



FUNCTIONAL SAFETY CERTIFICATE

This is to certify that the

SIL725 Safety Alarm Annunciator

manufactured by

RTK Instruments Ltd

*St James Business Park,
Knaresborough,
North Yorkshire,
HG5 8PJ
UK*

has been assessed by Sira Certification Service with reference to the
CASS methodologies and found to meet the requirements of

IEC 61508-2:2000

The certified failure data herein may be used in the design of safety functions up to and including safety integrity level 2 (SIL2) when used in accordance with the scope and conditions of this certificate.

Certification Manager:

A handwritten signature in black ink, appearing to read "D R Stubbings".

D R Stubbings

Initial Certification: 29 May 2009
This certificate issued: 29 May 2009
Renewal date: 28 May 2014

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



Certificate No.: Sira FSP 09006/01
Page 1 of 6



011

Sira Certification Service

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Product description and scope of certification

The SIL725 Safety Alarm Annunciator (referred to as "SIL725" in this certificate) accepts inputs from volt-free contacts, such as pressure or level switches, or from devices such as trip or proximity detector amplifiers. When an input is in the alarm condition, an alarm window for that channel is illuminated and an internal horn sounds to alert the operator. A number of output relay contacts are provided to pass the alarm signal onwards to other equipment. These relays may be configured by the user to operate either as group relays that are associated with a number of inputs or individual repeat relays from each alarm channel. Output relays are energised in normal use and de-energise on alarm.

SIL725 systems may be built using cells arranged in a matrix, and so may be one of a range of possible sizes and hence number of channels.

The assessment has been carried out with reference to the *Conformity Assessment of Safety-related Systems (CASS)* methodology. This includes an assessment of the measures used to avoid systematic failures introduced during the safety lifecycle and the relevant aspects of the management of functional safety applied to the SIL725.

The SIL725 does not contain any embedded software.

Use in safety functions

The product's functionality which has been assessed for use in safety functions is to respond to the opening of input contacts, or loss of input signal voltage, for any alarm channel by the following actions:

- Annunciate an alarm condition by illumination of the alarm channel window and sound the integral horn
- de-energise any horn relay (HNA and HNB), if configured to do so
- de-energise any group relay (GPA and GPB), if configured to do so

Hardware safety integrity

Control of dangerous failures during operation is achieved by:

- the use of interlocked safety relays which conform to EN 50205
- fail-safe design techniques and some on-board diagnostics
- a hardware fault tolerance of 1 in the input circuits



Certificate No.: Sira FSP 09006/01
Page 2 of 6



011

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Identification of certified equipment

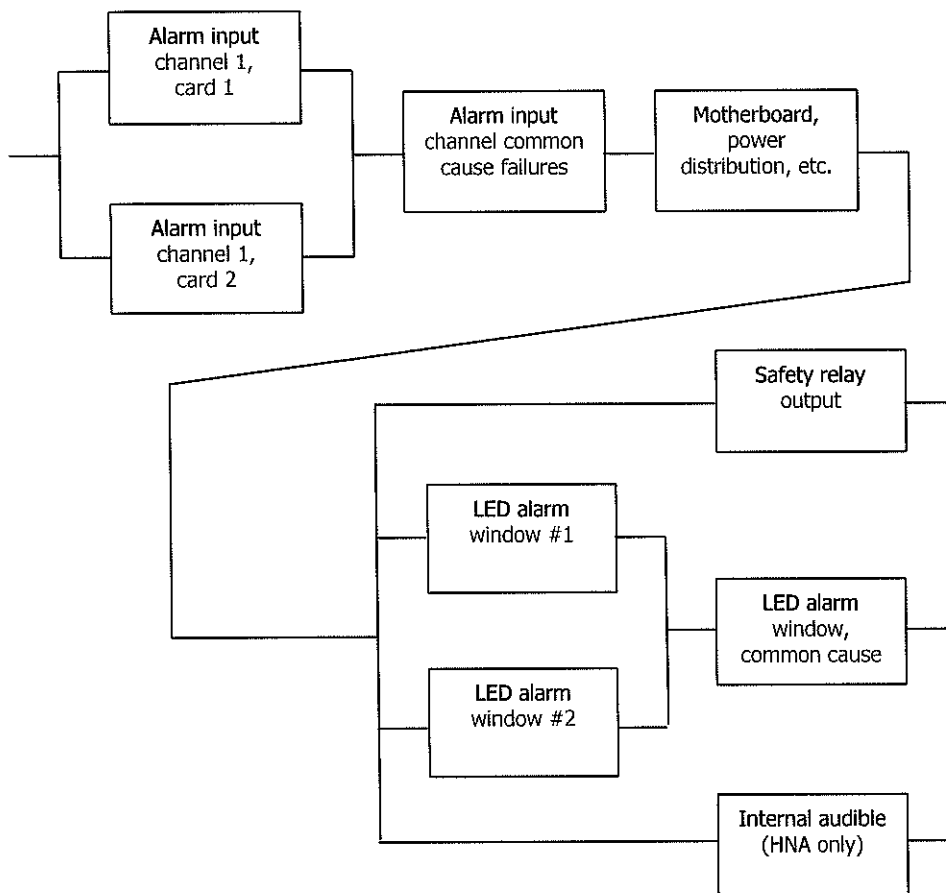
The certified equipment and its safe use is defined in the manufacturer's documentation listed in Table 1 below.

Table 1: Certified drawings

Document no.	Rev	Date	Document description
CE6998	3	12/03/09	SIL725 Circuit Overview
CE6999	5	12/03/09	SIL725 Active Alarm Board
CE8303	2	19/02/08	SIL725 Common Relay Board
CE7001	1	12/02/09	SIL725 SIO Board
CE7002	1	16/09/08	SIL725 Mother Board
CE7003	0	18/07/06	SIL725 Pushbutton Board
CE7004	2	03/12/08	SIL725 Supply Input Board
CE8305	4	12/09/08	SIL725 Low Voltage Lockout Board
CE8385	0	18/02/08	SIL725 LED Board
CE8646	3	10/11/08	SIL725 Audible Board
-	4.X		SIL725 Instruction Manual

"X" = minor revision that does not affect functional safety information in the Instruction Manual

Reliability Block Diagram (RBD)



Certificate No.: Sira FSP 09006/01
Page 3 of 6



011

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CASS 'Base Data' in support of use in safety functions

The reliability block diagram and probabilities of failure (symbol: λ) have been established for the certified equipment by a failure modes and effect analysis (FMEA) for a failure mode of: Fail to annunciate (horn or flash window) or fail to release a relay, for 2 inputs connected to 2 channels on different input boards.

Table 2: Failure data

Circuit Block (refer to RBD above)	λ_{DU}	λ_{DD}	$\lambda_{SPURIOUS}$	λ_{SU}
Alarm input channel #1	0.129	0.019	0.081	0.333
Alarm input channel #2	0.129	0.019	0.081	0.333
Alarm input channel common cause failure	0.013	0.002	-	-
Motherboard, power distribution etc.	0.009	0	0.027	0.096
Safety relay output	0.002	0	2.415	4.242
LED alarm window #1	0.009	0	0.002	0.009
LED alarm window #2	0.009	0	0.002	0.009
LED alarm window, common cause	0.001	0	0	0
Internal audible (HNA only)	0.019	0	0.006	0.013
Total	See Note 4	0.040	2.614	5.035

Notes on the failure data:

- 1) Failure rates stated are in units of failures per million hours.
- 2) There are no safe detected failures (λ_{SD})
- 3) λ_{SU} includes $\lambda_{SPURIOUS}$
- 4) Calculation of λ_{DU} depends on MTTR and proof test – refer to SIL725 Instruction Manual for guidance and IEC 61508-6 for reliability and PFD calculations
- 5) The 1oo2 internal architecture for the input stage assumes a β -factor of 10%.



Certificate No.: Sira FSP 09006/01
Page 4 of 6



011

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The failure data (above) is supported by the 'Base Information' given in Table 3 below.

Table 3: Base Information

Product ID:	'SIL725 Alarm Annunciator'. See also manufacturer's code for options of window size, cell width, height, etc.
Functional specification:	SIL725 Safety Requirements Specification, rev 2.3, and published specification in the SIL725 Instruction Manual, rev 4.X
Environment / stress criteria:	Failure rates modelled using normal component quality control processes and control room environments.
Environment limits:	-20°C to +50°C average, (+60°C maximum), 0-95% RH, non-condensing
Lifetime limit:	10 years
Maintenance requirements:	Refer to manufacturer's Instruction Manual
Repair constraints:	Refer to manufacturer's Instruction Manual
Hardware fault tolerance:	Internally: 1 for input circuits; 0 for remaining circuits
Systematic failure constraints:	None
Highest SIL (systematic):	SIL 2
Systematic fault avoidance measures:	Conforms with IEC 61508-2, 7.4.4 - refer to SIL725 Measures to avoid and control failures, rev 2.0 and Sira Assessment Report R56A16668A
Systematic fault tolerance measures:	Conforms with IEC 61508-2, 7.4.5 - refer to SIL725 Measures to avoid and control failures, rev 2.0 and Sira Assessment Report R56A16668A
Validation records:	Refer to manufacturers validation records and Sira Assessment Report R56A16668A
Type A / Type B:	Type B

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 61508-1:1998 clause 6.

Conditions of Certification

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

1. The manufacturer shall analyse failure data from returned products on an on-going basis. Sira Certification Service shall be informed in the event of any indication that the actual failure rates are worse than the certified failure rates. (A process to rate the validity of field data should be used. To this end, the manufacturer should encourage users to operate a formal field-experience feedback programme).



Certificate No.: Sira FSP 09006/01
Page 5 of 6



011

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2. Sira shall be notified in advance (with an impact analysis report) before any modifications to the certified equipment or the functional safety information in the Instruction Manual are carried out. Sira may need to perform a re-assessment if modifications are judged to affect the certified data or the product's safe use.
3. On-going lifecycle activities associated with this product (e.g., modifications, corrective actions, field failure analysis) shall be subject to surveillance by Sira in accordance with 'Regulations Applicable to the Holders of Sira Certificates'.
4. The RS485 serial output option available on the standard version of the 725 shall not be used in the SIL725.

Conditions of Safe Use

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

1. The user shall comply with the requirements given in the Manufacturer's user documentation (referred to in Table 1 above) in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, 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.
3. The power supply is outside the scope of this certificate. (A failure in the power supply will cause the safety relays to de-energise to their safe state, the lamp windows will not illuminate and the horn will not sound).
4. 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.

General Conditions and Notes

1. This certificate is based upon a functional safety assessment of the product described in Sira Test & Certification Assessment Report R56A16668A.
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.



Certificate No.: Sira FSP 09006/01
Page 6 of 6



011

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