



CSA  
Group

## FUNCTIONAL SAFETY CERTIFICATE

This is to certify that the

### MSH GAS DETECTOR MODEL (Platinum)

manufactured by

#### Dynament Ltd

Dynament Limited,  
Premier House, The Village,  
South Normanton, Derbyshire,  
DE55 2DS

have been assessed by Sira Certification Service with reference to the  
EN 50271 and IEC 61508 parts 1 & 2 and found to meet the requirements of

**EN 50271:2010\***

as an element/subsystem suitable for use in safety related systems performing safety functions  
up to and including

**SIL 1 capable with HFT = 0 (1oo1)<sup>+</sup>**

when used in accordance with the scope and conditions of this certificate.

<sup>+</sup> This certificate does not waive the need for further functional safety verification to establish  
the achieved Safety Integrity Level (SIL) of the safety related system

Certification Manager:

Wayne Thomas

Initial Certification : 24<sup>th</sup> June 2014  
This certificate issued : 24<sup>th</sup> June 2014  
Renewal date : 23<sup>rd</sup> June 2019

This certificate may only be reproduced in its entirety, without any change.

\*(see page 3 of the certificate)



Certificate No.: Sira FSP 14002/01  
Form 7016 issue 3  
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#### Sira Certification Service

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## Product description and scope of certification

The above models contain a tungsten filament infrared light source; an optical cavity into which gas diffuses a dual temperature compensated pyroelectric infrared detector, an integral semiconductor temperature sensor and electronics to process the signals from the pyroelectric detector. The products can be 3, 4 or 5 pins to external interfacing. The single channel version of the Platinum Gas Detector includes an analogue and serial communication outputs for calibration and testing. The dual channels version implement the serial communication function for calibration and testing of the sensor as well as transmitting gas measurements and fault signals. All versions operate from 3 to 5 volts. The 5 pins version has both digital output for direct communication and an analogue output signal. This certificate does not cover models certified under the ATEX Directive referenced in certificate number Sira 04ATEX3157U.

## Certified Data in support of use in safety functions

The products are assessed as safety related devices so that their output signals "analogues and/or digitals" can perform specific safety functions with a safety integrity level SIL 1. The products are effectively assessed to EN 50271 (requirement for software compliance) and to IEC 61508:2010, parts 1 and 2, "Functional Safety Management" FSM, FMEA and product lifecycles. Based on the results of the technical assessment achieved for quantitative and qualitative, a summary of the results can be illustrated in the Table 1 below. Performance test to EN 60079-29-1 has not been conducted hence it is not included in the scope of this certificate.

**Table 1: Summary of Failure Data of Platinum Gas Detector (Single and Dual Channels)**

<p><b>Safety Function:</b> To measure the concentration of gas by means of analogue and /or digital outputs so that: <i>Analogue output : Output voltage &lt; 0.2V or &gt;2.5V reserved for revealed failures</i> <i>Analogue output : Output voltage <math>\geq 0.2V</math> and <math>\leq 2.5V</math> normal operating conditions</i></p> <p><i>Digital output : &lt; -200% and/or &gt; 200% of gas concentration reserved for revealed failures</i> <i>Digital output : &gt;-200% and &lt; 200% of gas concentration for normal operating conditions</i></p> <p><b>Notes:</b> For bridge type sensors configuration powered by 5V to 3V, the output Voltage <math>V_o</math> is configurable as defined in this equation:</p> <p>Output Voltage (<math>V_o</math>) = (Zero * Supply Voltage) + (Sensitivity * (Gas Level / FSD)) Where, zero (0.4 to 0.6), Supply Volt (3V to 5V), Sensitivity (<math>\pm 0.1V</math> to <math>\pm 0.2V</math>), Gas Level (any value between -200% to +200%), FSD ( 5% v/v)</p> <p><b>(Sensitivity : 100mV)</b></p> <p>a) 5V supply voltage: <math>V_o &lt; 2.3V</math> or <math>&gt; 2.7V</math> reserved for revealed failures and <math>V_o \geq 2.3V</math> and <math>\leq 2.7V</math> normal operating conditions</p> <p>b) 3V supply voltage: <math>V_o &lt; 1.3V</math> or <math>&gt; 1.7V</math> reserved for revealed failures and <math>V_o \geq 1.3V</math> and <math>\leq 1.7V</math> normal operating conditions</p> <p><b>(Sensitivity : 200mV)</b></p> <p>a) 5V supply voltage: <math>V_o &lt; 2.1V</math> or <math>&gt; 2.9V</math> reserved for revealed failures and <math>V_o \geq 2.1V</math> and <math>\leq 2.9V</math> normal operating conditions</p> <p>b) 3V supply voltage: <math>V_o &lt; 1.1V</math> or <math>&gt; 1.9V</math> reserved for revealed failures <math>V_o \geq 1.1V</math> and <math>\leq 1.9V</math> normal operating conditions</p>
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Digital outputs (SF) conditions unchanged, their outputs as described above.			
Summary of Clauses 7.4.2 and 7.4.4 of IEC 61508-2	Single Channel	Dual Channel	Verdict
Architectural constraints	HFT=0	HFT=0	Type B
Safe Failure Fraction (SFF)	66%	67%	SIL 1
Random hardware failures: [h <sup>-1</sup> ] (dangerous)	$\lambda_{DD}$ 9.20E-08	1.56E-07 8.81E-08	
Random hardware failures: [h <sup>-1</sup> ] (safe)	$\lambda_{SD}$ 3.61E-09 $\lambda_{SU}$ 7.59E-09	2.05E-09 2.19E-08	
Diagnostic Coverage (DC)	64%	64%	
Probability of failure on demand @ proof test interval = 8760 Hrs Mean time to restoration = 8 Hrs	4.05E-04	3.88E-04	SIL 3
Frequency of a Dangerous failure (High Demand - PFH) [h <sup>-1</sup> ]	9.20E-08	8.81E-08	
Hardware safety integrity compliance	Route 1 <sub>H</sub>		
Systematic safety integrity compliance (HW)	Route 1 <sub>S</sub>		
Systematic safety integrity compliance (SW)	EN 50271		
Systematic Capability (SC1, SC2, SC3, SC4)	SC1		
Overall SIL-capability achieved	SIL 1 due to Architectural constraints (SFF).		

**Note 1:** The failure data:

- 1) Failure rates stated in Table 1 are in units of failures per hour
- 2) The PFD<sub>AVG</sub> figure shown is for illustration only assuming a proof test interval of 8760 hours and MTTR of 8 hours. Refer to IEC 61508-6 for guidance on PFD<sub>AVG</sub> calculations from the failure data.
- 3) The internal architecture is of 1oo1 (no redundancy).
- 4) Environment / stress criteria used in the FMEDA: 'Ground; stationary; non-weather protected' conditions.
- 5) The verified failure rates used in the safe failure fraction and diagnostic coverage do not include ( $\lambda$  no parts or no effect) failures in the calculation.

The failure data above is supported by the base information given in Table 2 below.

**Table 2**

1	Product identification:	Platinum Gas Detector (Single and Dual Channels)
2	Functional specification:	To measure the concentration of gas by means of analogue and /or digital outputs as described above in Table 1.
3-5	Random hardware failure rates:	Refer to Table 1 above
6	Environment limits:	Temperature range: -20 °C to +60 °C
7	Lifetime/replacement limits:	Refer to installation, operation and maintenance (I, O & M) instructions.
8	Proof Test requirements:	Refer to Safety Manual
9	Maintenance requirements:	Refer to Safety Manual



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10	Diagnostic coverage:	Refer to Table 1 above
11	Diagnostic test interval:	twice per second
12	Repair constraints:	None, other than compliance with the I, O & M instructions
13	Safe Failure Fraction:	Refer to previous tables above
14	Hardware fault tolerance (HFT):	zero
15	Highest SIL (architecture/type A/B):	Type B, SIL 1
16	Systematic failure constraints:	The products are software controlled. SW version is (V7.17.00.u. B18). <i>Software change must be consulted with SIRA for approval.</i>
17	Evidence of similar conditions in previous use:	Not applicable
18	Evidence supporting the application under different conditions of use:	All elements used in the are based on quantitative assessment. No PIU is considered.
19	Evidence of period of operational use:	Not applicable. No PIU is considered.
20	Statement of restrictions on functionality:	See tables above, for the required safety function.
21	Systematic capability (SC1, SC2, SC3)	SC1.
22	Systematic fault avoidance measures:	Refer to assessment of the techniques and measures used to avoid systematic failures introduced during the realization lifecycle from 61508-2 Annex B. see report R56A18622B_rev1. Software is assessed in accordance with EN 50271.
23	Systematic fault tolerance measures:	Not applicable
24	Validation records:	Functional verification assessed in Sira report R56A18622A_rev1 and R56A18622B_rev1 and R56A18622C_rev1

## Management of functional safety

The assessment has demonstrated that the product is supported by an appropriate functional safety management system that meets the relevant requirements of IEC 61508-1:2010 clause 6. See report R56A18622.

## Software Lifecycle compliance to EN 50271:2010

The software assessment covered the systematic software lifecycle to EN 50271 as required by the standard. The certificate covers parts 1 (FSM) and 2 (hardware lifecycle) of the IEC 61508. Software assessment forms part of the software reliability of the product operation and its calculation management. Performance tests were carried out by Dynamment Ltd. SCS did not carry out performance testing to EN 60079-29-1.

## Identification of certified equipment

The certified equipment is defined in the manufacturer's documentation listed in Table 3 below.

**Table 3: Certified documents**

Sira ref.	Document no	Rev	Date	Document description
FS-01	FS101	1a	01/05/2013	Single channel parts list
FS-02	FS102	1b	01/05/2013	Dual channel parts list
FS-03	DYN 118	3	01/05/2013	Circuit diagram for single channel processor board
FS-04	DYN 116	3	01/05/2013	Circuit diagram for dual channel analogue board
FS-05	DYN 115	2	01/05/2013	Circuit diagram for dual channel processor board
FS-06	DYN 114	3	01/05/2013	Circuit diagram for single channel analogue board



## Sira Certification Service

## Conditions of Certification

The validity of the certified base data is conditional on the manufacturer complying with the following conditions:

- i. The scope of the assessment is based on achieving a SIL1 as a results of an FMEA and supporting IEC 61508 assessment and EN 50271. Further assessment shall be required when the safety device is combined with specific enclosures for use in hazardous areas.
- ii. The manufacturer shall include the safety instructions in the relevant product manual.
- iii. The software version (V7.17.00.B18) shall not be changed or modified without the acknowledgement of the SCS. Any modifications to the software shall be assessed to EN 50271 and any additional relevant clauses from IEC 61508 part 3.

## Conditions of Safe Use

The following conditions apply to the installation, operation and maintenance of the assessed equipment. Failure to observe these may compromise the safety integrity of the assessed equipment:

- iv. The user shall comply with the requirements given in the manufacturer's user documentation in regard to all relevant functional safety aspects such as application of use, installation in and out of hazardous areas, operation, maintenance, proof tests, maximum ratings, environmental conditions, and repair.
- v. Selection of this equipment for use in safety functions, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
- vi. The safety related device must be functioning and powered independently of any control devices required for operation.
- vii. The proof test interval for the safety functions is 1 year.
- viii. All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.
- ix. The IR Platinum Series are only approved for software version (V7.17.00u B18).
- x. The certified products series shall only be configured using Dynament "Status Scientifics' PC application v3.4.0 or later".
- xi. The serial communication bus shall only be used with the protocol developed by Dynament Ltd to exercise the safety function.

## General Conditions and Notes

1. This certificate is based upon a functional safety assessment of the product described in Sira Test & Certification Assessment Reports R56A18622A\_rev1, R56A18622B\_rev1 and R56A18622C\_rev1).
2. If certified product or system is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The use of this Certificate and the Sira Certification Mark that can be applied to the product or used in publicity material are subject to the 'Regulations Applicable to the Holders of Sira Certificates' and 'Supplementary Regulations Specific to Functional Safety Certification'.
4. This document remains the property of Sira and shall be returned when requested by the issuer.
5. No part of the Functional safety related aspects stated in the instruction manual shall be changed without approval of the certification body.
6. This certificate will remain valid subject to completion of two surveillance audits within the five year certification cycle, and upon receipt of acceptable response to any findings raised during this period. This certificate can be withdrawn if the manufacturer no longer satisfies scheme requirements.



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