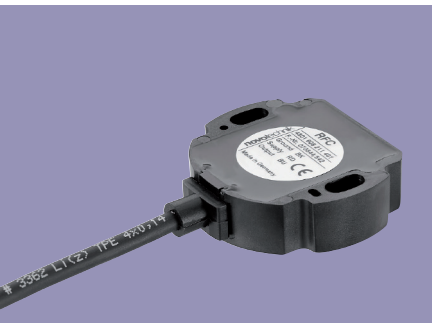
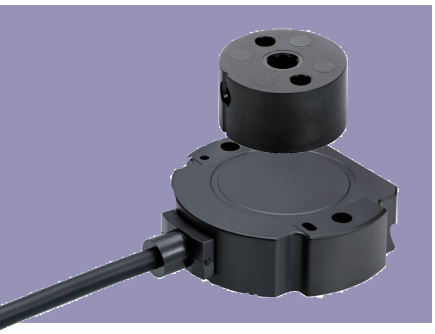
novotechnik
Siedle Group

NOVOHALL
Rotary Sensor
touchless technology
transmissive

Series RFC4800
digital
SSI, SPI, Incremental





Special features

- fully touchless - no shaft or seals to wear
- measure directly through any non-ferromagnetic material
- unlimited mechanical lifetime
- SSI, SPI or incremental output
- electrical range up to 360°
- linearity ±0.5 %
- simple mounting
- large allowable radial offset for magnetic pickup
- protection class IP67/IP69k
- resolution 9 - 14 bit
- wide temperature range -40° C up to +85° C
- for analog interface versions - see septarate data sheet

The RFC 4800 utilizes a separate magnet or magnetic position marker, attached to the rotating shaft to be measured.

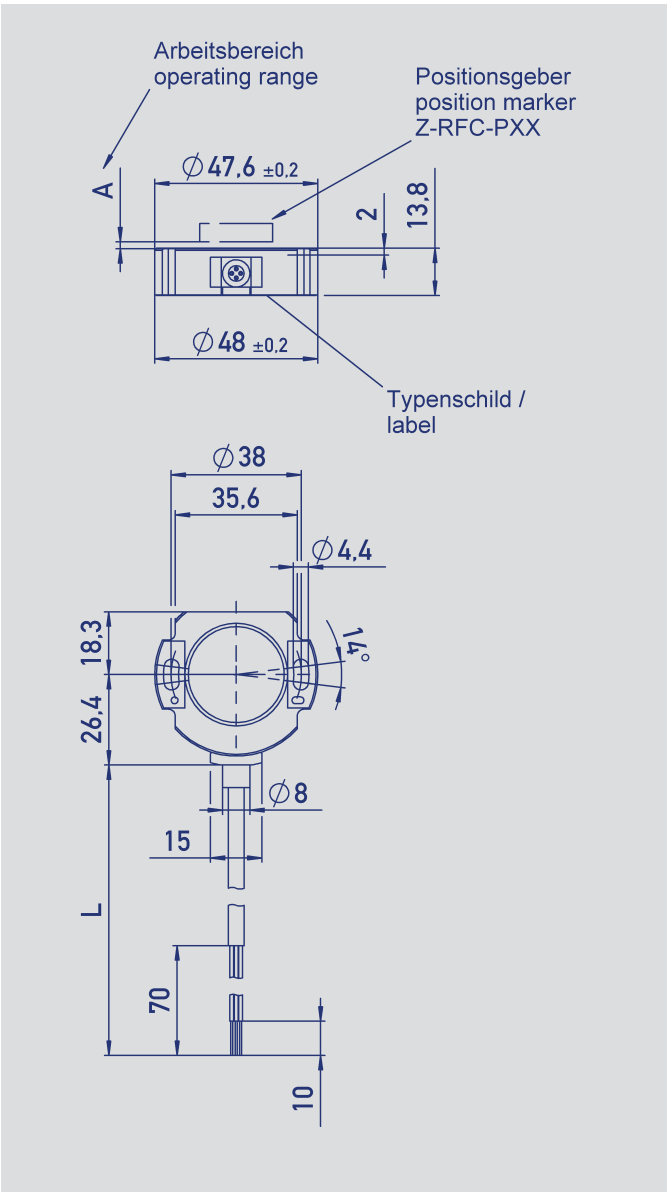
The orientation of the magnetic field is measured and the output is one of three types of digital signals.

The two-part design, with the RFC 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 non-ferromagnetic material.

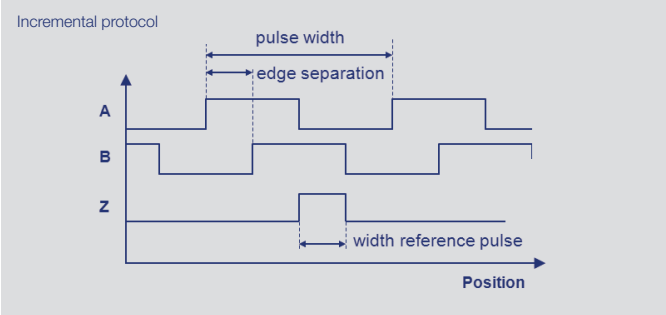
The housing is made of high grade temperature-resistant plastic material. Elongated holes allow for simple mounting and easy mechanical adjustment. The sensor is totally sealed and is not sensitive to dust, dirt or moisture.

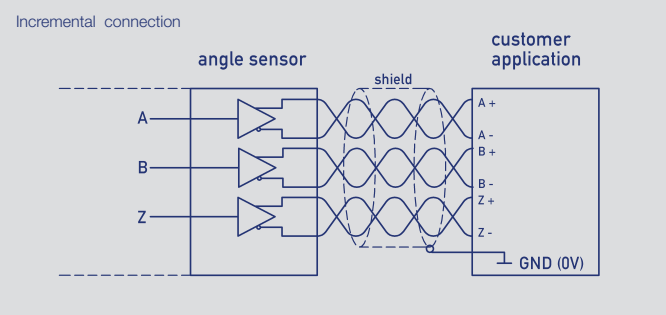
Electrical connection is made via an integrated shielded cable.

Description	
Housing	high grade, temperature resistant plastic
Electrical connections	shielded cable AWG 24 (0.25 mm²) SSI, INC shielded cable AWG 26 (0.14 mm²) SPI

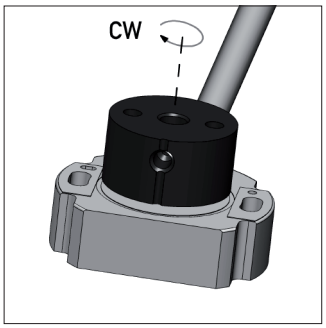


Incremental Interface



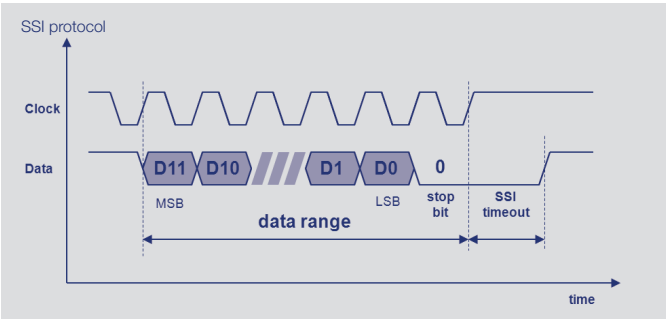


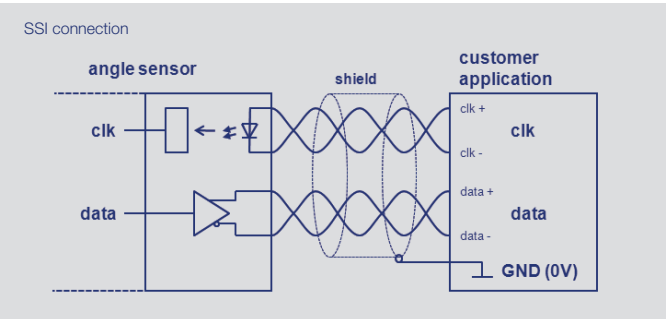
Connections Incremental	
Signal	**Wire colour**
Supply voltage Ub	Green
Supply voltage GND	Brown
A+	Yellow
A-	Grey
B+	Red
B-	Pink
Z+	White
Z-	Blue



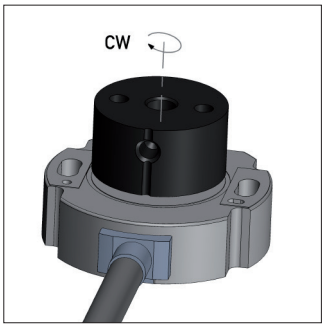
When the indicator of the position marker is pointing away from the cable, the output is in the vicinity of the reference pulse (Z).

SSI Interface





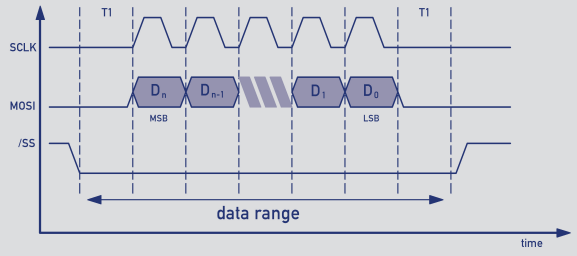
Connections SSI	
Signal	**Wire colour**
Supply voltage Ub	Green
Supply voltage GND	Brown
Signal output SSI Data+	Red
Signal output SSI Data-	Yellow
Clock input SSI Clk+	Pink
Clock input SSI Clk-	Blue
Not assigned	White
Not assigned	Grey



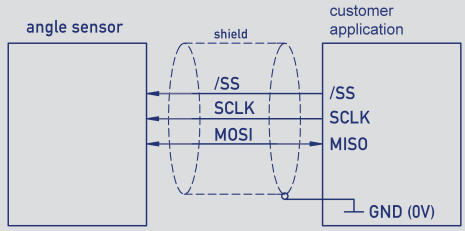
When the indicator of the position marker is pointing towards the cable, the sensor output is near the electrical center position.

SPI Interface

SPI protocol

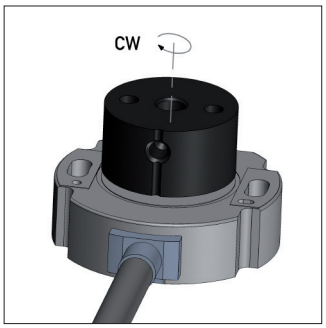


SPI connection



Connections SPI

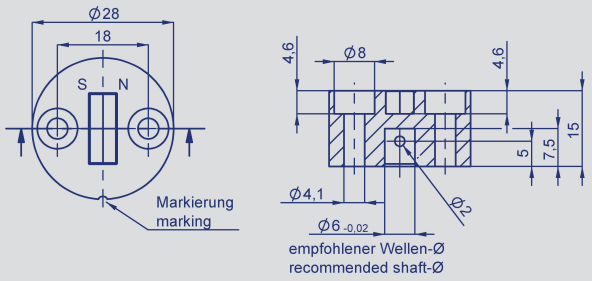
Signal	Wire colour
Supply voltage Ub	Green
Supply voltage GND	Brown
MOSI / MISO	Yellow
SCLK	Grey
/SS (slave select)	White



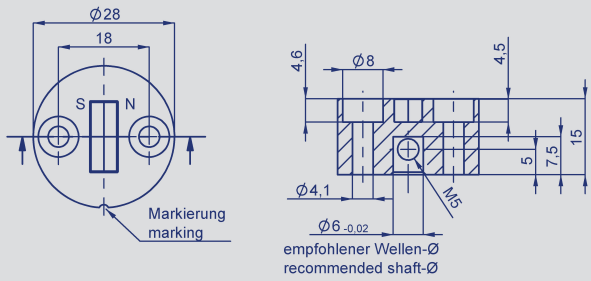
When the indicator of the position marker is pointing towards the cable, the sensor output is near the electrical center position.

Position marker (examples)

Position marker Z-RFC-P02 (accessory)



Position marker Z-RFC-P08 (accessory)



Operating range position marker SSI / INC

Z-RFC-P02 / ...P04 / ...P08 / ...P23	0 ... 1.5 mm

Operating range position marker SPI

see separate data sheet „Positionmarker rotary“

For position marker options and data, see separate data sheet.
Novotechnik-approved magnets are used to achieve specified performance.

Technical Data - SSI Interface

	RFC-48_ _-2 _ _-4 _ _- _ _ _ Supply voltage 5 VDC	
Mechanical Data		
Dimensions	see dimension drawing	
Mounting	with 2 screws M4 (enclosed in delivery), max.torque 250 Ncm	
Mechanical travel	360 continuous	°
Maximum operational speed	unlimited	
Weight	approx. 50	g
Electrical Data		
Supply voltage Ub	5 (4.5 ... 5.5)	VDC
Current consumption (w/o load)	typ. 27	mA
Reverse voltage	yes, supply lines	
Short circuit protection	yes, (vs. GND and Ub)	
Measuring range	360	°
Max. Clock rate	1	MHz
Inputs	RS422 compatible, CLK-lines electrically isolated via optocouplers	
Protocol	SSI (12 bit data + 1 stop bit)	
Encoding	Gray code	
Update rate	34 (at CLK = 1 MHz)	kHz
Monoflop time (tm)	20	µs
Resolution across 360°	12	Bit
Repeatability	0.1	°
Hysteresis	standard 0.7	°
Independent linearity	typ. 0.5	± % FS
Temperature error	±0.375	% FS
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 24, 0.25	mm^2
Environmental Data		
Temperature range	-40...+85	°C
Vibration IEC 60068-2-6	5...2000 Amax = 0.75 amax = 20	Hz mm g
Shock IEC 60068-2-27	100 (6 ms)	g
Life	mechanically unlimited	
MTTF (DIN EN ISO 13849-1 parts count method, w/o load)	148	years
Functional safety	When using our products in safety-related systems please conctact us	
Protection class (DIN 40050 / IEC 529)j	IP67 / IP6k9k	
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV EN 61000-4-3 electromagnetic fields 10V/m EN 61000-4-4 electrical fast transients (Burst) 1kV EN 61000-4-6 conducted disturbances, induced by RF fields 10V/m eff. EN 55011/EN 55022/a1 Radiated disturbances class B	

Technical Data - Incremental Interface

	RFC-48_ _-2 _ _-5 _ _- _ _ _ **Supply voltage 5 VDC**	
Mechanical Data		
Dimensions	see dimension drawing	
Mounting	with 2 screws M4 (enclosed in delivery, max. torque 250 Ncm	
Mechanical travel	360 continuous	°
Maximum operational speed	30000, higher speed on request	RPM
Weight	approx. 50	g
Electrical Data		
Supply voltage Ub	5 (4.5 ... 5.5)	VDC
Current consumption (w/o load)	typ. 20	mA
Reverse voltage	yes, supply lines and outputs	
Short circuit protection	yes (vs. GND and Ub)	
Measuring range	360	°
Outputs	A+/ A- B+ / B- Z+ / Z-	
Length Z-pulse	= distance between 2 edges A / B	
Ohmic load at outputs	> 1.2 per channel A/ B / Z	kΩ
Update Rate intern	500 typ.	ns
Resolution across 360°	12 (11 / 10 / 9)	Bit
Repeatability	0.1	°
Hysteresis	standard 0.7	°
Independent linearität	typ. 0.5	± % FS
Temperature error	±0.375	% FS
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 24, 0.25	mm^2
Environmental Data		
Temperature range	-40...+85	°C
Vibration IEC 60068-2-6	5...2000 Amax = 0.75 amax = 20	Hz mm g
Shock IEC 60068-2-27	100 (6 ms)	g
Life	mechanically unlimited	
MTTF (DIN EN IO 13849-1 parts count method, w/o load)	246	years
Functional safety	When using our products in safety-related systems please contact us	
Protection class (DIN 40050 / IEC 529	IP67 / IP6k9k	
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV EN 61000-4-3 electromagnetic fields 10V/m EN 61000-4-4 electrical fast transients (Burst) 1kV EN 61000-4-6 conducted disturbances, induced by RF fields 10V/m eff. EN 55011/EN 55022/A1 Radiated disturbances class B	

Technical Data - SPI Interface

	RFC-48_ _-2 _ _-8 _ _-_ _ _ **Supply voltage 5 VDC**	
Mechanical Data		
Dimensions	see dimension drawing	
Mounting	with 2 screws M4 (enclosed in delivery), max. torque 2 Ncm	
Mechanical travel	360 continuous	°
Weight	approx. 50	g
Electrical Data		
Supply voltage Ub	5 (4.5 ... 5.5)	VDC
Current consumption (w/o load)	typ. 15	mA
Reverse voltage	yes, supply lines	
Short circuit protection	yes (vs. GND and Ub)	
Measuring range	360	°
Max. Clock rate	400	kHz
Level SCLK, MOSI, /SS	TTL level (see application note SPI protocol)	
Protocol	SPI	
Update Rate	1	kHz
Resolution across 360°	14	Bit
Repeatability	0.1	°
Hysteresis	< 0.1	°
Independent linearity	≤ 0.5	± % FS
Temperature error	±0.625	% FS
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 26, 0.14	mm^2
Environmental Data		
Temperature range	-40...+85	°C
Vibration IEC 60068-2-6	5...2000 Amax = 0.75 amax = 20	Hz mm g
Shock IEC 60068-2-27	100 (6 ms)	g
Life	mechanically unlimited	
MTTF (DIN EN ISO 13849-1 parts count method, w/o load)	272	years
Functional safety	When using our products in safety-related systems please contact us	
Protection class (DIN 40050 / IEC 529	IP67 / IP6k9k	
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV EN 61000-4-3 electromagnetic fields 10V/m EN 61000-4-4 electrical fast transients (Burst) 1kV EN 61000-4-6 conducted disturbances, induced by RF fields 10V/m eff. EN 61000-4-8 Power frequency magnetic fields 3A/m EN 55011/EN 55022/A1 Radiated disturbances class B	

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Ordering specifications

Preferred types printed in bold:

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

Interface
4: Synchronous-Serial Interface (SSI)
5: Incremental Interface A / B / Z
8: SPI Interface

Interface parameter for SSI Interface (4 _ _)
11: 5 V /4.5 ... 5.5 V), output RS422 comp., Gray code, rising cw
12: 5 V (4.5 ... 5.5 V), output RS422 komp., Gray code, rising ccw

Interface parameter for Incremental Interface (5 _ _)
10: 5 V (4.5 ... 5.5 V), output RS422 comp., rising cw
High Side and Low Side outputs on request
UVW signals instead of ABZ signals for motor commutation on request

Interface parameter for SPI Interface (8 _ _)
31: 5 V (4.5 ... 5.5 V), Binary code, rising cw

Electrical connection
302: round cable 5-pol. 1 m (0,14mm²; shielded) SPI
432: round cable 8-pol. 1 m (0,25 mm², shielded, SSI, Inc.
Cable versions and assembled connectors on request.

R	F	C	–	4	8	0	1	–	2	1	2	–	4	1	1	–	4	3	2

Resolution (SSI Interface)
12: 12 bit - 4096 increments
Other resolutions on request.

Resolution (Incremental Interface)
12: 1024 ppr - 4096 increments resolution (at 4-fold interpolation)
11: 512 ppr - 2048 increments resolution (at 4-fold interpolation)
10: 256 ppr - 1024 increments resolution (at 4-fold interpolation)
9: 128 ppr - 512 increments resolution (at 4-fold interpolation)
Other resolutions on request.

Resolution (SPI Interface)
14: SPI 14 bit

Model
2: Digital Interface

Series

Mechanical version
4801: elongated hole for fixation and easy adjustment
4802: round hole mounting on request

Necessary accessories

Position marker Z-RFC-P02, P/N 005661.

(Information on further position markers, working distances and lateral magnet offset see separate data sheet Positionmarker_Rotary)

Available on request

- Driver configurations for 120 Ohm load
- Absolute position via burst of incremental information at initialization. (Power on Burst)