# QR series

QR40EMN-090HB-2V-CM-UL

## Absolute rotary encoder (contactless) Full Redundant

Output
0 - 5 V / 5 - 0 V

Supply voltage
10 - 32 Vdc

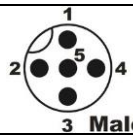
Measuring range
90° (±45°)



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CE

| General specifications v20230519 | |
|---|---|
| Housing | Reinforced plastic injection molded (Celanex 2300 GV3/30 - glass filled PBT, black) |
| Dimensions (indicative) | 40x40x17 mm |
| Mounting | Included: 2x M4x25 stainless steel pozidrive pan head screws, self-tapping (PZ DIN7500CZ), Mounting on flat surface only. Screw with care |
| Ingress Protection (IEC 60529) | IP67, IP69K (with IP69K mating connector) |
| Relative Humidity | 0 - 95% (non condensing, fully potted) |
| Weight | approx 50 gr. |
| Magnet type | 11,2 x 5,5 x 8 mm Neodymium/N35/nickel coated/remanention 1,2 T |
| Magnet distance to sensor | 0 to 10 mm, magnet at front side |
| Max. radial magnet misalignment | 1 mm Radial Off Axis ( < 0,3 mm for minimum non-linearity) |
| Direction of magnetization | Axial in 8 mm (Northpole marked) |
| Supply voltage | 10 - 32 Vdc |
| Polarity protection | Yes |
| Current consumption | ≤ 25 mA |
| Operating temperature | -40 to 85°C |
| Storage temperature | -40 to 85°C |
| Measuring range | 90° (±45°) |
| Programmable center position | No |
| Accuracy | |
| Resolution | 12 bit over 360° (min. step 0,09°) |
| Sensitivity error | ±0.5% typ. (@20°C), ±1% typ. (full Temp. range) |
| Offset error | Magnet + Sensor: <3° typ. (with perfect external magnet positioning) |
| Non linearity | < ± 1,5° in magnet alignment range (both outputs individual) |
| Repeatability | 0,13° |
| Response time | < 4 ms |
| Max speed | 100 rpm |
| Output signal | 0 - 5 V / 5 - 0 V |
| Short circuit protection | Yes (T<55°C), Max 10 s (T>55°C) |
| Output load resistor | ≥ 20 kΩ |
| Connection (length ±10%) | M12 5p male connector (Glass fibre reinforced grade, contacts CuZn pre-nickeled galv. Au) |
| Pinout M12 connector | Pin 1: + Supply voltage<br>Pin 2: not connected<br>Pin 3: Gnd<br>Pin 4: Output 1<br>Pin 5: Output 2 |






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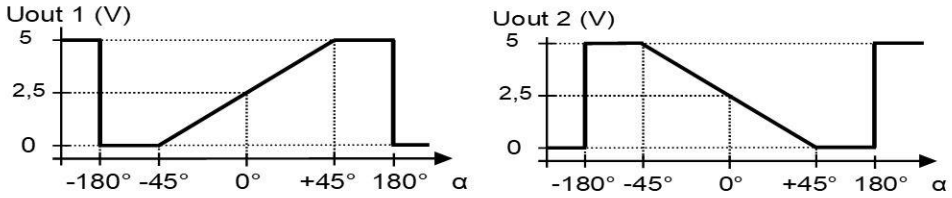
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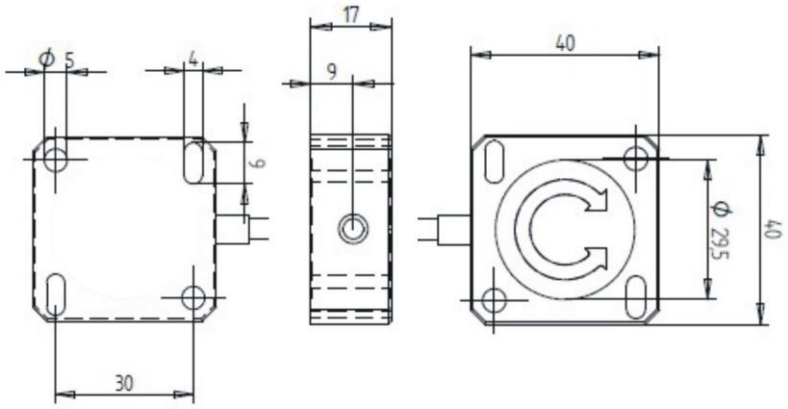
**Output approx. 0V when magnetic field outside specifications**

**Differences between the outputs < 3°**

### Transfer characteristic




### Dimensions (indicative only)




### Intended use & UL

Intended use:
QR series sensors are intended to measure rotation after installing in machines, equipment and systems. Flawless function in accordance with the specifications is ensured only when the device is used within its specifications. Modifications or non-approved use are not permitted and will result in loss of warranty and void any claims against the manufacturer.

This device can be used as safety component according to the EU Machine Directive (ISO13849), if the cross-check function between both outputs is performed by the application. An algorithm should be implemented in the application that compares the two outputs of this sensor, and brings the application into safe state if the difference between the two outputs exceeds the limits that fits the application involved.

UL:
UL certificate: UL File number: E312057
UL & c-UL listed product (standards UL60947-5-2 & CSA-C22,2 No. 14)
Product Identity / Category Code Number (CCN): Industrial Control Equipment / NRKH & NRKH7
Enclosure / Temperature rating: Enclosure type 1 / Temperature -40° . .+85°C
Electrical rating: Intended to be used with a Class 2 power source in accordance with UL1310

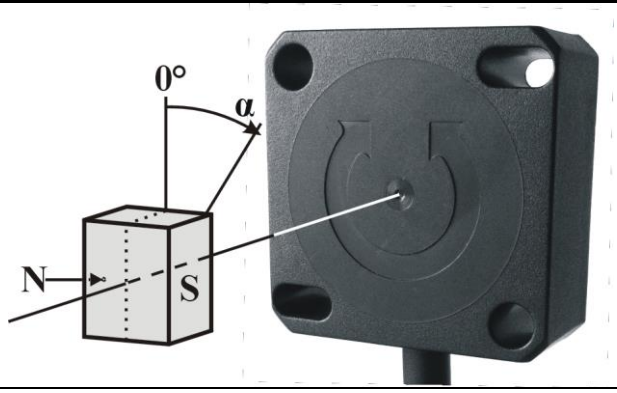
### Magnet orientation

Front view

Magnet drawn in α=0° position
Magnet rotates clockwise: α increases

Magnet North pole is indicated

Magnet surface to sensor: 11,2 x 8mm
Magnet heigth: 5,5mm






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