



1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 99ATEX2135X** Issue: **7**

4 Equipment: **TX592x Vortex Gas Flow Sensor/Transmitter**

5 Applicant: **Trolex Limited**

6 Address: Hazel Grove
Stockport
Cheshire
SK7 5DY
U.K.

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

IEC 60079-0:2011 EN 60079-11:2012 EN 60079-26:2007 EN 50303:2000

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:



I M1
Ex ia I Ma
Ta = -20°C to +60°C

or



II 1G
Ex ia IIC Ga T4
Ta = -20°C to +60°C

Project Number 26573

C Ellaby
Deputy Certification Manager

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

**Sira 99ATEX2135X
Issue 7**

13 DESCRIPTION OF EQUIPMENT

The TX592x-Series Vortex Gas Flow Sensor/Transmitters comprise three PCBs housed in an anti-static plastic enclosure. A polycarbonate window is fitted to allow viewing of the liquid crystal display. The Vortex Gas Flow Sensor, which projects from the enclosure or is mounted remotely via a flying lead, comprises a single PCB in a stainless steel cylindrical case.

There are three types of Sensor/Transmitters:

- TX5921: rear-projecting sensor
- TX5922: side-projecting sensor
- TX5923: remote sensor

Each of these types may be manufactured in one of four versions:

- Group I: 4 to 20 mA version
- Group I: 0.4 to 2 V version
- Group I: 5 to 15 Hz version
- Group II: 4 to 20 mA version

The supply to the equipment is via terminals T3 and T4. The equipment is designed to detect the rate of gas flow by creating a stream of vortices, through which an ultrasonic beam is passed. The received signal, which is modulated by the vortex stream, is then converted into an output at terminals T1 and T2.

The TX5921/2/3 have the following safety descriptions:

Version	T3/T4 (supply)	T1/T2 (signal out)[See notes 1-3]
Group I: 4 - 20 mA version	U _i = 16.5 V; C _i = 4 nF; L _i = 0	U _i = 16.5 V P _i = 1.72 W C _i = 15 nF; L _i = 0. U _o = 16.5 V; I _o = 220 mA P _o = 0.91 W C _o = 11.9 µF; L _o = 2.6 mH.
Group I: 0.4 - 2 V version	U _i = 16.5 V; C _i = 4 nF; L _i = 0	U _i = 16.5 V P _i = 1.72 W C _i = 15 nF; L _i = 0 U _o = 16.5 V; I _o = 41 mA P _o = 0.17 W C _o = 11.9 µF; L _o = 2.6 mH
Group I: 5-15 Hz version	U _i = 16.5 V; C _i = 4 nF; L _i = 0	U _i = 16.5 V P _i = 1.72 W C _i = 0; L _i = 0 U _o = 0
Version	T1/T2/T3/T4 (total inputs to 'supply' and 'signal out')	
Group II 4 - 20 mA version:	U _i = 28 V; I _i = 120 mA P _i = 0.84 W C _i = 18.3 nF; L _i = 0	

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Sira Certification Service

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**Sira 99ATEX2135X
Issue 7**

Note 1: In some applications, T1 and T2 are inputs, in which case these output parameters are not relevant.

Note 2: For Group I builds, the connections to terminals T1/T2 and T3/T4 shall be from the same power supply. The user should note that the power to terminals T1/T2 must be limited to 1.72 W via a supply with a minimum source resistance of 40 Ω. There is no specific power limitation to terminals T3/T4, so terminals T1/T2 and T3/T4 should be regarded as separate intrinsically safe circuits.

Note 3: The user should refer to the parameters of the equipment connected to terminals T1/T2 and compare these to the parameters listed in the table. The more onerous set of parameters should be used.

Note 4: Terminals T5, T6 and T8 are connections to the Vortex Head which may be integral with the main part of the apparatus (TX5921 and TX5922) or connected by a cable not exceeding 10 m in length (TX5923). T7 is not connected.

The equipment has not been assessed as a 'safety device' as referenced in Directive 94/9/EC, Annex II, clause 1.5.

TX-592x-Series Vortex Sensing Head

The TX592x Vortex Gas Flow Sensor Remote Head is a stand-alone item of apparatus designed to be powered from a suitable barrier or isolator, or alternatively via a sensor/transmitter. The Vortex Head comprises a single PCB in a stainless steel cylindrical case. The apparatus is designed to detect the rate of gas flow by creating a stream of vortices, through which an ultrasonic beam is passed. The received signal is modulated by the vortex stream.

There are two types of Sensing Heads:

- 1 TX5924: hand-held
- 2 TX5925: fixed-mount

Both of these types are manufactured for Group I and Group II applications. The construction of the Group I and Group II versions is identical. The Vortex Head has the following safety description:

Group I (total of supply plus signal)	Group II (total of supply plus signal)
Ui = 16.5 V	Ui = 30 V
Ii = 390 mA	Ii = 390 mA
Pi = 1.61 W	Pi = 1.2 W
Ci = 0	Ci = 0
Li = 15 μH	Li = 15 μH

The equipment has not been assessed as a 'safety device' as referenced in Directive 94/9/EC, Annex II, clause 1.5.

Variation 1 - This variation introduced the following changes:

- i. The use of pad printing was recognised as an alternative method of marking.

Variation 2 - This variation introduced the following changes:

- i. A potentiometer was added to the sensor head circuit.

Variation 3 - This variation introduced the following changes:

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Sira 99ATEX2135X
Issue 7

i. The value of C26 was increased from 2.64 nF to 12 nF.

Variation 4 - This variation introduced the following changes:

i. The use of 'Faradex' stainless steel filled nylon 6 as an alternative anti-static enclosure material.

Variation 5 - This variation introduced the following changes:

i. To permit the value of C26 in the 4-20 mA Group I build to be increased from 2.64nF to 12 nF.

Variation 6 - This variation introduced the following changes:

i. The mechanical design of the head was varied as required.

Variation 7 - This variation introduced the following changes:

- i. To recognise that the equipment complies with IEC 60079-0:2011, EN 60079-11:2012, EN 60079-26:2007 & EN 50303:2000. The list of standards is updated accordingly.
- ii. The addition of an alternative plastic enclosure material with anti-static properties.
- iii. The deletion of the zinc alloy enclosure option.
- iv. The marking details are now laser-etched on a stainless steel label and is attached to the front face of the apparatus.
- v. The use of Bedford opto-isolator Type OPI1264D approved under BAS 01ATEX1278U/4 coded Ex ia IIC Ga as a replacement to that approved under BAS Ex 89C2096U/2 coded EEx ia IIC.
- vi. The use of Littelfuse fuse 259 approved under Baseefa02ATEX0071U –Issue 3 coded Ex as a replacement to that approved under BAS Ex 832302U.
- vii. As a result of the modifications the Product Description, Conditions of Certification, Special Conditions for Safe Use and Marking were amended.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report no.	Comment
0	19 April 2000	R52X6307A	The release of the prime certificate.
1	16 November 2000	52V6965	The introduction of Variation 1.
2	20 February 2002	R52A8653A	The introduction of Variation 2.
3	17 September 2002	52V9493	The introduction of Variation 3.
4	24 March 2003	R52A9400A	The introduction of Variation 4.
5	14 May 2003	52V10187	The introduction of Variation 5.
6	3 May 2006	R52V14453A	The introduction of Variation 6.
7	22 March 2012	R26573A/00	This Issue covers the following changes: <ul style="list-style-type: none">• All previously issued certification was rationalised into a single certificate, Issue 7, Issues 0 to 6 referenced above are only intended to reflect the history of the previous certification and have not been issued as documents in this format.• The introduction of Variation 7.

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**Sira 99ATEX2135X
Issue 7**

- 15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)
- 15.1 The only sensor that may be used with the TX5923 (remote sensor head version) is that supplied by Trolex. The maximum length of cable allowed is 10 m.
- 15.2 The plastic enclosure and the polycarbonate window are non-conducting and may generate an ignition-capable level of static under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of static on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.
- 16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)
- The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.
- 17 **CONDITIONS OF CERTIFICATION**
- 17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.
- 17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.
- 17.3 The use of this certificate is subject to the Regulations Applicable to Holders of SCS Certificates.
- 17.4 This certificate relies on the following previously-certified products. When used as part of the equipment, the key attributes listed in the table below shall still be maintained by their original certificate.

Product	Certificate number	Key attributes
Littelfuse fuse	BAS02ATEX0071U – Issue 3	Ex
Bedford OPI1264-series opto-isolator	BAS 01ATEX1278U/4	Ex ia IIC Ga

Certificate Annexe

Certificate Number: Sira 99ATEX2135X
Equipment: TX592x Vortex Gas Flow Sensor/Transformer
Applicant: Trolex Limited



Issue 0

Drawing	Sheets	Rev.	Date	Description
P5430.01	1 of 1	A	03 Nov 97	Control PCB Certified Circuit Diagram
P5430.04	1 of 1	A	22 Jan 98	Output PCB
P5431.01	1 of 1	B	05 Apr 00	Output PCB Certified Circuit Diagram
P5431.02	1 of 1	B	15 Mar 00	General Arrangement
P5431.03	1 of 4	C	05 Apr 00	Top side component map
P5431.03	2 of 4	C	05 Apr 00	Top Side Tracking
P5431.03	3 of 4	C	05 Apr 00	Bottom Side Tracking
P5431.03	4 of 4	C	05 Apr 00	Bottom side component map
P5431.37	1 of 1	C	05 Apr 00	Head PCB Certified Circuit Diagram
P5431.42	1 of 1	A	16 Jan 98	Certified Block Diagram
P5431.88	1 of 1	A	22 Mar 00	Certification Label
P9000.100	1 of 1	B	06 Apr 00	Alternative Housing Arrangement

Issue 1

Drawing	Sheets	Rev.	Date	Description
P9000.100	1 of 1	C	7 Jun 00	Alternative Housing Arrangement

Issue 2

Drawing	Sheets	Rev.	Date	Description
P5431.37	1 of 1	D	28 Jan 02	Schematic – head PCB
P5431.03	1 of 1	D	28 Jan 02	Artwork – head PCB
P5431.02	1 of 1	C	19 Dec 00	General Arrangement

Issue 3

Drawing	Sheets	Rev.	Date	Description
P5431.01	1 of 1	C	04 Sep 02	Output PCB Certified Circuit Diagram

Issue 4

Drawing	Sheets	Rev.	Date	Description
P5431.02	1 of 1	D	06 Feb 03	General arrangement

Issue 5

Drawing	Sheets	Rev.	Date	Description
P5431.01	1 of 1	D	04 Mar 03	Output PCB Certified Circuit Diagram

Issue 6

Drawing	Sheets	Rev.	Date	Description
P5431.02	1 of 1	E	17 Jan 06	General Assembly

Issue 7

Drawing	Sheets	Rev.	Date (Sira Stamp)	Title
P5431.02	1 of 1	G	06 Mar 12	General Assembly
P5431.88	1 of 1	B	16 Feb 12	Certification Labels
P5431.01	1 of 1	E	16 Feb 12	Output PCB Certified Circuit Diagram

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