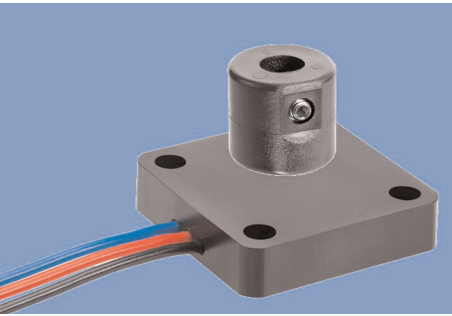


Product discontinued!  
Replacement requirement only on request.  
Replaced by series RFD.

**NOVOHALL**  
**Angle Sensor**  
**touchless technology**  
**transmissive**

Series RFA4000  
analog



**Special features**

- touchless technology, magnetic measurement
- enables for transmissive measurements
- electrical range up to 360°
- simple mounting
- lateral magnet offset up to  $\pm 3$  mm
- protection class IP67 / IP69k
- single and redundant versions
- unlimited mechanical lifetime
- resolution 12 bit
- independent linearity  $\pm 0.5$  %
- very favourable price/performance ratio
- extremely flat design  
30x30x7mm<sup>3</sup>

The sensor utilizes the orientation of a magnetic field for the determination of the measurement angle. Therefore, a magnet 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.

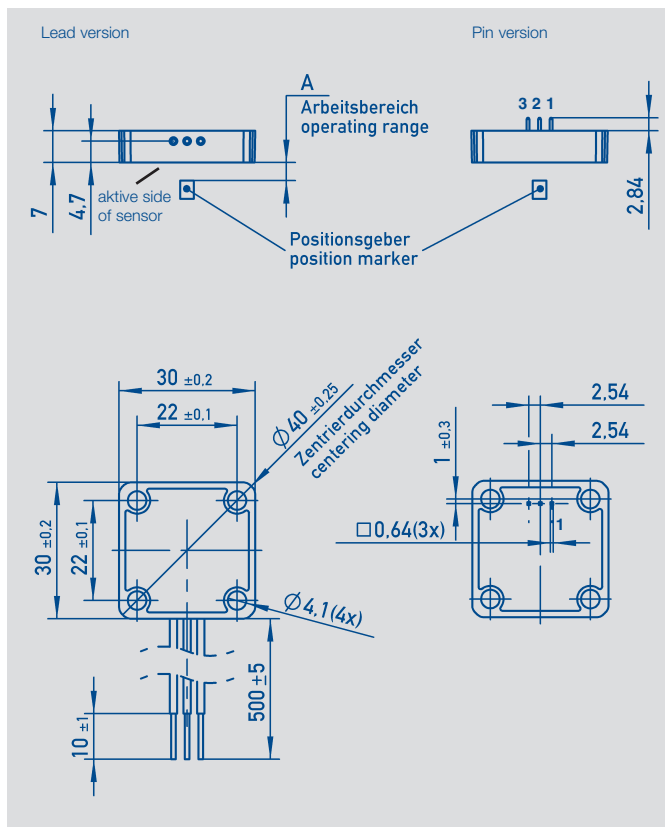
The two-part design of the sensor Series RFA and its position marker offers the customer maximal variability when mounting the sensor. The absence of shaft and bearing makes the assembly insensitive for customer application tolerances. Measurements can be made transmissively through various (non-magnetic)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

Electrical connection is made via lead wires.

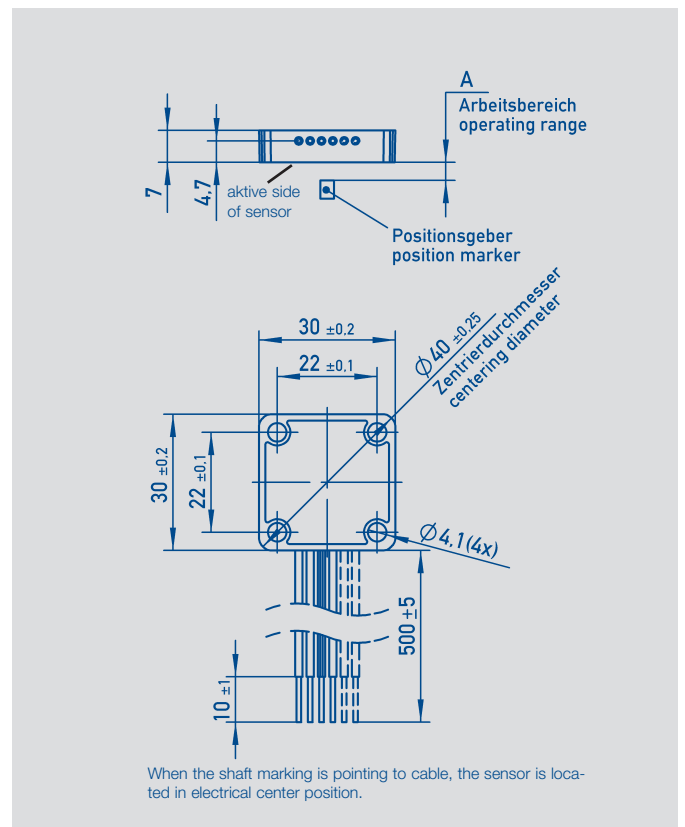
**Description**

Housing	high grade, temperature resistant plastic
Electrical connections	lead wires AWG 20 (0.5 mm <sup>2</sup> ) alternative soldering pins for PCB mounting

Dimensions single version (Code 6 \_ \_)



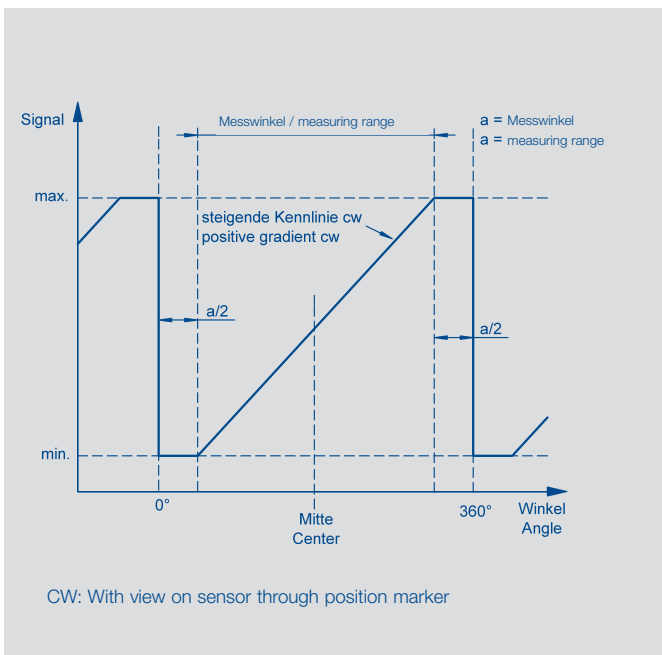
Dimensions multi-channel version (Code 7 / 8 \_ \_)



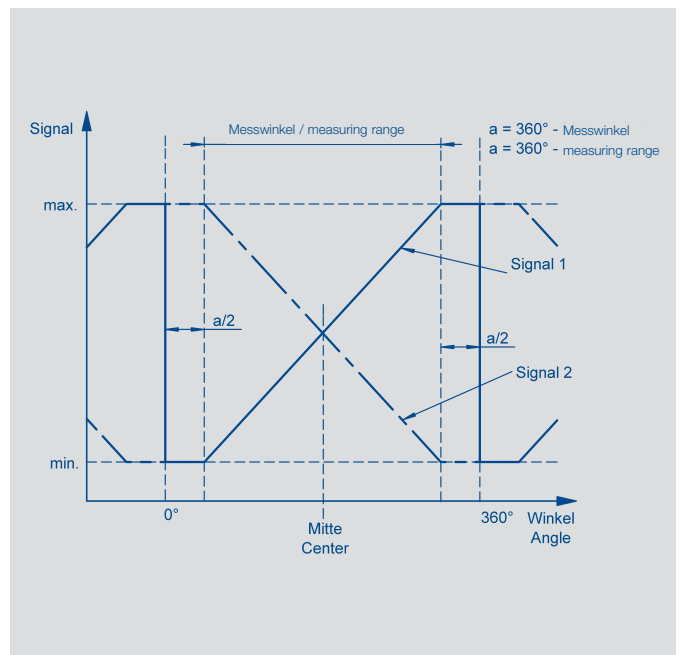
Pin assignment

Colour	single Code 6 _ _	partly redundant Code 7 _ _	fully redundant Code 8 _ _
Red	Supply voltage +Ub	Supply voltage +Ub	Supply voltage +Ub 1
Black	GND	GND	GND 1
Blue	Output	Output 1	Output 1
Red / white	-	-	Supply voltage +Ub 2
Black / white	-	-	GND 2
Blue / white	-	Output 2	Output 2

Output characteristic single (Code 6 \_ \_)

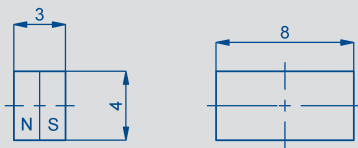


Output characteristics redundant (Code 7 / 8 \_ \_)

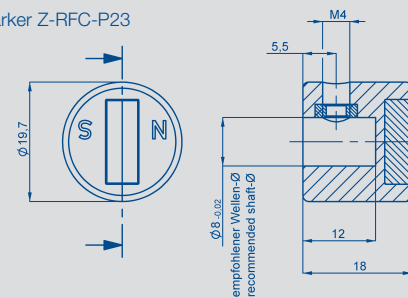


Position marker examples

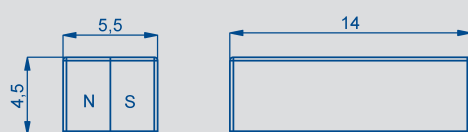
Position marker Z-RFC-P03



Position marker Z-RFC-P23



Position marker Z-RFC-P04



Technical Data and further position markers see separate data sheet. Only Novotechnik approved magnets may be used.

<b>Type designations</b>	<b>RFA-4001- _ _ _</b>	
<b>Mechanical Data</b>		
Dimensions	see dimension drawing	
Mounting	with 4 M4 screws (not included)	
Mechanical travel	360 continuous	°
Maximum operational speed	unlimited	min <sup>-1</sup>
Weight	ca. 10	g
<b>Electrical Data</b>		
Supply voltage Ub	5 ±0.5	VDC
No-load supply current	typ. 15 (typ. 8 on request) per channel	mA
Reverse voltage	yes, only supply lines	
Short circuit protection, vs. GND and +Ub	yes	
Measuring range	0 ... 30 up to 0 ... 360, in 10° steps	°
Number of channels	1 / 2	
Update rate	5000 typ.	measur./s
Resolution	12 bit	
Repeatability	0.1	°
Independent linearity	≤ 0.5 of signal range	%
Output signal	ratiometric to Ub 0.25 V ... 4.75 V 0.5 ... 4.5 V (load ≥1 kΩ)	
TC at stroke angle 30 up to 170°	typical 100	ppm/K
TC at stroke angle 180 up to 360°	typical 50	ppm/K
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section lead wires	0.5	mm <sup>2</sup>
<b>Environmental Data</b>		
Temperature range	-40...+125	°C
Vibration (IEC 60068-2-6)	5...2000 A <sub>max</sub> = 0.75 a <sub>max</sub> = 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) 464 (per channel) partly redundant 468 (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 Interference test in Absorber chamber ISO 11452-5 Interference test Stripline CISPR 25 Emitted interference CISPR 25 Conducted emission ISO 7637-1 Transients ISO 10506 ESD components check ISO 10605 ESD Handling & Packaging	
Working distance A / magnet constant	Z-RFC-P03: A = 2 ±1 mm / magnet constant = 1.85 [°/mm <sup>2</sup> ] Z-RFC-P04: A = 4.5 ±1.7 mm / magnet constant = 0.8 [°/mm <sup>2</sup> ]	
Lateral magnet offset (will cause additional linearity error)	max. ±3 mm (Z-RFC-P04), max. ±1.5 mm (Z-RFC-P03) The maximum error which is caused by lateral offset between sensor and position marker may be approximated as follows:  Error [°] = magnet constant x ( offset [mm] ) <sup>2</sup> The magnet constant depends from the position marker.  Example: Z-RFC-P04: magnet constant = 0.8 °/mm <sup>2</sup> ; offset = 0,5 mm Error [°] = 0.8°/mm <sup>2</sup> x (0,5 mm) <sup>2</sup> = 0,2°	

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<b>Ordering specifications</b>			<b>Operating voltage Ub</b> 2: Ub = 5 VDC (4.5 VDC ... 5.5 VDC)		
<b>Preferred types printed in bold:</b> <ul style="list-style-type: none"> <li>• delivery time up to 25 pcs. within 10 working days</li> <li>• no low volume surcharge</li> </ul>			<b>Output signal range</b> <b>1: 0.25 ... 4.75 V ratiometric to Ub</b> 2: 0.5 ... 4.5 V ratiometric to Ub		
			<b>Output characteristics</b> <b>1: rising cw</b> 2: rising ccw <b>3: crossed outputs, channel 1 rising cw (partly redundant)</b> <b>4: crossed outputs, channel 1 rising cw (fully redundant)</b> other characteristics on request		
			<b>Electrical connection</b> 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 _ _) 501: 3 soldering pins on housing bottom, single (6 _ _)		
<b>R F A - 4 0 0 1 - 6 3 6 - 2 1 1 - 4 0 1</b>					
Series	Mechanical specification 4001: Standard	Model 6: single 1 x Ub / 1 x output 7: partly redundant 1 x Ub / 2 x output 8: fully redundant 2 x Ub / 2 x output	Measuring range 03: angle 0° ... 30° min. ... <b>06, 12, 18, 24, 36</b> ... 36: angle 0° ... 360° max.		

#### Required accessories

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