IA – CERTIFICATE

(Review required by MASC as per ARP 0108)

IN TERMS OF REGULATION 21.17.2 OF THE MINERALS ACT (INCORPORATION THE MINE HEALTH AND SAFETY ACT) AND REGULATION 9 (1) OF THE ELECTRICAL MACHINERY REGULATIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Ex – Type Examination	
Certificate number:	**MASC MS/17-0863**
Equipment:	Isolation switching amplifier, type K*D*-SR*-Ex*.W.*
Serial No:	(See "Conditions of Certification")
Requested by:	Pepperl+Fuchs (Pty) Ltd
Address:	1st fl Zerwick Forum 8 Glen Eagle Office Park Cnr Monument Rd and Braambos St Glen Erasmia, Kempton Park 1619 South Africa
Manufacturer:	Pepperl+Fuchs GmbH
Address:	Lilienthalstrasse 200 68307 Mannheim Germany

DESCRIPTION:

The isolation switching amplifier type K*D*-SR*-Ex*.W.* is used for the transmission of control commands from the hazardous area into the non-hazardous area as well as for the safe electrical isolation of intrinsically safe and non-intrinsically safe circuits.

Covered types of isolation switching amplifier K*D*-SR*-Ex*.W.* :

KFD2-SR2-Ex1.W*
KFD2-SR2-Ex1.W.LB*
KFD2-SR2-Ex2.W*
KFD2-SR2-Ex2.W.SM*

Remark: the "*" represents alpha numeric signs (e.g.-Y1). These signs are used to describe different versions of a module. These differences do not affect intrinsic safety.

The maximum permissible ambient temperature is 60°C.

/. Electrical…

Electrical data:

Supply circuit…….. (terminals 14 and 15 resp. Power rail contacts PR1 and PR2)	direct voltage 20…30 V DC safety voltage, max:	U_m = 253 V AC U_m = 125 V AC
Fault signal output …….. (Power rail contacts PR4)	safety voltage, max:	U_m = 40 V AC
Output circuit…….. (terminals 7, 8, 9 resp. 10, 11, 12)	AC U ≤ 253 V U ≤ 126.5 V I ≤ 2 A I ≤ 4 A S ≤ 500 VA Cosφ ≥ 0.7 safety voltage, max.:	DC U ≤ 40 V U ≤ 130 V I ≤ 2 A I ≤ 20 mA P ≤ 80 W U_m= 253 V AC
Input circuits…….. (terminals 1, 2, 3 resp. 4, 5, 6)	type of protection Intrinsic Safety resp.	Ex ia I/IIA/IIB/IIC/IIIC Ex ib I/IIA/IIB/IIC/IIIC

maximum values per circuit:

U_o = 10.5 V

I_o = 13 mA

P_o = 34 mW

R_i = 807.7 Ω

linear characteristic

C_i ≈ 0

L_i ≈ 0

type of protection	Ex ia resp. ib			
	I	IIA	IIB/IIIC	IIC
maximum permissible external inductance L_o	1 H	1 H	840 mH	210 mH
maximum permissible external capacitance C_o	95 µF	75 µF	16.8 µF	2.41 µF

In the presence of concentrated capacitances and/or inductances in the intrinsically safe input circuit, the maximum permissible external capacitances and inductances are to be taken from the following table.

type of protection	Ex ia resp. ib			
	I	IIA	IIB/IIIC	IIC
maximum permissible external inductance L_o	20 mH	10 mH	7 mH	3 mH
maximum permissible external capacitance C_o	5.3 µF	4.6 µF	2.1 µF	620 nF

When both intrinsically safe input circuits are interconnected, the following maximum values result:

/. Uo =…

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e-mail: **info@masc-ex.co.za**

U_o = 10.5 V
I_o = 26 mA
P_o = 68 mW
R_i = 403.9 Ω
linear characteristic
C_i ≈ 0
L_i ≈ 0

type of protection	Ex ia resp. ib			
	I	IIA	IIB/IIIC	IIC
maximum permissible external inductance L_o	500 mH	420 mH	210 mH	52 mH
maximum permissible external capacitance C_o	95 µF	75 µF	16.8 µF	2.41 µF

In the presence of concentrated capacitances and/or in ductances in the interconnected intrinsically safe input circuits, the maximum permissible external capacitances and inductances are to be taken from the following table.

type of protection	Ex ia resp. ib			
	I	IIA	IIB/IIIC	IIC
maximum permissible external inductance L_o	20 mH	10 mH	7 mH	3 mH
maximum permissible external capacitance C_o	5.1 µF	4.4 µF	2.1 µF	590 nF

The intrinsically safe input circuits are safely electrically isolated from all other circuits up to a peak value of the nominal voltage of 375 V.

MARKING:

PTB marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.

IA No: MASC MS/17-0863

COMPLIANCE:

The equipment as described above and in MASC letter 17-0863 is hereby certified "Explosion Protected" [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I and is suitable for use in hazardous locations as stated below and as tested, assessed and inspected in accordance with the relevant requirements of SANS / IEC Standards:

The evaluation was conducted according to the requirements of:

i) SANS (IEC) 60079-0 : 2012 "Explosive atmospheres – Part 0: Equipment — General requirements"

ii) SANS (IEC) 60079-11 : 2012 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"

/. Location…

Location	Zone *0, 1 & 2	Gas Surface / Mining (As Applicable)
	Zone *20, 21 & 22	Dust (As Applicable)
Hazard Frequency	---	Continuous as could occur under normal operating conditions in hazardous area (*Outputs only)
Environment	Group I	Methane and Coal dust (As Applicable)
	Group IIC	Propane to Hydrogen / Acetylene (As Applicable)
	Group IIIC	Dust (Metallic & non-metallic) (As Applicable)
Service/Ambient Temperature	-20ºC to +40ºC	

The use of apparatus in hazardous locations is subject to the following provisions as applicable, which shall be adhered to:

i. SANS 10086 requirements;
ii. Any conditions mentioned in the above document;
iii. Codes of Practice enforced in terms of Regulations 21.17.2 of Minerals Act, by Chief Inspector of Mines;
iv. Any restrictions and conditions enforced by Chief Inspectors of Mines, Principal Inspector (Group I equipment) of Chief Inspector of Factories (Group II equipment);
v. Any relevant requirements of the MHS Act or the OHS Act.

CONDITIONS OF MANUFACTURE:

- None

SPECIAL CONDITIONS OF USE (X):

- None

CONDITIONS OF CERTIFICATION:

1. This Certificate remains valid based on a three yearly review covered by an official MASC letter.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This approval only covers the equipment as certified above and does not include any scheduled additions or variations / amendments / new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by PTB and in this approval.
5. The PTB certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification/report for the equipment must remain valid.

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