IA – CERTIFICATE

(Supplement 1: Reviewed 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/17-0862X**
Equipment:	KFD2-STC(V)4-Ex1(.2O) ... Smart Transmitter Isolator
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 SE
Address:	Lilienthalstrasse 200 68307 Mannheim Germany

DESCRIPTION:

The KFD2-STC(V)4-Ex1(.2O)... Smart Transmitter Isolator is designed to provide galvanic isolation between intrinsically safe circuits in a hazardous area and unspecified associated apparatus in a non-hazardous area and limit the voltage and current into the hazardous area to intrinsically safe levels.
The apparatus comprises a number of electrical components, including transformers, fuses, resistors and zener diodes, all mounted on a single printed circuit board and housed within a plastic enclosure fitted with terminals for external connections.
The use of 'C' or 'V' in the type description specifies Current source / sink or Voltage respectively.

Options following 'Ex1' in the type description are:

.2O	(Dual non-hazardous area output)
-Y…	(Current sink - used with 'C')
-1	(5 Volt - used with 'V')
-2	(10 Volt - used with 'V')

/. The apparatus...

The apparatus is designed to operate from a d.c. supply of up to 35V on terminals 7 to 12, 14 and 15, and power rail connector terminals 1 and 2. The segregation of the hazardous area circuits meets the requirements for 250V.

Terminals 7 to 12, 14 and 15 and power rail terminals 1 and 2

U_m = 250V

Terminals 1 and 3

U_o = 25.4V

I_o = 86.8mA

P_o = 551mW

C_i = 12nF

L_i = 0

Each channel may be considered as a separate intrinsically safe circuit.

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH) or L/R Ratio (µH/Ω)	
IIC	0.093	4.6	62.5
IIB	0.798	18	243
IIA	2.808	36	486
I	4.3	29	833

For Terminals 1, 2 (&5) and 3

U_o = 25.4V

I_o = 115mA

P_o = 0.584W

C_i = 12nF

L_i = 0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH) or L/R Ratio (µH/Ω)	
IIC	0.093	2.7	62.5
IIB	0.798	11	243
IIA	2.808	22	486
I	4.3	17	639

For Terminals 6 and 5 (&2)

U_o = 8.7V

I_o = 0

C_o = 5.9µF

I_i = 115mA

C_i = 0

L_i = 0

The actual output voltage is 6.51V; the Applicant requested it to be shown 8.7V

/. For variants…

For variants type KFD2-STC4-EX1.H and type KFD2-STC4-EX1.2O.H

For Terminals 7 to 12, 14 and 15 and power rail terminals 1 and 2

U_m = 250V

Terminals 1 and 3

U_o = 27.2V

I_o = 93mA

P_o = 0.632W

C_i = 12nF

L_i = 0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH) or L/R Ratio (µH/Ω)	
IIC	0.077	4.2	57.7
IIB	0.678	17.7	216
IIA	2.288	36.0	456
I	4.0	51.9	687

For Terminals 3 and 2 (&5)

U_o = 3.5V

I_o = 73mA

P_o = 64mW

U_i = 30V

I_i = 117mA

C_i = 0

L_i = 0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH) or L/R Ratio (µH/Ω)	
IIC	100	6.4	532
IIB	100	25	532
IIA	100	50	532
I	1000	42	7207

For Terminals 1, 2 (&5) and 3

U_o = 27.2V

I_o = 117mA

P_o = 0.639W

C_i = 12nF

L_i = 0

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

/. Group…

Group	Capacitance (µF)	Inductance (mH) or L/R Ratio (µH/Ω)	
IIC	0.077	2.2	34.1
IIB	0.678	10	136
IIA	2.288	20	272
I	4.0	30	409

For Terminals 6 and 5 (&2)

U_o = 8.7V
I_o = 0
C_o = 5.9µF
U_i = 30V
I_i = 117mA
C_i = 0
L_i = 0

The actual output voltage is 6.51V; the Applicant requested it to be shown 8.7V

Notes:

The above parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the Lo value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the Co value.

The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) ≥1% of the Lo value and
- the total C_i of the external circuit (excluding the cable) ≥1% of the Co value.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Group IIB and 600nF for Group IIC.

MARKING:

SGS marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.
IA No: MASC MS/17-0862X

COMPLIANCE:

The equipment as described above and in MASC letter 17-0862 is hereby certified "Explosion Protected" [Ex ia Ga] IIC, [Ex ia Da] IIIC , [Ex ia Ma] I -20ºC ≤ Ta ≤ +60ºC 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 +60ºC	

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):

- The equipment must be installed in a controlled environment with suitably reduced pollution.

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 SGS and in this approval.
5. The SGS 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.

D.P Visser
TECHNICAL SPECIALIST

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TECHNICAL OFFICR

Mining And Surface Certification

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