



1 **EC TYPE-EXAMINATION CERTIFICATE**

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

3 Certificate Number: Sira 06ATEX2067X

4 Equipment: Model 84 Vortex Flowmeter

5 Applicant: Invensys Systems Inc.

6 Address: 33 Commercial Street  
Foxboro  
MA 02035  
USA

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 confidential report number R52A11609E, R52A11609G and R52A15731B.

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:

EN50014: 1997            EN50020: 2002  
EN50018: 2000            EN50284: 1999  
EN50281-1-1: 1998

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:



II 1GD T103°C  
EEx ia IIC T4 (T<sub>a</sub> = -40°C to +80°C)



II 2 (1) GD T85°C  
EEx d[ia] T4 (T<sub>a</sub> = -20°C to +80°C)



II 1GD T103°C  
EEx ia IIC T4 (T<sub>a</sub> = -40°C to +80°C)



II 1GD T103°C  
EEx ia IIC T4 (T<sub>a</sub> = -40°C to +80°C)



II 2/1 (1) GD T85°C  
EEx d[ia]ia T4 (T<sub>a</sub> = -20°C to +80°C)

(See certificate schedule for full marking breakdown)

Project Number 52A15731  
Date 10 May 2006  
Latest Issue 12 January 2007  
C. Index 12

C Ellaby  
Certification Officer

**Sira Certification Service**

Rake Lane, Eccleston, Chester, CH4 9JN, England

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## SCHEDULE

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Re-issued 19 July 2006 to include the changes described in report number R52A11609G.

Re-issued 12 January 2007 to include the changes described in report number R52A15731B and to incorporate Variation 1 dated 10 October 2006.

#### 13 DESCRIPTION OF EQUIPMENT

The Model 84 Vortex Flowmeter is a flow measurement instrument using a piezoelectric crystal. The unit is connected to loop power (4 – 20 mA), which provides power and communication to and from the device. If the unit contains the pulse output option it is also powered via a separate intrinsically safe supply. The equipment being assessed comprises an integral and remote version. The integral version comprises a single enclosure and is available in either an intrinsic safety version or flameproof version however the integral version always uses intrinsic safety to protect the piezoelectric crystal. The remote version comprises two separate enclosures, the main housing and the remote housing. The main housing of the remote version is available in an intrinsic safety version or flameproof version however the remote housing is always intrinsically safe and is separately marked as such. The integral version (main housing) externally comprises an aluminum enclosure with an optional display window. The main housing contains a five-board PCB stack, a preamplifier and a terminal board. In the remote version there is a second enclosure, which is referred to as the remote housing. The remote housing is made of cast aluminium and consists of a single field wiring compartment with a threaded blank cover and internally contains a preamplifier board. The remote housing is a Limatherm type XD-AD and has been previously certified, II 2 GD EEx d IIC certificate number FTZU 03ATEX0074U, however its flameproof characteristics have not been relied upon. In the remote housing of the remote version there is a preamplifier board.

This certificate covers the both the flameproof and the intrinsically safe versions of the Model 84 Vortex Flowmeter. There is an additional complication in that there is an integral and a remote version of both types. To understand the scope of the certificate it is necessary to first understand the basic differences between the flameproof and intrinsically safe versions. Obviously the flameproof version depends upon a flameproof enclosure and intrinsically safe one relies upon intrinsic safety. However, the flameproof version has a piezoelectric crystal, which is located outside of the flameproof enclosure and so it is protected by intrinsic safety. It is therefore necessary to certify the circuitry inside the enclosure as "Associated Apparatus". To put this into effect the flameproof version uses the same electronic circuits as the intrinsically safe version though the former has the addition of an infallible shunt safety assembly, which is located on the integral preamplifier board.

#### **Intrinsically Safe (IS) Versions**

The essential differences between the remote and integral IS versions are that the remote version uses a separate external piezoelectric crystal together with an additional preamplifier board. The integral version uses an onboard piezoelectric crystal with an optional preamplifier.

#### **Flameproof Versions**

The essential differences between the remote and integral flameproof versions are that the preamplifier board in the integral version contains both "Barrier" circuitry and optional preamplifier circuitry. The preamplifier board in the remote version contains only "Barrier" circuitry.

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**Safety Description**

**Main Housing**

**Intrinsic Safety**

Loop power (4 – 20 mA) terminals

U<sub>i</sub> = 30 V  
I<sub>i</sub> = 110 mA  
P<sub>i</sub> = 0.8 W  
C<sub>i</sub> = 0  
L<sub>i</sub> = 0

Pulse output terminals

U<sub>i</sub> = 30 V  
I<sub>i</sub> = 110 mA  
P<sub>i</sub> = 0.8 W  
C<sub>i</sub> = 0.3 nF  
L<sub>i</sub> = 0  
U<sub>o</sub> = 6.51 V  
I<sub>o</sub> = 6.6 mA

**Flameproof**

Loop power (4 – 20 mA) terminals

U<sub>m</sub> = 250 Vrms  
Supply = 24V dc nominal

Pulse output terminals

U<sub>m</sub> = 250 Vrms  
Supply = 24 V dc nominal

**Marking Breakdown**

**Intrinsically Safe Version**

**Main Housing Integral Version**



II 1GD T103°C  
EEx ia IIC T4  
(T<sub>a</sub> = -40°C to +80°C)

**Main Housing Remote Version**



II 1GD T103°C  
EEx ia IIC T4  
(T<sub>a</sub> = -40°C to +80°C)

**Remote Housing**



II 1GD T103°C  
EEx ia IIC T4  
(T<sub>a</sub> = -40°C to +80°C)

**Flameproof Version**

**Main Housing Integral Version**



II 2/1 (1) GD T85°C  
EEx d[ia]ia T4  
(T<sub>a</sub> = -20°C to +80°C)

**Main Housing Remote Version**



II 2 (1) GD T85°C  
EEx d[ia] T4  
(T<sub>a</sub> = -20°C to +80°C)

**Remote Housing**



II 1GD T103°C  
EEx ia IIC T4  
(T<sub>a</sub> = -40°C to +80°C)

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**14 DESCRIPTIVE DOCUMENTS**

**14.1 Drawings**

**Label Drawings**

| Drawing | Sheets | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description   |
|---------|--------|------|-----------------------------------|---|
| G0120BS | 1 of 1 | C    | 2006-11-03                        | Plate, Data (I/A Vortex) ATEX (Main Housing IS Version)   |
| G0120BT | 1 of 1 | C    | 2006-11-03                        | Plate, Agency (ATEX) Model 84 (Remote Terminal Box)       |
| B0189VF | 1 of 1 | B    | 2006-11-03                        | Plate, Data, (I/A Vortex) ATEX (Main Housing Exd Version) |

**Drawings Common to Flameproof Version and Intrinsically Safe Versions**

| Drawing | Sheets    | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description                          |
|---------|-----------|------|-----------------------------------|--------------------------------------|
| X0180HG | 1 to 2    | A    | 2006-11-03                        | Compound, Potting Silicone           |
| 10137BP | 1         | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 2         | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 3 to 4    | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 5         | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 6 to 8    | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 9 to 12   | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 13 to 14  | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 15        | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 16 to 17  | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 18        | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 19 to 20  | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 21        | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 22 to 49  | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 50 to 51  | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 52        | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 53 to 64  | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 65        | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 66 to 71  | B    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137BP | 72 to 178 | C    | 2006-11-03                        | Vortex Flowmeter (Flanged) Model 84F |
| 10137CH | 1         | C    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 2         | B    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 3 to 4    | C    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 5         | B    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 6 to 7    | C    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 8 to 9    | B    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 10 to 11  | C    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 12 to 14  | B    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CH | 15 to 86  | C    | 2006-11-03                        | Vortex Flowmeter (Wafer) Model 84W   |
| 10137CK | 1 to 2    | C    | 2006-11-03                        | Sanitary Vortex Flowmeter Model 84S  |
| 10137CK | 3         | B    | 2006-11-03                        | Sanitary Vortex Flowmeter Model 84S  |

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| Drawing  | Sheets  | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description   |
|----------|---------|------|-----------------------------------|---|
| 10137CK  | 4 to 25 | C    | 2006-11-03                        | Sanitary Vortex Flowmeter Model 84S   |
| P0127BE  | 1 to 4  | H    | 2006-11-03                        | Surface Mount Technology PWA Multivariable Vortex HART MAU Board                      |
| 10127BE  | 1 to 13 | H    | 2006-11-03                        | Hart MAU Board M84 Vortex   |
| P0127BF  | 1 to 10 | C    | 2006-11-03                        | Surface Mount Technology PWB Multivariable Vortex HART MAU Board                      |
| P0127BN  | 1 to 5  | G    | 2006-11-03                        | Surface Mount Technology PWA Multivariable Vortex MAU Board                           |
| 10127BN  | 1 to 14 | G    | 2006-11-03                        | Foxcom MAU Board Multivariable Vortex   |
| P0127BP  | 1 to 10 | C    | 2006-11-03                        | Surface Mount Technology PWB Multivariable Vortex MAU Board                           |
| P0127CQ  | 1 to 2  | C    | 2006-11-03                        | Surface Mount Technology PWA M84 Pulseout Board                                       |
| P0127CQ  | 1 of 1  | -    | 2006-11-03                        | Surface Mount Technology PWA M84 Pulseout Board (Bill of Materials)                   |
| 10127CQ  | 1 to 11 | C    | 2006-11-03                        | M84 Pulseout Board Vortex (Sheet 5 annotated by Sira)                                 |
| P0127BD  | 1 to 10 | C    | 2006-11-03                        | Surface Mount Technology PWB Multiplexer/Pulseout Board                               |
| P0127BA  | 1 to 4  | H    | 2006-11-03                        | Surface Mount Technology PWA Vortex Sensor Board                                      |
| 10127BA  | 1 to 9  | H    | 2006-11-03                        | Sensor Board, M84 Vortex  |
| P0127BB  | 1 to 10 | D    | 2006-11-03                        | Surface Mount Technology PWB Vortex Sensor Board                                      |
| P0127BG  | 1 to 2  | D1   | 2006-11-03                        | Surface Mount Technology PWA I/A MV Vortex Processor Board                            |
| P0127BG  | 1 of 1  | D1   | 2006-11-03                        | Surface Mount Technology PWA I/A MV Vortex Processor Board (Bill of Materials)        |
| 10127BG  | 1       | D1   | 2006-11-03                        | I/A MV Vortex Processor PWA   |
| 10127BG  | 2 to 7  | OD   | 2006-11-03                        | I/A MV Vortex Processor PWA   |
| P0127DT  | 1 to 2  | C1   | 2006-11-03                        | Surface Mount Technology PWA I/A MV Vortex Processor Board (HART)                     |
| P0127DT  | 1 of 1  | -    | 2006-11-03                        | Surface Mount Technology PWA I/A MV Vortex Processor Board (HART) (Bill of Materials) |
| 10127DT  | 1       | C1   | 2006-11-03                        | I/A MV Vortex Processor PWA (Hart)  |
| 10127DT  | 2 to 7  | OC   | 2006-11-03                        | I/A MV Vortex Processor PWA (Hart)  |
| P0127BH  | 1 to 10 | B    | 2006-11-03                        | Surface Mount Technology PWB I/A MV Vortex Processor Board                            |
| K0146HB  | 1 of 1  | D    | 2006-11-03                        | Piezo-Electric Crystal Lithium Niobate  |
| K0148RV  | 1 to 1  | D    | 2006-11-03                        | Electronics Module Assembly   |
| K0148RX  | 1 of 1  | D    | 2006-11-03                        | MAU/Potting Assembly  |
| K0152GB  | 1 of 1  | A    | 2006-11-03                        | Junction Box, M84   |
| G0120BB  | 1 of 1  | A    | 2006-11-03                        | Label, M84 Cable Warning  |
| G0120BC  | 1 of 1  | A    | 2006-11-03                        | Label, M84 M20 x 1.5 Thread   |
| D0162AK  | 1 of 1  | C    | 2006-11-03                        | Label, Blank  |
| D0162AL  | 1       | N    | 2006-11-03                        | Housing, Die Casting  |
| D0162AL  | 2       | K    | 2006-11-03                        | Housing, Die Casting  |
| D0162AN- | 1 of 1  | J    | 2006-11-03                        | Cover, Die Casting  |

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|----------|--------|------|-----------------------------------|--|
| D0162AP- | 1 of 1 | P    | 2006-11-03                        | Cover, Machining                             |
| K0149FV- | 1      | G    | 2006-11-03                        | Housing, Machining                           |
| K0149FV- | 2      | F    | 2006-11-03                        | Housing, Machining                           |
| K0149GR  | 1 of 1 | A    | 2006-11-03                        | Blank, Label, Remote                         |
| K0148SL  | 1 to 1 | G    | 2006-11-03                        | Electronics Module Assembly, Hart, N/Pulse   |
| K0148SM  | 1 to 1 | E    | 2006-11-03                        | Electronics Module Assembly, Foxcom, N/Pulse |
| K0148SP  | 1 to 1 | E    | 2006-11-03                        | Electronics Module Assembly, Foxcom, W/Pulse |
| K0147VT  | 1 to 1 | G    | 2006-11-03                        | Electronics Module Assembly, Hart, W/Pulse   |
| L0123HS  | 1 to 6 | A    | 2006-11-03                        | Terminal Block w/ Pulse PWB                  |
| L0123HU  | 1 to 7 | A    | 2006-12-21                        | Remote Preamplifier PWB                      |
| L0123HE  | 1 to 8 | C    | 2006-12-21                        | Integral Preamplifier PWB                    |

**FoxComp Part Numbers** (Note: - The numerical part of foxcomp part numbers define the data sheet, e.g. P0202\*\* is a zener diode data sheet irrespective of the letter suffixes. Hence P0202BK and P0202DB have the same data sheet).

| Drawing | Sheets | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description  |
|---------|--------|------|-----------------------------------|--------------|
| P0203BZ | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0203BW | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204BN | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| BF160VN | 1 to 4 | D    | 2006-03-24                        | Transformer  |
| P0153FT | 1 of 1 | -    | 2006-03-24                        | Diode        |
| P0153JJ | 1 of 1 | -    | 2006-03-24                        | Diode        |
| P0188AB | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0188SL | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0202BK | 1 of 1 | -    | 2006-03-24                        | Zener Diode  |
| P0202DH | 1 of 1 | -    | 2006-03-24                        | Zener Diode  |
| P0202DN | 1 of 1 | -    | 2006-03-24                        | Zener Diode  |
| P0202DP | 1 of 1 | -    | 2006-03-24                        | Zener Diode  |
| P0202DR | 1 of 1 | -    | 2006-03-24                        | Zener Diode  |
| P0203BN | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0203YH | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0203YU | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0203YW | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0203YX | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204AT | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204BE | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204CF | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204ED | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0204FT | 1 of 1 | -    | 2006-03-24                        | Resistor     |
| P0207BD | 1 of 1 | -    | 2006-11-03                        | Barrier Fuse |
| P0203BA | 1 of 1 | -    | 2006-12-21                        | Resistor     |
| P0202DB | 1 of 1 | -    | 2006-11-03                        | Zener Diode  |
| P0153LU | 1 of 1 | -    | 2006-11-03                        | Zener Diode  |

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|---------|--------|------|-----------------------------------|--------------|
| P0202FB | 1 of 1 | -    | 2006-12-21                        | Zener Diode  |
| P0204AR | 1 of 1 | -    | 2006-11-03                        | Resistor     |
| P0207BE | 1 of 1 | -    | 2006-12-21                        | Barrier Fuse |
| P0153GJ | 1 to 2 | -    | 2006-12-21                        | Zener Diode  |

#### Drawings Applicable to Intrinsically Safe Version Only

| Drawing | Sheets | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description                        |
|---------|--------|------|-----------------------------------|------------------------------------|
| L0123HM | 1 to 3 | A    | 2006-12-19                        | Terminal Block w/o Pulse PWA       |
| 10111UM | 1 to 3 | A    | 2006-12-19                        | Terminal Block w/o Pulse Schematic |
| L0123HL | 1 to 3 | A    | 2006-12-19                        | Terminal Block w/ Pulse PWA        |
| 10111UL | 1 to 3 | A    | 2006-12-19                        | Terminal Block w/ Pulse Schematic  |
| L0123HG | 1 to 3 | F    | 2006-12-19                        | Integral Hi Temp Preamp PWA        |
| 10111UG | 1 to 3 | F    | 2006-12-19                        | Integral Hi Temp Preamp Schematic  |
| L0123HH | 1 to 3 | E    | 2006-12-19                        | Neck Board Preamp PWA              |
| 10111UH | 1 to 3 | E    | 2006-12-19                        | Neck Board Schematic               |
| L0123HT | 1 to 2 | D    | 2006-12-19                        | Remote Std-Temp Preamp PWA         |
| 10111UT | 1 to 2 | D    | 2006-12-19                        | Remote Std-Temp Preamp Schematic   |
| L0123HV | 1 to 2 | D    | 2006-12-19                        | Remote Hi-Temp Preamp PWA          |
| 10111UV | 1 to 2 | D    | 2006-12-19                        | Remote Hi-Temp Preamp Schematic    |

#### Drawings Applicable to Flameproof Version only

| Drawing  | Sheets | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description             |
|----------|--------|------|-----------------------------------|-------------------------|
| C0127EZ- | 1 of 5 | W    | 2006-11-03                        | O-Ring Buna-N           |
| C0127EZ- | 2 of 5 | V    | 2006-11-03                        | O-Ring Buna-N           |
| C0127EZ- | 3 of 5 | W    | 2006-11-03                        | O-Ring Buna-N           |
| C0127EZ- | 4 of 5 | U    | 2006-11-03                        | O-Ring Buna-N           |
| C0127EZ- | 5 of 5 | S    | 2006-11-03                        | O-Ring Buna-N           |
| X0145BV- | 1 of 5 | R    | 2006-11-03                        | O-Ring, Silicone Rubber |
| X0145BV- | 2 of 5 | R    | 2006-11-03                        | O-Ring, Silicone Rubber |
| X0145BV- | 3 of 5 | M    | 2006-11-03                        | O-Ring, Silicone Rubber |
| X0145BV- | 4 of 5 | L    | 2006-11-03                        | O-Ring, Silicone Rubber |
| X0145BV- | 5 of 5 | M    | 2006-11-03                        | O-Ring, Silicone Rubber |
| P0170NZ  | 1 of 3 | E    | 2006-11-03                        | Cable, Multiconductor   |
| P0170NZ  | 2 of 3 | B    | 2006-11-03                        | Cable, Multiconductor   |
| P0170NZ  | 3 of 3 | E    | 2006-11-03                        | Cable, Multiconductor   |
| X0173MC- | 1 of 3 | F    | 2006-11-03                        | Bolt, Hex Cap Screw     |
| X0173MC- | 2 of 3 | E    | 2006-11-03                        | Bolt, Hex Cap Screw     |
| X0173MC- | 3 of 3 | F    | 2006-11-03                        | Bolt, Hex Cap Screw     |
| X0173NJ- | 1 to 2 | C    | 2006-11-03                        | Screw, Metric           |
| X0173SR- | 1 of 3 | H    | 2006-11-03                        | Fasteners, Tin Plated   |
| X0173SR- | 2 of 3 | G    | 2006-11-03                        | Fasteners, Tin Plated   |

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| <b>Drawing</b> | <b>Sheets</b> | <b>Rev.</b> | <b>Date (Sira Stamp)<br/>(yyyy-mm-dd)</b> | <b>Description</b>                   |
|----------------|---------------|-------------|---|--------------------------------------|
| X0173SR-       | 3 of 3        | H           | 2006-11-03                                | Fasteners, Tin Plated                |
| X0201FC        | 1 to 2        | B           | 2006-11-03                                | O-Ring Buna-N                        |
| N0248AK-       | 1 to 2        | E           | 2006-11-03                                | Potting Compound Polyurethane 2-Part |
| B1276ZU        | 1 to 2        | B           | 2006-11-03                                | Screw, Tapping                       |
| 10137CN        | 1 of 4        | C           | 2006-11-03                                | Certification Dwg. M84 Vortex (ATEX) |
| 10137CN        | 2 of 4        | A           | 2006-11-03                                | Certification Dwg. M84 Vortex (ATEX) |
| 10137CN        | 3 of 4        | C           | 2006-11-03                                | Certification Dwg. M84 Vortex (ATEX) |
| 10137CN        | 4 of 4        | C           | 2006-11-03                                | Certification Dwg. M84 Vortex (ATEX) |
| B0137SA-       | 1 of 2        | M           | 2006-11-03                                | Vortex Meter (2 Inch) Casting        |
| B0137SA-       | 2 of 2        | L           | 2006-11-03                                | Vortex Meter (2 Inch) Casting        |
| B0137SD-       | 1 of 1        | F           | 2006-11-03                                | Vortex Meter (2 Inch) Machining      |
| B0137SH-       | 1 of 2        | N           | 2006-11-03                                | Vortex Meter 3" Casting              |
| B0137SH-       | 2 of 2        | M           | 2006-11-03                                | Vortex Meter 3" Casting              |
| B0137SP-       | 1 to 2        | N           | 2006-11-03                                | Vortex Meter 80mm Machining          |
| B0137SQ        | 1 of 1        | H           | 2006-11-03                                | Vortex Meter 4" Class 150 Casting    |
| B0137SR        | 1 of 1        | G           | 2006-11-03                                | Vortex Meter 4" Class 300 Casting    |
| B0137SS-       | 1 to 2        | N           | 2006-11-03                                | Vortex Meter 4" Casting              |
| B0137TA        | 1 of 1        | H           | 2006-11-03                                | Vortex Meter 100mm PN 40 Casting     |
| B0139CA        | 1 of 1        | B           | 2006-11-03                                | Pipe Plug                            |
| K0146HY-       | 1 of 3        | J           | 2006-11-03                                | Sensor Assy                          |
| K0146HY-       | 2 of 3        | G           | 2006-11-03                                | Sensor Assy                          |
| K0146HY-       | 3 of 3        | J           | 2006-11-03                                | Sensor Assy                          |
| K0146KA-       | 1 of 1        | E           | 2006-11-03                                | Tube, Extension                      |
| K0146MU-       | 1 to 2        | F           | 2006-11-03                                | Sanitary Grounded Sensor Assy        |
| K0147CC        | 1 of 1        | A           | 2006-11-03                                | Washer, Grafoil High Temp.           |
| K0147FR        | 1 to 2        | B           | 2006-11-03                                | Terminal Block Std with Pulse        |
| K0147GB        | 1 of 1        | G           | 2006-11-03                                | bonnet, casting, w/o hub             |
| K0147GT-       | 1 of 2        | J           | 2006-11-03                                | Bonnet, Mach., Std Temp W 0 Hub      |
| K0147GT-       | 2 of 2        | H           | 2006-11-03                                | Bonnet, Mach., Std Temp W 0 Hub      |
| K0147GW        | 1 of 1        | D           | 2006-11-03                                | Bonnet Neck High Temp                |
| K0147GX-       | 1 of 1        | D           | 2006-11-03                                | Bonnet assy, High temp               |
| K0147RA-       | 1 of 1        | C           | 2006-11-03                                | Vortex Meter .75 Inch (Casting)      |
| K0147RC-       | 1 of 1        | C           | 2006-11-03                                | Flow Tube .75 Inch (Casting)         |
| K0147RH-       | 1 of 1        | B           | 2006-11-03                                | Vortex Meter (1 Inch) Casting        |
| K0147RK-       | 1 of 1        | D           | 2006-11-03                                | Flow Tube 1 Inch (Casting)           |
| K0147RQ-       | 1 of 1        | D           | 2006-11-03                                | Vortex Meter 1.5" (Casting)          |
| K0147RS-       | 1 of 1        | D           | 2006-11-03                                | Flow Tube 1.5 Inch (Casting)         |
| K0147SK-       | 1 of 1        | B           | 2006-11-03                                | Vortex Meter (.75 Inch) Machining    |
| K0147SM-       | 1 of 2        | E           | 2006-11-03                                | Flow Tube (.75 Inch) Machining       |
| K0147SV-       | 1 of 1        | C           | 2006-11-03                                | Vortex Meter (1 Inch) Machining      |
| K0147SX-       | 1 to 2        | G           | 2006-11-03                                | Flow Tube (1 Inch) Machining         |
| K0147TF-       | 1 of 1        | B           | 2006-11-03                                | Vortex Meter (1.5 Inch) Machining    |
| K0147TH-       | 1 to 2        | D           | 2006-11-03                                | Flow Tube (1.5 Inch) Machining       |

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| Drawing  | Sheets | Rev. | Date (Sira Stamp)<br>(yyyy-mm-dd) | Description                        |
|----------|--------|------|-----------------------------------|------------------------------------|
| K0147TS- | 1 of 1 | B    | 2006-11-03                        | Vortex Meter (15 mm) Machining     |
| K0147XW  | 1 of 1 | D    | 2006-11-03                        | window, extended, cast, Vortex     |
| K0147XX- | 1 of 1 | E    | 2006-11-03                        | window, extended, mach             |
| K0147YA- | 1 of 1 | A    | 2006-11-03                        | Window, Display, Assy              |
| K0147ZS  | 1 of 1 | G    | 2006-11-03                        | Terminal Block Assy, Std           |
| K0148FT  | 1 of 1 | C    | 2006-11-03                        | Seal Assembly                      |
| K0148JA- | 1 of 1 | A    | 2006-11-03                        | Sensor Body Machining              |
| K0148JC- | 1 to 2 | G    | 2006-11-03                        | 83F/W Grounded Sensor assy std     |
| K0148KK- | 1 to 3 | G    | 2006-11-03                        | Sensor assembly HI-Temp            |
| K0148RZ  | 1 of 1 | C    | 2006-11-03                        | Bonnet, cast, with hub             |
| K0148TW  | 1 of 1 | F    | 2006-11-03                        | Neck, Cast, Pre-Amp MTG            |
| K0148TX  | 1 of 1 | H    | 2006-11-03                        | Neck, Mach., STD, Vortex           |
| K0148WH  | 1 of 1 | C    | 2006-11-03                        | Cover, extended, cast, Vortex      |
| K0148WJ- | 1 of 1 | E    | 2006-11-03                        | cover, extended, mach              |
| K0149FM- | 1 of 1 | F    | 2006-11-03                        | Terminal Block Assy, Ex-Proof      |
| K0149FQ- | 1 to 2 | B    | 2006-11-03                        | Terminal Block, Ex-Proof,W/P       |
| K0149FV- | 1 of 2 | G    | 2006-11-03                        | Housing, Machining                 |
| K0149FV- | 2 of 2 | F    | 2006-11-03                        | Housing, Machining                 |
| K0149HT  | 1 of 1 | C    | 2006-11-03                        | Adapter, Potted, Feedthru, Remote  |
| K0149HU- | 1 to 5 | E    | 2006-11-03                        | Cable Assembly, Potted, M84 Vortex |
| K0149JA- | 1 of 1 | A    | 2006-11-03                        | Flow Tube Machined 8 Inch          |
| K0149JC  | 1 of 1 | A    | 2006-11-03                        | Flow Tube, 8 Inch 1st Machining    |
| K0149JD  | 1 of 1 | B    | 2006-11-03                        | Flow Tube Casting 8 Inch           |
| K0149JE- | 1 of 1 | A    | 2006-11-03                        | Flow Tube Machined 6 Inch          |
| K0149JG  | 1 of 1 | A    | 2006-11-03                        | Flow Tube, 6 Inch 1st Machining    |
| K0149JH  | 1 of 1 | B    | 2006-11-03                        | Flow Tube Casting 6 Inch           |
| K0152JF  | 1 of 1 | A    | 2006-11-03                        | Shield, Bonnet, ATEX               |
| D0162AW  | 1 of 1 | C    | 2006-11-03                        | Lens, Explosion Proof              |
| D0162VJ- | 1 of 1 | G    | 2006-11-03                        | Screw Assembly                     |
| D0162WM  | 1 of 1 | E    | 2006-11-03                        | Lock, Cenelec                      |
| D0179FJ- | 1 of 1 | A    | 2006-11-03                        | Conduit Plug M20 EXPL/Dust Proof   |
| B0185AJ  | 1 of 1 | C    | 2006-11-03                        | Adaptor                            |
| B0194GA- | 1 of 1 | F    | 2006-11-03                        | Vortex Meter 3" Machining          |
| B0194GB- | 1 of 1 | F    | 2006-11-03                        | Vortex Meter 4" Machining          |
| B0194GH- | 1 to 2 | E    | 2006-11-03                        | Flow Tube Casting 3"               |
| B0194GK- | 1 of 2 | D    | 2006-11-03                        | Flow Tube Casting 4"               |
| B0194GK- | 2 of 2 | C    | 2006-11-03                        | Flow Tube Casting 4"               |
| B0194HJ- | 1 of 1 | E    | 2006-11-03                        | Flow Tube Mach 4"                  |
| B0194HN- | 1 of 1 | E    | 2006-11-03                        | Flow Tube Mach 3"                  |
| B0194HQ- | 1 of 1 | D    | 2006-11-03                        | Flow Tube Machining 2"             |
| B0194TH  | 1 of 1 | A    | 2006-11-03                        | Vortex Meter Casting DN100 PN64    |
| B0194TJ  | 1 of 1 | A    | 2006-11-03                        | Vortex Meter                       |
| B0194TY- | 1 of 2 | P    | 2006-11-03                        | Vortex Meter 50 mm Machining       |

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|----------|--------|------|-----------------------------------|--|
| B0194TY- | 2 of 2 | J    | 2006-11-03                        | Vortex Meter 50 mm Machining             |
| B0194UC- | 1 to 2 | M    | 2006-11-03                        | Vortex Meter 100 mm Machining            |
| B0194VZ  | 1 of 1 | C    | 2006-11-03                        | Isolation Manifold Vortex Meter          |
| L0123HP  | 1 to 3 | A    | 2006-11-03                        | Terminal Block EEX d w/o Pulse PWA       |
| 10111UP  | 1 to 3 | A    | 2006-11-03                        | Terminal Block EEX d w/o Pulse Schematic |
| L0123HN  | 1 to 3 | A    | 2006-11-03                        | Terminal Block EEX d w/ Pulse PWA        |
| 10111UN  | 1 to 3 | A    | 2006-11-03                        | Terminal Block EEX d w/ Pulse Schematic  |
| K0152JV  | 1 of 1 | B    | 2006-11-03                        | P.E. Ground Retainer Molding             |
| L0123HD  | 1 to 3 | F    | 2006-12-19                        | Integral Hi Temp EEx d Preamp PWA        |
| 10111UD  | 1 to 5 | F    | 2006-12-19                        | Integral Hi Temp EEx d Preamp Schematic  |
| L0123HF  | 1 to 3 | E    | 2006-12-19                        | EEx d Neck Board Preamp PWA              |
| 10111UF  | 1 to 3 | E    | 2006-12-19                        | EEx d Neck Board Schematic               |

14.2 Report numbers R52A11609E, R52A11609G and R52A15731B.

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

15.1 The following conditions apply to **the Intrinsically Safe Version**

- i. The main housing of the remote version shall only be used with the remote housing, bearing certificate number Sira 06ATEX2067X.
- ii. The negative terminal of the Loop Power shall only be connected to a load resistor to the negative side of the incoming power supply.
- iii. As aluminium is used at the accessible surface of this equipment, in the event of rare incidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the Model 84 Vortex Flowmeter is being installed in locations that specifically require group II zone 0 applications.

15.2 The following conditions apply to **the Flameproof Version**

- i. The main housing of the remote version shall only be used with the remote housing, bearing certificate number Sira 06ATEX2067X.
- ii. The main housing of the remote and integral flameproof versions of the "Model 84 Vortex Flowmeter" shall be connected with an earthing and bonding conductor.

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 report numbers R52A11609E, R52A11609G and R52A15731B.

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### EC TYPE-EXAMINATION CERTIFICATE

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#### 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 following conditions apply to the **Intrinsically Safe Version and the Flameproof Version**:
- i. On 100% of production the Model 84 Vortex Flowmeters shall be dielectric tested. A test voltage of 500 V ac or 720 V dc shall be applied between the supply input terminals and the protective ground terminal for one minute with no breakdown or flashover.
  - ii. A routine dielectric test shall be successfully conducted on each protective Transformer T1, T2, T3 (Foxboro PIN BF160VN) as described below:
    - A test potential of 1500 Vrms 48 Hz-62 Hz shall be raised in a period of not less than 10 seconds and held for a minimum of 60 seconds between the input windings and output windings.
    - A test potential of 1500 Vrms 48 Hz-62 Hz shall be raised in a period of not less than 10 seconds and held for a minimum of 60 seconds between the input and output windings tied together and the core.
- As an alternative, a DC voltage may be used having no more than a 3% ripple at a level of 1.4 times the specified rms voltage
- 17.4 The following conditions apply to the **Flameproof Version**:
- i. No routine overpressure tests are required as the main housing satisfactorily passed the four times overpressure test for exemption of the routine test. However, the following routine pressure tests are required as the parts form part of a welded construction:
    - The sensor assembly is constructed of a tube welded to a sensor body ceramic to metal seal internal to the tube. Each sensor assembly shall be subjected to a routine overpressure test 12.75 bar (185 psi). In all cases the pressure shall be maintained for at least 10 s as required by clause 16 of IEC 60079-1:2003. There shall be no permanent deformation or damage to the enclosure. Reference drawing number K0148KK.
    - The bonnet assembly is constructed of a bonnet neck welded to a bonnet, machining. Each bonnet assembly shall be subjected to a routine overpressure test 12.75 bar (185 psi). In all cases, the pressure shall be maintained for at least 10 s as required by clause 16 of IEC 60079-1:2003. There shall be no permanent deformation or damage to the enclosure. Reference drawing number K0147GX.
    - The sensor assembly and the bonnet assembly can be pressure tested either individually or together as one unit.
  - ii. The manufacturer shall close off any unused cable entries with suitably certified flameproof 'd' cable blanking devices.

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## EC TYPE-EXAMINATION CERTIFICATE VARIATION

**CERTIFICATE NUMBER** Sira 06ATEX2067X Dated 10 May 2006  
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**VARIATION NUMBER** 1 (ONE) Dated 18 May 2007

### VARIATION TO EQUIPMENT

To permit:

- 1 The use of alternative SRAM IC.
- 2 The drawings to be updated to show the latest versions of software.
- 3 The depopulation of two zero ohm links.
- 4 The introduction of additional fasteners.
- 5 The geometric symbols to be updated to the latest standards.
- 6 The paint colour to be changed.
- 7 The tapped hole to be re-dimensioned.

### DESCRIPTIVE DOCUMENTS

The following drawings are introduced by this variation:

| Drawing | Sheet  | Rev. | Date      | Description   |
|---------|--------|------|-----------|---|
| P0127DT | 1 to 3 | D    | 30 Jan 07 | Surface Mount Technology PWA I/A MV Vortex Processor board (HART) Bill of Materials |
| 10127DT | 1 to 7 | D    | 26 Jan 07 | I/A MV Vortex Processor PWA (Hart)  |
| K0149FV | 1 of 2 | H    | 03 Oct 06 | Housing, Maching  |
| K0148SL | 1 of 1 | L    | 05 Mar 07 | Electronics Module Assembly, Hart, N/Pulse  |
| K0147VT | 1 of 1 | L    | 05 Mar 07 | Electronics Module Assembly, Hart, W/Pulse  |
| L0123HG | 1 to 3 | G    | 12 Jan 07 | Integral Hi Temp Preamp PWA   |
| 10111UG | 1 to 3 | G    | 11 Jan 07 | Integral Hi Temp Preamp Schematic   |
| X0173SR | 1 to 3 | J    | 08 Jan 07 | Fasteners, Tin Plated   |
| K0146KA | 1 of 1 | F    | 15 Jan 07 | Tube, Extension   |
| L0123HD | 1 to 3 | G    | 12 Jan 07 | Integral Hi Temp EEx d Preamp PWA   |
| 10111UD | 1 to 5 | G    | 10 Jan 07 | Integral Hi Temp EEx d Preamp Schematic   |

The following drawings are removed by this variation:

| Drawing | Sheet  | Rev. | Date      | Description   |
|---------|--------|------|-----------|---|
| P0127DT | 1 of 1 | -    | 03 Nov 06 | Surface Mount Technology PWA I/A MV Vortex Processor board (HART) Bill of Materials |
| 10127DT | 1 to 2 | C1   | 03 Nov 06 | I/A MV Vortex Processor PWA (Hart)  |

### ADDITIONAL CONDITIONS OF CERTIFICATION

None

**File No.** 52A16582

**Report No.** R52A16582A

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**C Ellaby**  
Certification Officer

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