

NOVOHALL
Angle Sensor
touchless technology
transmissive

Series RFD4000
analog



The sensor utilizes the orientation of a magnetic field for the determination of the measurement angle. Therefore, a position marker is attached to the rotating shaft. The magnetic field orientation is captured with an integrated circuit. An analogue output signal represents the calculated angle.

The extreme miniaturization of the sensor enables the application also in very small installation spaces. The housing is made of high grade temperature-resistant plastic material. The sensor is totally sealed and therefore is not sensitive to dust, dirt or moisture.

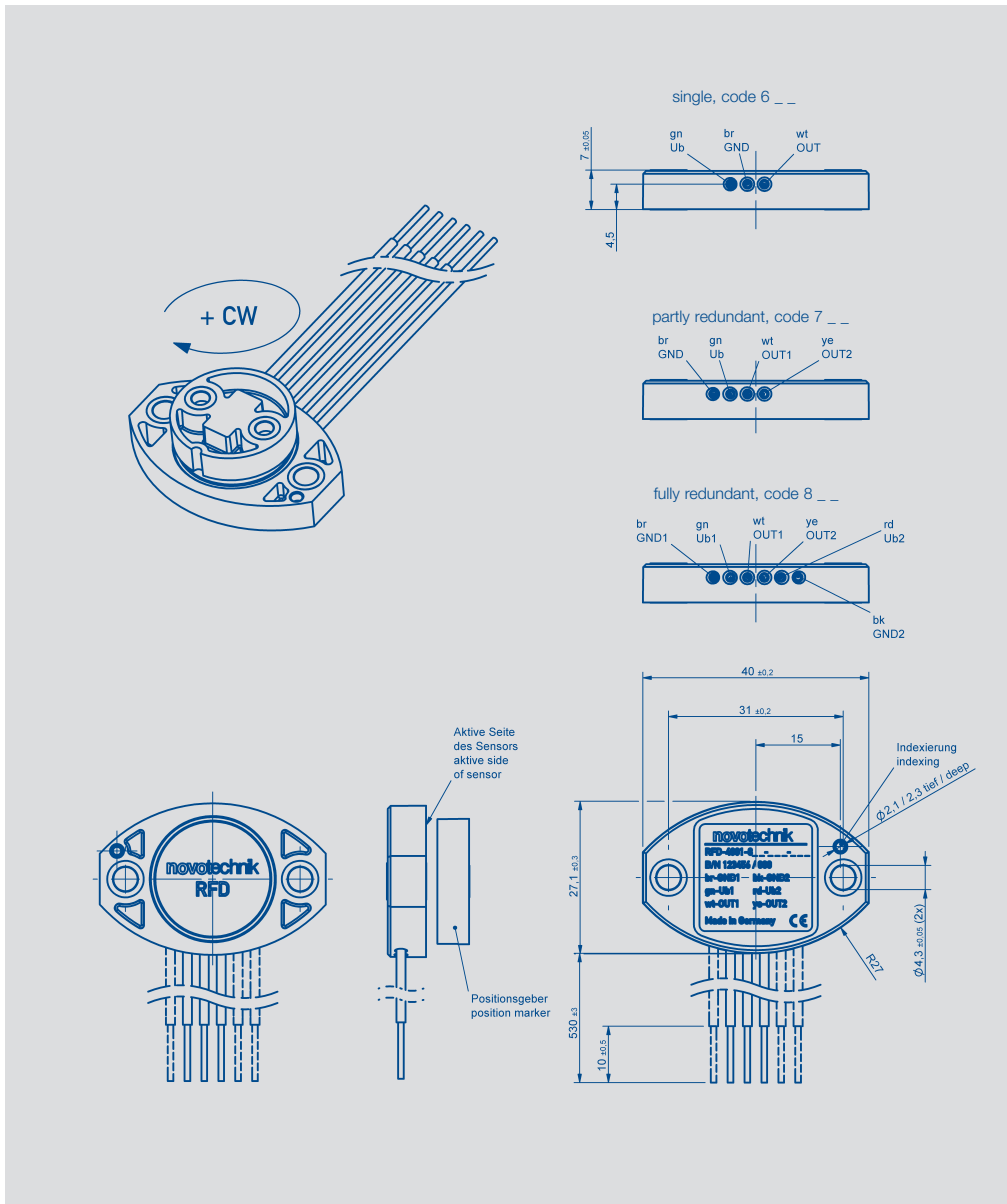
The two-part design of the sensor Series RFA and its position marker offers the customer maximal variability when mounting the sensor. The absence of shaft and bearing makes the assembly insensitive for customer application tolerances. Measurements can be made transmissively through various (non-magnetic) materials.

Electrical connection is made via lead wires.

Special features

- touchless technology, magnetic measurement
- enables for transmissive measurements
- electrical range up to 360°
- simple mounting
- lateral magnet offset up to $\pm 1,5$ mm
- protection class IP67 / IP69k
- single and redundant versions
- unlimited mechanical lifetime
- resolution 12 bit
- absolute linearity ± 1 %
- very favourable price/performance ratio
- extremely flat design

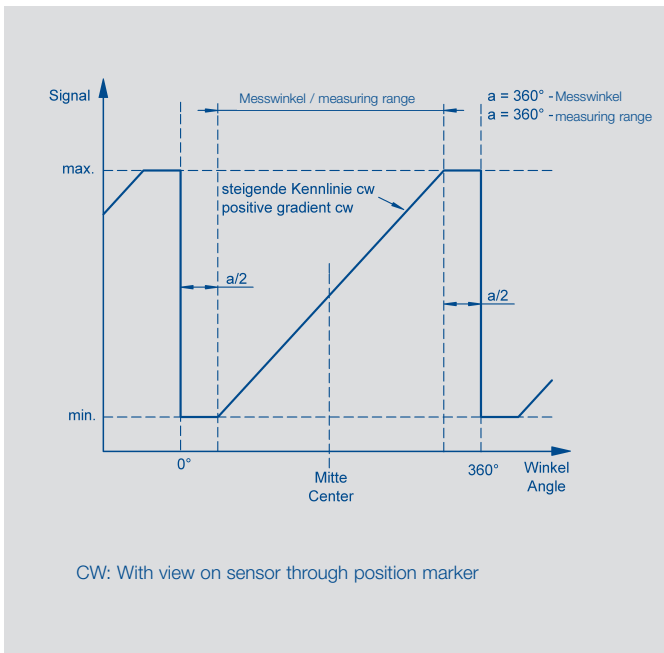
Description	
Housing	high grade, temperature resistant plastic, Thermoplast with brass inserts
Electrical connections	lead wires 3 x 0.5 m (0.5 mm ²) single lead wires 4 x 0.5 m (0.5 mm ²) partly redundant lead wires 6 x 0.5 m (0.5 mm ²), fully redundant



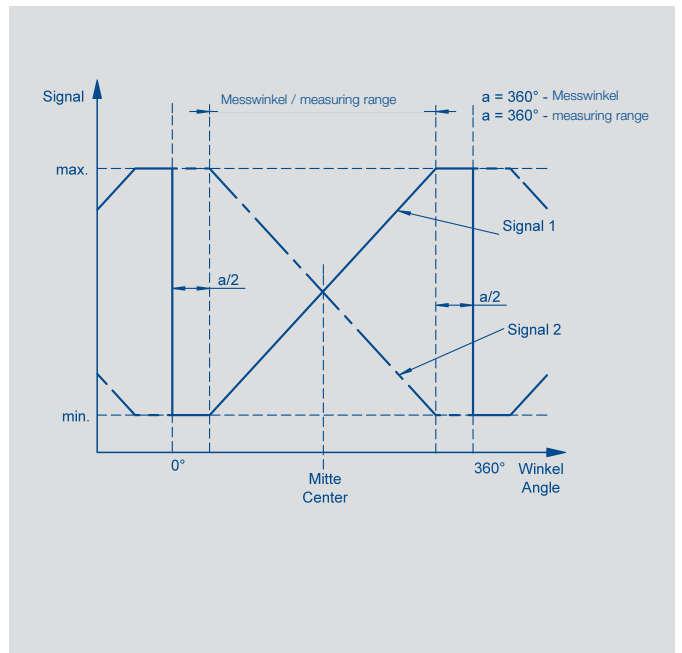
Pin assignment

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

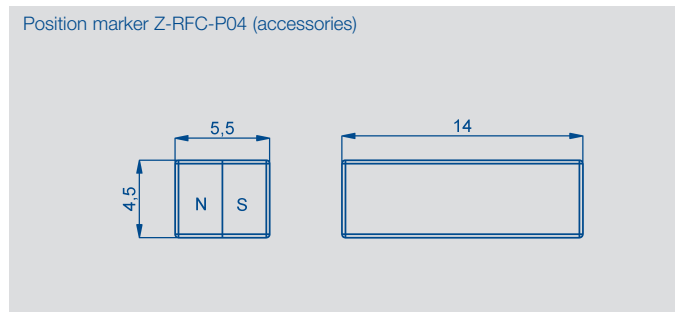
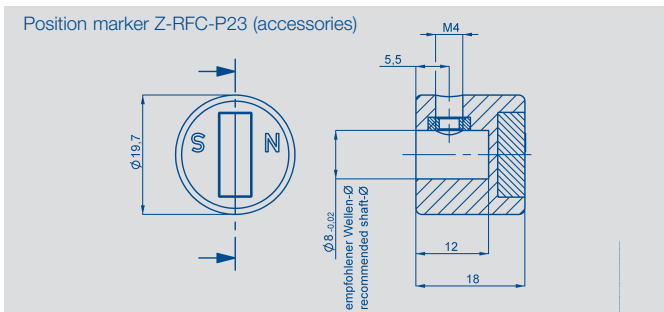
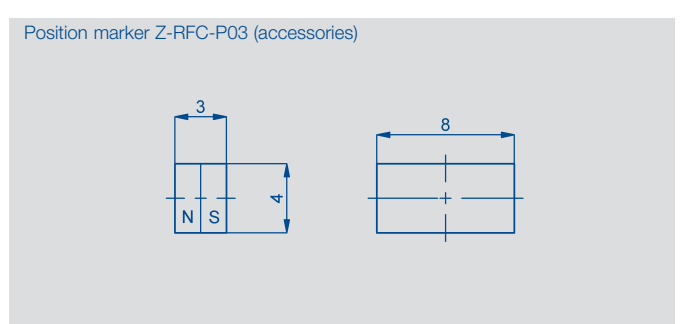
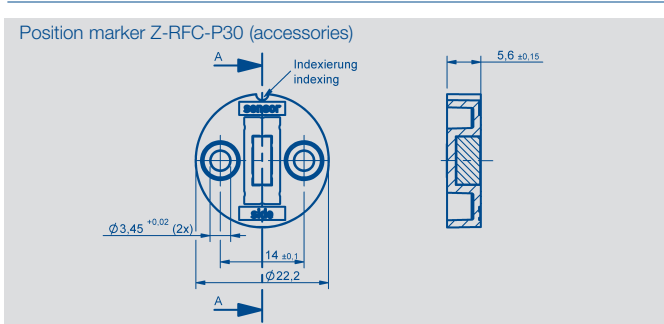
Output characteristic single (code 6 _ _)



Output characteristics redundant (code 7 / 8 _ _)



Position marker examples



Technical data and further position markers see separate data sheet.

Type designations	RFD-4001- _ _ _ Supply voltage 5 VDC	
Mechanical Data		
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 ²
Electrical Data		
Supply voltage U_b	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 U_b	
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	°
Absolute linearity	±1 (at $R_L = 10\text{ k}\Omega$)	%
Output signal	ratiometric to U_b 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	M Ω
Environmental Data		
Temperature range	-40...+125	°C
Vibration (IEC 60068-2-6)	5...2000 $A_{max} = 0.75$ $a_{max} = 20$	Hz mm 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)	424 (single) 330 (per channel) 266 (per channel) When using our produkts in safety-related systems, please contact us	years years years
Protection class (DIN EN 60529)	IP67 / IP69k	
EMC compatibility	ISO 11452-2 Radiated EM HF-Fields, Absorber Hall ISO 11452-5 Radiated EM HF-Fields, Stripline ISO TR10605 Packaging and Handling + Component Test CISPR 25 Radiated Emission (conducted) CISPR 25 Radiated Emission (Field) EN 61000-4-4 Immunity against fast transient disturbance (Burst) 1kV EN 61000-4-6 Immunity against conducted disturbances inducted 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:

- delivery time up to 25 pcs. within 10 working days
- no low volume surcharge

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 U_b**
 2: 0.5 ... 4.5 V ratiometric to U_b

Output characteristics

1: **Rising slope cw (single)**
 2: Rising slope ccw (single)
 3: **Two crossed outputs, output 1 rising cw (fully / partly redundant)**

Electrical connection

401: lead wires 3 x 0.5 m (0.5 qmm), single (6 _ _)
 411: lead wires 4 x 0.5 m (0.5 qmm), partly redundant (7 _ _)
 421: lead wires 6 x 0.5 m (0.5 qmm), fully redundant (8 _ _)

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

Series

Mechanical specification
 4001: Standard

Model

6: **single output 1 x U_b / 1 x output**
 7: partly redundant 1 x U_b / 2 x output
 8: **fully redundant 2 x U_b / 2 x output**

Measuring range

03: angle 0° ... 30° min.
 ...
06, 12, 18, 24, 36
 ...
 36: angle 0° ... 360° max.

Order Code Example: RFD 4001 618 211 401: RFD4001 with 180° electrical angle, supply 5 V, output rising cw, range 0.5 ... 4.5 V, connection 4 lead wires
 Order Code Example: RFD 4001 824 223 421: RFD4001 with 240° electrical angle, supply 5 V, output 1 rising cw / output 2 rising ccw, range 0.5 ... 4.5 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 Position-
 marker_rotary)

Recommended accessories

Process-controlled indicators
 MAP... with display.

Available on request

Cable versions
 Customized connectors
 Specific angle ranges /
 characteristics
 SPI or PWM interface
 Other interfaces