



# Certificate of Compliance

**Certificate:** 1859870

**Master Contract:** 179806

**Project:** 2495424

**Date Issued:** March 5, 2012

**Issued to:** Bristol, Inc. dba Remote Automation

**Solutions**  
**1100 Buckingham St**  
**Watertown, CT 06795**  
**USA**  
**Attention: Jeff McGaughey**

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.*



*Glenn Black*

**Issued by:** Glenn Black

## **PRODUCTS**

**CLASS 2258 82** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards

**CLASS 2258 02** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

Ex d IIB; IP66:

AEx d IIB; IP66:

DL8000 Series Controller, Model W40161; input rated 100 to 240Vac, 50/60 Hz, 0.75 A max.; and Model W40209; input rated 20 to 30 Vdc, 2.0 A max. 30W max.; Temp Code T6, temperature range -40C to +65C.

Class I, Div. 2, Groups A, B, C, D; Type 4:

DL8000 Series Controller, Model W40201; input rated 115 to 240Vac, 50/60 Hz, 230 VA.; Temp Code T4, temperature range -25C to +70C.



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### **APPLICABLE REQUIREMENTS**

CAN/CSA-C22.2 No. 0-M91 - General Requirements – Canadian Electrical Code, Part II

CSA Std C22.2 No 142-M1987 - Process Control Equipment

CAN/CSA-C22.2 No. 94-M91 - Special Purpose Enclosures

CSA Std. C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

CAN/CSA-C22.2 No. 60079-0-07 - Electrical apparatus for explosive gas atmospheres - Part 0: General Requirements

CAN/CSA-C22.2 No. 60079-1-07 - Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof Enclosures “d”

CAN/CSA-60529:05 - Degrees of protection provided by enclosures (IP Code)

UL 50 (11th Ed.) - Enclosures for Electrical Equipment

UL916, 3rd Ed. - Energy Management Equipment

UL Std. No. 1604 (3rd Ed.) - Electrical Equipment for Use in Class I and II, Division 2; Class III Hazardous (Classified) Locations

ANSI/UL 60079-0-2005 - Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements

ANSI/UL 60079-1-2005 - Electrical Apparatus for Explosive Gas Atmospheres - Part 1: Flameproof enclosures “d”

ANSI/IEC 60529:2004 - Degrees of protection provided by enclosures (IP Code)



# Descriptive Report and Test Results

**MASTER CONTRACT:** 179806

**REPORT:** 1859870

**PROJECT:** 2495424

**Edition 1:** May 16, 2007; Project 1859870 – Toronto  
Issued by R. Wildish

**Edition 2:** October 28, 2008; Project 2102242 – Toronto  
Issued by G. Black

**Edition 3:** May 6, 2010 Project 2229922 – Toronto  
Issued by G. Black

**Edition 4:** January 04, 2011; Project 2384679 – Toronto  
Issued by E. Migliozi

Report pages reissued  
Descriptive documents revised

**Edition 5:** March 5, 2012; Project 2495424 – Toronto  
Issued by G. Black

Report pages reissued

Contents: Certificate of Compliance - Pages 1 to 2  
Supplement to Certificate of Compliance - Page 1  
Description and Tests - Pages 1 to 177  
Descriptive Documents Package – Engineering File Only

## **PRODUCTS**

**CLASS 2258 02** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

**CLASS 2258 82** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - CERTIFIED TO U.S.  
STANDARDS

Ex d IIB; IP66:

AEx d IIB; IP66:

DL8000 Series Controller, Model W40161; input rated 100 to 240Vac, 50/60 Hz, 0.75 A max. and Model W40209; input rated 20 to 30 Vdc, 2.0 A max. 30W max.; Temp Code T6, temperature range -40C to +65C.

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**MASTER CONTRACT:** 179806

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**Page No:** 2

**Date Issued:** March 5, 2012

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Class I, Div. 2, Groups A, B, C, D; Type 4:

DL8000 Series Controller, Model W40201; input rated 115 to 240Vac, 50/60 Hz, 230 VA.; Temp Code T4, temperature range -25C to +70C.

### **APPLICABLE REQUIREMENTS**

- CAN/CSA-C22.2 No. 0-M91 - General Requirements – Canadian Electrical Code, Part II
- CAN/CSA-C22.2 No. 94-M91 - Special Purpose Enclosures
- CSA Std C22.2 No 142-M1987 - Process Control Equipment
- CSA Std. C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
- CAN/CSA-C22.2 No. 60079-0-07 - Electrical apparatus for explosive gas atmospheres - Part 0: General Requirements
- CAN/CSA-C22.2 No. 60079-1-07 - Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof Enclosures “d”
- CAN/CSA-60529:05 - Degrees of protection provided by enclosures (IP Code)
  
- UL 50 (11<sup>th</sup> Ed.) - Enclosures for Electrical Equipment
- UL916, 3<sup>rd</sup> Ed. - Energy Management Equipment
- UL Std. No. 1604 (3rd Ed.) - Electrical Equipment for Use in Class I and II, Division 2; Class III Hazardous (Classified) Locations
- ANSI/UL 60079-0-2005 - Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
- ANSI/UL 60079-1-2005 - Electrical Apparatus for Explosive Gas Atmospheres - Part 1: Flameproof Enclosures “d”
- ANSI/IEC 60529:2004 - Degrees of protection provided by enclosures (IP Code)

### **MARKINGS**

Refer to Descriptive Documents Package (Dwg W40161 for Ex d and W40201 for Div. 2) for marking details. The following marking details are either etched or silkcreened onto a minimum 0.02 inch thick metal nameplate, which is secured to the outside of the enclosure with drive screws, pins or rivets (in bottomed holes):

#### W40161

- CSA Mark, with C/US designator
- CSA Certificate number
- manufacturers ID
- model designation
- serial number or date code
- electrical rating
- ambient temperature range
- ingress protection rating
- hazardous locations designations: Ex d IIB T6; AEx d IIB T6; (In addition to these required markings, the following optional markings may also appear: Class I, Zone 1, Group IIB, T6)
- temperature code rating
- the warning re keep cover tight while circuits are live
- the warning re seals must be installed within 50mm
- the warning: Do not open when explosive mixture is present. (appears on separate metal plate, secured to the enclosure cover with drive screws, pins or rivets (in bottomed holes).
- identification of conduit entry threads (i.e. 1-11 ½ NPSM and 2-11 ½ NPSM) (engraved into the enclosure cover adjacent to conduit entry openings).

#### W40201

- CSA Mark, with C/US designator

- manufacturers ID
- model designation
- serial number or date code
- electrical rating
- ambient temperature range
- CSA Type 4 enclosure rating
- hazardous locations designations
- temperature code rating
- the warning, WARNING: EXPLOSION HAZARD - DO NOT CONNECT/DISCONNECT MODULES OR WIRING OR REPLACE FUSES WHILE CIRCUITS ARE LIVE UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS
- the warning, WARNING: BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS
- the warning, WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2
- the warning (placed adjacent to connector on bottom of enclosure), WARNING: EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS

### **ALTERATIONS**

1. Markings as above.
2. External ground screw with wire-retaining clamp plate is provided (W40161).
3. For the W40201 enclosure, all through-hole screws and rivets are sealed by o-rings.

### **FACTORY TESTS**

1. The equipment at the conclusion of manufacture and before shipment, shall withstand for one min, without breakdown, the application of the following ac potentials:
  - (a) 1000V for equipment rated 250V or less, and 1000V plus twice rated voltage for equipment rated at more than 250V between low voltage live parts and the enclosure if such circuits leave or enter the enclosure;
  - (b) 1000V for equipment rated 250V or less, and 1000V plus twice rated voltage for equipment rated at more than 250V between live parts of low and extra-low voltage circuits and different low voltage circuits if such circuits leave or enter the enclosure;
  - (c) 500V between extra low potential live parts and exposed non-current-carrying metal parts or ground terminal, if such circuits leave or enter the enclosure.
2. A transformer, if provided, shall withstand for one min without breakdown, the application of an ac potential of 1000V plus twice the max voltage of the winding applied between each winding and all other windings, the core, and the enclosure; except that if the max voltage of a winding does not exceed 30V, the test voltage may be reduced to 500V ac for that winding. Ungrounded metallic shields are to be treated as windings when performing these dielectric strength tests.

### **Notes:**

1. As an alternative, potentials 20 percent higher may be applied for one second.

2. Where it is more convenient to do so, the dielectric strength tests may be made by applying a direct current voltage instead of an ac voltage, provided that the voltage used is 1.414 times the values specified above.
3. Capacitors in the secondary circuit may be disconnected during the dielectric strength tests specified in Items 1(a) to (c).
4. The test specified in Item 1(c) shall be waived on grounded or Class 2 circuits.
5. Transformer manufacturer's agreement to perform Test No 2 will be acceptable. Also, this test shall be waived on Certified transformers.

**Warning:** The factory test(s) specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

### **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.
  - b) Component descriptions marked with the identifier “(INT)” are the only components that are eligible for substitution at the factory.
  - c) Substitution of a CSA Certified component with a component “Certified” or “Listed” by another organization may result in annual sample pickup and Conformity Testing.
  - d) Substitution of a “Certified” or “Listed” component with a component that is “Recognized” or “Accepted” is not permitted 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.

### **COMPONENT SPECIAL PICKUP**

1. Component descriptions marked with the identifier “(CT)” are subject to annual pickup and Conformity Testing.

**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.

<u>Subject</u>	<u>Drawing</u>	<u>Rev</u>	<u>Date</u>
<u>W40161</u>			
Certification drawing	W40161	E	11-30-10
Enclosure Case casting details	W40128	C	02-07-06
Enclosure Case machining details	W40129	H	06-30-09
Enclosure Cover casting details	W40130	B	10-05-05
Enclosure Cover machining details	W40131	D	05-04-07
Enclosure window details	BE-12652-1	D	11-22-04
SIRA Evaluation and Test Report	R51A8735A		Nov., 2002
UL Test Report	E222918		01.05.06
<u>W40201</u>			
Certification Drawing	W40201	B	11-30-10
<u>Common Drawings</u>			
ACIO module assembly	W48086	D	07-17-07
ACIO schematic, main board	W38286	C1	10-08-08
ACIO schematic, daughter board	W38294	C1	10-06-08
Display board assembly	W48081	B	12-20-11
Display board schematic	W38305	D	12-2-11
APM module schematic, main board	7FSC1054	D2	04-19-07
APM module schematic, daughter board	7FSC1055	C1	07-28-08
<u>W40209</u>			
Certification Drawing	W40209	A	12-14-10



**SPECIAL INSTRUCTIONS FOR FIELD SERVICES**

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  - d) Substitution of a “Certified” or “Listed” component with a component that is “Recognized” or “Accepted” is not permitted without evaluation and report updating.
  
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**COMPONENT SPECIAL PICKUP**

1. Component descriptions marked with the identifier “(CT)” are subject to annual pickup and Conformity Testing.

**DESCRIPTION**

Notes:

1. The term “(INT)”, following the component name, denotes a certified component that can be replaced by another CSA Certified component or one from another certified source (approved by OSHA/SCC accredited body for the same application) provided that it has an equivalent rating, configuration (size, orientation, mounting) and that applicable minimum creepage and clearance distances are maintained from live parts to bonded metal parts and secondary parts..
2. The term “(CT)”, following the component name, denotes a component that is subject to periodic re-testing unless evidence of re-testing equivalent to the CSA program is available.

General Assembly: The Danload DL8000 Series controllers consist of a Fisher ROC800 electronics assembly mounted inside a flameproof enclosure (W40161) or general purpose CSA Type 4 enclosure for Division 2 installations (W40201). Refer to Certification Drawing in Descriptive Documents Package for assembly details.

1. ROC800 Electronics: The ROC electronics assembly has been Certified in CSA report 1258773. In addition to the modules previously certified, the DL8000 adds a display board, ACIO module, APM module and an AC/DC convertor. The AC/DC convertor used in the W40161 is manufactured by Sola/HEVI-duty, p/n SCP30S12; rated 85 - 264 Vac, 50/60 Hz, cUL Listed to CSA Std C22.2 No. 234. The AC/DC converter used in the W40201 is manufactured by Traco, type TSP-070-EX; rated 100-120/220-240Vac, 50/60 Hz, 2/1 A; Certified (C/US) for use in Class I, Div. 2, Group A,B,C,D in CSA Certificate 1562919. Refer to Descriptive Documents Package for module and board assembly details.
2. W40161 Enclosure: Two-piece cast aluminum housing consisting of the case and cover. Cover is secured in place with 16 bolts and is equipped with two 1-11 ½ NPSM and one 2-11 ½ NPSM conduit entries in bottom wall. Cover has an opening for the display window. Additional construction details are provided below. Refer also to Descriptive Documents package for details.
- 2.1 Body: Refer to Dwgs. Dwg. W40128 (Casting) and Dwg. W40129 (Machining)

Material: Painted die cast aluminum alloy, Type 356 T6, 0.45% Mg. (i.e. Maximum magnesium content less than 7.5 %). (Note: Tensile strength and Yield strength of this alloy are stable at the upper and lower ambient levels of the Danload 8000).

Dimensions: Approx 350 mm (13.76 inches) by 328 mm (12.9 inches) by 318 mm (12.53 inches) tall. Thickness at the flange is 19 mm (0.75 inches).

Volume: Approx 15,160 cc (925 cu. in.) (internal free volume).

- 2.2 Conduit/Cable Entries:

Number of Entries: 3.

Trade Size: Two 1” – 11- ½ NPSM and one 2” – 11- ½ NPSM.

Thread Pitch: 2.2 mm (11 - ½ threads per inch).

Depth to Integral Throat: 23.9 mm/0.94 inches.

Throat Diameter: 19 mm/0.75 inches min.

Location: Side wall.

Identification: Thread form of entries is identified adjacent to the entries.

Unused openings: Unused openings are closed using blanking plugs, which are removable from the outside only through the use of a tool.

- 2.3 Joint between Blanking Plugs and Body:

Type: Threaded.

Number of Full-Thread Engagement: 8

Class of Fit: medium

Thread Pitch: 2.2 mm ((11- ½ threads per inch)

Axial Thread Engagement: 17.78 mm (0.7 inches) minimum

2.4. Grounding Provision - Internal:

Type: Plated screw with SST wire retaining clamp-plate.

Mounting: Screw is threaded into a ground-lug assembly, which is press-fitted into a blind hole on integral boss inside enclosure. Minimum 3.0 mm (0.12 inches) wall thickness at bottom of hole.

Identification: IEC Ground Symbol.

2.5 Grounding Provision - External:

Type: Plated screw with SST wire retaining clamp-plate; allowing for effective connection of conductor with cross-sectional area of 4 mm<sup>2</sup> minimum.

Mounting: Screw is threaded into a ground-lug assembly, which is press-fitted into a blind hole on outside wall of enclosure. Minimum 3.0 mm (0.12 inches) wall thickness at bottom of hole.

Identification: IEC Ground Symbol

Details: External ground connection facility is electrically in contact with Internal ground connection facility.

2.6 Cover: (One provided) Consists of the following components:

2.6.1 Frame: Refer to Dwg. W40130 (Casting) and Dwg. W40131 (Machining)

Material: Painted die cast aluminum alloy, Type 356 T6, 0.45% Mg. (i.e. Maximum magnesium content less than 7.5 %). (Note: Tensile strength and Yield strength of this alloy are stable at the upper and lower ambient levels of the Danload DL 8000).

Dimensions: Approx 355 mm (13.96 inches) by 330 mm (13.0 inches) by 88.6 mm (3.49 inches) tall. Thickness at the flange around the cover screw holes is 44.5 mm (1.75 inches). Minimum thickness at 19 keypad bosses on top of cover beside window is 3.16 mm (0.125 inch).

Mounting: Provided with sixteen maximum 11 mm diameter through-holes for cover securing bolts. The bolt holes are counterbored 17.5 mm (0.69 inches) diameter by 10.67 mm (0.42 inches) deep for the cover screw heads.

Details: A 3.7 mm (0.146 inch) wide, x 2.2 mm (0.088 inch) deep groove is cut into the Cover flange joint surface to allow for mounting of a 2.6 mm (0.103 inch) diameter BUNA N O-ring gasket at Cover/Base joint. A 2.5 mm (0.99 inch) wide, x 1.4 mm (0.055 inch) deep groove is cut into the Cover flange joint surface to allow for mounting of a 1.8 mm (0.07 inch) diameter BUNA N O-ring gasket at Cover/Window joint.

2.6.2 Window: Refer to Dwg. BE-12652-1

Material: Fully Tempered Soda-Lime glass, 19 mm/0.75 inches thick.

Dimensions: Approx 215.3 (8.475 inches) by 83.8 mm (3.3 inches).

Mounting: Secured in place with two aluminum clamping pieces.

2.6.3 Glass to Cover Frame Joint:

Type: Metal to Glass Flat (Flanged) type

Path Width/Length: 12.7 mm minimum

Gap: 0.0762 mm max.

Average Surface Roughness: 63 um

2.6.4 Cover Securing Bolts: Refer to Dwg. W40161 for details. Fourteen M10-1.5x50mm long hex socket-head cap screws and two M10-1.5x60mm long hex socket-head cap screws w/security hole (18-8 SST), all with tolerance of 6g/6H, are used. Bolts are constructed of SST and have a lower yield stress rating of 240 N/mm<sup>2</sup>.

2.7 Joint between Cover and Body:

Type: Metal-to-metal flat type.

Path Width/Length: 12.7 mm minimum width from inside edge to nearest bolt hole or o-ring groove.

Gap: 0.0762 mm max.

Average Surface Roughness: 63 um

Joint Surface Coating: Chromate conversion coating.

2.8 Special Fasteners: Cover Bolts are hex socket-head cap type, considered as Special Fasteners in accordance with E60079-0. When fully threaded into place, bolt heads are completely recessed within counterbore of cover bolt holes. Threaded portion of bolts engage a minimum of 5 mm of axial length of threads in the enclosure base.

3. W40201 Enclosure: Housing body is a formed and welded 304 stainless steel box. Door is a formed 0.090 in thick aluminum. Both parts are coated with epoxy polyester or polyurethane. Door is hinged to body with a piano hinge, secured with two lockable draw latches, and sealed with gasket made from Cohrlastic R1048M material. Door has a cut-out for a 0.178 in. thick lexan window, adhered to the outside with Dow Corning 832 RTV sealant. A plastic bezel with magnetic keypad buttons is then attached using 6 screws. The ROC800 and power module assembly are mounted to a base plate secured to the back of the housing body. An LOI connector with tethered screw-on cap is attached through a hole in the bottom wall with a hex nut and sealing provided by a synthetic rubber gasket. All screws that go through the walls of the housing body for securing the piano hinge use a sealing washer with neoprene seal. Rivets that go through housing wall are also sealed with the sealing washer or a sealed rivet. Three holes are located in the bottom wall for provision of conduit hubs. Refer to descriptive Documents package for additional details.

**Project 2102242**: This project covers additional modules included in the ROC800 electronics assembly. These modules were evaluated in CSA Report 1258773. As a result, the Certification drawing W40161 was revised.

**Project 2229922**: This project covers the addition of the Model W40201. The Description above has been revised to include construction details pertinent to this model.

**Project 2384679**: This project covers the addition of the Model W40209 and drawings revision. This alternate construction is similar to Model W40161 except that the keypad and display are removed and it's powered by 24 Vdc. For details see Drawing W40209.

The changes do not affect the explosion-proof characteristics of the products certified.

**Project 2495424**: This project covers the revised construction of the DL8000 Controller display. These changes do not affect safety or ratings of the product.

**TEST RESULTS**

Rating CSA C22.2 No 142-M1987, Cl 6.3  
UL916, 3<sup>rd</sup> Ed., Sec. 39

Volts	Hz	Amps	Watts	Conditions
120	60	0.21	14.3	A. Outputs fully loaded using loads provided by manufacturer
120	50	0.24	14.7	B. As in A.
240	60	0.14	14.9	C. As in A.
240	50	0.15	15.3	D. As in A.

Temperature: CSA Std. C22.2 No 142-M1987, Cl 6.4  
UL Std. 916, 3<sup>rd</sup> ed., Sec. 40

The Danload 8000 unit was operated as per rating condition D, with the supply increased to 250Vac, to obtain the following:

Thermocouple Locations	Method	Maximum Deg. C
Line Voltage Terminal Block	Thermocouple	42
Enclosure Cover Window	“	30
Enclosure Surface	“	30
Room Ambient	Thermometer	24

Leakage Current: CSA Std. C22.2 No 142-M1987, Cl 6.5.3  
UL Std. 916, 3<sup>rd</sup> Ed., Sec. 42

- (a) The leakage current that flowed in the grounding conductor was: 0.001 mA
- (b) The maximum leakage current that flowed between the grounding conductor and any ungrounded signal or control circuit that enters or leaves the enclosure was: 0.001 mA

Note: Leakage test conducted at 240Vac, 60 Hz.

Leakage Current Test Following Humidity Conditioning: UL Std. 916, 3<sup>rd</sup> Ed., Sec. 43

Test waived, as the equipment is not cord or plug connected.

Abnormal Operation Test: UL Std. 916, 3<sup>rd</sup> Ed., Sec. 45.1

Test waived, since (1) equipment is not three-phase; (2) there are no blowers or fans and; (3) there are no ventilation openings.

Component Breakdown Test: UL Std. 916, 3<sup>rd</sup> Ed., Sec. 46

Test waived, since all components are contained in a complete enclosure without ventilation openings.

Dielectric Strength: CSA Std. C22.2 No 142-M1987, Cl 6.8.1  
UL Std. 916, 3<sup>rd</sup> Ed., Sec. 49

- (a) 1500 Vac applied between input (supply) and output (relay) circuits tied together and ground:  
Results: No breakdown - Satisfactory
- (b) 1500 Vac applied between input (supply) and output (relay) circuits tied together and the secondary output circuits:  
Results: No breakdown - Satisfactory
- (c) 1500 Vac applied between input (supply) circuits and relay circuits.  
Results: No breakdown – Satisfactory

Impact test: CAN/CSA-E60079-0:07, Cl. 26.4.2  
ANSI/UL 60079-0:2005, Cl. 26.4.2

2 samples of the enclosure were subjected to the following impact, with 2 impacts per enclosure:

Impact Energy: 7 Joules  
Impact Weight: 1.0 kg.  
Free Falling Height: 70 cm.  
Impact Head: 25 mm diameter hardened steel sphere.

Results: Satisfactory, there was no degradation of the enclosure.

3 samples of the glass window were subjected to the following impact:

Impact Energy: 4 Joules (2.7 ft-lbs)  
Impact Weight: 1.0 kg (2.2 lbs)  
Free Falling Height: 40 cm (15.7 inches)  
Impact Head: 25 mm (1 inch) diameter hardened steel sphere.

Results: No shattering or crack observed.

Note: the above Impact Tests were conducted by SIRA under SIRA Assessment Report R51A8735A, dated Nov. 2002, on the Model Danload 6000 (which uses the same window as the DL8000) and are considered acceptable for this CSA Certification.

Impact Test: CAN/CSA E60079-0:07, Cl. 26.4.2  
ANSI/UL 60079-0:2005, Cl. 26.4.2

1 sample of the DanLoad8000 enclosure cover glass window was subjected to the following impact (as a conditioning test prior to Explosion Testing, per Cl. 15 of CAN/CSA E60079-1:07):

Impact Energy: 4 Joules (2.7 ft-lbs)  
Impact Weight: 1.0 kg (2.2 lbs)  
Free Falling Height: 40 cm (15.7 inches)  
Impact Head: 25 mm (1 inch) diameter hardened steel sphere.

Results: No damage to the glass window.  
Ambient Temperature: 24 Deg. C

Thermal Shock Test: CAN/CSA E60079-0:07, Cl. 26.5.2  
ANSI/UL 60079-0:2005, Cl. 26.5.2

Device: Cover Window on Model DL8000 Enclosure.

A 1 mm diameter jet of water, at a temperature of  $(10 \pm 5)$  Deg. C was sprayed on the enclosure cover window, which was at its highest operating surface temperature for its rated ambient (i.e. window was at a temperature of 75 Deg. C minimum):

Results: Window did not break.

Determination of explosion pressure (reference pressure): CAN/CSA-E60079-1:07, Cl. 15.1.2  
ANSI/UL 60079-1:05, Cl 15.1.2

Test Number	Ethylene Test Gas % Mixed With Air (i.e. $8 \pm 0.5$ %)	Internal Electronics Arrangement	Explosion Pressure (psi)	Rise Time (ms)
1	7.9	with DanLoad 8000 pcbs	97.2	24.0
2	7.9	with DanLoad 8000 pcbs	93.6	24.6
3	7.9	with DanLoad 8000 pcbs	93.2	24.2
4	8.0	w/o pcbs – empty housing	142.3	3.2
5	8.0	w/o pcbs – empty housing	138.3	3.6
6	8.1	w/o pcbs – empty housing	134.4	3.9
7	7.9	w/o pcbs – empty housing	134.4	3.5
8	7.9	w/o pcbs – empty housing	131.8	3.9

- Notes:
- (1) No lengths of conduit to be attached.
  - (2) All O-rings and seals (gaskets) shall remain in place.
  - (3) 5 kHz filter to be used.
  - (4) Unit is for use in an ambient temperature of - 40 Deg. C. Therefore, the Pressure Determination Tests conducted with the test mixture pre-pressurized to 1.25 Bar.

Conduit Size: Two 1 inch NPSM and One 2 inch NPSM, with NPT adaptors.

Overpressure test: CAN/CSA-E60079-1:07, Cl. 15.1.3  
ANSI/UL 60079-1:05, Cl 15.1.3

Test Pressure: (4 times max pressure obtained in explosion pressure test)

$$4 \times 142.3 \text{ psig} = 570 \text{ psig}$$

Duration: (Length of time held at test pressure) 1 min

Results: Satisfactory; no apparent damage to enclosure, some bolts seemed slightly bent.

(Note: the tensile and yield strength of the aluminium alloy (Type 356 T6) is known to be stable at the extreme ends of the ambient temperature range for the Danload DL 8000 Controller. Therefore it was considered acceptable to conduct the Hydrostatic Overpressure testing at room ambient temperature).

Test for non-transmission of an internal ignition:

CAN/CSA-E60079-1:07, Cl. 15.2.1.1

ANSI/UL 60079-1:05, Cl. 15.2.1.1

Test Number	Hydrogen Test Gas (%) Mixed with Air (i.e. 37 ± 0.5 %)	External Ignition	Remarks
1	36.9	no	internal equipment in place
2	37.0	no	as in 1
3	36.9	no	as in 1
4	36.9	no	as in 1
5	37.2	no	as in 1

- Notes:
- (1) All O-rings and seals (gaskets) shall be removed.
  - (2) NPSM/NPT Conduit Adaptors joint engagement reduced by at least 1/3 per table 6 of CAN/CSA-E60079-1 (ie. engaging max. 5.3 full threads). Note: reduction is due to presumed non ISO 965 thread fit.
  - (3) Window and cover joints shimmed to 0.003 inches (ie. actual design gap).
  - (4) Unit is for use in an ambient temperature of + 65 Deg. C. Therefore, flameproof test conducted with the test mixture pre-pressurized to 1.04 times atmospheric pressure.





IP Tests for Protection Against Water indicated by **second** characteristic numeral **6**:

CAN/CSA-C22.2 No. 60529-05, Cl. 14.2.6

ANSI/IEC 60529:2004, Cl. 14.2.6

The enclosure was sprayed with water jet with the following parameters:

Nozzle dia (mm)	Flow rate (L/min)	Distance (m)	Time (mins)	Water Temperature
12.5	100	2.5 to 3	1 to 3	± 5 Deg. of sample temperature.

Result: Water did not enter the enclosure

Note: the above IP x6 Test was conducted by UL under UL Test Report E222918, dated 01.05.06, on the Model Danload 6000 (which uses the same enclosure as the DL8000) and is considered acceptable for this CSA Certification.

**Project 2102242:** No further testing was considered necessary for the additional ROC800 modules as these were evaluated and tested in CSA Report 1258773. All previous tests are still considered representative.

**Project 2229922:** The following evaluation and tests were conducted in consideration of the Model W40201 added in this project. Otherwise, previous tests conducted on the ROC800 electronics in 1258773 are still considered representative.

Impact Test: CSA Std C22.2 No. 142-M1987, Cl 6.10.2

The lexan window was subjected to an impact of 7J applied by a steel sphere of 50mm. Tests were conducted at room ambient.

Results: Satisfactory, there was no visible damage to the window.

Hosedown Test: CAN/CSA-C22.2 No. 94-M91, Cl 6.8.2  
UL Std. 50, Sec. 35.2.1

A sample enclosure was subjected to a stream of water from a hose with a 1 inch (25.4 mm) nozzle that delivers at least 65 gallons (246 liters) per minute. The water was directed at the sample from all sides at a distance of 10 to 12 feet (3 to 3.7 m) for 5 minutes. At the conclusion of the test, the enclosure was opened and inspected.

Results: Satisfactory, no water entered the enclosure.

Gasket Test: CSA Std. C22.2 No 94, Cl. 6.2.5  
UL Std. 50, Sec. 43.1

Testing on the gasket sample was waived due to the testing being conducted on the same gasket material in report LR 83777-34.

Dielectric Strength: CSA Std. C22.2 No 142-M1987, Cl 6.8.1  
UL Std. 916, Sec. 49

- (a) 1500 Vac applied between input (supply) and the enclosure  
Results: No breakdown\*
- (b) 1500 Vac applied between input (supply) and the extra-low voltage secondary circuits  
Results: No breakdown\*

\* no breakdown occurred during test however it was noted that there was leakage current flowing due to the capacitive coupling in the Traco power supply.

Leakage Current: CSA Std. C22.2 No 142-M1987, Cl 6.5.3  
UL Std. 916, Sec. 42

Test was waived as the manufacturer of the power supply confirmed that internal input and output circuits are ground referenced.

Temperature: CSA Std C22.2 No. 213-M1987, Cl 6.2  
UL Std 1604 (3<sup>rd</sup> Ed.), Para. 5.2

Temperature code rating for the W40201 is marked as T4 for ambient temperatures up to +70C based on the temp code rating for the Traco power supply Certified in CSA Report 1562919.

Connector Pull Test: CSA Std C22.2 No. 213-M1987, Cl 6.2  
UL Std 1604 (3<sup>rd</sup> Ed.), Para. 5.2

The connector P2 on the Display board was subjected to a pulling force of 15 N.

Results: Satisfactory

**Project No. 2384679:** The tests performed previously on Model W40161 were considered representative and no tests were deemed necessary.

**Project 2495424:** This project covers the revised construction of the DL8000 Controller display. These changes do not affect safety or ratings of the product. No testing was deemed necessary.

END OF REPORT