



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 TSA 24.0003X** Page 1 of 4 [Certificate history:](#)
Status: **Current** Issue No: 0
Date of Issue: 2024-05-17
Applicant: **Nautitech Mining Systems Pty Limited**
Unit 3/9 Packard Ave
Castle Hill NSW 2154
Australia
Equipment: **Lighting Interface Module (LIM) and Power Interface Module (PIM)**
Optional accessory:
Type of Protection: **Increased Safety "eb" & Intrinsic Safety "ib"**
Marking: **Ex eb ib I Mb**

Approved for issue on behalf of the IECEx
Certification Body:

Ujen Singh

Position:

Quality & Certification Manager

Signature:
(for printed version)

Date:
(for printed version)

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2. This certificate is not transferable and remains the property of the issuing body.
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TestSafe Australia
919 Londonderry Road
Londonderry NSW 2753
Australia





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Manufacturer: **Nautitech Mining Systems Pty Limited**
Unit 3/9 Packard Ave
Castle Hill NSW 2154
Australia

Manufacturing locations: **Nautitech Mining Systems Pty Limited**
Unit 3/9 Packard Ave
Castle Hill NSW 2154
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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 60079-0:2017](#) Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

[IEC 60079-11:2011](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

[IEC 60079-7:2017](#) Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

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/TSA/ExTR24.0015/00](#)

Quality Assessment Report:

[AU/MSQ/QAR21.0001/01](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Light Interface Module (LIM)/Power Interface Module (PIM) 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 $U_m = 20\text{ V}$ 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. This connector is further protected by Ex eb type of protection between the modules and end plates. An Ex eb compartment has a gasket that provides the required sealing. Where CUBEx compatible modules are assembled together, the modules are connected through mating Elcon connectors. In the first and last modules in chain, backplane compartment is then closed by metallic cover made of Stainless steel 316. The metallic cover is fastened to the body by three M5x0.8-6H countersunk screw to the three rods on each side. The assembly is fixed together with special metallic couplings and rods arrangement to ensure secureness of the connector. The two compartments (between the end plate and a module and between the two modules) are increased safety compartments. The equipment has Warning : Do not open when energized.

The LIM/PIM module receives power from the PSM Module on this high-power rail ($U_m = 20\text{ V}$) only when Zone 0 conditions are not present. The LIM/PIM provides several intrinsically safe outputs:

- 9 separate 'LAMP/POWER' circuits. There are three variants, LIM $U_o = 20\text{ V}$ $I_o = 1.2\text{ A}$ or PIM $U_o = 13\text{ V}$ $I_o = 2.5\text{ A}$ or PIM $U_o = 13\text{ V}$, $I_o = 2.8\text{ A}$
- 1 combined 'GPIO' circuit that consists of 13 General Purpose Input Output lines with a ($U_o = 20\text{ V}$ and a combined $I_o = 559\text{ mA}$ for LIM variant) OR ($U_o = 13\text{ V}$ and combined $I_o = 364\text{ mA}$ for PIM variants).

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

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The LIM/PIM must be installed with a compatible module on either side or end plates to form a complete system.
2. The output plug and cabling is supplied by the equipment manufacturer to maintain adequate segregation of output circuits for installation.
3. The field socket JDRC-40 shall be fitted with either a matching plug and cable or a distribution circuit PCB and or Junction box, which are at least IP54 rated.



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Equipment (continued):

Refer to Annexe.

Annex:

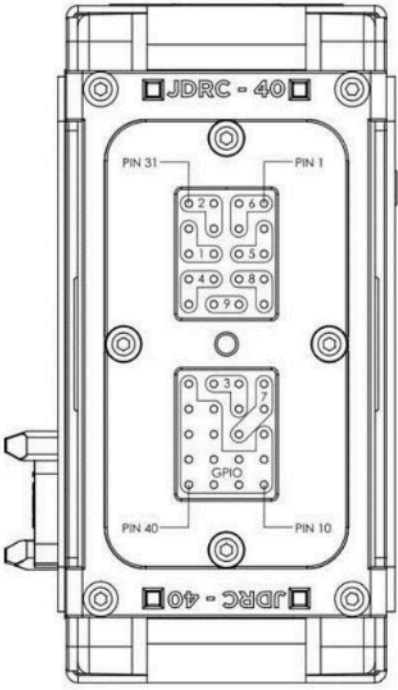
[Annexe for IECEx TSA 24.0003X.pdf](#)

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Equipment description continue:

The parameters provided below shall be taken into account in installation. **External Connectors JDRC-40**

Description	Circuit	Pin	Function	Entity Parameters
 <p style="font-size: small;">FIG 2. ELECTRICAL PORT MARKING, CIRCUIT & TERMINAL NUMBERS JDRC-40</p>	1	33	Power 1	LIM Per Circuit: $U_o: 20\text{ V}$ $I_o = 1.2\text{ A}$ $C_o = 2\ \mu\text{F}$ $L_o = 100\ \mu\text{H}$ (Ref. Note 1)
		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	
	10	37	GPIO 1	
		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		
				LIM Combined: $U_o: 20\text{ V}$ $I_o = 559\text{ mA}$ $C_o = 2\ \mu\text{F}$ $L_o = 1\text{ mH}$ PIM 2.8 A/2.5 A Combined: $U_o: 13\text{ V}$ $I_o = 364\text{ mA}$ $C_o = 2\ \mu\text{F}$ $L_o = 1\text{ mH}$ (All Ref. Note 1)

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Note 1:

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

- a) The total Li of the external circuit (excluding the cable) \geq 1% of the Lo value
 - b) The total Ci of the external circuit (excluding the cable) \geq 1% of the Co value.
- The reduced capacitance of the external circuit. (including cable) shall not be greater than 1uF.

Note 2:

PIM can have some ports configuration for Io = 2.5 A and some ports for Io = 2.8 A

External Connector JEF2

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

*The respective values of Um of 20 V at the four pin power rail are supplied from an adjacent compatible Module (e.g. PSM) in a system and are adequately segregated and ingress protected and hence incapable of sparking.

Drawing list pertaining to Issue 0 of this Certificate:

Drawing/Document No.:	Page/s:	Title:	Revision Level:	Date: yyyy-mm-dd
CD_12035-A_12045-A_12055-A	1	LIM & PIM CERTIFICATION DETAIL <i>Assembly</i>	4	2024-01-12
DS_12035-A_12045-A_12055-A	1	LIM & PIM DATASHEET <i>Assembly</i>	4	2024-03-26
DS_2160-936-1	1	BTFP CERTIFICATION DETAIL	2	2017-03-02
ZUQPTY4FSNWN-57-573	1/24	12035 Lighting Interface Module (LIM) <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	2/24	7681 LIM MAIN LEFT COVERSHEET <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	3/24	7683 LIM MAIN RIGHT COVERSHEET <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	4/24	7685 LIM MAIN CPU LEFT COVERSHEET <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	5/24	7687 LIM 40WAY FANOUT <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	6/24	12035 Ex ib Active Current Limiter 1.2A <i>Schematic</i>	4	2023-10-04
ZUQPTY4FSNWN-57-573	7/24	MS_HX Active Current Limit <i>Schematic</i>	5	2024-05-13

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Drawing/Document No.:	Page/s:	Title:	Revision Level:	Date: yyyy-mm-dd
ZUQPTY4FSNWN-57-573	8/24	7683 LDO Power Limiter Schematic	4	2023-09-06
ZUQPTY4FSNWN-57-573	9/24	7681 Signal Barrier 1 Schematic	3	2021-10-15
ZUQPTY4FSNWN-57-573	10/24	7683 Signal Barrier 2 Schematic	3	2021-10-15
ZUQPTY4FSNWN-57-573	11/24	7681 SAFE GPIO LEFT <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	12/24	7683 SAFE GPIO RIGHT <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	13/24	12035 GPIO ESD PROTECTION <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	14/24	7683 SAFEPSU <i>Schematic</i>	3	2014-03-04
ZUQPTY4FSNWN-57-573	15/24	12035 DUAL OUTPUT SWITCH w/OVERLOAD	3	2021-10-15
ZUQPTY4FSNWN-57-573	16/24	12035 PSU_1V2 <i>Schematic</i>	3	2014-03-04
ZUQPTY4FSNWN-57-573	17/24	7683 PSU_3V3 <i>Schematic</i>	3	2014-03-04
ZUQPTY4FSNWN-57-573	18/24	7685 CPU <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	19/24	7681 EDGE CONNECTOR 1 <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	20/24	7683 EDGE CONNECTOR 2 <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-573	21/24	MS_BT MEMORY_SPI_FLASH_4MB <i>Schematic</i>	3	2021-11-23
ZUQPTY4FSNWN-57-573	22/24	MS_BR SAFETY µP <i>Schematic</i>	3	2021-11-23
ZUQPTY4FSNWN-57-573	23/24	MS_EF CUBEx_BACKPLANE_LEFT <i>Schematic</i>	3	2021-11-23
ZUQPTY4FSNWN-57-573	24/24	MS_BU IO Expander 24-bit I2C <i>Schematic</i>	3	2021-10-15
ZUQPTY4FSNWN-57-574	1/2	7689 BTFP TOP SHEET <i>Schematic</i>	1.1	2015-07-22
ZUQPTY4FSNWN-57-574	2/2	DS_EJ Bluetooth 4.0 BLE <i>Schematic</i>	1.1	2015-07-22
ZUQPTY4FSNWN-57-578	1/7	Part# 7680 LIM MAIN LEFT PCB Artwork Top Layer	1.2	2018-10-04
ZUQPTY4FSNWN-57-578	2/7	Part# 7680 LIM MAIN LEFT PCB Artwork Bottom Layer	1.2	2018-10-04
ZUQPTY4FSNWN-57-578	3/7	Part# 7680 LIM MAIN LEFT PCB Artwork Top Overlay	1.2	2018-10-04
ZUQPTY4FSNWN-57-578	4/7	Part# 7680 LIM MAIN LEFT PCB Artwork Bottom Overlay	1.2	2018-10-04
ZUQPTY4FSNWN-57-578	5/7	Part# 7680 LIM MAIN LEFT PCB Artwork Top Paste	1.2	2018-10-04
ZUQPTY4FSNWN-57-578	6/7	Part# 7680 LIM MAIN LEFT PCB Artwork Bottom Paste	1.2	2018-10-04

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ZUQPTY4FSNWN-57-578	7/7	Part# 7680 LIM MAIN LEFT PCB Artwork Board Outline	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	1/7	Part# 7682 LIM MAIN Right PCB Artwork Top Layer	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	2/7	Part# 7682 LIM MAIN Right PCB Artwork Bottom Layer	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	3/7	Part# 7682 LIM MAIN Right PCB Artwork Top Overlay	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	4/7	Part# 7682 LIM MAIN Right PCB Artwork Bottom Overlay	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	5/7	Part# 7682 LIM MAIN Right PCB Artwork Top Paste	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	6/7	Part# 7682 LIM MAIN Right PCB Artwork Bottom Paste	1.2	2018-10-04
ZUQPTY4FSNWN-57-579	7/7	Part# 7682 LIM MAIN Right PCB Artwork Board Outline	1.2	2018-10-04
ZUQPTY4FSNWN-57-580	1/8	Part# 7684 LIM CPU LEFT PCB Artwork Top Layer	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	2/8	Part# 7684 LIM CPU LEFT PCB Artwork Mid Layer 1	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	3/8	Part# 7684 LIM CPU LEFT PCB Artwork Mid Layer 2	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	4/8	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Layer	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	5/8	Part# 7684 LIM CPU LEFT PCB Artwork Top Silk Overlay	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	6/8	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Silk Overlay	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	7/8	Part# 7684 LIM CPU LEFT PCB Artwork Top Solder Mask Print	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	8/8	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Solder Mask Print	1.1	2015-07-24
ZUQPTY4FSNWN-57-580	1/9	Part# 7684 LIM CPU LEFT PCB Artwork Top Layer	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	2/9	Part# 7684 LIM CPU LEFT PCB Artwork Mid Layer 1	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	3/9	Part# 7684 LIM CPU LEFT PCB Artwork Mid Layer 2	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	4/9	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Layer	1.2	2021-10-15

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ZUQPTY4FSNWN-57-580	5/9	Part# 7684 LIM CPU LEFT PCB Artwork Top Overlay	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	6/9	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Overlay	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	7/9	Part# 7684 LIM CPU LEFT PCB Artwork Top Paste	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	8/9	Part# 7684 LIM CPU LEFT PCB Artwork Bottom Paste	1.2	2021-10-15
ZUQPTY4FSNWN-57-580	9/9	Part# 7684 LIM CPU LEFT PCB Artwork Board Outline	1.2	2021-10-15
ZUQPTY4FSNWN-57-581	1/6	Part# 7686 LIM CONNECTOR PCB Artwork Top Layer	1.1	2015-07-24
ZUQPTY4FSNWN-57-581	2/6	Part# 7686 LIM CONNECTOR PCB Artwork Bottom Layer	1.1	2015-07-24
ZUQPTY4FSNWN-57-581	3/6	Part# 7686 LIM CONNECTOR PCB Artwork Top Silkscreen Overlay	1.1	2015-07-24
ZUQPTY4FSNWN-57-581	4/6	Part# 7686 LIM CONNECTOR PCB Artwork Bottom Silkscreen Overlay	1.1	2015-07-24
ZUQPTY4FSNWN-57-581	5/6	Part# 7686 LIM CONNECTOR PCB Artwork Top Solder Mask Print	1.1	2015-07-24
ZUQPTY4FSNWN-57-581	6/6	Part# 7686 LIM CONNECTOR PCB Artwork Bottom Solder Mask Print	1.1	2015-07-24
ZUQPTY4FSNWN-57-584	1/8	Part# 7688 BT Face Plate PCB Artwork Top Layer	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	2/8	Part# 7688 BT Face Plate PCB Artwork Mid Layer 1	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	3/8	Part# 7688 BT Face Plate PCB Artwork Mid Layer 2	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	4/8	Part# 7688 BT Face Plate PCB Artwork Bottom Layer	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	5/8	Part# 7688 BT Face Plate PCB Artwork Top Silkscreen Overlay	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	6/8	Part# 7688 BT Face Plate PCB Artwork Bottom Silkscreen Overlay	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	7/8	Part# 7688 BT Face Plate PCB Artwork Top Solder Mask Print	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	8/8	Part# 7688 BT Face Plate PCB Artwork Bottom Solder Mask Print	1.1	2015-10-24
ZUQPTY4FSNWN-57-584	1/8	Part# 7688 BT Face Plate PCB Artwork Top Layer	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	2/8	Part# 7688 BT Face Plate PCB Artwork Mid Layer 1	1.2	2024-02-15

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ZUQPTY4FSNWN-57-584	3/8	Part# 7688 BT Face Plate PCB Artwork Mid Layer 2	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	4/8	Part# 7688 BT Face Plate PCB Artwork Bottom Layer	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	5/8	Part# 7688 BT Face Plate PCB Artwork Top Silkscreen Overlay	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	6/8	Part# 7688 BT Face Plate PCB Artwork Bottom Silkscreen Overlay	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	7/8	Part# 7688 BT Face Plate PCB Artwork Top Solder Mask Print	1.2	2024-02-15
ZUQPTY4FSNWN-57-584	8/8	Part# 7688 BT Face Plate PCB Artwork Bottom Solder Mask Print	1.2	2024-02-15
CD_2181-960-A	1	CUBEx Ex Compartment	1	2024-04-17

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