



**General Safety Information**

This manual is intended for experienced electricians certified in accordance with the German Ordinance on Industrial Safety and Health. The accident prevention regulations must be observed.

**Description/Use**

The incremental rotary encoder of Series RVI84.-.....N.-.... is an intrinsically safe piece of equipment and converts rotary motion into electrical signals. The mechanic of the incremental rotary encoder comprises a cover with a fixed connection cable, a flange, a dual ball bearing shaft, and a code disk. The rotary encoder features two intrinsically safe slotted 2-wire NAMUR sensors. These sensors are not connected to each other electrically and they are not grounded. The intrinsic safety of the built-in NAMUR SJ2-N slot sensors is attested by the EC-Type Examination Certificate PTB 99 ATEX 2219 X.

**Information on the Gas Hazardous Area:**

Gas-explosion-protected equipment for use in Zone 1 and Zone 2.

Declaration of conformity	PF13CERT2948 X
Directive conformity	ATEX 2014/34/EU
Conformity with standards	EN ISO 80079-36:2016 + AC:2019, EN ISO 80079-37:2016; type of protection "c" EN 60079-0:2012+A11:2013-11, EN 60079-11:2012-01
Identification	⊕ II 2 G Ex h ia IIC T6...T4 Gb

**General Technical Information:**

Rated voltage U <sub>0</sub>	8 VDC
Outputs	NAMUR SJ2-N slot initiators in accordance with EN 60947-5-6 Intrinsic safety attested by EC-Type Examination Certificate PTB99 ATEX 2219 X
Permissible ambient temperature	-20 °C to max 60 °C depending on the rotational speed, current circuit, and temperature class; see "Connection Values" table
Housing	Aluminum
Flange	Aluminum
Shaft	Stainless steel
Momentary rated speed	max 3000 rpm; see "Connection Values" table
Maximum shaft load	Axial 50 N Radial 100 N
Degree of protection as per EN 60529	IP65

**Installation**

The device must not be opened.

Information on the hazardous area, the manufacturer datasheets, and all laws and guidelines applicable for the use or the intended purpose must be observed.

The current version of standard 60079-14 in particular must be observed.

The overall rotary encoder system is designed for a maximum momentary rated speed of 3000 rpm. The maximum permitted radial and axial bearing loads specified in the datasheet must be taken into account.

The permissible ambient temperature range specified in this manual must be observed (see "Connection Values" table).

Application areas in which ambient conditions may damage the sealing material NBR must be checked and avoided where possible.

The device must be shielded from strong electromagnetic fields and protected against mechanical damage.

Impermissible electrostatic charging of the metal housing parts must be avoided. Dangerous electrostatic charging of the metal housing parts can be avoided through grounding or by including the flange mounting in the equipotential bonding system.

To minimize risk from electrostatic discharge - clean only with a damp cloth.

The mechanical and electrical values (e.g., ambient temperature, rotational speed, mechanical load, max supply voltage, etc.) of the acquired equipment must not exceed the permitted values set out by the manufacturer.

Issue date: 11.03.2020 TDOCT0533C\_ENG

The intrinsic safety is guaranteed only when the equipment is used in connection with the appropriate associated equipment and in accordance with the verification of intrinsic safety.

The associated equipment must meet the requirements of category "ia." Due to the potential risk of ignition that can occur as a result of faults and/or transient currents in the equipotential bonding system, galvanic isolation in the supply and signal current circuit is preferred. Associated equipment without galvanic isolation may be used only if the appropriate requirements as set out in IEC 60079-14 are met.

### Connection

The supply device that supplies the intrinsically safe circuits must be certified separately; the supply device must not exceed the following maximum values:

$U_i$  = open-circuit voltage

$I_i$  = short-circuit current

$P_i$  = max output power

See also the "Connection Values" section in this manual.

If the intrinsically safe circuits are not floating, potential equalization across the length of the entire intrinsically safe circuits is required. In this case, the connection of the rotary encoder housing to the equipotential bonding system must be guaranteed by including the flange mounting.

### Electrical Connection of the Encoder

Initiator	Signal	Cable
A	A <sub>NAMUR+</sub>	Brown
	A <sub>NAMUR-</sub>	Blue
B	B <sub>NAMUR+</sub>	White
	B <sub>NAMUR-</sub>	Black

The polarity must be observed.

### Connection Values

The ambient temperature ( $T_{amb.}$ ) of the encoder must not exceed 60 °C. The permissible ambient temperatures ( $T_{amb.}$ ) in °C depending on the current circuit, permanent speed, and temperature class are set out in the table below:

Current circuit	Type 2			Type 3			Type 4		
	$U_i \leq 16 \text{ V}, I_i \leq 25 \text{ mA}, P_i \leq 64 \text{ mW}$			$U_i \leq 16 \text{ V}, I_i \leq 52 \text{ mA}, P_i \leq 169 \text{ mW}$			$U_i \leq 16 \text{ V}, I_i \leq 76 \text{ mA}, P_i \leq 242 \text{ mW}$		
Permanent speed in rpm	$\leq 500$	$\leq 1000$	$\leq 3000$	$\leq 500$	$\leq 1000$	$\leq 3000$	$\leq 500$	$\leq 1000$	$\leq 3000$
$T_{amb.}$ for temperature class T4	60 °C	60 °C	60 °C	60 °C	60 °C	52 °C	48 °C	45 °C	37 °C
$T_{amb.}$ for temperature class T5	56 °C	55 °C	45 °C	35 °C	32 °C	24 °C	20 °C	-	-
$T_{amb.}$ for temperature class T6	44 °C	41 °C	33 °C	23 °C	20 °C	-	-	-	-

The inner capacitance ( $C_i$ ) of each initiator is max 30 nF.

The inner inductance ( $L_i$ ) of each initiator is max 100 µH.

The connection cable of the rotary encoder has a distributed capacitance of approx. 0.2 nF/m.

### Commissioning

Before commissioning the equipment, check the connection.

The equipment may not be operated if damaged.

### Special Requirements

Ensure that the intrinsically safe circuits meet the requirements of the manual; in particular, the permissible ambient temperatures ( $T_{amb.}$ ) in °C depending on the current circuit, permanent speed, and temperature class as specified in the "Connection Values" table must not be exceeded.

The device must be protected against mechanical damage.

The rotary encoder connection lines must be protected against pull and torsion stress.

The inner capacitance and inductance of each initiator must be observed.

### Maintenance, Servicing, and Troubleshooting

Physical, chemical, and mechanical influences determine the useful life of the shaft-side sealing rings. These influences include deterioration, ambient agents, temperature, wear, and dirt in combination with the rotational speed.

The interaction of these influences is very complex. For this reason, there is no basis for calculating the useful life of the seal rings, but rather only values gleaned from experience. According to seal-ring manufacturers, under normal conditions, equipment seals can reach a useful life of 10,000 operating hours in continuous operation or three to five years.

Since the application areas and the demands made on equipment can vary significantly, there is no general maintenance cycle prescribed for this equipment. Depending on the application, sealing elements on the equipment such as shaft seals or a ball bearing sealing disk and the cable entry point must be checked for wear at appropriate intervals.

The calculated bearing service life of the explosion-protection-relevant bearing assembly of this equipment is up to  $9.8 \cdot 10^9$  revolutions. These theoretical values are valid for normal use in accordance with the datasheet specifications for the equipment.

Service life may vary in practice, depending on the area of application and the ambient conditions (load/force, rotational speed, shock, temperature, surroundings, etc.). The bearing unit should be checked at appropriate intervals in accordance with the application requirements.

No changes are permitted to be made. Only the manufacturer may perform repair work.

Issue date: 11.03.2020 TDOCT0533C\_ENG

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

Pepperl+Fuchs Group  
www.pepperl-fuchs.com

USA: +1 330 486 0001  
fa-info@us.pepperl-fuchs.com

Germany: +49 621 776 4411  
fa-info@de.pepperl-fuchs.com

Singapore: +65 6779 9091  
fa-info@sg.pepperl-fuchs.com