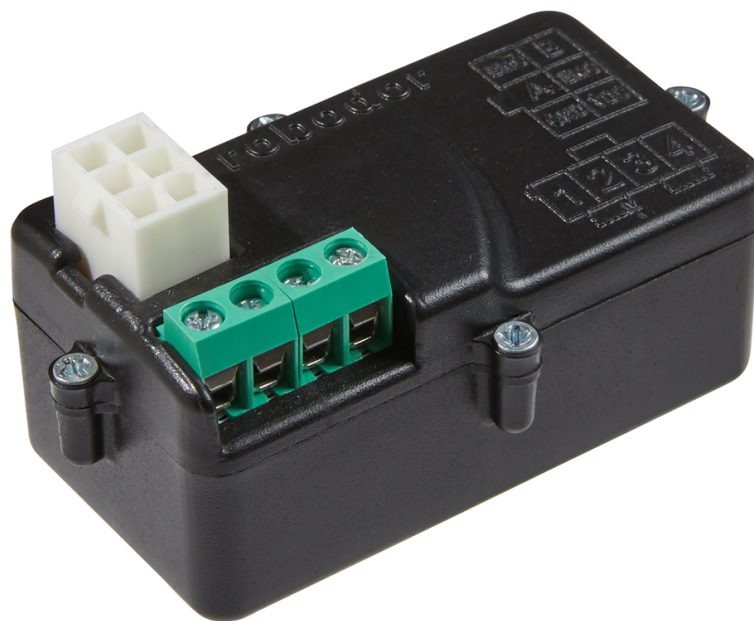


RARE v4

Single Turn Absolute Encoder

User Manual



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RARE v4 is designed to be mounted laterally onto the motor's gearbox, enabling absolute position detection up to one turn. Thanks to its plug-in connector, installation and removal can be completed quickly and easily, allowing for fast and practical assembly.

Operating voltage	7-15V _{DC}
Supply Current	30 mA
Operating temperature	-10/+50°C
Interface Definition	RS485; Asynchronous Half Duplex Start bit: 1, Data bit: 8, Stop bit: 1, Parity: Even
Transfer Speed	9,600 - 19200 bps
Power Up Time	Maximum 50 ms
Resolution	13 bit; 8192 step
Absolute Measurement Range	360° absolute position 0.04395°/step
Response Data	8192 resolution, sent in the range 0..8191
Mechanical Connection	Ø7.9 mm female shaft with half moon slot (4.95 mm)(Fig 1)
Protection Class	IP22
Electrical Connections	1: EMC 2: RS485 A 3: GND 4: RS485 B 5: EMC 6: +VDC
Fixing of the encoder	Flat headed screw M4

Table 1: Encoder Technical Specifications

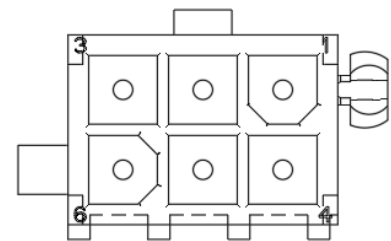
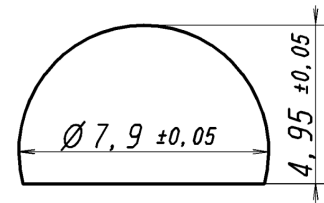
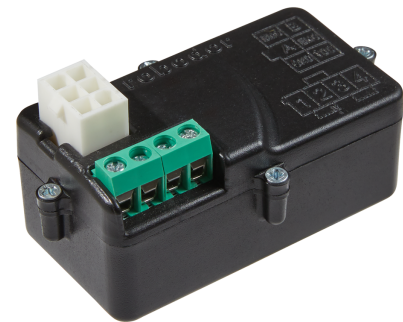


Figure 1: Encoder / Shaft Connection / Connector

1 Communication Protocol Definition

The absolute encoder operates on a request-response communication model. It sends a response only when a valid request is received according to the defined protocol. To ensure proper communication, the bus must remain idle for at least 1.8ms before any request is sent.

1.1 Baud Rate Initialization

Upon powering up, the system starts with a default baud rate of 9600. If it receives five consecutive unidentified requests, it automatically adjusts to the 19200 baud rate, allowing dynamic configuration.

1.2 Response Timing

There is a minimum required delay of 50 μ s between the request and the corresponding response from the encoder.

1.3 Request Protocol

- **Decreasing Value Request:** The encoder expects A2 and B0 codes, sent in 2-byte hexadecimal format.
- **Increasing Value Request:** Similar to decreasing request, but uses code B3 instead of B0.

1.4 Response Protocol

When a valid request is received, the encoder responds with 3 bytes:

- Byte 1: Always starts with A3
- Byte 2: High byte of position data
- Byte 3: Low byte of position data

The combined position information is in the range of 0 to 8191 (13-bit resolution).

1.5 Error Messages

The encoder also provides specific response code for error handling:

- A3 FA FA

2 Standarts

- **EN IEC 61000-6-1:** Immunity for residential, commercial and light-industrial environments
- **EN IEC 61000-6-2:** Immunity for industrial environments
- **EN IEC 61000-6-3:** Emission standard for residential, commercial and light-industrial environments
- **EN IEC 61000-6-4:** Emission standard for industrial environments