



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEX TRA 15.0003X** Page 1 of 5 Certificate history:
Status: **Current** Issue No: 2 [Issue 1 \(2017-06-08\)](#)
Date of Issue: 2021-08-21 [Issue 0 \(2015-08-28\)](#)
Applicant: **Nautitech Mining Systems Pty Ltd**
Unit 3, 9 Packard Avenue
Castle Hill NSW 2154
Australia
Equipment: **Lighting Interface Module (LIM)**
Optional accessory:
Type of Protection: **Intrinsic safety "ib"**
Marking: Ex ib I Mb
-20C < Ta < +60C

Approved for issue on behalf of the IECEx
Certification Body:

Ajay Maira

Position:

Certification Authority

Signature:
(for printed version)

Ajay Maira

Date:

2021-08-21

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

Ex Testing and Certification Pty Ltd
1/30 Kennington Drive
Tomago NSW 2322
Australia



TESTING & CERTIFICATION



IECEX Certificate of Conformity

Certificate No.: **IECEX TRA 15.0003X**

Page 2 of 5

Date of issue: 2021-08-21

Issue No: 2

Manufacturer: **Nautitech Mining Systems Pty Ltd**
Unit 3, 9 Packard Avenue
Castle Hill NSW 2154
Australia

Additional
manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEX Quality system requirements. This certificate is granted subject to the conditions as set out in IECEX Scheme Rules, IECEX 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "I"
Edition:6.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[AU/TRA/ExTR15.0003/00](#)

Quality Assessment Report:

[AU/MSC/QAR21.0001/00](#)



IECEX Certificate of Conformity

Certificate No.: **IECEX TRA 15.0003X**

Page 3 of 5

Date of issue: 2021-08-21

Issue No: 2

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Lighting Interface Module LIM is a purpose built apparatus that may be present in a configurable instrumented system built to achieve a safety and/or a control function.

The complete instrumented system may use several modules, where the modules are mechanically and electrically connected to each other using header-socket connections on the compatible sides that mate with each other, and the modules are fastened together to form one assembly.

For further details, see the Annexe.

SPECIFIC CONDITIONS OF USE: YES as shown below:

See Annexe for details



IECEX Certificate of Conformity

Certificate No.: **IECEX TRA 15.0003X**

Page 4 of 5

Date of issue: 2021-08-21

Issue No: 2

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
See Annexe for details



IECEX Certificate of Conformity

Certificate No.: **IECEX TRA 15.0003X**

Page 5 of 5

Date of issue: 2021-08-21

Issue No: 2

Additional information:

Job 21105

Annex:

[IECEX TRA 15.0003X-2 Annexe - final.pdf](#)

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.: 2

Description:

The Lighting Interface Module (LIM) is a purpose built apparatus that may be present in a configurable instrumented system built to achieve a safety and/or a control function.

The complete instrumented system may use several modules, where the modules are mechanically and electrically connected to each other using header-socket connections on the compatible sides that mate with each other, and the modules are fastened together to form one assembly.

A typical configuration of the instrumented system may contain a power supply that connects to a suitably certified input source (usually alternator or other mains connected power source) and after its voltage and current limitation delivers power on a '4 Pin Power Rail' through all the modules, thus forming a backplane based connection system. This high power rail with $U_n = 20\text{ V}$ and $I_n = 11.9\text{ A}$ is adequately segregated between the active and return lines, and also segregated from all other circuits, connection pins are duplicated and all the modules are fastened together to prevent sparking to be considered.

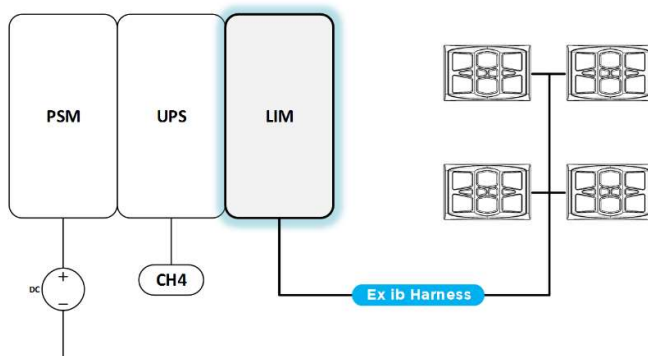
The LIM module receives power from the PSM Module on this high power rail ($U_n = 20\text{ V}$) only when Zone 0 conditions are not present.

The LIM provides several intrinsically safe outputs:

- 9 separate 'LAMP' circuits, each with a $U_o 20\text{ V}$ $I_o 1.2\text{ A}$
- 1 combined 'GPIO' circuit that consists of 13 General Purpose Input Output lines with a combined $U_o 20\text{ V}$ $I_o 559\text{ mA}$

The LIM Module contains several internal printed circuit boards interconnected to each other. It is totally encapsulated.

A typical instrumented system example is depicted below.



IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Specific Conditions of Use pertaining to Issue 0 of this Certificate:

- a) The LIM must be installed with a compatible module on either side or end plates to form a complete system.
- b) The output plug and cabling is supplied by the equipment manufacturer to maintain adequate segregation of output circuits for installation.
- c) The field socket JDRC-40 shall be fitted with either a matching plug and cable or an end cap, which are at least IP54 rated.
- d) The parameters provided below shall be taken into account in installation. Consult the manufacturer for assistance and advice.

External Connectors JDRC-40

Description	Circuit	Pin	Function	Entity Parameters
Output Circuits	1	33	Power 1	Per Circuit: U _o = 20V I _o = 1.2A C _o = 2uF L _o = 100uH See Note
		23	Power 2	
		32	Common	
	2	31	Power 1	
		22	Power 2	
		21	Common	
	3	26	Power 1	
		17	Power 2	
		16	Common	
	4	34	Power 1	
		35	Power 2	
		24	Common	
	5	13	Power 1	
		3	Power 2	
		2	Common	
	6	1	Power 1	
		12	Power 2	
		11	Common	
	7	7	Power 1	
		18	Power 2	
		6	Common	
	8	5	Power 1	
		4	Power 2	
		14	Common	
	9	25	Power 1	
		15	Common	

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Description	Circuit	Pin	Function	Entity Parameters
	10	37	GPIO 1	Combined: U _o : 20V I _o = 559mA C _o = 2uF L _o = 1mH See Note
		36	GPIO 2	
		27	GPIO 3	
		38	GPIO 4	
		28	GPIO 5	
		39	GPIO 6	
		29	GPIO 7	
		8	GPIO 8	
		19	GPIO 9	
		9	GPIO 10	
		20	GPIO 11	
		10	GPIO 12	
		30	GPIO 13	
	40	Common		

Note

The values of L_o and C_o shall be reduced to 50% if both the following conditions are met:

- a) The total L_i of the external circuit (excluding the cable) ≥ 1% of the L_o value and
- b) The total C_i of the external circuit (excluding the cable) ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF.

External Connectors JEF1

Description	Circuit	Pin	Function	Parameters
4 Pin Power Rail	Module supply	37	Ground	U _n = 20V* I _n = 11.9A*
		36		
		35	Power	
		34		
-	-	Remaining pins are not fitted/used in the LIM	-	-

* The U_n 20V and I_n 11.9A are adequately segregated and ingress protected intrinsically safe voltage and current that is allowed in up to Zone 1 conditions but not allowed in Zone 0 conditions. The source of the 4-pin power rail is a compatible module (e.g. PSM).

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Drawing list pertaining to Issue 0 of this Certificate:

Manufacturer's Documents

Title:	Drawing No.:	Pages	Rev. Level:	Date:
Part# 7680-1.0 LIM Main Left (All layers) PCB Artwork	ZUQPTY4FSNWN-57-578	6	1	2015-07-24
Part# 7682-1.0 LIM Main Right (All layers) PCB Artwork	ZUQPTY4FSNWN-57-579	6	1	2015-07-24
Part# 7684-1.0 LIM CPU Left (All layers) PCB Artwork	ZUQPTY4FSNWN-57-580	8	1	2015-07-24
Part# 7686-1.0 LIM Connector (All layers) PCB Artwork	ZUQPTY4FSNWN-57-581	6	1	2015-07-24
Part# 7688-1.0 BT Face Plate (All layers) PCB Artwork	ZUQPTY4FSNWN-57-584	8	1.0	2015-08-10
PART 2160-936-1 BTFP CERTIFICATION DETAIL	ZUQPTY4FSNWN-5-7-577	1	1	2015-07-08
Part# 7689-1.0 BTFP TOP SHEET Schematic	ZUQPTY4FSNWN-57-574	1	1	2015-07-22
Part# DS_EJ-1 Bluetooth 4.0 BLE Schematic	ZUQPTY4FSNWN-57-574	1	1	2014-06-03
PART 12035-1 LIM CERTIFICATION DETAIL	ZUQPTY4FSNWN-51-575	1	1	2015-07-06

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:	IECEX TRA 15.0003X	Issue No.:	2
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Title:	Drawing No.:	Pages	Rev. Level:	Date:
Part# 12035-1.0 Lighting Interface Module (LIM) Schematic	ZUQPTY4FSNWN-57-573	1 of 24	1	2015-02-20
Part# 7681-1.0 LIM MAIN LEFT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	2 of 24	2	2015-02-20
Part# 7683-1.0 LIM MAIN RIGHT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	3 of 24	2	2015-02-20
Part# 7685-1.0 LIM CPU LEFT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	4 of 24	2	2015-02-20
Part# 7686-1.0 LIM 40WAY FANOUT Schematic	ZUQPTY4FSNWN-57-573	5 of 24	1	2015-07-07
Part# 12035-1.0 Ex ib Active Current Limiter 1.2A Schematic	ZUQPTY4FSNWN-57-573	6 of 24	1	2015-03-12
Part# DS_HX-1.0 Active Current Limit 1.2A Schematic	ZUQPTY4FSNWN-57-573	7 of 24	1	2015-03-07
Part# 12035-1.0 LDO Power Limiter Schematic	ZUQPTY4FSNWN-57-573	8 of 24	1	2015-07-15
Part# 7681-1.0 Signal Barrier 1 Schematic	ZUQPTY4FSNWN-57-573	9 of 24	1	2015-07-07
Part# 7683-1.0 Signal Barrier 2 Schematic	ZUQPTY4FSNWN-57-573	10 of 24	1	2015-07-07

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Title:	Drawing No.:	Pages	Rev. Level:	Date:
Part# 7681-1.0 SAFE GPIO LEFT Schematic	ZUQPTY4FSNWN-57-573	11 of 24	2	2015-02-26
Part# 7682-1.0 SAFE GPIO RIGHT Schematic	ZUQPTY4FSNWN-57-573	12 of 24	2	2015-02-26
Part# 12035-1.0 GPIO ESD PROTECTION Schematic	ZUQPTY4FSNWN-57-573	13 of 24	1	2015-02-27
Part# 7683-1.0 SAFEPSU Schematic	ZUQPTY4FSNWN-57-573	14 of 24	2	2014-03-04
Part# 12035-1.0 DUAL OUTPUT SWITCH w/ OVERLOAD Schematic	ZUQPTY4FSNWN-57-573	15 of 24	1	2015-07-07
Part# 7683-1.0 PSU_1V2 Schematic	ZUQPTY4FSNWN-57-573	16 of 24	2	2014-03-04
Part# 7683-1.0 PSU_3V3 Schematic	ZUQPTY4FSNWN-57-573	17 of 24	2	2014-03-04
Part# 7685-1.0 CPU Schematic	ZUQPTY4FSNWN-57-573	18 of 24	2	2015-03-04
Part# 7681-1.0 EDGE CONNECTOR 1 Schematic	ZUQPTY4FSNWN-57-573	19 of 24	1	2015-07-07
Part# 7683-1.0 EDGE CONNECTOR 2 Schematic	ZUQPTY4FSNWN-57-573	20 of 24	1	2015-07-07

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Title:	Drawing No.:	Pages	Rev. Level:	Date:
Part# DS_BT-1.0 MEMORY_SPI_FLASH_4MB Schematic	ZUQPTY4FSNWN-57-573	21 of 24	1	2013-06-25
Part# DS_BR-1.1 SAFETY μ P Schematic	ZUQPTY4FSNWN-57-573	22 of 24	1	2013-05-29
Part# DS_EF-1.0 CUBEx_BACKPLANE_LEFT Schematic	ZUQPTY4FSNWN-57-573	23 of 24	2	2013-07-22
Part# DS_BU-1.0 IO Expander 24-bit I2C Schematic	ZUQPTY4FSNWN-57-573	24 of 24	2	2013-08-02
PART 12035-1 LIM DATASHEET	ZUQPTY4FSNWN-57-576	1	1	2015-07-06

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.: 2

Variations permitted by Issue 1 of this certificate:

1. The applicant and manufacturer have changed to NTMS.
2. Revised QAR reference to AU/ITA/QAR08.0004/09 to include this equipment in the scope of the audit of the manufacturer.
3. The manufacturer has submitted a complete set of drawings which have been retitled with their name. Where the drawing contained pictures showing the name of the earlier manufacturer, these have been edited to that extent. No other changes were made, and the revised drawing list is included below.
4. There are no changes in the parameters or conditions from the earlier issue of the certificate.

Specific Conditions of Use pertaining to Issue 1 of this certificate:

There are no changes to the conditions of use.

Drawings Associated with the Issue 1 of this Certificate:

Manufacturer's Documents

Title:	Drawing No.:	Pages	Rev. Level:	Date:
Part# 7680 LIM Main Left (All layers) PCB Artwork	ZUQPTY4FSNWN-57-578	6	1.1	2015-07-24
Part# 7682 LIM Main Right (All layers) PCB Artwork	ZUQPTY4FSNWN-57-579	6	1.1	2015-08-10
Part# 7684 LIM CPU Left (All layers) PCB Artwork	ZUQPTY4FSNWN-57-580	8	1.1	2015-07-24
Part# 7686 LIM Connector (All layers) PCB Artwork	ZUQPTY4FSNWN-57-581	6	1.1	2015-07-24
Part# 7688 BT Face Plate (All layers) PCB Artwork	ZUQPTY4FSNWN-57-584	8	1.1	2015-08-10
BTFP CERTIFICATION DETAIL	DS_2160-936-1	1	2	2017-03-02

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Title:	Drawing No.:	Pages	Rev. Level:	Date:
7689 BTFP TOP SHEET Schematic	ZUQPTY4FSNWN-57-574	1 of 2	1.1	2015-07-22
DS_EJ Bluetooth 4.0 BLE Schematic	ZUQPTY4FSNWN-57-574	2 of 2	1.1	2014-03-06 ¹
12035 Lighting Interface Module (LIM) Schematic	ZUQPTY4FSNWN-57-573	1 of 24	1.1	2015-02-20
7681 LIM MAIN LEFT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	2 of 24	2.1	2015-02-20
7683 LIM MAIN RIGHT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	3 of 24	2.1	2015-02-20
7685 LIM CPU LEFT COVERSHEET Schematic	ZUQPTY4FSNWN-57-573	4 of 24	2.1	2015-02-20
7686 LIM 40WAY FANOUT Schematic	ZUQPTY4FSNWN-57-573	5 of 24	1.1	2015-07-07
12035 Ex ib Active Current Limiter 1.2A Schematic	ZUQPTY4FSNWN-57-573	6 of 24	1.1	2015-03-12
DS_HX Active Current Limit 1.2A Schematic	ZUQPTY4FSNWN-57-573	7 of 24	1.1	2015-03-07
12035 LDO Power Limiter Schematic	ZUQPTY4FSNWN-57-573	8 of 24	1.1	2015-07-15

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Title:	Drawing No.:	Pages	Rev. Level:	Date:
7681 Signal Barrier 1 Schematic	ZUQPTY4FSNWN-57-573	9 of 24	1.1	2015-07-07
7683 Signal Barrier 2 Schematic	ZUQPTY4FSNWN-57-573	10 of 24	1.1	2015-07-07
7681 SAFE GPIO LEFT Schematic	ZUQPTY4FSNWN-57-573	11 of 24	2.1	2015-02-26
7682 SAFE GPIO RIGHT Schematic	ZUQPTY4FSNWN-57-573	12 of 24	2.1	2015-02-26
12035 GPIO ESD PROTECTION Schematic	ZUQPTY4FSNWN-57-573	13 of 24	1.1	2015-02-27
7683 SAFEPSU Schematic	ZUQPTY4FSNWN-57-573	14 of 24	2.1	2014-03-04
12035 DUAL OUTPUT SWITCH w/ OVERLOAD Schematic	ZUQPTY4FSNWN-57-573	15 of 24	1.1	2015-07-07
7683 PSU_1V2 Schematic	ZUQPTY4FSNWN-57-573	16 of 24	2.1	2014-03-04
7683 PSU_3V3 Schematic	ZUQPTY4FSNWN-57-573	17 of 24	2.1	2014-03-04
7685 CPU Schematic	ZUQPTY4FSNWN-57-573	18 of 24	2.1	2015-03-04

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.: 2

Title:	Drawing No.:	Pages	Rev. Level:	Date:
7681 EDGE CONNECTOR 1 Schematic	ZUQPTY4FSNWN-57-573	19 of 24	1.1	2015-07-07
7683 EDGE CONNECTOR 2 Schematic	ZUQPTY4FSNWN-57-573	20 of 24	1.1	2015-07-07
DS_BT MEMORY_SPI_FLASH_4MB Schematic	ZUQPTY4FSNWN-57-573	21 of 24	1.1	2013-06-25
DS_BR SAFETY μ P Schematic	ZUQPTY4FSNWN-57-573	22 of 24	1.2	2013-05-29
DS_EF CUBEx_BACKPLANE_LEFT Schematic	ZUQPTY4FSNWN-57-573	23 of 24	2.1	2013-07-22
DS_BU-1.0 IO Expander 24-bit I2C Schematic	ZUQPTY4FSNWN-57-573	24 of 24	2.1	2013-08-02
LIM CERTIFICATION DETAIL	12035-A	1 of 2	2	2017-02-15
LIM DATASHEET	12035-A	2 of 2	2	2017-02-15

¹The date listed was incorrect and has been updated during issue 2 of this certificate.

Variations permitted by Issue 2 of this certificate:

- The manufacturer's Quality Assessment was changed from Ex Testing and Certification to another IECEX Certification Body, Mine Safety Technology Centre. QAR reference has been changed accordingly.

Specific Conditions of Use pertaining to Issue 2 of this certificate:

There are no changes to the conditions of use.

IECEX Certificate of Conformity



Annexe



Annexe for Certificate No.:

IECEX TRA 15.0003X

Issue No.:

2

Drawings Associated with the Issue 2 of this Certificate:

There are no drawings applicable to this issue of the certificate.