



### Safety recommendations for electrical apparatus to be used in hazardous areas

The encoder Type 78E is a flameproof enclosure containing low voltage electronic components that converts rotational motion into electrical signals.

The encoder Type 78E market with “Type: 78E Mining” (detail type key variant \*\*\*78E-\*\*\*\*\*2-\*\*\*\* and \*\*\*78E-\*\*\*\*\*4-\*\*\*\*) is usable in Mining areas.

#### Data on gas-hazardous and dust-hazardous areas (Group II and III) for encoder Type 78E

Conformity	EN 60079-0:2012 + A11:2013; IEC 60079-0:2011-06, Edition 6.0 EN 60079-1:2014; IEC 60079-1:2014-06, Edition 7.0 EN 60079-31:2014; IEC 60079-31:2013-11, Edition 2.0
EC-type examination certificate	ITS 15 ATEX 18372 X IECEX ITS 15.0061 X
Ex Marking	II 2G Ex db IIC T5 Gb II 2D Ex tb IIIC T100°C Db

#### Data on gas-hazardous and dust-hazardous areas (Group I, II and III) for encoder Type 78E Mining (only detail type key variant \*\*\*78E-\*\*\*\*\*2-\*\*\*\* and \*\*\*78E-\*\*\*\*\*4-\*\*\*\*)

Conformity	EN 60079-0:2012 + A11:2013; IEC 60079-0:2011-06, Edition 6.0 EN 60079-1:2014; IEC 60079-1:2014-06, Edition 7.0 EN 60079-31:2014; IEC 60079-31:2013-11, Edition 2.0
EC-type examination certificate	ITS 15 ATEX 18371 X IECEX ITS 15.0060 X
Ex Marking	I M2 Ex db I Mb II 2G Ex db IIC T5 Gb II 2D Ex tb IIIC T100°C Db

#### General data for encoder Type 78E and Type 78E Mining

Permissible ambient temperature	- 40 °C to + 70 °C
Protection degree as per EN 60529	IP64 (without radial shaft seal) IP65, IP66, IP67 (with radial shaft seal, Standard)
Rated speed @ IP66	max 3.000 rpm
Voltage	10 V to 30 V DC

#### Installation and commissioning

Only skilled / authorized persons are allowed to install the apparatus. Information on hazardous areas and the manufacturer data sheets, as well as all laws or guidelines applying to the use or the intended purpose are to be followed.

Standards 60079-14, in their valid versions, are especially to be heeded.

Rotary encoder cables must be protected externally from pull and torsion stress. The chapter “Special conditions” of this manual instruction has to be heeded.

The entire system of rotary encoders including the evaluation electronics is designed for a maximum momentary rated speed of 3.000 rpm. Due to the expected premature wear of sealing elements, sustained operation exceeding 1.500 rpm has to be avoided. Attention should be paid to the permissible axial shaft load of max. 60 N and radial shaft load of max. 80 N.

It is essential to use an appropriate back-up fuse. This fuse must not exceed a maximum of 6 amperes.

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

The encoder series Type \*\*\*78E Mining with type key variant \*\*\*78E-\*\*\*\*\*2-\*\*\*\* and \*\*\*78E-\*\*\*\*\*4-\*\*\*\* is usable in Mining areas.

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**Additionally the following applies to use in the dust-explosion protection area**

The device belongs to Category 2D and may be implemented in dust-zone 21. In particular, the requirements of IEC 60079-14, in its valid version, are to be met for set-up, operation and upkeep.

Maximum surface temperature is 100 °C. Dust must not be allowed to accumulate to more than 5 mm.

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

**Important information on the rotary encoder connection cap general**

The connection cap and the connection cap cables must not be disconnected while energized. The apparatus bears the warning: "WARNING-Do NOT open when an explosive atmosphere is present!"

With the connection cap disconnected, soiling of the internal area must be prevented (i.e. the area that is inaccessible when the connector is inserted).

Be aware of National Wiring Standards for ATEX environment.

The protection degree of the rotary encoder with the connection cap that can be removed by the customer must, at the least, meet IP6X rating when mounted.

M4 Allen screws on the removable connection cap placed on the rotary encoder must be tightened to a torque of 3.5 Nm +/- 0.5 Nm.

**Additional information if delivered only with stopping plug(s)/cable gland(s) (without mounted cable)**

Certificate and manual instructions of the mounted cable glands must be followed (see Ex marking of gland or stopping plug), especially in direction for the cable (and its parameter) customer wants to use.

It is allowed to mount stopping plugs onto the connection cap of the housing. These stopping plugs must have an own Ex-d (flameproof) certification with Ex-marking have to cover the Ex-requirements of the encoder certification.

Unused holes of encoder cap are to be filled with an appropriate stopping plug in such a way as to ensure permanent IP6X protection. Stopping plugs must be tightened with a torque like mentioned in the manual instruction of the used stopping plug.

For mining Version \*\*\*78E-\*\*\*\*\*2-\*\*\*\* or \*\*\*78E-\*\*\*\*\*4-\*\*\*\* stopping plugs must be manufactured from either stainless steel (e.g. 1.4301 / AISI 304) or acid-proof stainless steel (e.g. 1.4435 / AISI 316L).

**Additional information for Encoder delivered with M20 x 1.5 mounting thread**

Delivered plastic screw plugs at the encoder connection cap are only for protection of the mounting threads and connection cap. These plugs must not be used for encoder operation. They have to be replaced by certified cable glands or plugs as described below.

Rotary encoder connection cap has two M20 x 1.5 (tolerance H6) mounting threads. The maximum thread length is 16mm. Only certified Ex-d (flameproof) cable glands or stopping plugs must be used and must be suitable to the mounting thread.

Certificate, Ex-d marking and technical data of cable glands or plugs must apply to EN/IEC 60079-1 and have to cover the Ex-requirements of the encoder's certificate. The instruction manual of used cable glands or stopping plugs have to be followed.

The mounting of cable glands or plugs have to be in such a way as to ensure permanent IP65, IP66 or IP67 protection (see configuration / technical data of encoder).

Unused mounting threads of encoder cap are to be filled with an appropriate stopping plug in such a way as to ensure permanent IP65, IP66 or IP67 protection. Stopping plugs must be tightened with a torque like mentioned in the manual instruction of the used stopping plug.

For mining Version \*\*\*78E-\*\*\*\*\*2-\*\*\*\* or \*\*\*78E-\*\*\*\*\*4-\*\*\*\* cable glands and stopping plugs must be manufactured from either stainless steel (e.g. 1.4301 / AISI 304) or acid-proof stainless steel (e.g. 1.4435 / AISI 316L).

**Operation**

The device must not be opened in a hazardous area when energized. Rotary encoder cables must be protected externally from pull and torsion stress. Electrostatic charging of the metal housing parts should be avoided. Hazardous electrostatic charging of metal-housing parts can be prevented by grounding or integration into potential equalization, whereby very small metal-housing parts (e.g. screws) need not be considered. The encoder includes an appropriate connection on the housing. To minimize risk from electrostatic discharge – clean only with a damp cloth.

**Special conditions**

- It is a condition of certification that the flame paths have to comply with the manufacturers drawings and can only be repaired by the manufacturer.
- It is a condition of certification that the precautions must be taken to avoid dust from forming layers on the encoder.
- The fasteners used to secure enclosure body to end shields shall have a minimum yield stress of 450 MPa.
- For encoder Type 78E: Use only suitably certified Ex db IIC Gb and Ex tb IIC Db cable glands, thread adapters and blanking elements.
- For encoder Type 78E Mining: Use only suitably certified Ex db I Mb/ Ex db IIC Gb and Ex tb IIC Db cable glands, thread adapters and blanking elements.

**Upkeep and maintenance**

The values given in the data sheet on degree of protection, climate testing, electromagnetic compatibility and shock and vibration resistance were tested and released in accordance with the specified standard. Encoder operation is assured with regard to these definitions.

Physical, chemical and mechanical influences determine the useful life of the shaft-side sealing rings. Deterioration, ambient agents, temperature, and wear and dirt combining with rotational speed are all involved. The interaction of these influences is very complex. Hence there is no basis for calculating the useful life of the seal rings, but rather only values gleaned from experience.

Since the fields of application and the demands made on apparatus can be very different, there is no general maintenance cycle prescribed for these apparatus.

Depending on the application, sealing elements on the apparatus such as shaft seal rings or ball bearing sealing disk and cable entry point are to be checked for wear at appropriate intervals.

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

Only skilled and authorized persons are allowed to perform visual inspection of the apparatus at appropriate time intervals.

No modifications must be made. Only the manufacturer has permission to perform repair work.

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

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