

**NOVOHALL  
Rotary Sensor  
touchless technology  
transmissive**

Series RFD4000  
analog



**Special features**

- fully touchless - no shaft or seals to wear
- measure directly through any non-ferromagnetic material
- electrical range up to 360°
- linearity  $\pm 0.5\%$
- simple mounting
- lateral magnet offset up to  $\pm 1.5\text{ mm}$
- protection class IP67/IP69k
- single and redundant versions
- unlimited mechanical lifetime
- resolution 12 bit
- excellent price/performance ratio
- extremely flat 7 mm design

The RFD 4000 utilizes a separate magnet or magnetic position marker, attached to the rotating shaft to be measured.

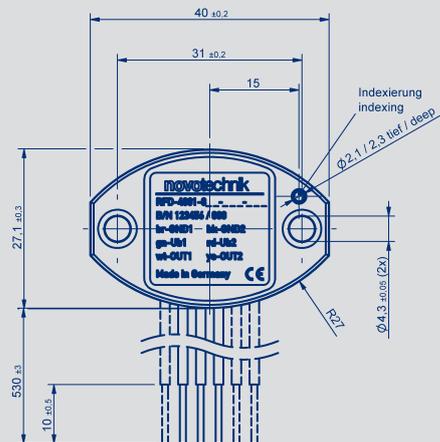
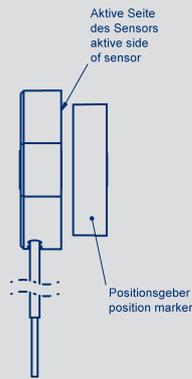
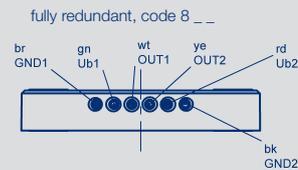
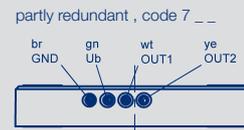
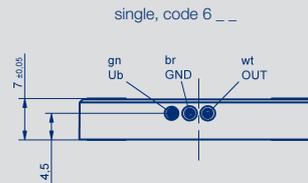
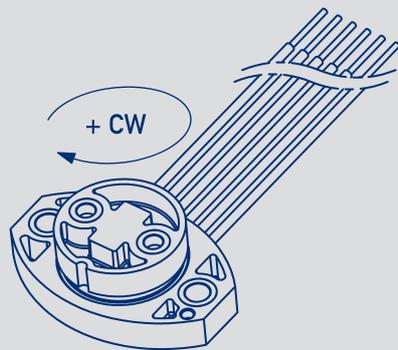
The orientation of the magnetic field is measured and an analog voltage representing the angle is the output signal.

The very compact physical dimensions allows installation in small spaces. The housing is made of high grade temperature-resistant plastic material. The sensor is sealed and is not sensitive to dust, dirt, or moisture.

The two-part design, with the RFD sensor itself, and its magnetic position marker, offers great flexibility when mounting. The absence of shaft and bearing makes the assembly much less sensitive to axial and radial application tolerances. Measurements can be made transmissively through any nonferromagnetic material.

Electrical connection is made via lead wires.

Description	
Housing	high grade, temperature resistant plastic, Thermoplast with brass inserts
Electrical connections	lead wires 3 x 0.5 m (0.5 mm <sup>2</sup> ) single
	lead wires 4 x 0.5 m (0.5 mm <sup>2</sup> ) partly redundant
	lead wires 6 x 0.5 m (0.5 mm <sup>2</sup> ), fully redundant

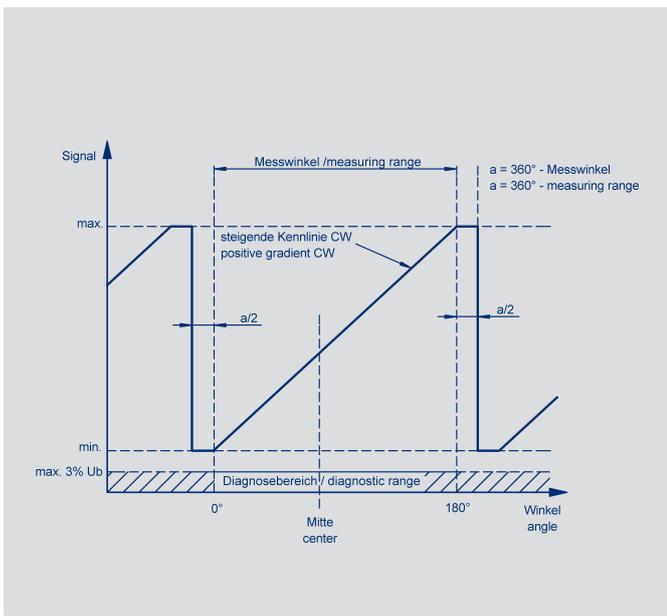


When the shaft marking points to the cable outlet, the sensor is in the electrical center position.

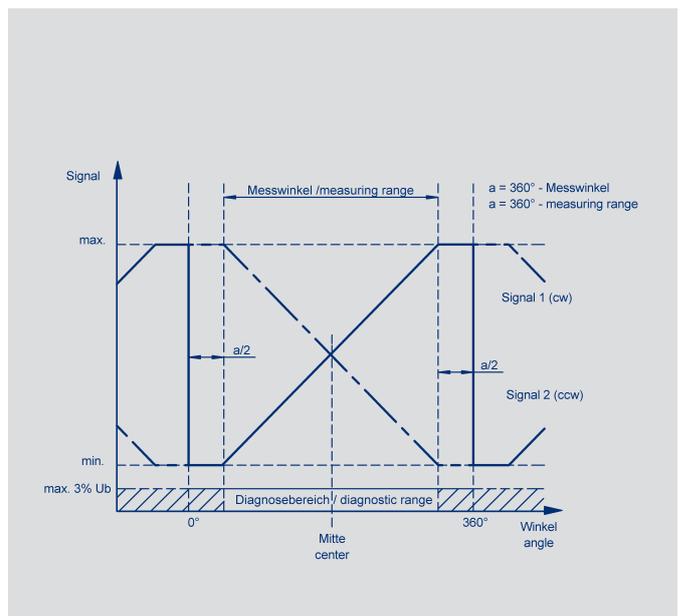
**Pin assignment**

Colour	single code 6 __	partly redundant code 7 __	fully redundant code 8 __
Green	Supply voltage +Ub	Supply voltage + Ub	Supply voltage +Ub 1
Brown	GND	GND	GND 1
White	Output	Output 1	Output 1
Red	-	-	Supply voltage +Ub 2
Black	-	-	GND 2
Yellow	-	Output 2	Output 2

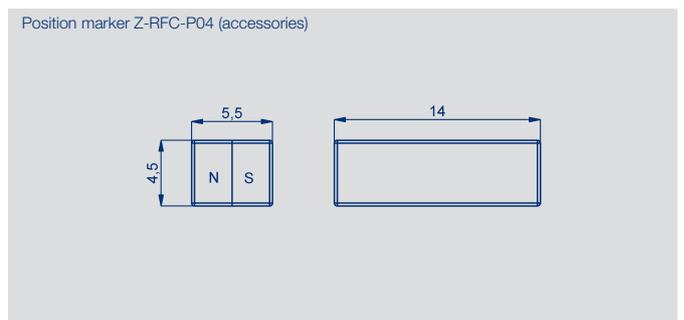
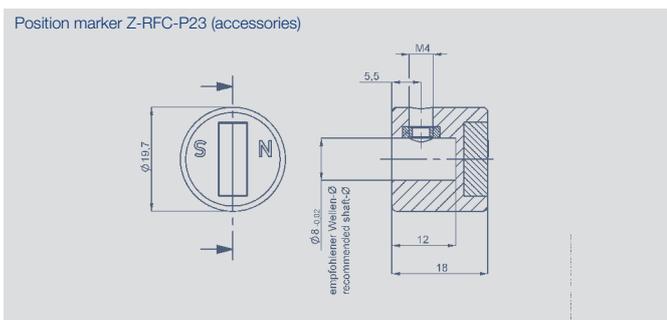
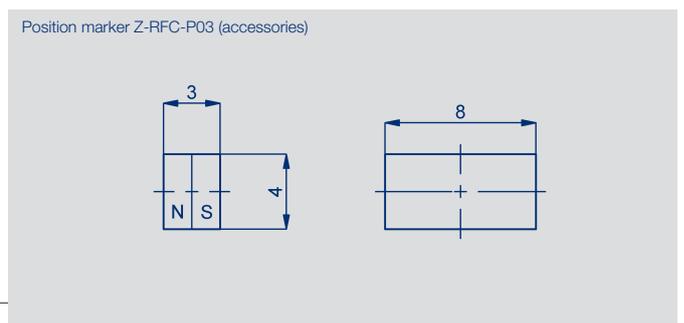
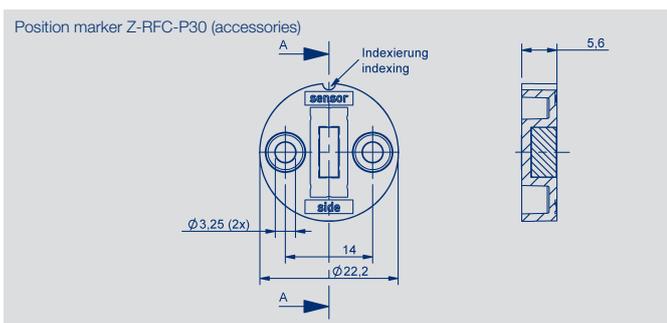
**Output characteristics single (code 6 \_ \_)**



**Output characteristics redundant (code 7 / 8 \_ \_)**



**Position marker examples**



Technical data and further position markers see separate data sheet.  
Novotechnik-approved magnets are used to achieve specified performance.

<b>Type designations</b>	<b>RFD-4021- - - - - 2 _ _ - 4 _ _</b>	
<b>Mechanical Data</b>		
Dimensions	see dimension drawing	
Mounting	with 2 M4 screws ( included)	
Mechanical travel	360 continuous	°
Maximum operational speed	unlimited	
Weight	approx. 10	g
Cross-section lead wires	0.5	mm <sup>2</sup>
<b>Electrical Data</b>		
Supply voltage Ub	5 (4.5 ... 5.5)	V
No-load supply current	typ. 13 (8 on request) per channel	mA
Reverse voltage	yes, only supply lines	
Short circuit protection	yes, all outputs vs. GND and Ub	
Measuring range	0 ... 30 up to 0 ... 360, in 10° steps	°
Resolution	12	bit
Number of channels	1 / 2	
Update rate	2500	Hz
Repeatability	0.1	°
Independent Linearity	±0,5 (at RL = 10 kΩ vs. GND)	%
Output signal	ratiometric to Ub 0.25 V ... 4.75 V 0.5 ... 4.5 V	
Temperature error at stroke angle 30 up to 170°	±0.875	% FS
Temperature error at stroke angle 180 up to 360°	±0,6	% FS
Insulation resistance (500 VDC)	≥ 10	MΩ
<b>Environmental Data</b>		
Temperature range	-40...+125	°C
Vibration (IEC 60068-2-6)	5...2000 Hz Amax = 0.75 mm amax = 20 g	
Shock (IEC 60068-2-27)	100 (6 ms)	g
Life	mechanical unlimited	
MTTF (DIN EN ISO 13849-1 parts count method, w/o load)	675 (single) 512 (per channel) partly redundant 516 (per channel) fully redundant	years years years
Functional Safety	When using our products in safety-related systems, please contact us	
Protection class (DIN EN 60529)	IP67 / IP69k	
EMC compatibility	ISO 11452-2 Radiated EM HF-Fields, Absorber Hall 200 V/m ISO 11452-5 Radiated EM HF-Fields, Stripline 200 V/m ISO TR10605 Packaging and Handling + Component Test 8/15 kV CISPR 25 Radiated Emission (conducted) GW 5 CISPR 25 Radiated Emission (Field) GW 5 EN 61000-4-4 Immunity against fast transient disturbance (Burst) 1kV EN 61000-4-6 Immunity against conducted disturbances induced by HF Fields 10V/m eff. EN 61000-4-8 Immunity against Power Frequency Magnetic Fields 30 A/m	
Working distance A / magnet constant	see data sheet position marker	
Lateral magnet offset	see data sheet	



## Ordering specifications

### Preferred types printed in bold:

- reduced delivery time for up to 25 pcs
- best low volume pricing

Operating voltage  $U_b$   
 2:  $U_b = 5 \text{ VDC}$  (4.5 VDC ... 5.5 VDC)

### Output signal range

- 1: 0.25 ... 4.75 V ratiometric to supply voltage  
 2: 0.5 ... 4.5 V ratiometric to supply voltage

### Output characteristics

- 1: rising cw  
 2: rising ccw  
 3: crossed outputs, channel 1 rising cw (partly redundant)  
 4: crossed outputs, channel 1 rising cw (fully redundant)  
 other characteristics on request

### Electrical connection

- 401: lead wires 3 x 0.5 m, single (6 \_ \_)  
 411: lead wires 4 x 0.5 m, partly redundant (7 \_ \_)  
 421: lead wires 6 x 0.5 m, fully redundant (8 \_ \_)  
 other cable lengths and assembled connectors on request

**R F D - 4 0 2 1 - 6 3 6 - 2 1 1 - 4 0 1**

Series

Mechanical specification  
 4021: standard

### Measuring range

- 03: angle 0° ... 30° min.  
 ...  
**06, 12, 18, 24, 36**  
 ...  
 36: angle 0° ... 360° max.  
 other angles on request

### Number of channels

- 6: single output (three wires, one output)  
 7: partly redundant (four wires, two outputs)  
 8: fully redundant (six wires, two outputs)

Order Code Example: RFD 4021 618 211 401: RFD4021 with 180° electrical angle, supply 5 V, output rising cw, range 0.25 ... 4.75 V, connection 3 lead wires

Order Code Example: RFD 4021 824 214 421: RFD4021 with 240° electrical angle, supply 5 V, output 1 rising cw / output 2 rising ccw, range 0.25 ... 4.75 V, connection 6 lead wires, 2 x  $U_b$ , 2 x output

## Required accessories

Position marker Z-RFC-P30,  
 Art.No. 056086;  
 Position marker Z-RFC-P03,  
 Art.No. 005658;  
 Position marker Z-RFC-P04,  
 Art.No. 005659;  
 Position marker Z-RFC-P23,  
 Art.No. 056074  
 (further position markers see  
 separate data sheet  
 Positionmarker\_rotary)

## Recommended accessories

MAP process control  
 indicators with display

## Available on request

SPI or PWM interface  
 Other interfaces