1 **EC TYPE-EXAMINATION CERTIFICATE**

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

3 Certificate Number: **Sira 04ATEX2124X** Issue: **2**

4 Equipment: **TF Series Liquid Level Switch**

5 Applicant: **Hycontrol Limited**

6 Address: Larchwood House
Orchard Street
Redditch
Worcestershire B98 7DP
UK

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 Ed. 6 EN 60079-11:2012 EN 60079-26:2007

The above list of documents may detail standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation, which is available on request.

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
Ex ia IIC T5 ..... T2 Ga
Ex ia IIIC T85°C ..... 265°C Da

(See special conditions for safe use for the temperature class and maximum surface temperature for dust (T**°C) that are applicable to the relevant ambient and process temperatures)

A C Smith
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Project Number 28646

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13 **DESCRIPTION OF EQUIPMENT**

The TF Series Switch, is a vibrating fork liquid level sensor. It comprises an encapsulated printed circuit board (PCB) located in either a metal or plastic enclosure. The electronic circuit connects to a metal tuning fork sensor that forms part of the outer enclosure and protrudes into the process medium.

The equipment has the following input parameters and is designed to connect to an intrinsically safe supply, external electrical connections are made to a terminal block (TB1) that contains two terminals or a permanently fixed length of cable:

Without cable			**With cable**		
Ui	=	15 V	Ui	=	15 V
Ii	=	32 mA	Ii	=	32 mA
Pi	=	0.1 W	Pi	=	0.1 W
Ci	=	12 nF	Ci	=	37 nF
Li	=	0.06 mH	Li	=	0.16 mH

Standard length probes:-

HYCATF-XX (wetside material)
-XX (process connection)
-X (electronics module)
-X (surface finish)
-XX (approval & housing)
-A (std. length probe)

Mid range temperature version would be prefixed **HYCATFM-XX etc**
High temperature version would be prefixed **HYCATFH-XX etc**

Extended length probes:-

HYC-TF-XX (wetside material)
-XX (process connection)
-X (electronics module)
-X (surface finish)
-XX (approval & housing)
-XXXX (fork length)

Mid range temperature version would be prefixed **HYC-TFM-XX etc**
High temperature version would be prefixed **HYC-TFH-XX etc**

Variation 1 - This variation introduced the following changes:

i. The use of an additional product label that introduces an alternative product name, ELSWING 2 Liquid Level Switch Type Number T***C*A*H, and includes details of a marketing agent.
ii. The equipment may be supplied by a permanently fixed length of cable; the description was modified to recognise this change and the associated parameters.
iii. The option to use a metallic label was included; in addition, the detailed information was rationalised.

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iv. Following appropriate re-assessment to demonstrate compliance with the requirements of the EN 60079 and EN 61241 series of standards, the documents originally listed, EN 50014:1997 + A1 & A2, EN 50020:1994 and EN 50284:1999, were replaced by EN 60079-0:2006, EN 60079-11:2007, EN 60079-26:2004, IEC 61241-0:2004 and IEC 61241-11:2005, the markings were updated accordingly.
v. The transducer voltage clamp was changed.
vi. An alternative high temperature transducer design was introduced, this uses the above, modified, encapsulated electronics. The new transducer is designed for higher process temperatures (up to +260°C) and has a longer body with the piezo electric crystals located at one end, these are wired to the voltage clamp pcb at the other end. New product designations were introduced identifying the different temperature versions.
vii. The specification of alternative ambient and process temperatures and corresponding temperature classes and maximum surface temperatures for dust for each model using a special condition for safe use.
viii. The recognition of minor changes to the circuit capacitance.
ix. The standards used to confirm compliance for dust were changed to EN 61241-0:2006 and EN 61241-11:2006.
x. To recognise changes to the Transducer Voltage Clamp Drawing these include:

- Zener diodes ZD2, 3, 4 & 5 are 8.2V ±5% type BZV55C8V2 and they may alternatively be 6.2V ±5% BZV55C6V2.

xi. To recognise the updating of the circuit reference for the zener diodes and terminals on drawing 71097/1242.
xii. To allow resistors R15A and R15B (11KΩ ±5%) and R23A, R23B, R56A and R56B (47Ω ±5%) on drawing 71079/1243 to be omitted.
xiii. To recognise to option to allow the reed switch fitted on the encapsulated printed circuit board to be replaced by a Hall Effect switch.
xiv. The introduction of a new model, HYC*TFM-****N*A*** this model incorporates a thermal extension tube to ensure that the temperature of the electronics is not greater than +80°C. This tube may be welded or screwed onto the vessel adaptor with the following temperature classes the Special Condition for Safe Use has been amended to reflect this new model.

Temperature Class	Maximum Surface Temperature (T)	**Ambient Temperature (Ta)**	**Process Temperature (Tp)**
T5	T85°C	-50°C to 80°C	-40°C to 80°C
T4	T120°C	-50°C to 69°C	-40°C to 115°C
T3	T185°C	-50°C to 50°C	-40°C to 180°C

xv. The recognition that HYC*TFH-****C*A*** is deleted and HYC*TF-****N*A*** ** now known as HYC*TF-****K*A***
xvi. The use of an alternative encapsulant was endorsed.
xvii. Minor change track changes to the existing printed circuit board were approved.
xviii. Following appropriate re-assessment to demonstrate compliance with the requirements of the latest series of standards, the documents previously listed in section 9, EN 60079-0:2006, EN 60079-11:2007, EN 60079-26:2004, EN 61241-0:2006 and EN 61241-11:2006, were replaced by those currently listed.

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xix. The introduction of 8/16mA Cassettes version of the Vibrating Fork Liquid Level Sensor, which has the following models, HYC*TF-****H*A***, HYC-TFM-****M*A*** & HYC*TFH-****M*A***, the markings in section 12 were updated and Special Condition for Safe Use 15.3 is amended accordingly. The 8/16mA Cassettes Versions have the following input parameters:
At terminal 1
Ui = 30 V
Ii = 93 mA
Pi = 0.65 W
Ci = 12 nF
Li = 0.035 mH

xx. The ON Semiconductor zener diode type 1N5339B (ZD9 and ZD10) has a revised maximum junction temperature of 150°C (was 200°C) and revised thermal resistance value.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report number	Comment
0	7 July 2004	R52V11787A	The release of the prime certificate.
1	17 August 2005	N/A	Issued to correct a typographical error
2	29 January 2013	R28646A/00	The introduction of Variation 1

14.3 Certificate number Sira 01ATEX2121X Issue 7

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

15.1 When the TF Series Liquid Level Switch is used with process mediums that have a temperature in excess 80°C, then the internal temperature of the electronics enclosure shall not exceed this value.

15.2 The following precautions are applicable dependant upon the material used to construct the enclosure:

Metallic enclosures - The metallic alloy used for the enclosure material may be 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 TF Series Liquid Level Switch is being installed in locations that specifically require group II, category 1G equipment.

Plastics enclosures - Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of the TF Series Liquid Level Switch may generate an ignition-capable level of electrostatic charge. Therefore, when they are used for applications that specifically require group II, category 1 equipment, the TF Series Liquid Level Switch shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the TF Series Liquid Level Switch shall only be cleaned with a damp cloth.

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15.3 The temperature class and the maximum surface temperature for dust (T**°C) are defined by the appropriate ambient temperature and process temperature and are given in the charts below:

HYC*TF-**C*A*** & HYC*TF-****K*A***

Gas atmospheres - Ex ia IIC T5 ..... T3 Ga Dust atmospheres - Ex ia IIIC T85°C ..... 155°C Da			
Temperature Class	Maximum Surface Temperature (T)	Ambient Temperature (Ta)	Process Temperature (Tp)
T5	T85°C	-40°C to 80°C	-40°C to +60°C
T4	T120°C	-40°C to 60°C	-40°C to +115°C
T3	T155°C	-40°C to 50°C	-40°C to +150°C

HYC*TFH-**N*A***

Gas atmospheres - Ex ia IIC T5 ..... T2 Ga Dust atmospheres - Ex ia IIIC T85°C ..... 265°C Da			
Temperature Class	Maximum Surface Temperature (T)	Ambient Temperature (Ta)	Process Temperature (T_p)
T5	T85°C	-50°C to 80°C	-70°C to +80°C
T4	T120°C	-50°C to 77°C	-70°C to +115°C
T3	T190°C	-50°C to 71°C	-70°C to +185°C
T2	T265°C	-50°C to 65°C	-70°C to +260°C

HYC*TFM-**N*A***

Gas atmospheres - Ex ia IIC T5 ..... T3 Ga Dust atmospheres - Ex ia IIIC T85°C ..... 185°C Da			
Temperature Class	Maximum Surface Temperature (T)	**Ambient Temperature (Ta)**	**Process Temperature (Tp)**
T5	T85°C	-50°C to 80°C	-40°C to +80°C
T4	T120°C	-50°C to 69°C	-40°C to +115°C
T3	T185°C	-50°C to 50°C	-40°C to +180°C

HYC*TF-**H*A***

Gas atmospheres - Ex ia IIC T5 ..... T3 Ga		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T5	-40°C to +80°C	-40°C to +60°C
T4	-40°C to +60°C	-40°C to +115°C
T3	-40°C to +50°C	-40°C to +150°C
Dust atmospheres - Ex ia IIIC T85°C ..... 155°C Da		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T85°C	-40°C to +70°C	-40°C to +60°C
T120°C	-40°C to +60°C	-40°C to +115°C
T155°C	-40°C to +50°C	-40°C to +150°C

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 04ATEX2124X**
Issue 2

HYC*TFM-**M*A*****

Gas atmospheres - Ex ia IIC T5 ..... T3 Ga		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T5	-50°C to +80°C	-40°C to +80°C
T4	-50°C to +69°C	-40°C to +115°C
T3	-50°C to +50°C	-40°C to +180°C
Dust atmospheres - Ex ia IIIC T85°C ..... 185°C Da		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T85°C	-50°C to +70°C	-40°C to +80°C
T120°C	-50°C to +69°C	-40°C to +115°C
T185°C	-50°C to +50°C	-40°C to +180°C

HYC*TFH-**M*A*****

Gas atmospheres - Ex ia IIC T5 ..... T2 Ga		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T5	-50°C to +80°C	-70°C to +80°C
T4	-50°C to +77°C	-70°C to +115°C
T3	-50°C to +71°C	-70°C to +185°C
T2	-50°C to +65°C	-70°C to +260°C
Dust atmospheres - Ex ia IIIC T85°C ..... 265°C Da		
Temperature Class	Ambient Temperature (Ta)	Process Temperature (Tp)
T85°C	-50°C to +70°C	-70°C to +80°C
T120°C	-50°C to +70°C	-70°C to +115°C
T190°C	-50°C to +70°C	-70°C to +185°C
T265°C	-50°C to +65°C	-70°C to +260°C

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 This product shall be uniquely marked with the label identified in the annexe of this certificate.

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Certificate Annexe

Certificate Number: **Sira 04ATEX2124X**

Equipment: **TF Series Liquid Level Switch**

Applicant: **Hycontrol Limited**

Issue 0

Drawing No.	Sheets	Rev	Date (Sira stamp)	Title
71097/1100	1 of 1	2	16 Apr 04	Labels I.S. Hyc (ATEX)

Issue 1 No new drawings were introduced.

Issue 2

Drawing No.	Sheets	Rev.	Date (Sira stamp)	Title
71097/1100	1 of 1	4	02 Oct 12	Label I.S. HYC (ATEX)
71097/1329	1 to 2	2	29 Jan 13	TF Series Ex ia Temperature Class

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