

# Datasheet

## Features at a glance

- Through-hole hollow shaft, bore Ø 20 mm.
- Self-extinguishing, impact-resistant housing, resistant to solvents, gasoline, oil, and grease.
- Precision rotary potentiometer connected to the drive shaft via a transmission system.
- Available with potentiometers rated for 1, 3, 5, or 10 revolutions, with drive ratios between the drive shaft and the potentiometer.
- The potentiometer is protected against overloads by a slip clutch.
- For this application, the rotational speed of the drive shaft is required to measure the total travel of the machine (see pitch table).



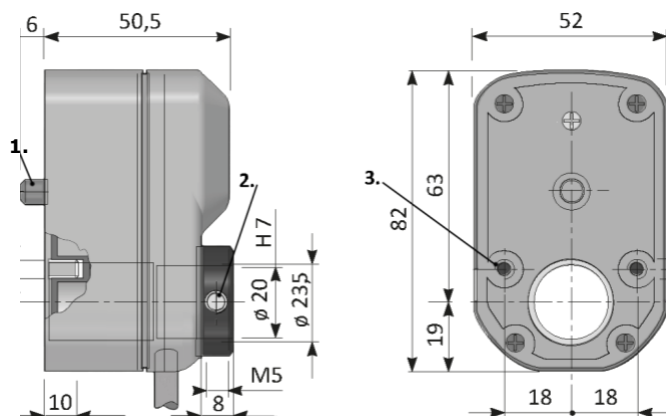
## Technical characteristics

|                                          |                                                                                                                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electrical voltage ( <b>PR20</b> )       | Cables: 2, 5, 10 meters (optional with plug)                                                                                                                                                                   |
| Electrical voltage ( <b>PR20C</b> )      | Plug: 4-pin                                                                                                                                                                                                    |
| Electrical voltage ( <b>PR20RS</b> )     | Plug: M12x1, 4-pin (standard)<br>Plug: M12T, 4-pin male connector + 4-pin female connector (optional)<br>Plug: M12Y, 4-pin female connector + 4-pin female connector (optional)<br>Cables: 2 meters (optional) |
| Power supply ( <b>PR20RS</b> )           | 10 – 30 VDC max. 100 mA                                                                                                                                                                                        |
| Resolution ( <b>PR20RS</b> )             | 16 bit                                                                                                                                                                                                         |
| Display range ( <b>PR20RS</b> )          | 0, 65535                                                                                                                                                                                                       |
| Conversions per second ( <b>PR20RS</b> ) | 12                                                                                                                                                                                                             |
| Fieldbus Interface ( <b>PR20RS</b> )     | Modbus (Profinet, EthernetIP, EtherCat, Powerlink)                                                                                                                                                             |
| Linearity                                | ±0,25 %                                                                                                                                                                                                        |
| Rotational speed (1:1)                   | 400 min <sup>-1</sup> , 1.000 min <sup>-1</sup> (for short periods of use)                                                                                                                                     |
| Potentiometer                            | 1 (340°) – 3 (1.080°) – 5 (1.800°) – 10 (3.600°)                                                                                                                                                               |
| Hollow drive shaft                       | Ø 20 H7                                                                                                                                                                                                        |
| Weight                                   | 180 g                                                                                                                                                                                                          |
| Performance                              | 1 W                                                                                                                                                                                                            |
| Resistance                               | 10 kΩ                                                                                                                                                                                                          |
| Max. revolutions                         | 340° ±4° - 1.080° ±10° - 1.800° ±10° - 3.600° ±10°                                                                                                                                                             |
| Protection rating                        | IP54                                                                                                                                                                                                           |
| Housing color                            | Gray (RAL 7004)                                                                                                                                                                                                |
| Operating temperature                    | -10 °C to +70 °C                                                                                                                                                                                               |
| Relative humidity                        | 10 to 90 %                                                                                                                                                                                                     |
| Electromagnetic compatibility (EMC)      | 2014/30 EU                                                                                                                                                                                                     |
| RoHs                                     | 2011/65/EU                                                                                                                                                                                                     |

# Datasheet

## Dimensions

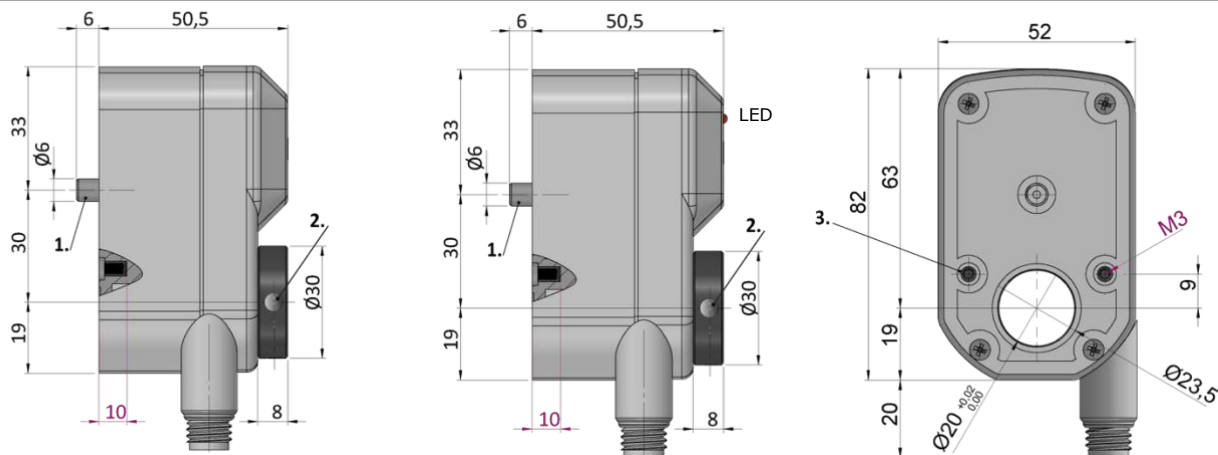
### PR20



1. Torque support / 2. Mounting pins / 3. Mounting holes

All measurements are in mm

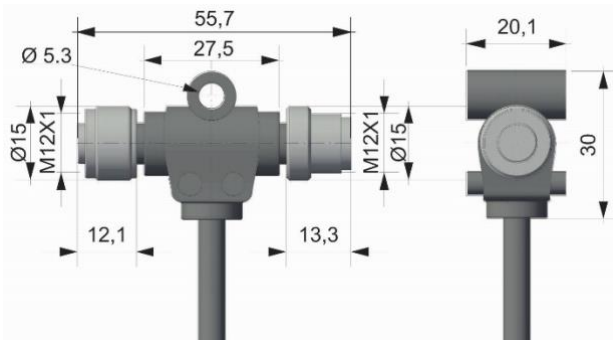
### PR20C / PR20RS



1. Torque support / 2. Mounting pins / 3. Mounting holes

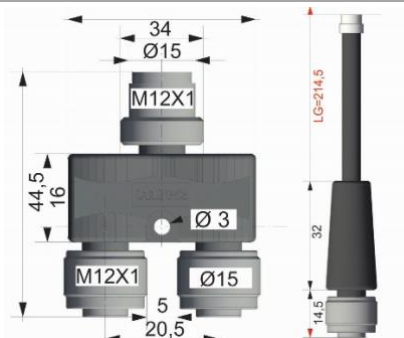
All measurements are in mm

### T-Connectors M12T (optional)



T-Connector, 4-pin male connectors + 4-pin female connectors M12x1, cable length 135 mm

### Y-Connectors M12Y (optional)



All measurements are in mm

Y-Connector, 2x 4-pin M12x1 female connectors, cable length 200 mm

# Datasheet

## Transmission ratio calculation

To optimize the precision, it is essential to select a **transmission ratio** and **potentiometer combination** that provides a slightly higher number of turns than required to cover the full stroke.

|                          | Multiplication | Reduction                                                  |
|--------------------------|----------------|------------------------------------------------------------|
| <b>PR20/PR20C/PR20RS</b> | 1/3; 1/2       | 1/1; 3,3/1; 10/1; 12/1; 18/1; 24/1; 30/1; 54/1; 72/1; 90/1 |

| Available potentiometers | 1        | 3           | 5           | 10          |
|--------------------------|----------|-------------|-------------|-------------|
| <b>Turns</b>             | 340° ±4° | 1.080° ±10° | 1.800° ±10° | 3.600° ±10° |

### Example 1. - Calculation with a known number of turns

The transducer must complete **230** total turns to cover the full potentiometer stroke.

**Choice: 10-turn potentiometer with a 24/1 transmission ratio Calculation:**

**24 × 10 = 240 turns**

### Example 2. - Calculation with known distance and pitch

A screw with a 4 mm pitch must travel a distance of 550 mm.

Required turns calculation:  $550 \div 4 = 137.5$  turns

**Selection: 5-turn potentiometer with a 30/1 transmission ratio Calculation:**

**30 × 5 = 150 available turns**

### Example 3. - Angular displacement measurement

An angular displacement of 105° must be measured.

**Selection: 1-turn potentiometer (340°) with a 1/3 multiplication ratio Calculation:**

**340 ÷ 3 = 113.5° available**

- For angular measurements, a 1-turn potentiometer is preferable for higher accuracy.

# Datasheet

## Ordering example

**Type** PR20-I - 10 - 10W - 10K - 2 - C1 - M12T

### Description

PR20 = Hollow shaft  
(Cable outlet)  
PR20C = Hollow shaft  
(Connectors)  
**PR20-I** = Hollow shaft /  
4 - 20 mA  
PR20-V = Hollow shaft /  
0 - 10 V  
PR20RS = Hollow shaft /  
(RS485 Modbus)

### Gear ratio

See the table

### Potentiometer gear (Rotational speed)

1W = 340°  
3W = 1.080°  
5W = 1.800°  
**10W** = 3.600°

### Resistance

**10K** = 10 kΩ (more available upon request)

### Cable length (cable version only)

**2** = 2 m  
**5** = 5 m  
**10** = 10 m

### Mating connector (only connector-version) optional

**C1** = Straight connector output (female)  
**C2** = 90° Connector Outlet (female)

### Connector (RS485 version only) optional

**M12T** = T- Connectors \*  
**M12Y** = Y- Connectors \*\*

\* 4-pin male connector + 4-pin female connector M12x1, cable length 135 mm

\*\* 4-pin M12x1 female connector + 4-pin M12x1 female connector, cable length 200 mm

## Accessories

### Fieldbus connection (for RS485 version only)

**Type** GATEWAY - PROFINET  
**GATEWAY** = Gateway

### Fieldbus

**PROFINET** = Profinet  
**ETHERNETIP** = EtherNet/IP  
**ETHERCAT** = EtherCat

# Datasheet

POWERLINK = Ethernet Powerlink

## Fieldbus-Connection

### Gateway- Interface for PR20RS



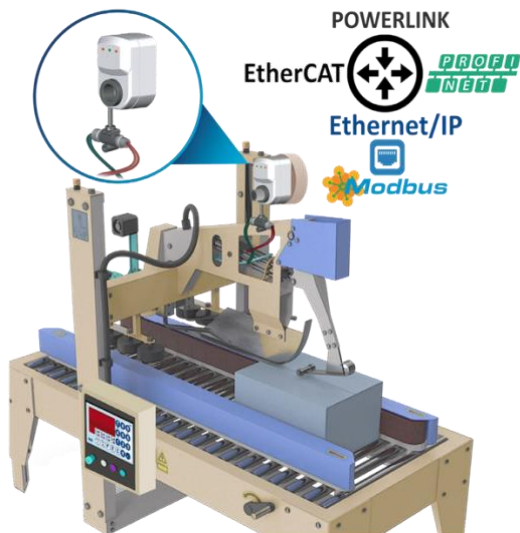
#### GATEWAY

Protocol converters for connection to fieldbus networks.

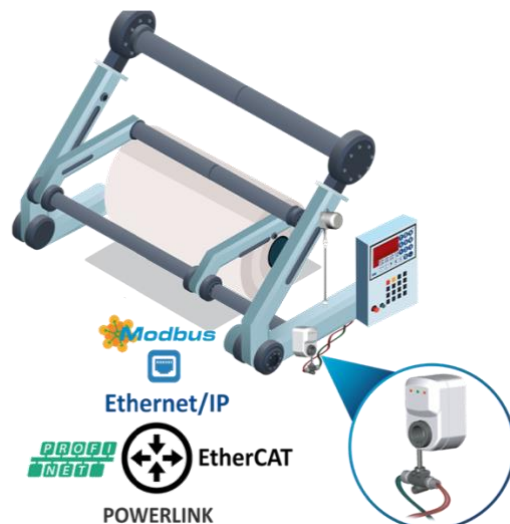


### Examples of use PR20RS

#### Linear axis position control



#### Swing arm angle position control



# Datasheet

**Manufacturer:**  **FIAMA**  
since 1913

The manufacturer reserves the right to make changes to the products without prior notice if it deems such changes necessary for their improvement.