1 **EC TYPE-EXAMINATION CERTIFICATE**

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

3 Certificate Number: **Sira 01ATEX2189X** Issue: **4**

4 Equipment: **Type 4-20 mA ABS Absolute Shaft Encoder**

5 Applicant: **Hohner Automation Limited**

6 Address: Units 14, 15 and 16
Whitegate Industrial Estate
Wrexham LL13 8UG
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:

EN 60079-0:2006 EN 60079-11:2007 EN 60079-26:2007 EN 61241-0:2006 EN 61241-11:2006
EN 60079-0:2009 (used for marking guidance)

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 1G D
Ex ia IIC T4 Ga (T_a = -20°C to +60°C)
Ex iaD 20 T135° Da
Tamb -20°C to +60°C when Pi =0.7W or
Tamb -20°C to +40°C when Pi =0.76W

I M1
Ex ia I Ma (T_a = -20°C to +60°C)

Project Number 22617
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Certification Officer

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13 **DESCRIPTION OF EQUIPMENT**

The **Type 4-20 mA ABS Absolute Shaft Encoder** is designed to indicate the angular movement of a shaft. Movement is detected optically by shining light produced by LEDs through a graduated disc that rotates with the shaft. User connections are by means of an external plug-and-socket.

The circuit comprises two PCBs, the top board being mainly at the supply voltage and the lower board being exclusively powered from the nominally 5 V rail. The assembly is contained within a metallic enclosure with an ingress protection rating of at least IP54.

The equipment is a 2-wire device, utilising pins 1 and 2, with the following safety description:

U_i = 28 V
I_i = 100 mA
P_i = 0.7 W
C_i = 12 nF
L_i = 0

The screen may be connected to pin 4, which is galvanically isolated from the enclosure. Pin 3 is not used.

There are two builds, differing in the number of LEDs and the physical arrangement of the PCBs:

10-bit hollow shaft encoder
10-bit solid shaft encoder

Variation 1 - This variation introduced the following changes:

i. The number of zener diodes was reduced to two per voltage clamp and the specification of 1N5339B as an alternative to MLL5919 5.6 V.
ii. The high voltage board artworks were changed to accommodate the alternative zener diode.

Variation 2 - This variation introduced the following changes:

i. The high voltage board circuit was changed.

Variation 3 - This variation introduced the following changes:

i. Alternative safety parameters were recognised, Ii and Pi have been changed as detailed below:

U_i = 28 V
$\mathbf{I_i}$ = **150 mA**
$\mathbf{P_i}$ = **0.76 W**
C_i = 12 nF
L_i = 0

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Variation 4 - This variation introduced the following changes:

i. The recognition that the enclosure has been increased in size.
ii. The inclusion of a plastic enclosure option was endorsed.
iii. A new PCB assembly has been introduced.
iv. The Type 11 bit shaft encoder build has been removed from the description above and the drawings have been modified accordingly.
v. An assessment of the Type 4-20 mA ABS Absolute Shaft Encoder against the Dust Standards.
vi. Following appropriate re-assessment to demonstrate compliance with the requirements of the EN 60079 series of standards, the documents originally listed in section 9, EN 50014:1997 (amendments 1 and 2), EN 50020:1994, EN 50284:1999 and EN 50303:2000, were replaced by those currently listed, the markings were updated accordingly and the conditions were modified to recognise the requirements of the latest standards, resulting in an 'X' condition being applied.

Revised entity parameters

Gas @ 60°C ambient				Dust @ 60°C ambient				Dust @ 40°C ambient		
U_i	=	28 V		U_i	=	28 V		U_i	=	28 V
I_i	=	150 mA		I_i	=	100 mA		I_i	=	150 mA
P_i	=	0.76 W		P_i	=	0.7 W		P_i	=	0.76 W
C_i	=	12 nF		C_i	=	12 nF		C_i	=	12 nF
L_i	=	0		L_i	=	0		L_i	=	0

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	File/report no.	Comment
0	14 June 2002	R52A8132A	The release of the prime certificate.
1	5 September 2002	52V9373	The introduction of Variation 1.
2	12 November 2002	52V9696	The introduction of Variation 2.
3	25 April 2008	R52A18095A	This Issue covers the following changes: • All previously issued certification was rationalised into a single certificate, Issue 3, Issues 0 to 2 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 3.
4	2 November 2010	R22617A/00	The introduction of Variation 4.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 01ATEX2189X
Issue 4

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

15.1 Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned 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.

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Certificate Annexe

Certificate Number: **Sira 01ATEX2189**

Equipment: **Type 4-20 mA ABS Absolute Shaft Encoder**

Applicant: **Hohner Automation Limited**

Issue 0

Number	Sheet	Rev.	Date	Description
GA-ABS2W-HOLLOW-01	1 of 1	1.0	25 Mar 02	General assembly
GA-ABS2W-SOLID -01	1 of 1	1.0	29 Apr 02	General assembly
HV10BIT SCHEMATIC	1 of 1	1.0	18 Jul 01	Schematic – high voltage 10-bit PCB
HV11BIT SCHEMATIC	1 of 1	1.0	05 Apr 02	Schematic – high voltage 11-bit PCB
HV-10BIT-55-ART	1 to 2	1.0	21 Mar 02	Artwork – 10-bit hollow shaft
HV-10BIT-S3-ART	1 to 2	1.0	30 Apr 02	Artwork – 10-bit solid shaft
HV-11BIT-14-ART	1 to 2	1.0	15 Apr 02	Artwork – 11-bit hollow shaft
HV-10BIT-55-PARTS	1 to 2	1.0	21 Mar 02	Silkscreen – 10-bit hollow shaft
HV-10BIT-S3-PARTS	1 to 2	1.0	30 Apr 02	Silkscreen – 10-bit solid shaft
HV-11BIT-14-PARTS	1 to 2	1.0	15 Apr 02	Silkscreen – 11-bit hollow shaft
LB-ABS55-001-01	1 of 2	1.0	14 Dec 01	Marking
LV10BIT	1 to 4	1.0	20 Sep 01	Schematic – low voltage 10-bit PCB
LV11BIT*	1 to 4	1.0	05 Apr 02	Schematic – low voltage 11-bit PCB

* Sheet 4 was-amended by Sira on 10 June 2002.

Issue 1

Number	Sheet	Rev.	Date	Description
HV10BIT SCHEMATIC	1 of 1	1.1	08 Aug 02	Schematic – high voltage 10-bit PCB
HV11BIT SCHEMATIC	1 of 1	1.1	08 Aug 02	Schematic – high voltage 10-bit PCB
HV-10BIT-55-ART	1 to 2	1.1	08 Aug 02	Artwork – 10-bit hollow shaft
HV-10BIT-55-PARTS	1 to 2	1.1	08 Aug 02	Silkscreen – 10-bit hollow shaft
HV-10BIT-S3-ART	1 to 2	1.1	08 Aug 02	Artwork – 10-bit solid shaft
HV-10BIT-S3-PARTS	1 to 2	1.1	08 Aug 02	Silkscreen – 10-bit solid shaft
HV-11BIT-14-ART	1 to 2	1.1	08 Aug 02	Artwork – 11-bit hollow shaft
HV-11BIT-14-PARTS	1 to 2	1.1	08 Aug 02	Silkscreen – 11-bit hollow shaft

Issue 2

Number	Sheet	Rev.	Date	Description
HV10BIT SCHEMATIC	1 of 1	1.2	10 Oct 02	Schematic – high voltage 10-bit PCB
HV11BIT SCHEMATIC	1 of 1	1.2	10 Oct 02	Schematic – high voltage 11-bit PCB
HV-10BIT-55-ART	1 to 2	1.2	10 Oct 02	Artwork – 10-bit hollow shaft
HV-10BIT-S3-ART	1 to 2	1.2	18 Oct 02	Artwork – 10-bit solid shaft
HV-11BIT-14-ART	1 to 2	1.2	21 Oct 02	Artwork – 11-bit hollow shaft
HV-10BIT-55-PARTS	1 to 2	1.2	10 Oct 02	Silkscreen – 10-bit hollow shaft
HV-10BIT-S3-PARTS	1 to 2	1.2	18 Oct 02	Silkscreen – 10-bit solid shaft
HV-11BIT-14-PARTS	1 to 2	1.2	21 Oct 02	Silkscreen – 11-bit hollow shaft

Issue 3

Number	Sheet	Rev.	Date	Description
LB2W-420ABS-02	1 of 2	/	24 Apr 08	2 Wire 4-20mA Absolute Label

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Certificate Annexe

Certificate Number: **Sira 01ATEX2189**

Equipment: **Type 4-20 mA ABS Absolute Shaft Encoder**

Applicant: **Hohner Automation Limited**

Issue 4

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
AS-HS-003-01	1 & 2	01	08 Oct 10	4-20mA Hollow Shaft General Assembly
AS-SS-002-01	1 & 2	01	08 Oct 10	4-20mA Hollow Shaft General Assembly
HV 10BIT Schematic	1 of 6	1.3	05 Oct 10	4-20mA Absolute LED PCB Schematic (HV 10 Bit)
LV 10BIT Schematic	2 of 6	1.0	05 Oct 10	4-20mA Absolute Photo Transistor cct
LV 10BIT Schematic	3 of 6	1.0	05 Oct 10	4-20mA Absolute Comparator cct
LV 10BIT Schematic	4 of 6	1.0	05 Oct 10	4-20mA Absolute Gray and DAC cct
LV 10BIT Schematic	5 of 6	1.0	05 Oct 10	4-20mA Absolute Conn. And Test Point cct
Interconnection Schematic	6 of 6	1.0	05 Oct 10	4-20mA Absolute Interconnection Schematic
HV 10BIT & LV 10BIT	1 to 9	1.3	05 Oct 10	4-20mA Absolute (08ABS2W420-001-03) PCB-051 PCB tracking
IA-LB2W-420ABS-03	1 of 1	03	05 Oct 10	2 wire 4-20mA absolute label

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