CSA INTERNATIONAL

Descriptive Report and Test Results

MASTER CONTRACT: 205470
REPORT: 2117554
PROJECT: 2117554

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Issued by Wesley Van Hill, C.E.T.

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PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations
CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations – Certified to US Requirements

Class I, Division 2, Groups A, B, C and D

Wireless communications device, Model ZC-B100, input rated 10-28 V dc / 1.0 A Max (Cellular Version) or 10-16/22 V dc / 3.0 A Max (External Satellite Version); Ta = -40 to +60°C; Temperature Code T4 @ +60°C ;Type 4 enclosure. Installation shall be in accordance with drawing 15772

Wireless communications device, Model ZC-A100, input rated 11-16/22/28 V dc* / 8.8 A Max; Ta = -40 to +60°C; Temperature Code T4 @ +60°C ;Type 4 enclosure; installation shall be in accordance with drawing 15772; provides intrinsically safe circuits for Class I, Division 1 when connected per barrier control drawings SCI-969 (MTL) and/or 116-0119B (Pepperl+Fuchs).
* Input voltage dependent on modem option selected & installed.

NOTE: Suitability of the final installation is to be determined by the authority having local jurisdiction

APPLICABLE REQUIREMENTS

CSA Standard C22.2 No. 0-M1991 - General Requirements - Canadian Electrical Code Part II
CSA Standard C22.2 No.0.4-M2004 - Bonding of Electrical Equipment
CSA Standard C22.2 No. 94-M1991 - Special Purpose Enclosures
CSA Standard C22.2 No.142-M1987 – Process Control Equipment
CSA Standard C22.2 No. 157-M1992 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
CSA Standard C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

UL Standard 50, Eleventh Edition - Enclosures for Electrical Equipment
UL Standard 508, Seventeenth Edition – Industrial Control Equipment
UL Standard 913, Seventh Edition - Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, III, Division 1, Hazardous (Classified) Locations
ANSI/ISA–12.12.01–2007 – Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

MARKINGS

Main Unit: Both Models.

(1) Submittor's name, trademark, or the CSA file number (adjacent the CSA Mark).
(2) Catalogue / Model designation.
(3) Complete electrical rating (amps and volts dc).
(4) Date code / Serial number traceable to month and year of manufacture.
(5) Hazardous Location designations.
(6) Temperature code T4.
(7) Approved ambient temperature range (-40°C to +60°C)
(8) Enclosure rating Type 4.
(9) The CSA Mark with adjacent C_US qualifiers.
(10) The following markings:
    i) WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.
    ii) SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
(11) The following additional markings on the Model ZC-A100:
    i) WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
    ii) The designation: [Exia], associated equipment provides IS circuits for Division 1 when installed as per barrier control drawings SCI-969 (MTL) and/or 116-0119B (Pepperl+Fuchs).

Internal Markings:

(12) Fuse ratings in volts and amperes appears on or near the fuseholders.
(13) The symbols G, GR or GROUND or IEC Protective Earthing Symbol next to main ground lug and designation IS Ground next to the IS grounding terminal.
(14) The following warning appears next to the internal USB / DB9 ports:
    "WARNING - EXPLOSION HAZARD - DO NOT USE USB OR LOCAL OPERATOR INTERFACE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS."

REQUIRED METHOD OF MARKING:

CSA Accepted self adhesive nameplate material.

The markings below shall appear is a user's guide or equivalent provided for use with the unit:

- THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, AND D OR NON-HAZARDOUS LOCATIONS ONLY.
- WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.
- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
- Complete input & output electrical specifications.
- Field & IS Grounding requirements / description.
- A complete outline of how to wire up the IS I/O including segregation requirements inside the enclosure from non-IS wiring (e.g. 50mm separation per the CEC/NEC).

Note: Jurisdictions in Canada may require markings to be also in French. It is the responsibility of the Customer to provide bilingual marking, where applicable, in accordance with the requirements of the Provincial Regulatory Authorities. It is the responsibility of the Customer to determine this requirement and have bilingual wording added to the "Markings".

ALTERATIONS

1) Markings as noted above.
2) Enclosure door is bonded to main protective ground lug as described below.
3) Internal fuseholder carriers and ferrule wire connections on the GND, RX. TX communications cable shall withstand a 15N pullout force.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no) are not eligible for substitution without evaluation and report updating.

2. This report contains reference to certain construction and engineering documents that have been deemed critical to ensuring continued compliance with applicable construction and performance requirements. A list of these documents, with drawing numbers and the appropriate revision levels is summarized in this report. Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request. Failure to produce these documents in a timely manner constitutes noncompliance and is subject to the actions outlined in the CSA Product Service Agreement.

FACTORY TESTS

Dielectric Strength Test:

The dielectric test between extra-low voltage circuits and non current carrying parts is waived as:
i) Circuits are grounded (per CSA Standard 142, Clause 6.8.1 c), and;
ii) Circuits are <42.4Vpk / 30Vrms per exception in UL Standard 508, 49.3.1.

DESCRIPTIVE DOCUMENTS

NOTE: Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request.

List of Figures:

Figure No.:	Description:
1	Model ZC-B100, Small Enclosure - Front View
2	Model ZC-B100, Small Enclosure - Rear View
3	Model ZC-B100, Small Enclosure - Internal View
4	Model ZC-B100 & ZC-A100, Solid State Relay Internal View
5 & 6	Model ZC-A100, Large Enclosure - Internal View

Applicable Drawings

Drawing No	Rev	Pages	Description
15772	2	4	Zed.i Connect F.I. Installation Drawing
16401	2	3	Zed.i Connect – Basic - Wiring - Cellular Modem
16402	2	3	Zed.i Connect – Basic - Wiring - Satellite Modem
BM16353 - 16354	5	2	Zed.i Connect – Basic – Bill of Materials
15776	3	1	Zed.i Connect – Basic – Enclosure Cutout
16434	1	1	Zed.i Connect – Basic – NEMA 4 Test
16403	1	5	Zed.i Connect – Advanced - Wiring Diagram - Full I/O
16404	1	5	Zed.i Connect – Advanced - Wiring Diagram
BM16350 - 16351	1	2	Zed.i Connect – Advanced – Bill of Materials
15781	2	1	Zed.i Connect – Advanced - Enclosure Cutout
16435	1	1	Zed.i Connect – Advanced – NEMA 4 Test

DESCRIPTION

PART A: Model ZC-B100 (Connect Basic, Small Enclosure)

The subject model is a wireless communications device for use in Class I, Division 2 areas. It is housed in a CSA/UL Type 4 enclosure and is intended for installation by the submitter's trained personnel.

1. **Enclosure:** See Figures 1 and 2. Coated sheet steel, Certified, UL Listed `Hammond' Model EJ12126, rated Type 4, 12, 13.

   Note: Enclosure was retested for Type 4 rating (enclosure was configured as shown in Manufacturer's drawing 16434)

2. **RF Gas Tube Surge Arrestor:** Accepted:
   Manufacturer: Hyperlink
   Model Number: AL-NFNFB-9
   Ratings: 0 - 3 GHz, 50 Ohm, 90 V 20%, -55°C to +85°C , IP65
   Secured By: Integral nut
   Remarks: Tested for Type 4 compliance when installed in Enclosure above – see TESTS.

The following components are secured to an internal back pan secured to enclosure as shown in Figure 3.

3. **Main Protective Ground Lug:** CSA Certified (File 012798), UL Listed (File E9809)
   Manufacturer: Thomas and Betts, "Blackburn"
   Model Number: ADR2
   Ratings: 12-14 AWG
   Secured By: Screw secured to enclosure
   Remarks: Door is bonded to this lug by means of a min 14 AWG green colored insulated conductor with closed loop ring pressure connectors, screw secured to threaded boss on door and to main ground lug stack.

4. **Terminal Strip Components:** (ELV)
   Fusholders: Certified, cURus Recognized (File E60425)
   Manufacturer: Phoenix Contact
   Model Number: UK 5-HESI, 3004100
   Ratings: CSA /UL (CSA 600V, 6.3A, 28-10 AWG; UL 26-10 AWG)
   Secured By: DIN Rail Securement Provisions

   Pass Through Terminals: cURus Recognized (File E60425)
   Manufacturer: Phoenix Contact
   Model Number: ST4, 3031364
   Ratings: UL 600V / 30A / 28-10 AWG
   Secured By: DIN Rail Securement Provisions

   Pass Through Terminals: cURus Recognized (File E60425)
   Manufacturer: Phoenix Contact
   Model Number: ST4-PE, 3031380
   Ratings: UL 28-10 AWG
   Secured By: DIN Rail Securement Provisions

5. **Fuses:** (ELV) CSA Certified (File 234651), UR Recognized (File E33925)
Manufacturer: Ferraz Shawmut
Model Number: GSD1, GSD ¼, GSD2,GSD5, GSD10
Ratings:
(F1) 250 V, 250mA
(F2) 250 V, 1A
(F3) 250 V, 2A
(F4) 250 V, 5A
(F5) 250 V, 10A

6. **USB Diagnostics Connector:** (ELV), Accepted
Manufacturer: L-Com
Model Number: ECF504-5M
Secured By: Screws

7. **Reset Switch: (ELV)** Accepted
Manufacturer: APEM
Model Number: ISR3SAD200
Secured By: Screws
Remarks: Evaluated as non-incendive – see TESTS.

8. **Processor Assisted Communications Device:** (ELV) cCSAus Certified (CSA Report 205470-2120356)
Manufacturer: Zed i Inc.
Model: PAC4000
Ratings: 8-28 V dc / 1.0 A Max; Ta = -40 to +75°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +75°C.
Secured By: Four self tapping screws in back pan

9. **Internal Cellular Modem:** (ELV) cETLus Listed (Report 3132373CRT-001 a)
Manufacturer: Sierra Wireless
Model: Raven XT V2221-T
Ratings: 10-28 V dc / 0.02-0.45 A Max; Ta = -30 to +70°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +70°C.
Secured By: Clip type bracket as shown

10. **Internal Solid State Relay:** (ELV) Accepted – See Figure 4.
Manufacturer: Crydom
Model: CKM0610
Ratings: Control: 4.0-32.0 Vdc; Output: 60 V dc, 10 A.
Secured By: DIN Rail clip type bracket as shown
Remarks: Unit is encapsulated except for those components showing in Figure 4.

11. **Internal Cables:** (ELV) - Accepted
RS232:
Manufacturer: Hi-tech / MRO/First Cable Line (contract manufacturers)
Model Number: MD16412, MD16418

DB9 pigtail Satellite:
Manufacturer: Hi-tech/MRO/First Cable Line (contract manufacturers)
Model Number: MD15785

DB9 pigtail RTU:

Manufacturer: Hi-tech/MRO/First Cable Line (contract manufacturers)
Model Number: MD15786

RF Co-axial:
Manufacturer: Hi-tech / MRO /First Cable Line (contract manufacturers)
Model Number: MD15783

PART B: Model ZC-A100 (Connect Advanced, Large Enclosure)

The subject model is a wireless communications device for use in Class I, Division 2 areas. It is housed in a CSA/UL Type 4 enclosure and is intended for installation by the submitter's trained personnel.

1. **Enclosure:** See Figures 1 and 2. Coated sheet steel, Certified, UL Listed `Hammond' Model SE0901391, rated Type NEMA Type 3R, 4, and 12.

Note: Enclosure was retested for Type 4 rating (enclosure was configured as shown in Manufacturer's drawing 16435)

2. **RF Gas Tube Surge Arrestor:** Accepted:
Manufacturer: Hyperlink
Model Number: AL-NFNFB-9
Ratings: 0 - 3 GHz, 50 Ohm, 90 V 20%, -55°C to +85°C , IP65
Secured By: Integral nut
Remarks: Tested for Type 4 compliance when installed in Enclosure above – see TESTS.

3. **IS Protective Ground Bar:** CSA Certified (File 060905), UL Listed (File E6294)
Manufacturer: Square D
Model Number: PK3GTA1
Ratings: one 4-14AWG or two 14-12 Cu conductors, one 12-14AWG or two 12-10AWG AL conductors.
Secured By: Screw secured to enclosure
Remarks: For IS connections.

Main Protective Ground Lug: CSA Certified (File 012798), UL Listed (File E9809)
Manufacturer: Thomas and Betts, "Blackburn"
Model Number: ADR2
Ratings: CSA and UL, minimum 14 AWG
Secured By: Screw secured to enclosure
Remarks: For normal field connections

4. **Ground Bar:** CSA Certified (File 060905), UL Listed (File E6294)
Manufacturer: Square D
Model Number: PK12GTA
Ratings: one 4-14 AWG two 14-12AWG Cu, one 12-4AWG or two 12-10AWG Al wires.
Secured By: Screw secured to enclosure
Remarks: For IS connections.

4. **Terminal Strip Components:** (ELV)

Fuseholders: Certified, cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: UK 5-HESI, 3004100
Ratings: CSA /UL (CSA 600V, 6.3A, 28-10 AWG; UL 26-10 AWG)
Secured By: DIN Rail Securement Provisions

Fuseholders: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: UK-SI, 3118012
Ratings: 250V, 10A, 24-14 AWG, CSA; 300V, 10A, 28-12AWG UL/CUL
Secured By: DIN Rail Securement Provisions

Fuseholders: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: UK 10-DREHSI, 3005109
Ratings: CSA /UL 300V, 20A, 22-6 AWG; 300V, 20A, 24-6AWG UL/CUL
Secured By: DIN Rail Securement Provisions

Pass Through Terminals: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: ST4, 3031364
Ratings: UL 600V/30A/28-10 AWG
Secured By: DIN Rail Securement Provisions

Pass Through Terminals: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: ST4 Quattro, 3031445
Ratings: UL 600V/30A/28-10 AWG
Secured By: DIN Rail Securement Provisions

Pass Through Terminals: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: ST4-PE, 3031380
Ratings: UL 28-10 AWG
Secured By: DIN Rail Securement Provisions

Pass Through Terminals: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: STTB 4, 3031429
Ratings: UL 300V, 30A, 28-10AWG
Secured By: DIN Rail Securement Provisions

Pass Through Terminals: cURus Recognized (File E60425)
Manufacturer: Phoenix Contact
Model Number: UKK 5-2BE, 3048030
Ratings: 32A, 500V, 24-12 AWG
Secured By: DIN Rail Securement Provisions

5. **Fuses:** (ELV) CSA Certified (File 234651), UR Recognized (File E33925)
Manufacturer: Ferraz Shawmut
Model Number: GSD1, GSD ½, GSD ¼, GSD 1-1/2, GSD5, GSD10
Ratings:
(F1) 250 V, 250mA
(F2) 250 V, 1A
(F3) 250 V, 1.5A
(F4) 250 V, 5A
(F5) 250 V, 10A
(F6) 250 V, 0.5A

6. **USB Diagnostics Connector:** (ELV), Accepted
Manufacturer: L-Com
Model Number: ECF504-5M
Secured By: Screws

7. **Reset Switch: (**ELV) Accepted - 2 Switches – one labeled "ESD Reset "and one labeled "WAKE"
Manufacturer: APEM
Model Number: ISR3SAD200
Secured By: Screws
Remarks: Evaluated as non-incendive – see TESTS. Switch labeled "WAKE" was tested as part of the testing completed for the Model ZC-B100, the switch serves the same purpose in both models, serving as a wake-up for the PAC module listed below. The switch labeled "ESD Reset was tested as part of the Model ZC-A100

8. **Processor Assisted Communications Device:** (ELV) cCSAus Certified (CSA Report 205470-2120356)
Manufacturer: Zed i Inc.
Model: PAC4000
Ratings: 8-28 V dc / 1.0 A Max; Ta = -40 to +75°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +75°C.
Secured By: Four self tapping screws in back pan

9. **Internal Cellular Modem:** (ELV) cETLus Listed (Report 3132373CRT-001a)
Manufacturer: Sierra Wireless
Model: Raven XT V2221-T
Ratings: 10-28 V dc / 0.02-0.45 A Max; Ta = -30 to +70°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +70°C.
Secured By: Clip type bracket as shown.

10. **Internal Solid State Relay:** (ELV) Accepted – See Figure 4.
Manufacturer: Crydom
Model: CKM0610
Ratings: Control: 4.0-32.0 Vdc; Output: 60 V dc, 10 A.
Secured By: DIN Rail clip type bracket as shown
Remarks: Unit is encapsulated except for those components showing in Figure 4.

11. **Internal Cables:** (ELV) - Accepted

RS232:
Manufacturer: Hi-tech / MRO/First Cable Line (contract manufacturers)
Model Number: MD16413

DB9 pigtail Satellite:
Manufacturer: hi-tech/MRO/First Cable Line (contract manufacturers)
Model Number: MD15785

RJ45 pigtail:
Manufacturer: hi-tech/MRO/First Cable Line (contract manufacturers)
Model Number: MD16431

RF Co-Axial:
Manufacturer: Hi-tech / MRO /First Cable Line (contract manufacturers)
Model Number: MD16417

12. **Programmable Logic Controller:** cCSAus Certified (File 090133), cUL Certified (File E184163)
Manufacturer: Control Microsystems
Model: SCADAPack 350
Ratings: 11-28 V dc / 19.5W Max; Ta = -40 to +70°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +70°C.
Secured By: Screws

Alternate Programmable Logic Controller: cCSAus Certified (File 090133), cUL Certified (File E184163)
Manufacturer: Control Microsystems
Model: SCADAPack 32
Ratings: 11-30 V dc / 3.125 W Max; Ta = -40 to +70°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +70°C.
Secured By: Screws

Alternate Programmable Logic Controller: cCSAus Certified (File 083777)
Manufacturer: Emerson (Fisher Service Company)
Model: Floboss 107 (W40155)
Ratings: 8-30 V dc / 23W Maximum; Ta = -40 to +75°C; Class I, Division 2, Groups A, B, C & D; Temperature Code T4 @ +75°C.
Secured By: Screws

I/O Modules for Floboss 107, these physical cards plug into the Floboss 107
Manufacturer: Emerson (Fisher Service Company)
Models:
FB107 MVS Interface Card, FS1CM-4, Model: W30381X0032, 150mW not including MVS
FB107 6 point I/O card, FS1PT-6, Model: W30382X0012, 2.5W max
FB107 RS232 Communication Card, FS1CM-1, Model: W30381X0012, 50mW
FB107 Expansion Rack, 107A3, Model: W40160X0012, 8-30Vdc, 22W max
FloBoss 107 LCD Display, FS1DS-1, W40167, 8-30Vdc, 120mW

13. **IS Barrier:** CSA Certified (File 065756), UL Certified (File E106378)
Manufacturer: Pepperl + Fuchs
Model: Z710
Secured By: DIN Rail Securement Provisions
Ratings:

Terminals	System		Entity Parameters							
	Vmax (V)	Rmin (Ω)	Voc (Uo) V	Isc (Io) mA	Ca (µF) Groups			La (mH) Groups		
					A,B (IIC)	C,E (IIB)	D,F,G (IIA)	A,B (IIC)	C,E (IIB)	D,F,G (IIA)
1-2	9.1	50	9.77	200	3.51	10.5	28.1	0.48	4.08	7.5

Notes:

1. These devices are designed for installation in non-hazardous locations or Class I, Division 2, Group A, B, C and D or Class I, Zone 2, Groups IIC, IIB and IIA hazardous locations and provide intrinsically safe outputs when connected to switches, non-inductive resistive devices, thermocouples or CSA Certified Entity Equipment.
2. Barriers must be mounted in a suitable enclosure and must be installed and grounded in accordance with manufacturer's instructions drawing 116-0119. Maximum safe area voltage must not exceed 250 Vrms.

Alternate IS Barrier: CSA Certified (File 036637), UL Certified (File E120058)
Manufacturer: Measurement Technology Limited
Model: 7710+
Secured By: DIN Rail Securement Provisions
Ratings: MTL7710+ barrier for use in Class I, Division 2, Groups A,B,C,D; Ex nA IIC T4; CL I, Zone 2, AEx nA IIC T4; with IS connections to Class I, II, III; Groups A,B,C,D,E,F,G; Ex ia IIC; Class I, Zone 0, AEx ia IIC; per Drawing SCI-969. Entity parameters as follows

Terminals	Voc, Uo (V)	Isc, Io (mA)	Po (W)	Ca, Co (µF) AB(IIC)/CE(IIB) /DFG(IIA)	La, Lo (mH) AB(IIC)/CE(IIB) /DFG(IIA)	Div 2 / Zone 2 T-Code
3-4	10	200	0.5	3.0/20/100	0.91/2.72/7.25	T4 @ 60°C

Note: The Model 7700 Series I.S. barriers and Model 7798 Power Feed Module are for rail mounting in a suitable protective enclosure in a Class I, Div 2 or Zone 2 Hazardous Location, or a non-hazardous location and must be installed in accordance with the manufacturer's instructions. Terminals provide Intrinsically Safe circuits for switches, thermocouples, LED's and non-inductive resistive devices or Certified (Entity) Equipment.

TEST RESULTS

Edition 1: Project 2117554

PART A: Model ZC-B100

General: A sample of the Model ZC-B100 was tested at full rated load (see below) at the submitter's agent's facility, PowerComm Technical, in Sherwood Park, Alberta and witnessed by CSA Staff, unless noted otherwise.

Test clauses refer to CSA Standard C22.2 No. 142, 213 / UL 508, ANSI ISA 12.12.01:

- The units were running software that is causing them to draw the most current.
- The internal modem was set up to transmit to the submitter's network continuously.
- An additional 2.5 A load was applied to the solid state relay output to represent additional loading by an external satellite modem (option).

Input Ratings: CSA Standard 142 Clause 6.3 / UL 508 - Clause 62

Applied Potential (V)	Applied Frequency (Hz)	Measured Current (A)
10.0 V	dc	2.70 (0.24 *)
28.0 V	dc	2.64 (0.12 *)

* 2nd value measured with no external satellite 2.5A load.

Compliance: Pass

Dielectric Strength: CSA Standard 142 - Clause 6.8 / UL 508 – Clause 49

The dielectric test between extra-low voltage circuits and non current carrying parts was waived as:
i) Circuits are grounded (per CSA Standard 142, Clause 6.8.1 c), and;
ii) Circuits are <42.4Vpk / 30Vrms per exception in UL Standard 508, 49.3.1.

Temperature: CSA Standard 142 Clause 6.4 / UL 508 - Clause 40

	Maximum Temperature (ºC)	
TC Location	**10.0 V dc Input**	**28.0 V dc Input**
Main Input Power Fuse	69.0	68.3
RF Output Surge Arrestor	61.6	61.8
Solid State Relay Output Wire	62.4	62.7
Solid State Relay Heatsink	63.1	63.5
Solid State Relay Q1	69.4	**89.5**
Solid State Relay PC1	65.2	67.2
Internal Ambient Near PAC4000/Raven XT Modem	63.0	63.7
Enclosure Top	61.4	61.8
Enclosure Rear	61.4	61.7
Test Chamber Ambient	60.5	60.8

Temperature Code: CSA Standard 213 Clause 6.2 / ANSI/ISA 12.12.01 Section 10

Maximum Surface Temperature Reading (MSTR): 89.5°C
Ambient Chamber Temperature (ART): 60.8°C
Maximum Product Ambient Temperature (MTamb): 60°C
Uncertainty Factor (UF): 5°C
Calculated Maximum Surface Temperature (CMST): 93.7°C
MSTR – ART + UF + MTamb = CMST
89.5°C –60.8°C + 5°C + 60°C = 93.7°C

Result: Based on the above, the proposed Temperature Code of **T4** (135°C) is acceptable.
Note: Other associated Class I, Div 2 approved devices in unit (e.g. PAC4 processor and cellular modem rated T4 @ 60°C max)

Non-Incendive Circuit Measurements: CSA Standard 213 Clause 6.4.3 / ANSI/ISA 12.12.01 Section 7

Connector Designation	Measured Open Circuit Voltage (dc)	Measured Circuit Current (mA)	Measured Circuit Capacitance (nF)
Switch SW1	3.291	0.31	0.022

The above values comply with Clause 6.4 of CSA Standard 213 & Section 7 of ANSI/ISA 12.12.01.

*Note: "USB" connector is only to be used when area is known to be non-hazardous.

Connector Steady Force: CSA Standard 213 Clause 4.2.2 / ANSI/ISA 12.12.01 Section 8.2

A minimum of 15 N of force was applied to the following connectors in incendive circuits.

List Connectors / Wiring Terminations Tested	Pass / Fail
RX/TX/GND Wiring Ferrule Connections	Pass *
Relay Output Wire	Pass
Ground Common Spring Terminal Wire	Pass

Compliance: Pass
*** Retested by CSA under Field Certification Project 2141321.** Results are retained in the Engineering folder for this project

Type 4 Hosedown: CSA C22.2 No 94-M91, Clause 6.8.2; ANSI/UL 50, 11TH Ed, Section 35.2

Tests performed on a representative sample of the Model ZC-B100 with RF bulkhead surge arrestor installed at CSA International - Edmonton Lab.

The enclosure and its external mechanisms were sprayed for five minutes by water from a hose having a 25 mm inside diameter nozzle that delivered at least 240L of water per minute. The water stream was directed at the joints of the enclosure from a distance of 3.0 to 3.5 m and was moved along the joints or surface at a minimum rate of 6 mm/s.

At the conclusion of the test no water had entered the enclosure.

Several components were tested in the Type 4 hosedown, and are documented in Zedi drawings MD16434. The different optional installation locations for the devices are shown in these drawings.

PART B: Model ZC-A100

General: A sample of the Model ZC-A100 was tested at CSA International - Edmonton lab as follows:

Test clauses refer to CSA Standard C22.2 No. 142, 213 / UL 508, ANSI ISA 12.12.01:

- The units were running software that is causing them to draw the most current.
- The internal modem was set up to transmit to the submitter's network continuously.
- An additional 28Vdc 3A load was applied to the solid state relay output to represent additional loading by an external satellite modem (option).
- All the IO on the PLC was loaded externally to the enclosure to cause the PLC to dissipate the maximum power:
    - The digital IO was loaded with 1A current loads over the maximum voltage range.
    - The counters were configured for highest power dissipation by shorting their inputs. . The internal pullup for the counters were used up to the applied PLC input voltage of 14Vdc.
    - The current loops were loaded to sink 20mA.
    - The RS-485 connections were shorted with 100 ohm loads.
    - Analog input 5 had 32.7Vdc load applied.
    - Analog outputs supplied 20mA each into loads.
    - USB was loaded to draw 100mA.
- Also extra current was drawn through terminal blocks to simulate maximum device loading:
    - The MVT power supplies were loaded with 0.5A each.

Input Ratings: CSA Standard 142 Clause 6.3 / UL 508 - Clause 62

Applied Potential (V)	Applied Frequency (Hz)	Measured Current (A)
11.0 V	dc	8.66
28.0 V	dc	8.22
14.0 V	dc	8.52

Compliance: Pass

Dielectric Strength: CSA Standard 142 - Clause 6.8 / UL 508 – Clause 49

The dielectric test between extra-low voltage circuits and non current carrying parts was waived as:
i) Circuits are grounded (per CSA Standard 142, Clause 6.8.1 c), and;
ii) Circuits are <42.4Vpk / 30Vrms per exception in UL Standard 508, 49.3.1.

Temperature: CSA Standard 142 Clause 6.4 / UL 508 - Clause 40

	Maximum Temperature (ºC)		
TC Location	**11.0 V dc Input**	**28.0 V dc Input**	**14.0 V dc Input**
Main Input Fuseholder	80.9	79.6	81.2
Crydom Relay	63.7	65.0	65.0
U2 - Modem	71.8	83.3	75.8
Transmitter - Modem	72.7	75.3	73.7
U41 - Scada Pack	85.7	86.8	**88.4**
Q8 - Scada Pack	77.1	78.1	78.1
R10 - Scada Pack	78.9	83.4	80.1
L1 - Scada Pack	75.9	81.0	77.9
UMS Module	61.6	62.9	62.6
D101 Fuseholder	62.6	63.7	63.8
Interior Ambient	61.6	61.8	61.8
Top Of Enclosure	60.8	61.2	61.2
Front Of Enclosure	61.0	61.4	61.4
Ambient	60.6	60.7	60.8

Temperature Code: CSA Standard 213 Clause 6.2 / ANSI/ISA 12.12.01 Section 10

Maximum Surface Temperature Reading (MSTR): 88.4°C
Ambient Chamber Temperature (ART): 60.8°C
Maximum Product Ambient Temperature (MTamb): 60°C
Uncertainty Factor (UF): 5°C
Calculated Maximum Surface Temperature (CMST): 92.6°C

MSTR – ART + UF + MTamb = CMST

88.4°C –60.8°C + 5°C + 60°C = 92.6°C

Result: Based on the above, the proposed Temperature Code of **T4** (135°C) is acceptable.

Non-Incendive Circuit Measurements: CSA Standard 213 Clause 6.4.3 / ANSI/ISA 12.12.01 Section 7

Connector Designation	**Measured Open Circuit Voltage (dc)**	**Measured Circuit Current (mA)**
Switch SW1	5.0 V dc Max	5.0mA Max

The above values comply with Clause 6.4 of CSA Standard 213 & Section 7 of ANSI/ISA 12.12.01.

*Note: “USB” connector is only to be used when area is known to be non-hazardous.

Connector Steady Force: CSA Standard 213 Clause 4.2.2 / ANSI/ISA 12.12.01 Section 8.2

A minimum of 15 N of force was applied to the following connectors in incendive circuits.

List Connectors / Wiring Terminations Tested	**Pass / Fail**
Fuseholder UK-SI - Fuse	Pass
Fuseholder UK-SI - Terminals	Pass
Fuseholder UKK-DREHSI - Fuse	Pass
Fuseholder UKK-DREHSI - Terminals	Pass
Terminal block ST-4-PE	Pass
Terminal block UKK 5-PV	Pass
Terminal block STTB-4-PE	Pass
All other connectors, wire terminals, fuseholders and jumpers passed.	

Type 4 Hosedown: CSA C22.2 No 94-M91, Clause 6.8.2; ANSI/UL 50, 11TH Ed, Section 35.2

Tests performed on a representative sample of the Model ZC-A100 with RF bulkhead surge arrestor installed.

The enclosure and its external mechanisms were sprayed for five minutes by water from a hose having a 25 mm inside diameter nozzle that delivered at least 240L of water per minute. The water stream was directed at the joints of the enclosure from a distance of 3.0 to 3.5 m and was moved along the joints or surface at a minimum rate of 6 mm/s.

At the conclusion of the test no water had entered the enclosure.

Several components were tested in the Type 4 hosedown, and are documented in Zedi drawings MD16435. The different optional installation locations for the devices are shown in these drawings

No further evaluation or testing was determined to be necessary

End of Report