Rotary Encoders for Hazardous Areas: Safe Processes for Explosive Environments

Hazardous areas place very specific demands on encoders. These encoders are used in oil and gas production, chemical processes, or industrial plants where flammable gas mixtures can occur. As a world leader in the field of explosion protection, Pepperl+Fuchs stands for the highest standards and guarantees absolutely secure processes.

For Each Application a Reliable Solution

The variety of applications in hazardous areas is almost unlimited. Different requirements apply in terms of what type of protection to consider for industry or country-specific guidelines. To meet these requirements, Pepperl+Fuchs provides appropriate types of protection including flameproof (Ex d) and intrinsic safety (Ex i). Various encoder options are available for use in Zones 1, 2, 21, and 22. Certificates such as IECEx, Ex NEPSI, or KOSHA complete the program.

Typical Areas of Application

- Oil and gas
- Chemical industry
- Mobile equipment
- Material handling
- Process equipment
- Offshore and shipbuilding
- Mining

For more information, see the brochure Solutions for Process Automation or visit **www.pepperl-fuchs.com**

Safe Operation in Hazardous Environments

This rotary encoder is specifically designed for use in hazardous areas in Zone 1. Its technical design is consistent with the Ex i type of protection. Because this encoder is intrinsically safe, it works with electrical values that are too low for the ignition of an explosive atmosphere.
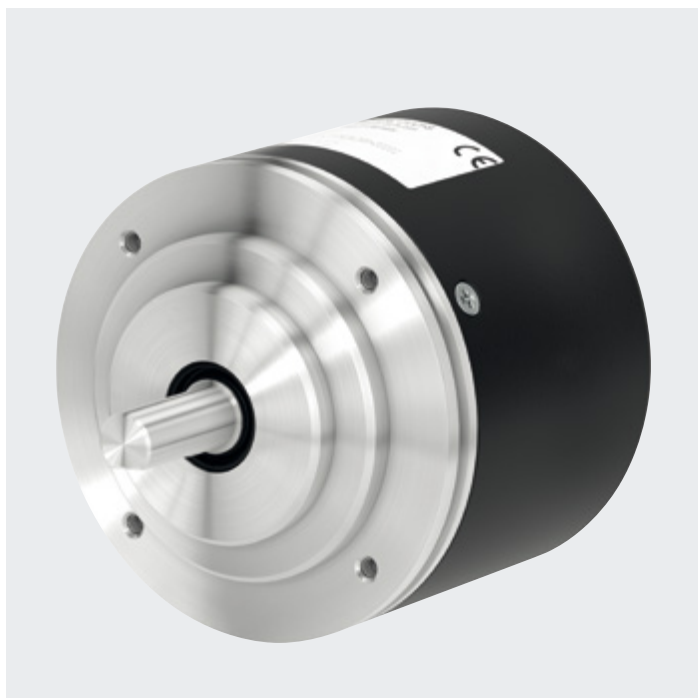
Safe Process Flows

This rotary encoder is used in the chemical industry, e.g., in painting and drying plants, wastewater treatment plants, and power plants. It is ideal for areas in which an explosive atmosphere can form as a mixture of air and flammable gases, vapors, or mists. It has a resolution of 25 pulses at a rotational speed of up to 3,000 revolutions per minute. A robust housing design ensures a long service life. The encoder is fitted with an intrinsically safe NAMUR interface according to DIN EN 60947-5-6.

Technical Information	
Design	Ø 78 mm
Shaft type	Solid shaft
Shaft dimension	Ø 10 mm
Flange type	Clamping flange
Max. rotational speed	3,000 rpm
Degree of protection	IP65
Connection type	Cable
Connection output	Axial
Electrical interface	NAMUR interface according to DIN EN 60947-5-6
Max. shaft load	Axial: 50 N, radial: 100 N
Resolution	Up to 25 pulses
Certification	Ex II 2G c Ex ia IIC T6 Gb
Order code	RVI84

Highlights

- Safe for use in a hazardous, explosive atmosphere of gases (Zone 1)
- Robust housing design for increased service life
- NAMUR interface according to DIN EN 60947-5-6

Certified for Worldwide Use

Hazardous area encoders offer a rugged bearing construction to accommodate high shaft loads. Thus, they operate extremely reliably even under demanding conditions. The compact design allows easy installation in confined spaces.

Suitable for Any Climate

This encoder comes with ATEX, IECEx, Ex NEPSI, and KOSHA certification. It offers a high degree of protection and features seawater-resistant housing, which makes it suitable for use in offshore applications. The encoder has a high rotational speed of 6,000 revolutions/min with an extended temperature range from –40 °C to 70 °C, which allows reliable use in extreme climatic conditions. A compact design ensures efficient use of installation space.

The encoder has Group I certification for the mining industry and Group II certification for the surface industry.

Technical Information	
Design	Ø 69 mm
Shaft type	Solid shaft
Shaft dimension	Ø 10 mm–Ø 12 mm
Flange type	Clamping, servo, and Euro flange
Max. rotational speed	6,000 rpm
Degree of protection	IP66 and IP67
Connection type	Cable
Connection output	Axial and radial
Electrical interface	Push-pull and RS-422
Max. shaft load	Axial: 110 N, radial: 150 N
Resolution	Up to 5,000 pulses
Certification	Ex II 2G Ex d IIC T6–T4 Gb Ex II 2D Ex t IIIC T80°C Db IP6X Ex NEPSI KOSHA
Order code	RVI70E

Highlights

- Certification for worldwide use
- Robust bearing design ensures a long service life
- Compact design, ideal for confined spaces
- Suitable for use in challenging environments with a high degree of protection and a seawater-resistant housing
- Large range of applications due to extended temperature range of –40 °C to 70 °C and high rotational speeds
- Wide range of variants for easy adaptation to any application

Flexible Mounting and Wiring

This encoder is suitable for speeds of up to 3,000 rpm and is designed for a temperature range of –40 °C to 70 °C. It conforms to the Ex d type of protection and meets the international ATEX, IECEx, and Ex NEPSI requirements for gases according to Zones 1 and 2, and for dust according to Zones 21 and 22. It has a modular design with a removable connection cover that simplifies mounting and maintenance. For fieldbus versions, the bus coding can be freely programmed directly on site. The 78E encoder has Group I certification for the mining industry and Group II certification for the surface industry.

Technical Information		
Design	Ø 78 mm	
Shaft type	Solid shaft	
Shaft dimension	Ø 10 mm–Ø 12 mm	
Flange type	Clamping flange and servo flange	
Max. rotational speed	3,000 rpm	
Degree of protection	IP66	
Connection type	Cable and cable gland with stopping plug	
Connection output	Radial	
Electrical interface/order code	SSI	AVS78E, AVM78E
	CANopen	CVS78E, CVM78E
	PROFIBUS	PVS78E, PVM78E
	DeviceNet	DVS78E, DVM78E
Max. shaft load	Axial: 60 N, radial: 80 N	
Max. bit count	Single turn: 65,536 (16 bit), multiturn: 16,384 (14 bit)	
Certification	Ex II 2G Ex db IIC T5 Gb Ex II 2D Ex tb IIIC T100°C Db IP6X Ex I M2 Ex db I/IIC T5 Ex NEPSI	

Highlights

- Removable connection cover: flexible mounting and wiring on site
- Simple maintenance: separation of the cable and rotary encoder means there is no need to replace the entire device
- ATEX, IECEx, and Ex NEPSI certification for worldwide use in Zones 1 and 21
- Wide range of variants for easy adaptation to any application
- Specially designed for offshore applications
- Robust design for use in extreme conditions

Reliable Operation for Dusts and Vapors

These rotary encoders with nA type of protection meet the requirements for explosion protection in Zones 2 and 22. Dust-tight housing effectively prevents explosions caused by sparks, heat, or dust accumulation on the housing. A compact design and a removable bus cover offer increased flexibility even in hazardous areas.

Compact and Flexible

This encoder delivers up to 5,000 pulses per revolution through either a push-pull output or an RS-422 interface. It is no larger than the corresponding standard design and is ideal for integration into plants with limited installation space. Due to its 58 mm standard housing, installing this encoder on a machine for use in hazardous areas is also ideal.

Technical Information	
Design	Ø 58 mm
Shaft type	Solid and recessed hollow shaft
Shaft dimension	Solid shaft: Ø 6 mm–Ø 10 mm Recessed hollow shaft: Ø 10 mm–Ø 12 mm
Flange type	Clamping, servo, and solid shaft flange with torque rest
Max. rotational speed	6,000 rpm
Degree of protection	IP54 and IP64
Connection type	Cable
Connection output	Axial and radial
Electrical interface	Push-pull and RS-422 (extended voltage range)
Max. shaft load	Axial: 40 N, radial: 60 N
Resolution	Up to 5,000 pulses
Certification	Ex II 3G Ex nA IIB T4 Gc Ex II 3D Ex tc IIIC T105°C Dc IPXX
Order code	RVI58X, RSI58X

Highlights

- Use in hazardous, explosive atmospheres of gases or dusts
- Compact design for confined spaces
- High signal accuracy with up to 5,000 pulses
- Flexible application and mounting options

Simplified Commissioning and Maintenance

This rotary encoder is available with a PROFIBUS interface that allows easy mounting on the shaft. It has a resolution of up to 16 bit for single turn (ST) and has up to 14 bit for the number of turns (MT). With its compact housing design, the rotary encoder can be flexibly mounted even where space is limited. A removable bus cover makes installation easier and reduces maintenance.

Technical Information		
Design	Ø 58 mm	
Shaft type	Solid and recessed hollow shaft	
Shaft dimension	Solid: Ø 6 mm–Ø 10 mm Recessed hollow: Ø 10 mm–Ø 15 mm	
Flange type	Clamping, servo, and solid shaft flange with torque rest	
Max. rotational speed	6,000 rpm	
Degree of protection	IP64 and IP66	
Connection type	Connector plugs and cables	
Connection output	Radial	
Electrical interface/order code	PROFIBUS	PVS58X, PVM58X, PSS58X, PSM58X
Max. shaft load	Axial: 40 N, radial: 110 N	
Max. bit count	Single turn: 65,536 (16 bit), multiturn: 16,384 (14 bit)	
Certification	Ex II 3G Ex nA IIB T4 Gc Ex II 3D Ex tc IIIC T120°C Dc IP6X	

Highlights

- Use in hazardous, explosive atmospheres of gases or dusts
- Simplified system integration with removable bus cover
- Compact design for confined spaces
- High resolution with up to 16 bit (ST), 14 bit (MT)
- Flexible mounting with a wide range of application and mounting options