



1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Safety Related Device intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 12ATEX1206X** Issue: **0**

4 Safety Related Device: **IRmax Gas Detectors**

This Safety Related Device has been assessed with reference to the CASS methodologies and found to meet the requirements of (IEC 61508:2010 & EN 50402:2005). It can be considered for use in the design of safety function up to and including SIL 2 and is not implicit of the achieved Safety Integrity Level (SIL) of the safety related system.

5 Applicant: **Crowcon Detection Instruments Ltd**

6 Address: **2 Blacklands Way
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Abingdon
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UK**

7 This safety related device 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 safety related device 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 standards:


IEC 61508:2010 EN 50402:2005/A1:2008 EN 60079-29-1:2007

10 If the sign 'X' is placed after the certificate number, it indicates that the safety related device 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 safety related device. If applicable, further requirements of this Directive apply to the manufacture and supply of this safety related device.

12 The marking of the safety related device shall include the following:

IRmax without display (Baseefa09ATEX0206X)

 II 2 GD

IRmax with (Baseefa09ATEX0220X)

 II 2 G (With fixed display)

 II 2 GD (With remote display)

Project Number **56A22353**

C Ellaby
Deputy Certification Manager

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13 DESCRIPTION OF SAFETY RELATED DEVICE

The IRmax Gas Detectors are designed for monitoring flammable gases such as methane or propane in industrial applications. They are compatible with an output 4-20 mA (sink or source) control system. The supply voltage is between 12 V DC to 30 V DC. The IRMax comes with Modbus as optional; this option is included in the FMEDA assessment but not available for use as a safety function.

Each sensor is calibrated for a single measuring range for flammable gas between 0 to 100 % of the lower explosion limit (LEL). The sensors operate on the principle of infrared absorption and are designated for 'Group II', fixed installation and continuous duty as defined in BS EN 60079-29-1.

This EC-Type examination certificate is part of the EC-Type examination for the gas detector sensors with a measuring function for explosion protection in accordance with the Directive 94/9/EC, Annex II, section 1.5 (safety related devices) and is only valid in connection with the EC-Type examination certificates Baseefa09ATEX0220X issued on 26th April 2010 and Baseefa09ATEX0206X issued on 15th April 2010). This supplementary EC-Type equipment covers the tests of the measuring functions of the equipment in according with the harmonized standards EN 60079-29-1:2007 and EN 50402:2005 for equipment with a measuring function range for combustible gases up to 100% of the lower explosive limit (LEL) and to the installed software implemented in the modules. This EC-Type examination certificate applies to the modules with the installed software "Host (V3 i1.08) and iModule (V5 i2.08)".

The safety function of the IRmax can be described as 'To measure the concentration of flammable gas by means of a 4-20 mA output to an accuracy of 10%. Output currents <3.6 mA and >21 mA are reserved for revealed failures'.

The Failure Modes and Effects Analysis (FMEA) of the IRmax Gas Detectors have been verified as evidence of conformity to IEC 61508-2:2010 in respect of 'hardware safety integrity' against the requirements at SIL (2) and the verification was selected to cover the electronics of the gas detectors devices which are sought to be used as means to provide safety functions for safety related systems. The IRmax Gas Detectors achieved the following results:

Description	Safety Functions Parameters	Verdict
Architectural constraints:	Proof Test Interval = 8760Hrs MTTR = 8 Hrs; HFT=0	Type B
	SFF = 95 %	SIL 2
Random hardware failures: [h ⁻¹]	$\lambda_{DD} = 9.74 \text{ E-}06$ $\lambda_{DU} = 5.06 \text{ E-}07$ $\lambda_{SD} = 1.95 \text{ E-}08$ $\lambda_{SU} = 8.59 \text{ E-}08$	
Diagnostic coverage (DC)	DC = 95 %	
Probability of failure on demand: (Low Demand Mode)	PFD _{AVG} =2.3 E-03	SIL 2
Probability of Dangerous failure (High Demand Mode) [h ⁻¹]	PFH = 5.06 E-07	SIL 2
Hardware safety integrity compliance	Route 1 _H	
Systematic safety integrity compliance	Route 1 _S	
Systematic Capability	SC2	
Overall SIL-capability achieved	SIL 2 (Low Demand)	

The safety function operates in 'low demand' because the expected demand rate from the application is expected to be less than once a year.



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14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report no.	Comment
0	22 August 2012	R56A22353C rev 0.2	The release of the prime certificate.

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

- 15.1 The user/installer shall comply with the environmental restrictions that apply to the use of this equipment, as stated in the product's instruction, installation, and safety manuals.
- 15.2 The user/installer shall install these products taking into account any restrictions or special conditions for safe use that are applicable to the previously certified devices that are used in their construction.
- 15.3 The personnel responsible for the operation of the gas detection system shall be suitably trained and competent.
- 15.4 Suitable test intervals for the Functional Safety have to be implemented as stated in the safety manual. Inspection and maintenance have to be conducted according to the desired application and the SIL-capability.

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 products covered by this certificate incorporate the following previously certified devices, it is therefore the responsibility of the manufacturer to continually monitor the status of the certification associated with these devices, and the manufacturer shall inform Sira of any modifications of the devices that may impinge upon the explosion safety design of their products.

Product	Manufacturer	Certificate no.
IRmax	Crowcon	Baseefa09ATEX0206X
IRmax	Crowcon	Baseefa 09ATEX0220X

- 17.5 The manufacturer shall take all reasonable steps to ensure that the user/installer complies with the special conditions for safe use associated with the safety related application.
- 17.6 The manufacturer shall provide the user interface specification to other modules, special conditions which can affect the safety integrity of the modules.

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- 17.7 The manufacturer shall pass the following questions to the end users to ensure full compatibility of the product with the intended use.
- Safety function to be performed
 - The SIL-capability
 - Minimum proof test interval
 - The communication facilities to the periphery
 - Expected operating conditions
 - Data on the gases to be analysed including full composition
- 17.8 In addition to the marking information required by Baseefa09ATEX0206X or Baseefa09ATEX0220X, IRmax detectors, with or without a display, that comply with Sira 12ATEX1206X shall be marked with that certificate number.

Certificate Annexe

Certificate Number: Sira 12ATEX1206X
Equipment: IRmax Gas Detectors
Applicant: Crowcon Ltd



Issue 0

Number	Issue	Date	Title
6672-CD	3	11 Jun 12	IRmax Field connectors & RS485 connector (RS 485 excluded from FMEA)
6657-CD	7	14 Oct 10	IREX 2C field connectors
6764-CD	3	13 Jul 10	iModule Dual Pyro
6690-CERT	5	09 Sep 12	Certificate label
ECAD-000049-CD	A	24 Jan 12	IRmax (HART) Host
IREX IRmax FMEA	2	27 Jun 12	FMEA justification for IREX and IRmax.

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