



Certificate Number: MASC M/11-361X
Issued: 26 June 2019
Expire: 27 August 2019
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IA – CERTIFICATE (Revision 5 – Revised 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:

Applicant:

Address:

MASC M/11-361X

STX3261 Methane Sensor

(See Conditions of Certification)

Troxel Limited.

Newby Road

Hazel Grove

Stockport

SK7 5DY

United Kingdom

Manufacturer:

Address:

Troxel Limited.

Newby Road

Hazel Grove

Stockport

SK7 5DY

United Kingdom

DESCRIPTION OF EQUIPMENT

The Methane Sensor is designed to measure ethane concentration by means of a pellistor type sensing head and electronically convert the measured methane concentration into an output signal that can be configured either as a 0V to 2.0V output signal or as a 4 to 20mA output signal. The unit consists of a controller PCB, an output PCB containing an encapsulated DC to DC converter and an optional LCD, all located in a plastic enclosure having an ingress protection rating of a least IP54. A window in the outer enclosure permits local viewing of the Methane concentration displayed on the optional LCD. A relay mounted on the controller PCB is programmed to disconnect the power to the catalytic sensor. The catalytic sensor is housed in a separate metallic enclosure that is externally attached to the main plastic enclosure. External electrical connections are made to screw type terminals mounted on the output PCB.

The STX3261 Methane Sensor has the following safety description:

**Connector pins 1 w.r.t. 2
(Power input)**

$U_i = 15.4V$

$I_i = 3.14A$

$L_i = 0$

$C_i = 0$

**Connector pins 4 w.r.t 3
(0.4 to 2V signal output)**

$U_o = 6.51V$

$I_o = 31.2mA$

$P_o = 21.5mW$

$C_o = 1000\mu F$

$C_i = 0$

$L_o = 0.5H$

$U_i = 15.4V$

**Connector pins 5 w.r.t 3
(4-20mA signal output)**

$U_o = 15.4V$

$I_o = 162.1mA$

$P_o = 62.5mW$

$C_o = 12.8\mu F$

$C_i = 121nF/132.46\mu F @ 6.51V$

$L_o = 17.7mH$

$U_i = 15.4V$

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The certificate does not cover any accessories to the methane sensor or its incorporation into an intrinsically safe system.

VARIATION 1: This variation introduced the following changes:

1. The name and the address of the applicant was changed.
2. The input voltage (U_i) at connector T1 w.r.t T2 and T4 w.r.t T3 is now 14.4V (previously 15.4V)
3. The input fuse F1 is now 0.125mA (was 250mA)
4. The 2V pellister power supply (DC to DC converter) is now part of the output printed circuit board (pcb) and is now un-encapsulated.
5. The DC to DC converter has been re-designed. The clamped output voltage to the pellister has remained 3.47V (maximum). The inductor value L1 in the modified DC to DC converter is 12 μ H (previously 470 μ H).
6. The 5V power rail clamped by ZD1 & ZD2 to 7.14V (previously D2, D3 & D4 clamped to 6.51V)
7. The output board now has two build options. It is built to give either an output of 0.4V – 2V or 4-20mA at terminal 4.
8. The circuit to be 4-20mA output is now supplied from the 12V rail (14.4V = U_i).
9. The relay, used to disconnect the power to the catalytic sensor, is no longer used.
10. The output pcb is now made up using four layers.
11. Minor circuit modifications have also been made to the LCD board, these do not affect intrinsic safety assessment.
12. The recognition of the new safety parameters listed below, when incorporating the changes described in this variation:

**Connector pins T1 w.r.t. T2
(power input)**

U_i = 14.4V
 I_i = 3.14A
 L_i = 0
 C_i = 0

**Connector pins T4 w.r.t.T3
(0.4 – 2V signal output)**

U_o = 7.14V
 I_o = 12mA
 P_o = 22mW
 C_i = 0
 L_i = 0
 C_o = 1000 μ F
 L_o = 1H
 U_i = 14.4V

**Connector pins T4 w.r.t.T3
(4 – 20mA signal output)**

U_o = 14.4V
 I_o = 276mA
 P_o = 1W
 C_i = 0
 L_i = 0
 C_o = 17.9 μ F
 L_o = 6.13mH
 U_i = 14.4V

VARIATION 2: This variation introduced the following changes:

1. The addition of interconnection details between the Head and the printed circuit board.
2. To permit the use of an alternative Head arrangement for the methane sensor.

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MARKING

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

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COMPLIANCE:

The unit as described above and in MASC Letter **11-361 R5** is hereby certified "Explosion Protected" Ex ia 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 Standards:

The evaluation was conducted according to the requirements of:

- **SANS (IEC) 60079-0: 2005 "Explosive atmospheres – Part 0: Equipment — General requirements"**
- **SANS (IEC) 60079-11: 2005 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"**
- **EN50303: 2005 "Category M1"**

Location	Zone 0 & 1	Mining
Hazard Frequency		Continuous as could occur under normal operating
Environment		Methane and Coal dust
Limiting Temperature		450°C (Methane gas) 150°C (Coal dust)
Ambient Temperature	-20°C to 55°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 report;
- 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.

SPECIAL CONDITIONS OF USE (X)

- The IP54 rating of the unit shall be maintained at all times.

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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 in a clear, legible, visible and indelible manner with the MASC marking details above.
3. This certificate of 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 SIRA and in this approval.
5. The SIRA certification must remain valid.
6. The bearing 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 for the equipment must remain valid.



D.P Visser
TECHNICAL SPECIALIST



M Dekker
TECHNICAL OFFICER

Mining And Surface Certification

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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).

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