



Mining And Surface Certification (Pty) Ltd

2015/021934/07



Certificate Number: MASC MS/17-0856

Issue: 25 April 2017

Expire: 25 April 2020

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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:

Equipment:

Serial No:

MASC MS/17-0856

Isolation switching amplifier, type K*A*-SR*-Ex*.W.*
(See “Conditions of Certification”)

Requested by:

Address:

Pepperl+Fuchs (Pty) Ltd

1st fl Zerwick Forum

8 Glen Eagle Office Park

Cnr Monument Rd and Braambos St

Glen Erasmia, Kempton Park 1619

South Africa

Manufacturer:

Address:

Pepperl+Fuchs GmbH

Lilienthalstrasse 200

68307 Mannheim

Germany

DESCRIPTION:

The isolation switching amplifier type K*A*-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*A*-SR*-Ex*.W.* :

| | | | |
|-----------------|--------------------|-----------------|--------------------|
| KFA4-SR2-Ex1.W* | KFA4-SR2-Ex1.W.LB* | KFA4-SR2-Ex2.W* | KFA4-SR2-Ex2.W.IR* |
| KFA5-SR2-Ex1.W* | KFA5-SR2-Ex1.W.LB* | KFA5-SR2-Ex2.W* | KFA5-SR2-Ex2.W.IR* |
| KFA6-SR2-Ex1.W* | KFA6-SR2-Ex1.W.LB* | KFA6-SR2-Ex2.W* | KFA6-SR2-Ex2.W.IR* |

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...

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Mining And Surface Certification (Pty) Ltd Reg No: 2015/021934/07

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IA CERTIFICATE NUMBER: MASC MS/17-0856
Isolation switching amplifier, type K*A*-SR*-Ex*.W.*

Electrical data:

Supply circuit..... 230 V AC $\pm 10\%$
 (terminals 14 and 15) safety voltage, max: $U_m = 253\text{ V AC}$
 or
 115 V AC $\pm 10\%$
 safety voltage, max: $U_m = 126.5\text{ V AC}$
 or
 100 V AC $\pm 10\%$
 safety voltage, max: $U_m = 110\text{ V AC}$

Output circuit..... AC DC
 (terminals 7, 8, 9 resp. 10, 11, 12) $U \leq 253\text{ V}$ $U \leq 126.5\text{ V}$ $U \leq 40\text{ V}$ $U \leq 130\text{ V}$
 $I \leq 2\text{ A}$ $I \leq 4\text{ A}$ $I \leq 2\text{ A}$ $I \leq 20\text{ mA}$
 $S \leq 500\text{ VA}$ $P \leq 80\text{ W}$
 $\text{Cos}\phi \geq 0.7$

safety voltage, max.: $U_m = 253\text{ V AC}$

Input circuits..... type of protection Intrinsic Safety Ex ia I/IIA/IIB/IIIC
 (terminals 1, 2, 3 resp. 4, 5, 6) resp. Ex ib I/IIA/IIB/IIIC

maximum values per circuit:
 $U_o = 10.6\text{ V}$
 $I_o = 19.1\text{ mA}$
 $P_o = 51\text{ mW}$
 $R_i = 554.4\ \Omega$
 linear characteristic
 $C_i \approx 0$
 $L_i \approx 0$

| type of protection | Ex ia resp. ib | | | |
|--|------------------|------------------|--------------------|--------------------|
| | I | IIA | IIB/IIIC | IIC |
| maximum permissible external inductance L_o | 1 H | 780 mH | 390 mH | 97 mH |
| maximum permissible external capacitance C_o | 90 μF | 72 μF | 16.2 μF | 2.32 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 | 5 mH | 3 mH |
| maximum permissible external capacitance C_o | 5.1 μF | 4.4 μF | 2.1 μF | 590 nF |

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

/. $U_o = \dots$

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$U_o = 10.6 \text{ V}$
 $I_o = 38.2 \text{ mA}$
 $P_o = 102 \text{ mW}$
 $R_i = 277.2 \Omega$
 linear characteristic
 $C_i \approx 0$
 $L_i \approx 0$

| type of protection | Ex ia resp. ib | | | |
|--|------------------|------------------|--------------------|--------------------|
| | I | IIA | IIB/IIIC | IIC |
| maximum permissible external inductance L_o | 320 mH | 195 mH | 97 mH | 24 mH |
| maximum permissible external capacitance C_o | 90 μF | 72 μF | 16.2 μF | 2.32 μF |

In the presence of concentrated capacitances and/or inductances 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 | 5 mH | 3 mH |
| maximum permissible external capacitance C_o | 4.8 μF | 4.2 μF | 2 μF | 550 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/17-0856

COMPLIANCE:

The equipment as described above and in MASC letter 17-0856 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...

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

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:

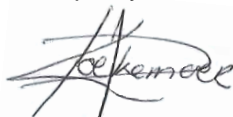
- None

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.



A. Koekemoer
TECHNICAL SPECIALIST



F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification

This document is issued based on Mining And Surface Certification's Standard Contract terms and conditions available on request.

While every endeavour is made to ensure that a test / assessment is representative and accurately performed, and that a report is accurate in the quoted results and conclusions drawn from the test / assessment, MASC or its members/employees shall in no way be liable for any error made in carrying out the test / assessment or for any erroneous statement, whether in fact or in opinion, contained in a report issued pursuant to a test / assessment.

MASC takes no responsibility for any non-conformances, exclusions or any results / assessments not in compliance with the standards. By marking the equipment in accordance with the documentation / standard, the manufacturer attests on his own responsibility that the equipment has been constructed in accordance with the applicable requirements of the relevant standards and that the routine verifications and routine tests have been successfully completed and the product complies with the documentation and standard(s).

This document is only for use and application in South Africa. It is issued based on National interpretations and accepted practises.

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