

# QR series



QR40EMN-180HB-2V-CM-5V-UL

## Absolute rotary encoder (contactless) Full Redundant

Output  
0 - 5 V / 5 - 0 V (ratiometric to 5 V supply voltage)

Supply voltage  
5V dc

Measuring range  
180° (±90°)



### General specifications v20230519

Reinforced plastic injection molded (Celanex 2300 GV3/30 - glass filled PBT, black)

40x40x17 mm

Included: 2x M4x25 stainless steel pozidrive pan head screws, self-tapping (PZ DIN7500CZ), Mounting on flat surface only. Screw with care

IP67, IP69K (with IP69K mating connector)

0 - 95% (non condensing, fully potted)

approx 50 gr.

11,2 x 5,5 x 8 mm Neodymium/N35/nickel coated/remanent 1,2 T

0 to 10 mm, magnet at front side

1 mm Radial Off Axis (< 0,3 mm for minimum non-linearity)

Axial in 8 mm (Northpole marked)

5V dc

Yes

≤ 25 mA

-40 to 85°C

-40 to 85°C

180° (±90°)

No

12 bit over 360° (min. step 0,09°)

±0.5% typ. (@20°C), ±1% typ. (full Temp. range)

Magnet + Sensor: <3° typ. (with perfect external magnet positioning)

< ± 1,5° in magnet alignment range (both outputs individual)

0,13°

< 4 ms

100 rpm

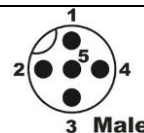
0 - 5 V / 5 - 0 V (ratiometric to 5 V supply voltage)

Yes (T<55°C), Max 10 s (T>55°C)

≥ 20 kΩ

M12 5p male connector (Glass fibre reinforced grade, contacts CuZn pre-nickel galvan. Au)

Pin 1: + Supply voltage  
Pin 2: not connected  
Pin 3: Gnd  
Pin 4: Output 1  
Pin 5: Output 2



### Housing

Dimensions (indicative)

Mounting

Ingress Protection (IEC 60529)

Relative Humidity

Weight

Magnet type

Magnet distance to sensor

Max. radial magnet misalignment

Direction of magnetization

Supply voltage

Polarity protection

Current consumption

Operating temperature

Storage temperature

Measuring range

Programmable center position

Accuracy

Resolution

Sensitivity error

Offset error

Non linearity

Repeatability

Response time

Max speed

Output signal

Short circuit protection

Output load resistor

Connection (length ±10%)

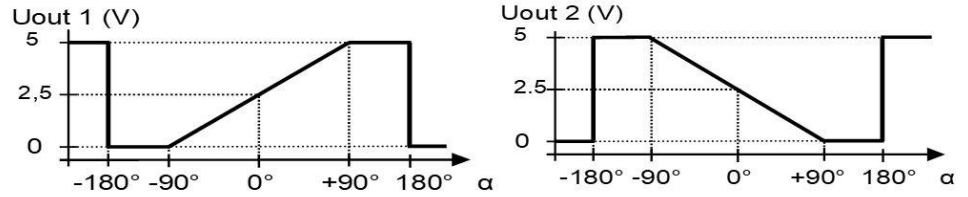
Pinout M12 connector

## QR40EMN-180HB-2V-CM-5V-UL

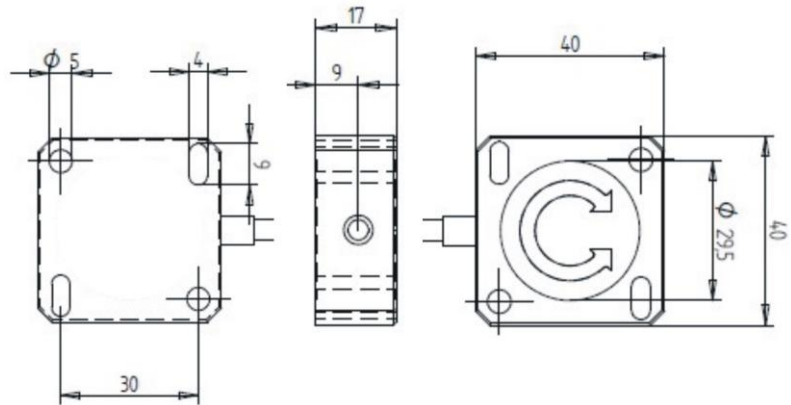
Output approx. 0V when magnetic field outside specifications

Differences between the outputs <math>< 3^\circ</math>

### 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

### Front view

Magnet drawn in  $\alpha=0^\circ$  position  
Magnet rotates clockwise:  $\alpha$  increases

Magnet North pole is indicated

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

### Magnet orientation

