



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.

Safety recommendations for electrical apparatus to be used in hazardous areas

The encoder series Type ***70E is a flameproof enclosure containing low voltage electronic components that converts rotational motion into electrical signals.

The encoder series Type ***70E with type key variant ***70E-*****2-**** and ***70E-*****4-**** is usable in Mining areas.

Data on gas- and dust-hazardous areas (Group I, II and III):

EC-type examination certificate	ZELM 14 ATEX 0519 X IECEX ZLM 14.0003X 2014/34/EU
Directive conformity	EN 60079-0:2012 + A11:2013, IEC 60079-0:2011-06, Edition 6.0
Conformity	EN 60079-1:2014, IEC 60079-1:2014-06, Edition 7.0 EN 60079-31:2014, IEC 60079-31:2013-11, Edition 2.0
Ex markings for aluminium anodized and stainless steel housing,	⊕ II 2G Ex db IIC T6 - T4 Gb ⊕ II 2D Ex tb IIIC T80°C Db
Type key and	***70E-*****N-**** ***70E-*****I-****
Ex Marking for Group I (Mining)	⊕ I M2 Ex db I Mb
Type key and	***70E-*****2-**** ***70E-*****4-****

General data

Permissible ambient temperature	-40 °C to max.+70 °C, see special conditions in table 1 ambient temperature
Protection degree as per EN 60529	IP66 / IP67
Maximum shaft load	Axial 110 N Radial 150 N
Rotational speed	up to 6000 U/min, see special conditions in table 1 ambient temperature
Max. power dissipation	0.95 W

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 IEC/EN 60079-14, in their valid versions and local requirements 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 continuous rated speed of 3000 rpm, monetary peak max. 6000 rpm. Due to the expected premature wear of sealing elements, sustained operation exceeding 6000 rpm has to be avoided. Attention should be paid to the permissible axial shaft load of max. 110 N and radial shaft load of max. 150N.

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 ***70E with type key variant ***70E-*****2-**** and ***70E-*****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/EN 60079-14, in its valid version, are to be met for set-up, operation and upkeep.

Maximum surface temperature depends on rotational speed and ambient temperature, see table 1 special conditions. 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.

Operation

The device and its cable gland must not be opened. 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 external equipotential bonding connection on the top of the housing. The minimum torque for equipotential bonding connection screw is 4.5 Nm. A cross-sectional area of minimum 4 mm² has to be heeded.

Special conditions

- 1) The surface temperature resp. temperature class of the equipment depends on the rotational speed of the shaft, the ambient temperature and the equipment version. The corresponding allocation for each type version has to be taken from following table 1 of this instruction manual.

Encoder housing material	Aluminium anodized, type key ***70E-*****N-****			EStainless steel V2A or V4A, type key ***70E-*****I-**** (Group II & III) ***70E-*****2-**** (Group I) ***70E-*****4-**** (Group I)		
	≤ 1500	≤ 3000	≤ 6000	≤ 1500	≤ 3000	≤ 6000
Rotational speed [rpm]						
Gas Temperature class T4 max. T _{amb} * [°C]	70	70	62	70	70	56
Gas Temperature class T5 max. T _{amb} * [°C]	70	70	59	70	58	51
Gas Temperature class T6 max. T _{amb} * [°C]	67	58	44	58	43	-
Staub Temperature class T80°C max. T _{amb} * [°C]	67	58	44	58	43	-
Mining	-	-	-	70	68	55

Table 1: Ambient temperature for gas and dust- hazardous areas (Temperature class - housing material - rotary speed– Tamb.)

- 2) The shaft and the shaft sealing ring are not checked for resistance of environmental effects (UV resistance, mechanical impacts), as environmental effects are not expected to occur, when the equipment is installed corresponding to the designated use. Therefore the shaft and the shaft sealing ring must be protected from environmental effects (light sources and mechanical impacts) until the rotary encoder is mounted to the machine.

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. According to seal-ring manufacturers, under normal conditions, apparatus seals can reach a useful life of 10,000 operating hours at continuous operation or 3 to 5 years.

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.

The calculated service life of the apparatus bearing unit relevant to explosion-protection comes to 1.6 * 10⁹ rotations; the electrical service life of the scanning LED comes to 100,000 h. These theoretical values are valid for normal use in accordance with the data sheet specifications for the apparatus. 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.

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