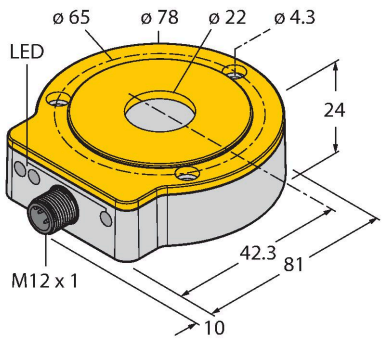
# RI360P0-QR24M0-HESG25X3-H1181
# Contactless Encoder – SSI
# Premium Line



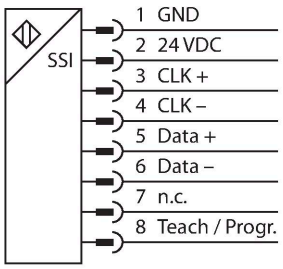

## Technical data

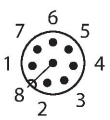
| | |
|---|---|
| Type | RI360P0-QR24M0-HESG25X3-H1181 |
| ID | 1590905 |
| Measuring principle | Inductive |
| **General data** | |
| Max. Rotational Speed | 6000 rpm |
| | Determined with standardized construction, with a steel shaft Ø 20 mm, L = 50 mm and reducer Ø 20 mm |
| Starting torque shaft load (radial / axial) | not applicable, because of contactless measuring principle |
| Measuring range | 0…360 ° |
| Nominal distance | 1.5 mm |
| Repeat accuracy | ≤ 0.01 % of full scale |
| Linearity deviation | ≤ 0.05 % f.s. |
| Temperature drift | ≤ ± 0.003 % / K |
| Output type | Absolute semi-multiturn |
| Resolution singleturn | 16 bit/65,536 units per revolution |
| Resolution multiturn | 6 bit/64 revolutions |
| Number of diagnostic bits | 3 Bit |
| **Electrical data** | |
| Operating voltage | 15…30 VDC |
| Residual ripple | ≤ 10 % $U_{ss}$ |
| Isolation test voltage | ≤ 0.5 kV |
| Wire breakage/Reverse polarity protection | yes (voltage supply) |

## Features

- Compact, rugged housing
- Many mounting possibilities
- Status displayed via LED
- Positioning element and aluminium ring not incl.
- SSI output
- 25 bit, Gray-coded
- SSI clock rate: 62.5 KHz … 1 MHz
- Single or multiturn, length of data frame and bit coding parametrizable via PACTware with programming box USB-2-IOL-0002 and adapter cable RKC8.302T-1,5-RSC4T/TX320
- Default settings: Singleturn Bit 0 … Bit 15, Multiturn Bit 16 … Bit 21, Status Bit 22 … Bit 24
- Zero point, sync./async. operating mode adjustable via Easy Teach
- Compatible with all standard SSI masters
- In sync. mode, jitter < 5 µs required on the master side
- Immune to electromagnetic interference
- 15…30 VDC
- Male M12 x 1, 8-pin

## Wiring diagram




## Functional principle

The measuring principle of inductive encoders is based on oscillation circuit coupling between the positioning element and the sensor, whereby an output signal is provided

RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

## Technical data

| | |
|---|---|
| Communication protocol | SSi |
| Output function | 8-pin, 25 Bit, Gray coded |
| Process data area | configurable |
| Diagnostic bits | Bit 22: Position was changed during power drop<br>Bit 23: Positioning element has reached the end of the measuring range. This is indicated by a lower signal quality.<br>Bit 24: Positioning element is outside the measuring range. |
| | Data messages parametrizable as multiturn and singleturn process data or error bits |
| Sample rate | 5000 Hz |
| | The sensor's sampling rate depends on the master's SSI cycle time. Sampling rate 1…5 KHz in synchronized operating mode (signal propagation delay 200 µs) |
| Current consumption | < 100 mA |
| **Mechanical data** | |
| Design | QR24 |
| Dimensions | 81 x 78 x 24 mm |
| Flange type | Flange without mounting element |
| Shaft Type | Hollow shaft |
| Shaft diameter D [mm] | 6<br>6.35<br>9.525<br>10<br>12<br>12.7<br>14<br>15.875<br>19.05<br>20 |
| Housing material | Metal/plastic, ZnAlCu1/PBT-GF30-V0 |
| Electrical connection | Connector, M12 × 1 |
| **Environmental conditions** | |
| Ambient temperature | -25…+85 °C |
| | Acc. to UL approval to +70 °C |
| Vibration resistance | 55 Hz (1 mm) |
| Vibration resistance (EN 60068-2-6) | 20 g; 10…3000 Hz; 50 cycles; 3 axes |
| Shock resistance (EN 60068-2-27) | 100 g; 11 ms ½ sine; 3 × each; 3 axes |
| Continuous shock resistance (EN 60068-2-29) | 40 g; 6 ms ½ sine; 4000 × each; 3 axes |
| Protection class | IP68<br>IP69K |

proportional to the angle of the positioning element. Turck refers to semi-multiturn because the multiturn process data is calculated internally from the number of single-turn zero passes. Because the sensor does not detect any revolutions when not supplied with power, the plausibility of the multiturn process data is indicated by a diagnostic bit. The rugged sensors are maintenance- and wear-free thanks to the contactless operating principle. They convince through their excellent repeatability, resolution and linearity within a broad temperature range. The innovative technology ensures high immunity to electromagnetic DC and AC fields.

RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

## Technical data

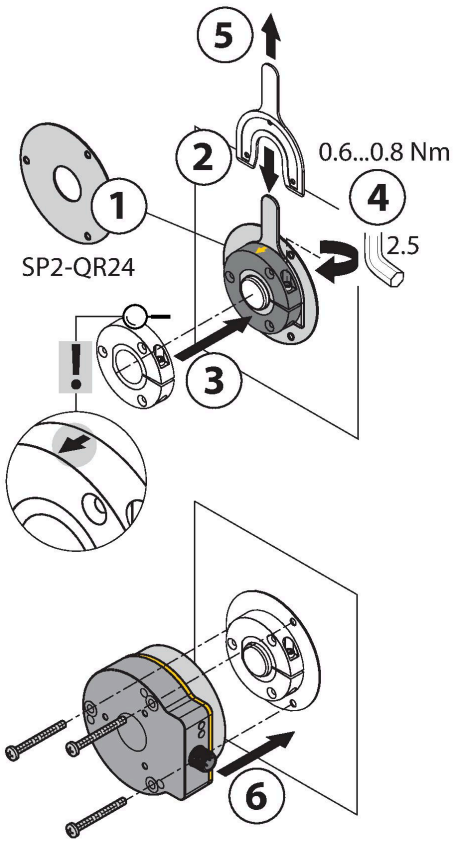
| | |
|---|---|
| MTTF | 138 years acc. to SN 29500 (Ed. 99) 40 °C |
| Power-on indication | LED, Green |
| Measuring range display | LED, yellow, yellow flashing |
| Error indication | LED, red |
| Included in delivery | MT-QR24 mounting aid |

RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

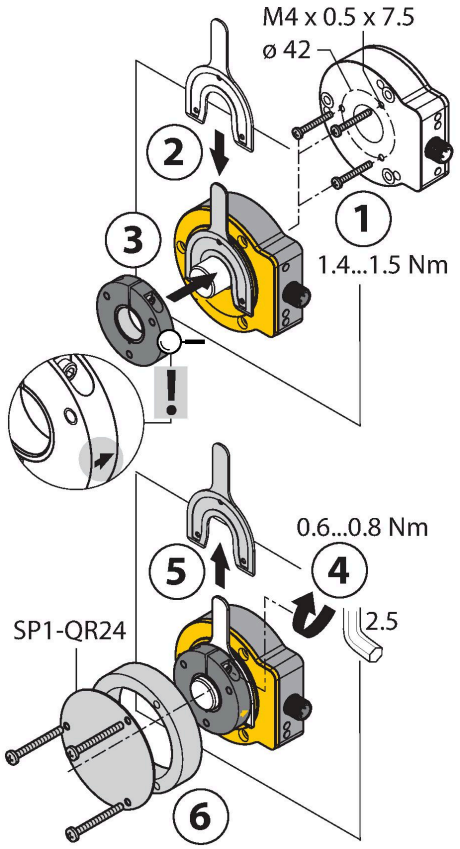
## Mounting instructions

Mounting instructions/Description

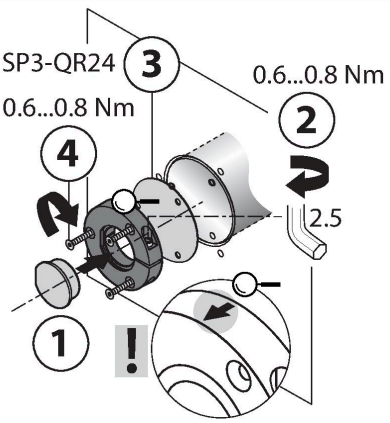
### A



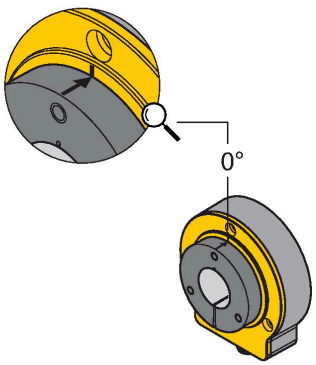

### B




### C




### Default: 0°




Extensive range of mounting accessories for easy adaptation to many different shaft diameters. Based on the functional principle of RLC coupling, the encoder is immune to magnetized metal splinters and other interferences.
The adjacent figure shows the two separate units, sensor and positioning element.
Mounting option A:
First, interconnect positioning element and rotatable shaft with the bracket. Then place the encoder above the rotating part in such a way that you get a tight and protected unit.
Mounting option B:
Push the encoder on the back site of the shaft and fasten it to the machine. Then clamp the positioning element to the shaft with the bracket.
Mounting option C:
If the positioning element is screwed on a rotating machine part and not to a shaft, you must first put on the dummy plug RA8-QR24. Then tie up the bracket. Screw on the encoder via the three bores.

When mounting, ensure that the positioning element is correctly aligned towards the sensor's active face. For correct fitting see arrow on the edge of the positioning element. (Arrow must point in direction of sensor)

Due to the separate installation of positioning element and sensor no electrical currents or harmful mechanical forces are transmitted via the shaft to the sensor. The encoder also offers a high degree of protection for life and stays permanently sealed.
The accessories enclosed in the delivery help to mount encoder and positioning element at an optimal distance from each other. LEDs indicate the switching status. Optionally, you can use the shield plates which are included in the accessories to increase the allowed distance between positioning element and sensor.

Status display via LED
green
Sensor is supplied correctly, asynchronous mode
green flashing
Sensor is supplied properly, synchronous mode
green fast flashing:
Sensor is supplied properly but is not receiving CLK pulses from the SSI master
yellow
Positioning element is in the measuring range, signal low (e.g. distance too large), see status bit 23
yellow flashing
Positioning element is outside the coverage, see status bit 24
off
Positioning element is in the measuring range

Multiturn error

RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

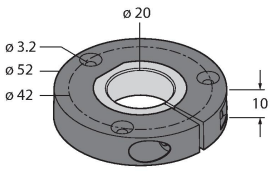
red:
Position was changed during power drop, see status bit 22

| Parameters | Easy-Teach Input | LED Display | Description |
|---|---|---|---|
| Zero point | Bridge Pin 1 (GND) and Pin 8 for 2 s | Status LED flashes, after 2 s steady | Encoder position set to zero. The Multiturn flag and the red LED are reset |
| Switching between sync/async mode | Bridge Pin 2 ($U_B$) and Pin 8 for 2 s | Status LED flashes, after 2 s steady<br><br>Power LED steady green: async mode,<br>Power LED flashes green: sync mode | The encoder is by default set to asynchronous mode. The encoder switches between async/<br><br>sync mode by means of a teach pulse |
| Effective mode | Bridge Pin 2 ($U_B$) and Pin 8 for 10 s | After 10 s status LED flashes for 2 s | Effective direction of encoder CW (factory setting)<br>Multiturn values are reset |
| | Bridge Pin 1 (GND) and Pin 8 for 10 s | After 10 s status LED flashes for 2 s | Effective direction of encoder CCW<br>Multiturn values are reset |
| Multiturn error- flag | Bridge Pin 1 (GND) and Pin 8 for 15 s | After 15 s power and status LED alterante | Multiturn Error and multiturn counters are reset |
| Switching between single/multiturn mode | Bridge Pin 2 ($U_B$) and Pin 8 for 20 s | After 20 s the red LED flashes | Validity depends on revision status |
| Easy-Teach reset | Bridge Pin 2 ($U_B$) and Pin 8 for 15 s | After 15 seconds, power and status LED flash alternately; In case the red LED lights up, the Easy-Teach reset must be triggered again | The following factory defaults are restored: Effective direction (CW), zero point, multiturn error (delete), multiturn counter (zero) |

To avoid unintended teaching, keep pin 8 potential-free.

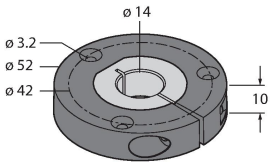
## Accessories

P1-RI-QR24 1590921



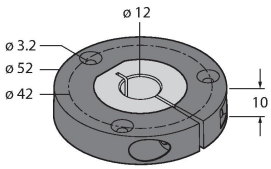

Positioning element, for Ø 20 mm shafts

P2-RI-QR24 1590922



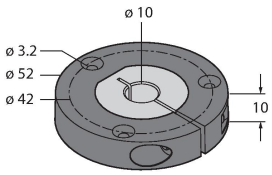

Positioning element, for Ø 14 mm shafts

P3-RI-QR24 1590923



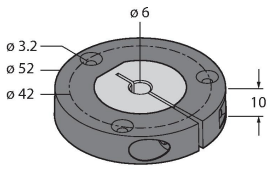

Positioning element, for Ø 12 mm shafts

P4-RI-QR24 1590924



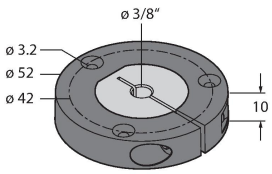

Positioning element, for Ø 10 mm shafts

P5-RI-QR24 1590925




Positioning element, for Ø 6 mm shafts

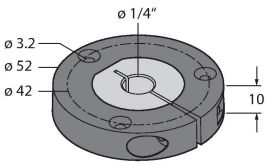
P6-RI-QR24 1590926




Positioning element, for Ø 3/8“ shafts

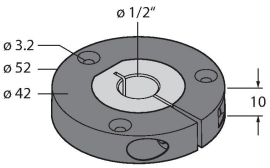
RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

| P7-RI-QR24 | 1590927 |
|---|---|



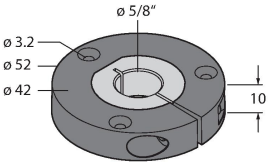

Positioning element, for Ø 1/4“ shafts

| P9-RI-QR24 | 1593012 |
|---|---|



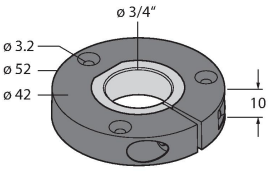

Positioning element for installation on Ø 1/2“ shafts

| P10-RI-QR24 | 1593013 |
|---|---|



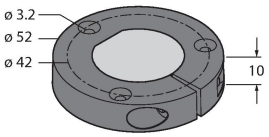

Positioning element for installation on Ø 5/8“ shafts

| P11-RI-QR24 | 1593014 |
|---|---|



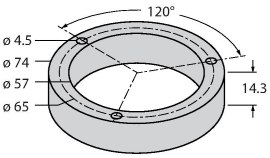

Positioning element for installation on Ø 3/4“ shafts

| P8-RI-QR24 | 1590916 |
|---|---|



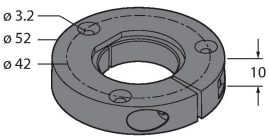

Positioning element with blanking plug for large shafts

| M1-QR24 | 1590920 |
|---|---|



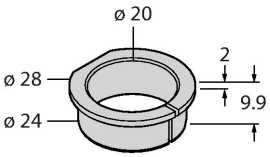

Aluminum protecting ring, for inductive encoders RI-QR24

| PE1-QR24 | 1590937 |
|---|---|



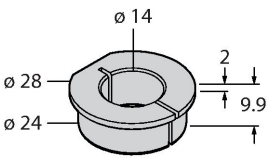

Positioning element without adapter sleeve

| RA1-QR24 | 1590928 |
|---|---|



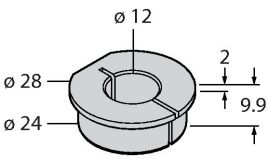

Adapter sleeve, for Ø 20 mm shafts

| RA2-QR24 | 1590929 |
|---|---|



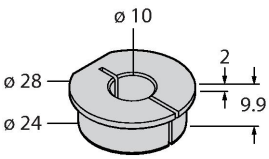

Adapter sleeve, for Ø 14 mm shafts

| RA3-QR24 | 1590930 |
|---|---|



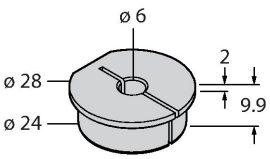

Adapter sleeve, for Ø 12 mm shafts

| RA4-QR24 | 1590931 |
|---|---|



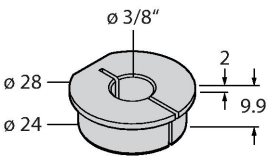

Adapter sleeve, for Ø 10 mm shafts

| RA5-QR24 | 1590932 |
|---|---|



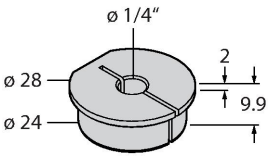

Adapter sleeve, for Ø 6 mm shafts

| RA6-QR24 | 1590933 |
|---|---|



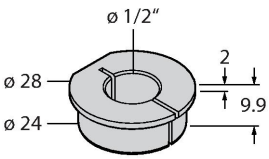

Adapter sleeve, for Ø 3/8“ shafts

| RA7-QR24 | 1590934 |
|---|---|



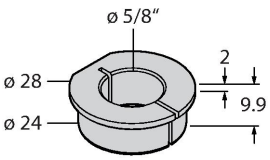

Adapter sleeve, for Ø 1/4“ shafts

| RA9-QR24 | 1590960 |
|---|---|




Adapter sleeve, for Ø 1/2" shafts

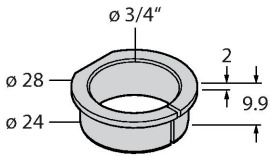
| RA10-QR24 | 1590961 |
|---|---|




Adapter sleeve, for Ø 5/8" shafts

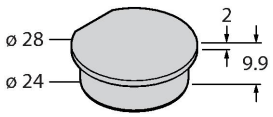
RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved

| RA11-QR24 | 1590962 |
|---|---|



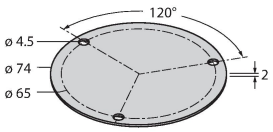

Adapter sleeve, for Ø 3/4" shafts

| RA8-QR24 | 1590959 |
|---|---|



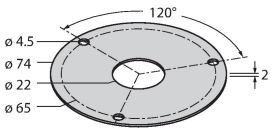

Plug for mounting option C

| SP1-QR24 | 1590938 |
|---|---|



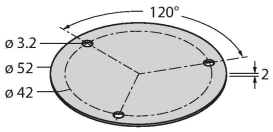

Shield plate Ø 74 mm, aluminium

| SP2-QR24 | 1590939 |
|---|---|



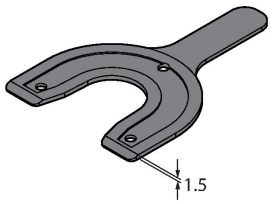

Shield plate Ø 74 mm, aluminiuim, with borehole for shaft feedthrough

| SP3-QR24 | 1590958 |
|---|---|



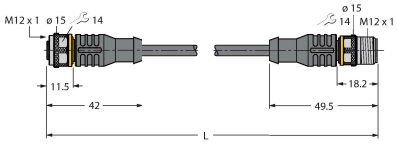

Shield plate Ø 52 mm, aluminium

| MT-QR24 | 1590935 |
|---|---|




Mounting aid for optimal alignment of positioning element

## Wiring accessories

| Dimension drawing | Type | ID | |
|---|---|---|---|
| | RKC8T-2/TXL | 6625142 | Connection cable, female M12, straight, 8-pin, cable length: 2 m, sheath material: PUR, black; cULus approval; other cable lengths and qualities available, see www.turck.com |
|  | RKC8.302T-1.5-RSC4T/TXL320 | 6625003 | Adapter cable to connect sensor to USB-2-IOL-0002 programming unit; female M12, straight, 8-pin on male M12, straight, 3-pin; cable length: 1.5 m; jacket material: PUR, jacket color: black, cULus approved; RoHS conform; protection class IP67 |
| | E-RKC 8T-264-2 | U-04781 | Connection cable, female M12, straight, 8-pin (twisted pairs),shielded, cable length: 2 m, sheath material: PVC, black; cULus approval; other cable lengths and qualities available, see www.turck.com |

RI360P0-QR24M0-HESG25X3-H1181| 11/29/2022 09-33 | technical changes reserved