Descriptive Report

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations
CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS

PART A:

Class I, Div. 2, Groups A, B, C and D T3A
Ambient Temperature range: -40°C to +80°C.

• Wireless Network Controller Model Nos. DX91*9**6W*** (900MHz Radio, Internal Antenna), DX91*9**6S*** (900MHz Radio, External Antenna), DX91*2**6W*** (2.4GHz Radio, Internal Antenna), DX91*2**6S*** (2.4GHz Radio, External Antenna), DX90*9**6W*** (900MHz Radio, Internal Antenna), DX90*9**6S*** (900MHz Radio, External Antenna), DX90*2**6W*** (2.4GHz Radio, Internal Antenna), DX90*2**6S*** (2.4GHz Radio, External Antenna) and DX95**** (No Radio, No Antenna). Supply rated 30Vdc, 1.1Amax.-Install per Control Document 134217.

Notes:

1. "*" in the model number may be a letter representing the specific Trim Level. "**" in the model number may be letters or numbers representing the Network Responsibility. "***" in the model number may be letters or numbers representing the I/O Configuration.

2. The Wireless Network Controllers must be installed in a suitable enclosure with provision for connection of Division 2 wiring methods in accordance with local codes as acceptable to the local inspection authority having jurisdiction.

PART B:

Ex/AEx nA IIC T4
Class I, Div. 2, Groups A, B, C and D T4
Ambient Temperature range: -40°C to +80°C.

• Wireless Network Controller Model Nos. DX80*9*6S-*** (1 Watt 900MHz Radio, 10-30V Power, External Antenna), DX80*2*6S-*** (2.4GHz Radio, 10-30V Power, External Antenna), DX80*9*6S-P***C (1 Watt 900MHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80*2*6S-P***C (2.4GHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80*R9M-H** (Data Radio, 1Watt 900MHz Radio, 10-30V Power, External Antenna), DX80*R2M-H** (Data Radio, 2.4GHz Radio, 10-30V Power, External Antenna), DX80*R9M-H*C (Data Radio, 1Watt 900MHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80*R2M-H*C (Data Radio, 2.4GHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80G2M6-QC (Gateway, 10-30V Power, External Antenna, Plug Connect), DX80*9*6S*******C (900MHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80*9*6W*******C (900MHz Radio, 10-30V Power, Internal Antenna, Plug Connect), DX80*2*6S*******C (2.4GHz Radio, 10-30V Power, External Antenna, Plug Connect), DX80*2*6W*******C (2.4GHz Radio, 10-30V Power, Internal Antenna, Plug Connect), DX70*9*6S*******C (900MHz Radio, 10-30V Power, External Antenna, Plug Connect), DX70*9*6W*******C (900MHz Radio, 10-30V Power, Internal Antenna, Plug Connect), DX70*2*6S*******C (2.4GHz Radio, 10-30V Power, External Antenna, Plug Connect), DX70*2*6W*******C (2.4GHz Radio, 10-30V Power, Internal Antenna, Plug Connect) and

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DX85********C (No Radio, No Antenna, Plug Connect). Supply rated 30Vdc, 1.1Amax. Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. "*" in the model number may be a letter, number or blank representing specific options.

2. The Wireless Network Controllers must be installed in a suitable enclosure per Control Document 143086 with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes as acceptable to the local inspection authority having jurisdiction.

• Wireless Network Controller Model Nos. DX80G9M2S (Gateway, 1Watt 900MHz Radio, Flex Power, External Antenna), DX80G2M2S (Gateway, 2.4GHz Radio, Flex Power, External Antenna), DX80DR9M (Data Radio, 1Watt 900MHz Radio, Flex Power, External Antenna), DX80DR2M (Data Radio, 2.4GHz Radio, Flex Power, External Antenna), DX80*9*2S-P*** (1Watt 900MHz Radio, Flex Power, External Antenna), DX80*2*2S-P*** (2.4GHz Radio, Flex Power, External Antenna), DX80*9*2S-P***C (1Watt 900MHz Radio, Flex Power, External Antenna, Plug Connect), DX80*2*2S-P***C (2.4GHz Radio, Flex Power, External Antenna, Plug Connect), DX80*R9M-H** (Data Radio, 1Watt 900MHz Radio, Flex Power, External Antenna), DX80*R2M-H** (Data Radio, 2.4GHz Radio, Flex Power, External Antenna), DX80*R9M-H**C (Data Radio, 1Watt 900MHz Radio, Flex Power, External Antenna, Plug Connect), DX80*R2M-H**C (Data Radio, 2.4GHz Radio, Flex Power, External Antenna, Plug Connect), DX80N9*2S*******C (Node, 900MHz Radio, Flex Power, External Antenna, Plug Connect), DX80N9*2W*******C (Node, 900MHz Radio, Flex Power, Internal Antenna, Plug Connect), DX80N2*2S*******C (Node, 2.4GHz Radio, Flex Power, External Antenna, Plug Connect) and DX80N2*2W*******C (Node, 2.4GHz Radio, Flex Power, Internal Antenna, Plug Connect). Supply rated 30Vdc, 1.1Amax or powered by DX81 FlexPower Battery Supply (which uses one user-replaceable XENO XL-205F lithium cell). Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. "*" in the model number may be a letter, number or blank representing specific options.

2. The Wireless Network Controllers and FlexPower Battery Supply must be installed in a suitable enclosure per Control Document 143086 with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes as acceptable to the local inspection authority having jurisdiction.

• Wireless Network Controller Model Nos. DX80N9X1S-P**E (Node, 1Watt 900MHz Radio, Flex Power or Internal Battery Power, External Antenna), DX80N2X1S-P**E (Node, 2.4GHz Radio, Flex Power or Internal Battery Power, External Antenna), DX80DR9M-H**E (Data Radio, 1Watt 900MHz Radio, Flex Power or Internal Battery Power, External Antenna), and DX80DR2M-H**E (Data Radio, 2.4GHz Radio, Flex Power or Internal Battery Power, External Antenna). Supply rated 30Vdc, 1.1Amax, or supply rated 5Vdc, or powered by one user-replaceable XENO XL-205F lithium cell. Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. "*" in the model number may be a letter, number or blank representing specific options.

2. The Wireless Network Controllers must be installed in a suitable enclosure per Control Document 143086 with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes as acceptable to the local inspection authority having

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jurisdiction.

• Wireless Network Controller Model Nos. DX80N9X1S-P6 (Node, 1Watt 900MHz Radio, Internal Battery Power, External Antenna), DX80N2X1S-P6 (Node, 2.4GHz Radio, Internal Battery Power, External Antenna), DX80DR9M-H6 (Data Radio, 1Watt 900MHz Radio, Internal Battery Power, External Antenna), DX80DR2M-H6 (Data Radio, 2.4GHz Radio, Internal Battery Power, External Antenna), DX80N9*1S**** (Node, 900MHz Radio, Internal Battery Power, External Antenna), DX80N9*1W**** (Node, 900MHz Radio, Internal Battery Power, Internal Antenna), DX80N2*1S**** (Node, 2.4GHz Radio, Internal Battery Power, External Antenna) and DX80N2*1W**** (Node, 2.4GHz Radio, Internal Battery Power, Internal Antenna) powered by one user-replaceable XENO XL-205F lithium cell. Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. "*" in the model number may be a letter, number or blank representing specific options.

2. The Wireless Network Controllers must be installed in a suitable enclosure per Control Document 143086 with provision for connection of Division 2 / Zone 2 wiring methods in accordance with local codes as acceptable to the local inspection authority having jurisdiction.

Class I, Div. 2, Groups A, B, C and D T4
Ambient Temperature range: -40°C to +80°C.

• Serial Sensors Model Nos. M12FTH3Q (Modbus RS485 Communications, 3.6-5.5V or 12-24V Power) and M12FTH4Q (Single Wire Serial Communications, 3.6-5.5V Power). Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. The Serial Sensor's connection end must be installed in a suitable enclosure per Control Document 143086. Sensing end may be installed outside of suitable enclosure if ingress protection rating is maintained.

Ex/AEx nA IIC T4
Class I, Div. 2, Groups A, B, C and D T4; Class II, Groups E, F and G T4; Class III T4; Type 4X Enclosure:
Ambient Temperature range: -40°C to +80°C.

• Wireless Network Controller Model Nos. DX80*9*6S*******B (900MHz Radio, 10-30V Power, External Antenna, Limatherm) DX80*9*6W*******B (900MHz Radio, 10-30V Power, Internal Antenna, Limatherm) DX80*2*6S*******B (2.4GHz Radio, 10-30V Power, External Antenna, Limatherm) DX80*2*6W*******B (2.4GHz Radio, 10-30V Power, Internal Antenna, Limatherm). Supply rated 30Vdc, 1.1Amax. Install per Control Document 143086.

Notes/Special Condition for Safe Use:

1. "*" in the model number may be a letter, number or blank representing specific options.

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APPLICABLE REQUIREMENTS

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-E60079-15-02 (R2006)	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 15: Type of Protection "n"
CSA Std. C22.2 No. 25-1966	-	Enclosures for Use in Class II Groups E, F, and G Hazardous Locations
CAN/CSA-C22.2 No. 94-M91	-	Special Purpose Enclosures
UL Std. No. 916:1998	-	Energy Management Equipment
ANSI/ISA-12.12.01-2007	-	Nonincendive Electrical Equipment for Use in Class I and Class II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
UL 60079-0:2005	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
UL 60079-15:2002	-	Electrical Apparatus for Explosive Gas Atmospheres - Part 15: Electrical Apparatus with Type of Protection "n"
UL 1203:2006	-	Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
UL 50E 2nd Ed:2007	-	Enclosures for Electrical Equipment, -Environmental Considerations

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

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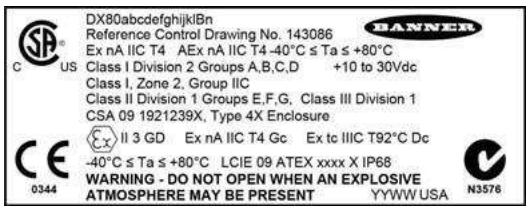
DX80 Metal Enclosure Label
Ink printed onto an Aluminum plate that is 25mm X 65mm and 0.5mm thick. This plate will then be screwed onto the housing using 2 blind screws represented here with the two crossed circles on either side of the plate.
See page 3 for a description of the abcdefghijklBn suffix Model numbering scheme. 900MHz models will not display the C-Tick symbol.



Markings are located on CSA accepted labels (plastic enclosure versions) or a 0.5mm ink printed aluminum plate secured with blind screws (metallic enclosure versions) as per label drawing 134430.

- CSA Monogram with “C/US” Indicator
- CSA certificate number (where applicable)
- Company name
- Model number
- Serial number
- Electrical ratings
- Ex nA IIC / AEx nA IIC (where applicable)
- Hazardous locations designation
- Temperature code rating
- Ambient temperature range

Warning
- Warning - Potential Electrostatic Charging Hazard, Clean only with a damp Cloth (where applicable)
- Warning - Explosion Hazard- Substitution of components may impair suitability for Class I, Division 2
- Warning - Explosion Hazard- Do not disconnect equipment unless power has been switched off or the area is known to be non hazardous
- CSA 09 ~~22~~ CA1921239 X

Note: The last two warnings appear on the control drawing 134217 and 143086.

ALTERATIONS

Not Applicable.

FACTORY TESTS

Not Applicable.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

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1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

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.

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DESCRIPTION

Notes:

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating
   b) The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.
   c) The Term "(INT*)" means a "Recognized" and/or "Accepted" component may be replaced by a component that is CSA Certified. The applicable country identifiers shall be included, the requirements in item "d" below as well as any "conditions of suitability" for the component (as recorded in this descriptive report) shall be complied with;
   d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
   e) Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.
   f) Substitution of a "Recognized" and/or "Accepted" component by one that is not CSA Certified is not permitted without a proper evaluation as well as a report update because the Conditions of Acceptance of the original component may be different than the Conditions of Acceptance of the substitute component.

PART A:

Models DX90, DX91 and DX95

1. General: This series of Wireless Network Controllers are used in industrial networks where communication requires low-speed/low-volume wireless data transmission and control. The network consists of three different base models, a Gateway (primary) device, at least one Node (secondary), or a Modbus Slave device. One Gateway can control a network of up to 15 Nodes through an RF link and up to 246 Modbus Slaves with Modbus protocol. Refer to the Descriptive Documents for complete details. A brief description follows.

   The 85 models covered by this report are based on 3 primary raw PCB's (Part B) of which five I/O sets are generated that differ from one another by available I/O features. These I/O sets have three different trim levels, and 4 different radio/antenna hardware configurations that can be programmed depending on network responsibility.

   The table below illustrates how one I/O Set generates 17 different model numbers:

Raw PCB	I/O Set	Trim	Radio and Antenna	Network Responsibility	Model Number	#
126989	Mixed 4/4/2/2/	DX80	900MHz Internal	node	DX91N9X6W4P4M2M2	1
				gateway	DX91G9M6W4P4M2M2	2

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			900MHz External	node	DX91N9X6S4P4M2M2	3
				gateway	DX91G9M6S4P4M2M2	4
			2.4GHz Internal	node	DX91N2X6W4P4M2M2	5
				gateway	DX91G2M6W4P4M2M2	6
			2.4GHz External	node	DX91N2X6S4P4M2M2	7
				gateway	DX91G2M6S4P4M2M2	8
		DX70	900MHz Internal	node	DX90N9X6W4P4M2M2	9
				gateway	DX90G9X6W4P4M2M2	10
			900MHz External	node	DX90N9X6S4P4M2M2	11
				gateway	DX90G9X6S4P4M2M2	12
			2.4GHz Internal	node	DX90N2X6W4P4M2M2	13
				gateway	DX90G2X6W4P4M2M2	14
			2.4GHz External	node	DX90N2X6S4P4M2M2	15
				gateway	DX90G2X6S4P4M2M2	16
		DX85	no radio	modbus slave	DX95M4P4M2M2	17

The I/O sets are offered in either:

1) Mixed 4/4/2/2 - 4 Digital Inputs, 4 Digital Outputs, 2 Analog Inputs, 2 Analog Outputs
2) Analog 0/0/4/4 - 0 Digital Inputs, 0 Digital Outputs, 4 Analog Inputs, 4 Analog Outputs
3) Digital 6/6/0/0 - 6 Digital Inputs, 6 Digital Outputs, 0 Analog Inputs, 0 Analog Outputs
4) Digital 8/4/0/0 - 8 Digital Inputs, 4 Digital Outputs, 0 Analog Inputs, 0 Analog Outputs
5) Digital 4/8/0/0 - 4 Digital Inputs, 8 Digital Outputs, 0 Analog Inputs, 0 Analog Outputs

5 I/O sets * (1Modbus trim + 2RF trims * (2radio * 2antenna * 2software)) = 85 different models.

All 85 Model Numbers are listed below:

Raw PCB	I/O Set	Trim	Radio and Antenna	Network Responsibility		Model Number
126989	Mixed 4422	DX80	900MHz Internal	node	1	DX91N9X6W4P4M2M2
				gateway	2	DX91G9M6W4P4M2M2
			900MHz External	node	3	DX91N9X6S4P4M2M2
				gateway	4	DX91G9M6S4P4M2M2
			2.4GHz Internal	node	5	DX91N2X6W4P4M2M2
				gateway	6	DX91G2M6W4P4M2M2
			2.4GHz External	node	7	DX91N2X6S4P4M2M2
				gateway	8	DX91G2M6S4P4M2M2
		DX70	900MHz Internal	node	9	DX90N9X6W4P4M2M2
				gateway	10	DX90G9X6W4P4M2M2
			900MHz External	node	11	DX90N9X6S4P4M2M2
				gateway	12	DX90G9X6S4P4M2M2
			2.4GHz Internal	node	13	DX90N2X6W4P4M2M2
				gateway	14	DX90G2X6W4P4M2M2
			2.4GHz External	node	15	DX90N2X6S4P4M2M2
				gateway	16	DX90G2X6S4P4M2M2
		DX85	Modbus Slave	slave	17	DX95M4P4M2M2
131558	Analog 0044	DX80	900MHz Internal	node	18	DX91N9X6W0P0M4M4
				gateway	19	DX91G9M6W0P0M4M4

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Raw PCB	I/O Set	Trim	Radio and Antenna	Network Responsibility		Model Number
			900MHz External	node	20	DX91N9X6S0P0M4M4
				gateway	21	DX91G9M6S0P0M4M4
			2.4GHz Internal	node	22	DX91N2X6W0P0M4M4
				gateway	23	DX91G2M6W0P0M4M4
			2.4GHz External	node	24	DX91N2X6S0P0M4M4
				gateway	25	DX91G2M6S0P0M4M4
		DX70	900MHz Internal	node	26	DX90N9X6W0P0M4M4
				gateway	27	DX90G9X6W0P0M4M4
			900MHz External	node	28	DX90N9X6S0P0M4M4
				gateway	29	DX90G9X6S0P0M4M4
			2.4GHz Internal	node	30	DX90N2X6W0P0M4M4
				gateway	31	DX90G2X6W0P0M4M4
			2.4GHz External	node	32	DX90N2X6S0P0M4M4
				gateway	33	DX90G2X6S0P0M4M4
		DX85	Modbus Slave	slave	34	DX95M0P0M4M4
130122	Digital 6600	DX80	900MHz Internal	node	35	DX91N9X6W6P6
				gateway	36	DX91G9M6W6P6
			900MHz External	node	37	DX91N9X6S6P6
				gateway	38	DX91G9M6S6P6
			2.4GHz Internal	node	39	DX91N2X6W6P6
				gateway	40	DX91G2M6W6P6
			2.4GHz External	node	41	DX91N2X6S6P6
				gateway	42	DX91G2M6S6P6
		DX70	900MHz Internal	node	43	DX90N9X6W6P6
				gateway	44	DX90G9X6W6P6
			900MHz External	node	45	DX90N9X6S6P6
				gateway	46	DX90G9X6S6P6
			2.4GHz Internal	node	47	DX90N2X6W6P6
				gateway	48	DX90G2X6W6P6
			2.4GHz External	node	49	DX90N2X6S6P6
				gateway	50	DX90G2X6S6P6
		DX85	Modbus Slave	slave	51	DX95M6P6
	Digital 8400	DX80	900MHz Internal	node	52	DX91N9X6W8P4
				gateway	53	DX91G9M6W8P4
			900MHz External	node	54	DX91N9X6S8P4
				gateway	55	DX91G9M6S8P4
			2.4GHz Internal	node	56	DX91N2X6W8P4
				gateway	57	DX91G2M6W8P4
			2.4GHz External	node	58	DX91N2X6S8P4
				gateway	59	DX91G2M6S8P4
		DX70	900MHz Internal	node	60	DX90N9X6W8P4
				gateway	61	DX90G9X6W8P4
			900MHz External	node	62	DX90N9X6S8P4
				gateway	63	DX90G9X6S8P4
			2.4GHz Internal	node	64	DX90N2X6W8P4
				gateway	65	DX90G2X6W8P4
			2.4GHz External	node	66	DX90N2X6S8P4
				gateway	67	DX90G2X6S8P4

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Raw PCB	I/O Set	Trim	Radio and Antenna	Network Responsibility		Model Number
		DX85	Modbus Slave	slave	68	DX95M8P4
	Digital 4800	DX80	900MHz Internal	node	69	DX91N9X6W4P8
				gateway	70	DX91G9M6W4P8
			900MHz External	node	71	DX91N9X6S4P8
				gateway	72	DX91G9M6S4P8
			2.4GHz Internal	node	73	DX91N2X6W4P8
				gateway	74	DX91G2M6W4P8
			2.4GHz External	node	75	DX91N2X6S4P8
				gateway	76	DX91G2M6S4P8
		DX70	900MHz Internal	node	77	DX90N9X6W4P8
				gateway	78	DX90G9X6W4P8
			900MHz External	node	79	DX90N9X6S4P8
				gateway	80	DX90G9X6S4P8
			2.4GHz Internal	node	81	DX90N2X6W4P8
				gateway	82	DX90G2X6W4P8
			2.4GHz External	node	83	DX90N2X6S4P8
				gateway	84	DX90G2X6S4P8
		DX85	Modbus Slave	slave	85	DX95M4P8

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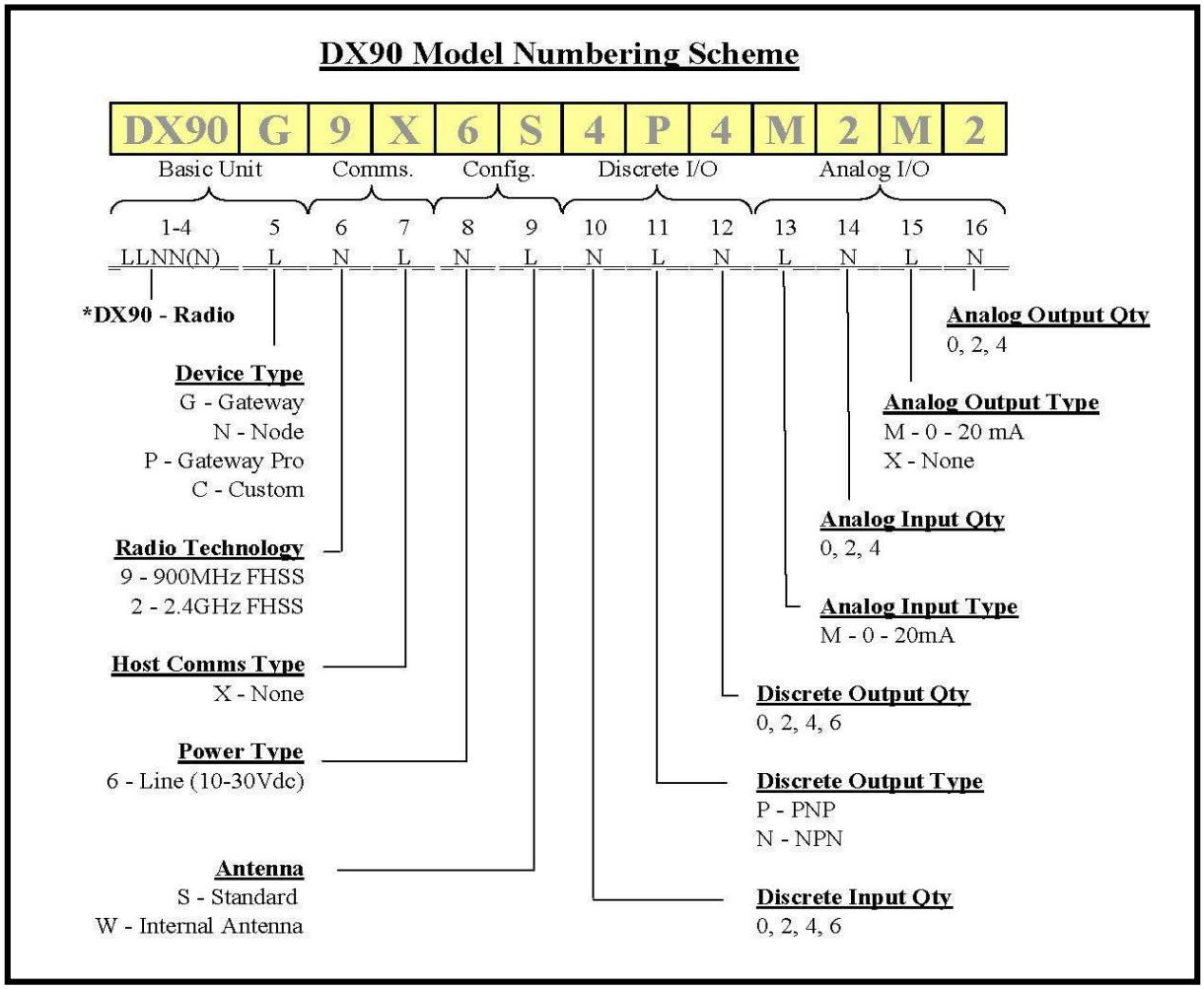
The Model Number breakdown is as follows:

i)



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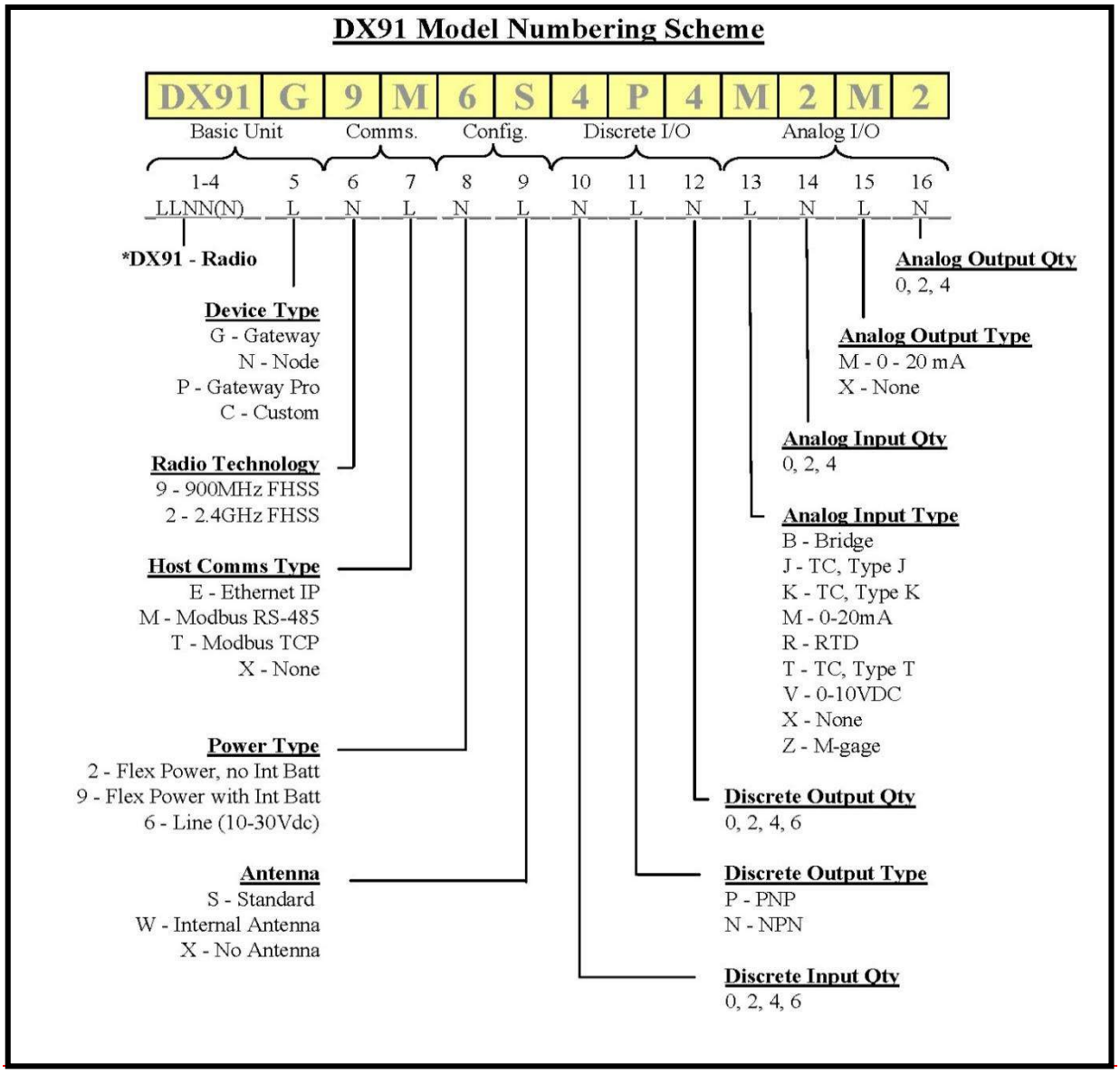
ii)



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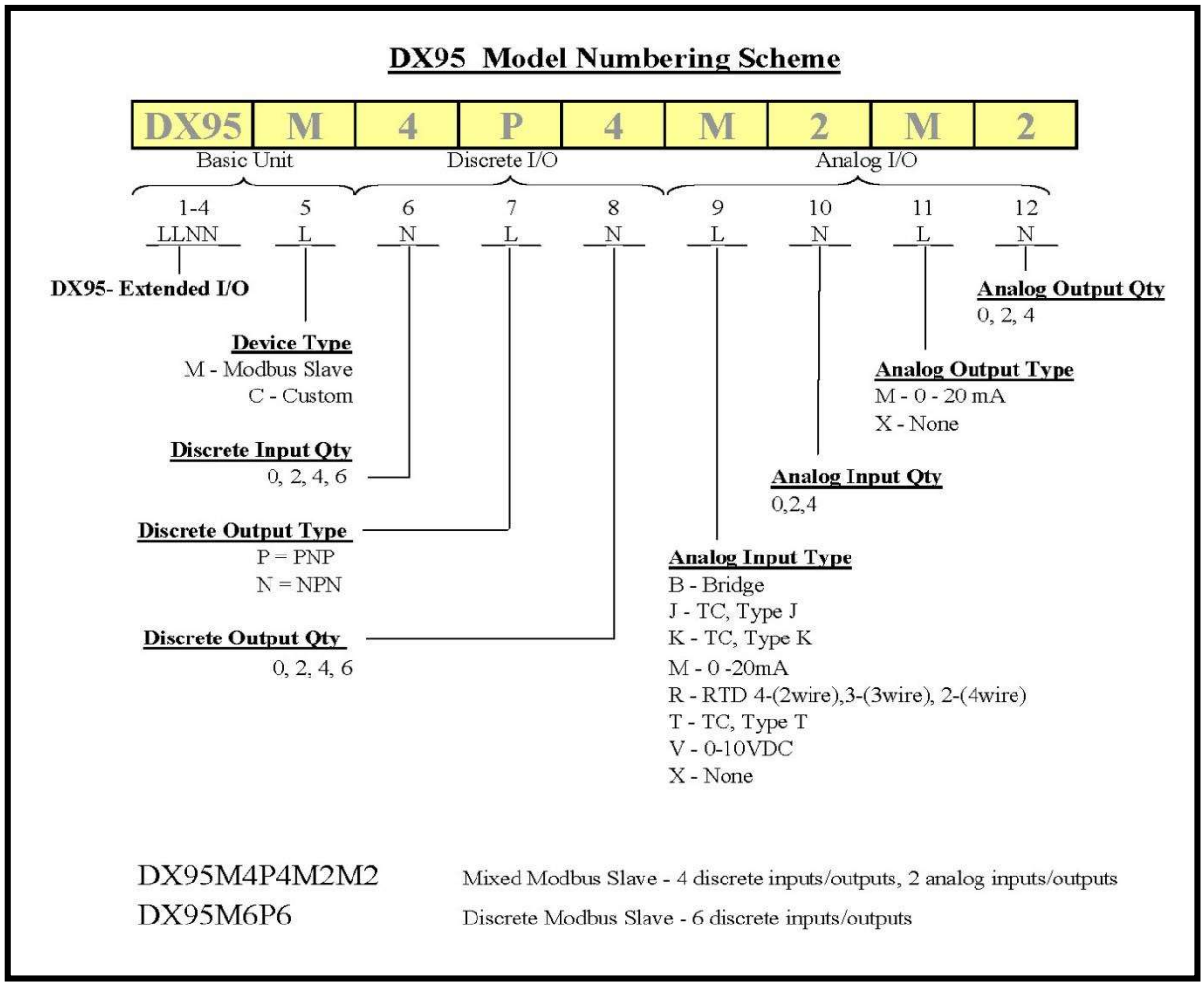
iii)



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The three Trim Levels that are used are referenced internally to Banner as:

i. DX70 (Standard)Trim level for DX90 units.

The DX70 is a DX80 that doesn't offer the push-button/LCD interface, does not offer RS485/Modbus communication, and RF communication is limited to one Gateway to one Node. A DX70 that is certified Class I Div2 will have the model number prefix of DX90.

ii. DX80 (Deluxe) Trim level for DX91 units.

The DX80 is the deluxe model that has a push-button/LCD interface and is capable of RS485/Modbus communication when programmed as a Gateway. The DX80 has a Euro style receptacle used to connect power and communication lines. When configured as a Gateway the DX80 can be used to host a web based pc ethernet configuration tool and it can be used to communicate with up to 246 Modbus Slave devices. A DX80 Gateway can control an RF network of up to 63 Node devices of which every I/O point on every device can be mapped to any matching I/O point on any device in the network via the web based PC ethernet interface. A DX80 that is certified Class I Div2 will have the model number prefix of DX91.

iii. DX85 (Slave) Trim level for DX95 units.

The DX85 will be used as a Modbus Slave device. Modbus is an RS485 based communication protocol that is popular in industrial markets and is not available with a radio. The DX85(s) will be used with DX80 Gateway's as 'Gateway I/O Expander's'. Theoretically up to 246 different devices can be daisy-chained together with the help of communication line repeaters. A DX85 that is certified Class I Div2 will have the model number prefix of DX95.

2. Enclosure

The enclosure is injection molded polycarbonate which has a UL 94V-0 rating. It has a cover which is secured with four stainless-steel screws. The overall dimensions are 80.8mm by 80.3mm by 60mm, not including hubs or connectors.

3. Circuit Boards

3.1 Header Circuit Board

Two header circuit boards may be used depending on the specific Model Number.

Each circuit board is 1.6mm thick FR-4/94V-0 glass based epoxy resin (2 layer) measuring 6.1cm by 4.3cm overall.

3.1.1 Ribbon Cable Connector

The ribbon cable connector is secured with the following adhesives applied in accordance with Drawing No. 134433:

- Resin Technology Group 119-EX Oxy-Bond Two-Component Epoxy Adhesive
- EFI Polymers 30030/40031 Two-Component Urethane
- Resin Technology Group URA-BOND 21-MVNA Two-Component Polyurethane

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3.2 Main Circuit Boards

Three main circuit boards may be used depending on the specific Model Number.

Each circuit board is 1.6mm thick FR-4/94V-0 glass based epoxy resin (6 layer) measuring 7.13cm by 7.15 cm overall (irregular).

3.2.1 Ribbon Cable Connector

The ribbon cable connector is secured with the following adhesives applied in accordance with Drawing No. 134433:

- Resin Technology Group 119-EX Oxy-Bond Two-Component Epoxy Adhesive
- EFI Polymers 30030/40031 Two-Component Urethane
- Resin Technology Group URA-BOND 21-MVNA Two-Component Polyurethane

4. Power Connector

The power connector located on the side of the enclosure has 5 pins and secured with a screw type collar.

PART B:

Models DX70, DX80 and DX85

1. General

All DX70/80/85 versions contain an internal wiring circuit board and a main circuit board. The main circuit board for all DX70/80 versions are equipped with a radio sub-board which is used for the wireless communications. DX85 models are not equipped with a radio and are intended to be used as i/o expansion devices through a serial link.

The main circuit board is mounted in the cover of the plastic enclosure. A 0.9mm thick nominal polycarbonate plate (solid insulation) covers the main circuit board of all units preventing the internal wiring board ribbon cable from coming into contact with any of its components or printed wiring tracks.

In the case of the metallic enclosure version, the cover of the plastic enclosure with the main board assembly is mounted in the front compartment (with window) of the Limatherm enclosure.

Refer to Descriptive Documents for complete details.

2. Model Numbering Scheme

The Wireless Network Controllers are available in the following versions:

- DX70…**C**, DX80…, DX80…**C**, DX80…**E** and DX85…**C** (Plastic Enclosure Versions) with DX81 FlexPower Battery Supply

- DX80…**B** (Metallic Enclosure Version)

Specific model number breakdown is shown below:

2.1 Model DX70

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Example Model Number

Digits Place	1-4	5	6	7	8	9	10	11	12	13	14	15	16	17	18-19
Value	DX70	G	9	X	6	S	4	P	4	M	2	M	2	C	-FR

Digit	Description	Options
1-4	Model	DX70
5	Device	G: Gateway N: Node
6	Radio frequency	2: 2.4 GHz 9: 900 MHz
7	Host communication type	X: None
8	Power type	6: 10–30V dc
9	Antenna	S: External W: Internal
10	Discrete input quantity	0, 2, 4, 8
11	Discrete type	P: Sourcing (PNP) N: Sinking (NPN)
12	Discrete output quantity	0, 2, 4, 8
13	Analog input type	M: 0–20 mA V: 0–10V dc
14	Analog input quantity	0, 2, 4
15	Analog output type	M: 0–20 mA V: 0–10V dc X: None
16	Analog output quantity	0, 2, 4
17	Housing type	C: IP20 Base Blank: IP67 Base
18-19	Country code	-FR: France

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2.2 Model DX80

Example Model Number

Digits Place	1-4	5	6	7	8	9	10	11	12	13	14	15	16	17	18-19
Value	DX80	G	9	M	6	S	4	P	4	M	2	M	2	C	-FR

Digit	Description	Options
1-4	Model	DX80
5	Device	C: Custom software G: Gateway N: Node
6	Radio frequency	2: 2.4 GHz 9: 900 MHz
7	Host communication type	C: Custom E: EtherNet/IP M: Modbus RS-485 T: Modbus/TCP X: None
8	Power type	1: FlexPower, internal battery 2: FlexPower, no internal battery 6: 10–30V dc
9	Antenna	S: External W: Internal X: No antenna
10	Discrete input quantity	0, 1, 2, 4, 6, 8
11	Discrete type	A: Async counter K: K50 EZ-LIGHT N: Sinking (NPN) P: Sourcing (PNP) S: Serial interface
12	Discrete output quantity	0, 2, 4, 6, 8
13	Analog input type	B: Bridge M: 0–20 mA R: RTD T: Thermocouple U: T30U Ultrasonic V: 0–10V dc X: None Z: M-GAGE
14	Analog input quantity	0, 2, 4
15	Analog output type	M: 0–20 mA V: 0–10V dc X: None
16	Analog output quantity	0, 2, 4
17	Housing type	B: Metal housing C: IP20 Base Blank: IP67 Base
18-19	Country code or Special Order Number	-FR: France -#####: Special Order Number -NB: No battery (for internal battery models)

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2.3 Model DX80 Performance Series

Example Model Number

Digits Place	**1-4**	**5**	**6**	**7**	**8**	**9**	**10-13**	**14**	**15-19**
Value	DX80	G	9	M	6	S	- PM8L	C	-FR

Digit	**Description**	**Options**
1-4	Model	DX80
5	Device	C: Custom software G: Gateway N: Node
6	Radio frequency	2: 2.4 GHz 9: 900 MHz
7	Host communication type	L: Low Cost M: Modbus RS-485 X: None
8	Power type	1: FlexPower, internal battery 2: FlexPower, no internal battery 6: 10–30V dc
9	Antenna	S: External X: No antenna
10-13	I/O Configuration	-P: Serial RS485/RS232 -P1: FlexPower, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs, Boost Voltage -P2: 4 Discrete Inputs, 4 Discrete Outputs, 2 Analog Inputs, 2 Analog Outputs -P3: FlexPower, Thermocouple -P4: FlexPower, RTD -P5: FlexPower, 2 Discrete Inputs, 2 Discrete Outputs, 4 Analog Inputs -P6: Serial Interface -P7: FlexPower, 12 Selectable Discrete Sinking Inputs/Outputs -P8: 12 Selectable Discrete Sourcing Inputs/Outputs -P12: FlexPower, SDI-12 Interface, H-Bridge Interface, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs, 1 Thermistor Input, 1 Counter Input -PM2: Pre-mapped, 4 Discrete Inputs, 4 Discrete Outputs, 2 Analog Inputs, 2 Analog Outputs -PM8: Pre-mapped, 12 Selectable Discrete Sourcing Inputs/Outputs -PM8L: Pre-mapped, 12 Selectable Discrete Sourcing Inputs/Outputs, No LCD -PB1: Board Module, FlexPower, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs -PB2: Board Module, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs, 2 Analog

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		Outputs
14	Housing type	C: IP20 Base E: Environmental IP67 housing with internal battery Blank: IP67 Base
15-19	Country code or Special Order	-FR: France -#####: Special Order Number -NB: No battery (for internal battery models)

2.4 Model DX80DR MultiHop Data Radio

Example Model Number

Digits Place	**1-4**	**5-6**	**7**	**8**	**9-11**	**12-13**
Value	DX80	DR	9	M	-H12	-KR

Digit	**Description**	**Options**
1-4	Radio model number	DX80
5-6	Device type	DR: Data Radio ER: Ethernet Data Radio SR: Serial Data Radio
7	Radio frequency	2: 2.4 GHz 9: 900 MHz
8	Communication type	M: Serial
9-11	I/O Configuration	-H: No I/O -H1: FlexPower, 4 Discrete Inputs, 2 Discrete Outputs, 4 Analog Inputs, 1 Thermistor Input, 1 Counter Input -H2: 4 Discrete Inputs, 4 Discrete Outputs, 2 Analog Inputs, 2 Analog Outputs -H3: FlexPower, Thermocouple -H4: FlexPower, RTD -H5: FlexPower, 4 Discrete Inputs, 2 Discrete Outputs, 4 Analog Inputs -H6: Serial Interface -H7: FlexPower, 12 Selectable Discrete Sinking Inputs/Outputs -H8: 12 Selectable Discrete Sourcing Inputs/Outputs -H12: FlexPower, SDI-12 Interface, H-Bridge Interface, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs, 1 Thermistor Input, 1 Counter Input -HB1: Board Module, FlexPower, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs -HB2: Board Module, 2 Discrete Inputs, 2 Discrete Outputs, 2 Analog Inputs, 2 Analog Outputs
12	Housing Type	C: IP20 Base E: Environmental IP67 housing with internal battery

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		Blank: IP67 Base
13	Special Order	-#####: Special Order Number -NB: No battery (for internal battery models)

2.5 Model DX85

Example Model Number

Digits Place	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Value	DX85				M	4	P	4	M	2	M	2	C

Digit	**Description**	**Options**
1-4	Radio model number	DX85
5	Device type	M: Modbus slave (RS-485) C: custom
6	Discrete input quantity	0, 2, 4, 6, 8
7	Discrete type	P: Sourcing (PNP) N: Sinking (NPN)
8	Discrete output quantity	0, 2, 4, 6, 8
9	Analog input type	B: Bridge J: TC, Type J K: TC, Type K M: 0–20 mA R: RTD T: TC, Type T V: 0–10V dc X: None
10	Analog input quantity	0, 2, 4
11	Analog output type	M: 0–20 mA X: None
12	Analog output quantity	0, 2, 4
13	Housing type	Blank: IP67 Base C: IP20 Base

2.6 Serial Sensors Model Nos. M12FTH3Q (Modbus RS485 Communications, 3.6-5.5V or 12-24V Power) and M12FTH4Q (Single Wire Serial Communications, 3.6-5.5V Power). See drawing 134152_B, and 196398_C for construction details.

3. Battery Powered Versions

3.1 Internal Battery Versions

Internal battery versions are powered by a single XENO Energy Co. Ltd. XL-205F Lithium Thionyl Chloride cell which is installed in a single cell holder which is secured to the base of the enclosure.

3.2 External Battery Versions

External battery versions are connected via a cable and connector to a DX81 FlexPower Battery Supply which uses one user-replaceable XENO XL-205F Lithium Thionyl Chloride cell.

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The DX81 FlexPower Battery Supply uses the same enclosure as the DX70/80/85 Plastic Enclosure versions except that it uses a blank cover (no display windows or push-buttons). A two layer glass-epoxy circuit board with a single cell holder is screwed to the bottom of the enclosure.

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4. Enclosures

4.1 Plastic Enclosure Versions

The material for the base is Sabic polycarbonate Lexan Resin 143R. It is yellow or black in colour, has no fillers, has a UV stabilizer added, no surface treatments and a relative temperature index 130°C (which is 50°C above the maximum service temperature of 80C).

Alternate Material:
Manufacturer EnviroPlas Inc
Resin EnviroPlas 122-(a)(f1)
Properties UV protected for outdoor use
Flammabilty V-0 @ 1.5 mm
RTI 125C
(UL Yellow Card E192776-101601832)

Plastic Enclosure components are injection molded by various contractors monitored by an approval process for assembly by Banner. The material used in traceable to UL 94 Standard for UV Protection, flammability and RTI with Material and Finish Declaration. The enclosures are inspected for acceptance. An alternate material for the base is Amco Polymers Tristar PC-10FRN. It is yellow or black in colour, has no fillers, has a UV stabilizer added, no surface treatments and a relative temperature index 125°C (which is 45°C above the maximum service temperature of 80°C).

Alternate Material:
Manufacturer Amco Polymers
Resin Tristar PC-10FRN
Properties UV protected for outdoor use
Flammabilty V-0 @ 1.5 mm
RTI 125°C
(UL Yellow Card E155285-223920)

The material for the top is Sabic polycarbonate Lexan Resin 505RU. It is black in colour, is 10% glass fiber reinforced, is flame retardant, has a UV stabilizer added, no surface treatments and a relative temperature index 136°C (which is 56°C above the maximum service temperature of 80C).

Alternate Material:
Manufacturer SABIC
Resin Lexan Elcres CFR7431(f1)
Properties UV protected for outdoor suitabilty
Flammability V-0 @ 1.2mm
RTI 125C @ 1.2 mm
(UL Yellow Card E121562-100922880)

The material for the LCD lens in the top is Sabic polycarbonate Lexan Resin 123. It has no colour, has no fillers, has a UV stabilizer added, no surface treatments and a relative temperature index 100°C (which is 20°C above the maximum service temperature of 80C).

Alternate Material: Makrolon 2407
Manufacturer Covestro Deutschland Ag
Resin Makrolon 2407 (f1)
Properties UV protected for outdoor suitabilty
Flammability V2 @ 1.5mm
RTI 125C @ 1.5 mm
(UL Yellow Card E121562-100922880)

4.2 Metallic (Limatherm) Enclosure Versions

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"Limatherm" Model XD-ID100win, two-compartment enclosure. CSA Certified for Class II, Division 1, Groups E, F & G, Class III under Certificate 231723-1823706, FM Approved for Class II, Division 1, Groups E, F & G, Class III under Certificate 3026118 and FTZU (ATEX) Approved for II 2 D under Certificate FTZU 04 ATEX 0332U.

5. Circuit Boards

All circuit boards are glass-epoxy. Refer to the Descriptive Documents for schematic diagram, component layout, trace layout, bill of materials (BOM) and dimensions.

6. Temperature/Humidity Probes

6.1 General

The temperature/humidity probes consist of a circuit board encapsulated in 12mm threaded stainless-steel barrel. The encapsulant is EFI Polymers Kit-Number 1576 two-part translucent urethane. Each probe is equipped with a threaded connector for a cable/connector secured with a threaded collar.

The probes are certified for Class I, Div. 2, Groups A, B, C and D only. They protrude from an IP54 enclosure (the connector and the cable will be in side of the IP54 enclosure).

6.2 TH3Q RS-485 Probe

The TH3Q RS-485 Probe includes a RS-485 chip and is used with line or battery powered DX99 units.

6.3 TH4Q Single Wire Probe

The TH4Q Single Wire Probe does not include a RS-485 chip and is only used with battery powered DX99 units.

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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.

PART A:

Models DX90, DX91 and DX95

Subject	Doc #	Drawing No.	Rev.
Document Map	1	134429	-
Label	2 or C3	134430	-
Control Drawing	3	134217	R2
Overall Assembly - Exploded View	4 or C7	134431	F
Overall Assembly - Dimensions	5 or C8	134432	-
Gluing of Ribbon Cable Connectors	6 or C10	134433	B
Mixed 4422 Main PCB Trace Layout	7	SXI050804	SXI060506
Mixed 4422 Main PCB Schematic	8 or D16	128652	F
Mixed 4422 Header PCB Trace Layout	12 or D25 or 38 or 44	133510	-
Mixed 4422 Header PCB Schematic	13 or D21	132147	A
Mixed 4422 Header PCB (LVR Version) Component Layout	14 or D22	132146	A
Mixed 4422 Header PCB (SCR Version) Component Layout	15 or D23	133852	R1
Analog 0044 Main PCB Trace Layout	17 or D19 or 27	125760	A
Analog 0044 Main PCB Schematic	18	133452	-
Analog 0044 Main PCB Component Layout	19 or D31	131558	-
Analog 0044 Main PCB Bill of Materials	19 or D31	131558	-
Analog 0044 Header PCB Drill Details	21 or D35	133420	-
Analog 0044 Header PCB Trace Layout	12 or D25 or 38 or 44	133510	-
Analog 0044 Header PCB Schematic		133422	-
Analog 0044 Header PCB Component Layout	21 or D35	133420	-
Analog 0044 Header PCB Bill of Material	21 or D35	133420	-

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Subject	Doc #	Drawing No.	Rev.
Digital 6600/8400/4800 Main PCB Drill Details	26 or D44	130122	A
Digital 6600/8400/4800 Main PCB Trace Layout	17 or D19	125760	A
Digital 6600/8400/4800 Main PCB Schematic	28 or D45	131689	B
Digital 6600/8400/4800 Main PCB Component Layout	26 or D44	130122	-
Digital 6600/8400/4800 Main PCB Bill of Materials	26 or D44	130122	-
Digital 6600 Header PCB Drill Details	31or D48	132134	A
Digital 6600 Header PCB Trace Layout	12 or D25 or 38 or 44	133510	-
Digital 6600 Header PCB Schematic		132138	A
Digital 6600 Header PCB (LVR Version) Component Layout		132135	A
Digital 6600 Header PCB (SCR Version) Component Layout		133853	R1
Digital 6600 Header PCB Bill of Material	31or D48	132134	A
Digital 8400 Header PCB Drill Details	37 or D57	132139	-
Digital 8400 Header PCB Trace Layout	12 or D25 or 38 or 44	133510	-
Digital 8400 Header PCB Schematic	39 or D58	132141	-
Digital 8400 Header PCB (LVR Version) Component Layout	40 or D59	132140	R1
Digital 8400 Header PCB (SCR Version) Component Layout	41 or D60	133850	R1
Digital 8400 Header PCB Bill of Material	37 or D57	132139	-
Digital 4800 Header PCB Drill Details	43 or D66	132142	-
Digital 4800 Header PCB Trace Layout	12 or D25 or 38 or 44	133510	-
Digital 4800 Header PCB Schematic	45 or D67	132144	-
Digital 4800 Header PCB (LVR Version) Component Layout	46 or D68	132143	R1
Digital 4800 Header PCB (SCR Version) Component Layout	47 or D69	133851	R1
Digital 4800 Header PCB Bill of Material	43 or D66	132142	-
900 MHz Radio Sub-PCB Trace Layout	49	SXI050922	SXI-050922
900 MHz Radio Sub-PCB Schematic	50	SXI-050922-SCH	-
900 MHz Radio Sub-PCB Component Layout	51 or D3	122978	-
900 MHz Radio Sub-PCB Bill of Materials	51 or D3	122978	-
2.4 GHz Radio Sub-PCB Trace Layout	53	SXI060221	SXI-060901
2.4 GHz Radio Sub-PCB Schematic	54 or D7	129790	-

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Subject	Doc #	Drawing No.	Rev.
2.4 GHz Radio Sub-PCB Component Layout	55 or D8	128953	R5
2.4 GHz Radio Sub-PCB Bill of Materials	55 or D8	128953	R5

PART B:

Models DX70, DX80 and DX85

Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
Common Drawings	Common Drawings	C3	Label Drawing	134430	C
		C4	DX8x Control Drawing	143086	C
		C5	Document Map	134429	D
		C7	Exploded Mechanical View	134431	F
		C8	Enclosure Dimensions	134432	C
		C9	Limatherm Technical Document	B_083040	1
		C10	Connector Gluing	134433	B
Radios	900MHz Radio	D1	Raw PCB	122977	A
		D2	Schematic	127269	A
		D3	Assembly	122978	B
		D4	BOM	122978BOM	B
		D5	Dimension Drawing	127738	A
	2.4GHz Radio	D6	Raw PCB	128446	B
		D7	Schematic	129790	-
		D8	Assembly	128953	B
		D9	BOM	128953BOM	B
		*	Dimension Drawing	127738	*
	1Watt Radio	D10	Raw PCB	127827	C
		D11	Schematic	135496	C
		D12	Assembly	127767	C
		D13	BOM	127767BOM	C
		D14	Dimension Drawing	137867	-
	HS 900MHz 1Watt Radio	D126	Raw PCB	161303	C
		D127	Schematic	161304	E
		D128	Assembly	161305	D
		D129	BOM	161305BOM	D
		*	Dimension Drawing	137867	*
Analog I/O	Main Board	D31	Raw PCB	131558	C
		D32	Schematic	137669	F
		D33	Assembly	131558ASSY	B
		D34	BOM	131558BOM	E
		*	Dimension Drawing	125760	A
	Wiring Board A, B	D35	Raw PCB	133420	-
		D36	Schematic	133422	A
		D37	Assembly Lever	133421	R1
		D38	Assembly Screw	133981	-

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
		D39	BOM	133981BOM	-
		*	Dimension Drawing	133510	-
	Wiring Board C	D40	Raw PCB	139379	A
		D41	Schematic	139381	B
		D42	Assembly	143731	A
		D43	BOM	143731BOM	A
		*	Dimension Drawing	194755	A
Digital I/O	Main Board	D44	Raw PCB	130122	D
		D45	Schematic	131689	H
		D46	Assembly	130122ASSY	C
		D47	BOM	130122BOM	E
		*	Dimension Drawing	125760	A
	6600 Wiring Board A, B	D48	Raw PCB	132134	A
		D49	Schematic	132138	B
		D50	Assembly Lever	133853	R1
		D51	Assembly Screw	132135	B
		D52	BOM	132134BOM	-
		*	Dimension Drawing	133510	*
	6600 Wiring Board C	D53	Raw PCB	139376	A
		D54	Schematic	139378	B
		D55	Assembly	143730	A
		D56	BOM	143730BOM	A
		*	Dimension Drawing	194755	A
	8400 Wiring Board A, B	D57	Raw PCB	132139	-
		D58	Schematic	132141	A
		D59	Assembly Lever	132140	R1
		D60	Assembly Screw	133850	-
		D61	BOM	133850BOM	-
		*	Dimension Drawing	133510	*
	8400 Wiring Board C	D62	Raw PCB	139370	A
		D63	Schematic	139372	B
		D64	Assembly	143728	A
		D65	BOM	143728BOM	A
		*	Dimension Drawing	194755	A
	4800 Wiring Board A, B	D66	Raw PCB	132142	-
		D67	Schematic	132144	A
		D68	Assembly Lever	132143	R1
		D69	Assembly Screw	133851	-
		D70	BOM	133851BOM	-
		*	Dimension Drawing	133510	*
	4800 Wiring Board C	D71	Raw PCB	139373	A
		D72	Schematic	139375	B
		D73	Assembly	143729	A
		D74	BOM	143729BOM	A
		*	Dimension Drawing	194755	A
Flex	Main	D75	Raw PCB	129333	D

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
Gateway and Data Radio	Board	D76	Schematic	135497	H
		D77	Assembly DX DATA RADIO	129333ASSY	D
		D79	BOM DX DATA RADIO	129333BOM	D
		*	Dimension Drawing	125760	A
Mini DIN Wiring Board	Wiring Board	D81	Raw PCB	130587	-
		D82	Schematic	130711	-
		D83	Assembly	130588	-
		D84	BOM	150588BOM	-
		D85	Dimension Drawing	130710	-
Flex Boost Nodes	Main Board	D86	Raw PCB	127647	D
		D87	Schematic	129223	J
		D88	Assembly	127647ASSY	C
		D89	BOM	127647BOM	E
		*	Dimension Drawing	125760	A
	Wiring Board	D90	Raw PCB	142974	A
		D91	Schematic	142976	A
		D92	Assembly	142975	A
		D93	BOM	142975BOM	A
		D94	Dimension Drawing	194755	A
Flex 4400 Nodes	Main Board	D95	Raw PCB	135289	B
		D96	Schematic	135291	D
		D97	Assembly	135289ASSY	B
		D98	BOM	135289BOM	C
		*	Dimension Drawing	125760	A
	Wiring Board	D99	Raw PCB	142977	A
		D100	Schematic	142979	A
		D101	Assembly	142978	A
		D102	BOM	142978BOM	A
		*	Dimension Drawing	194755	A
Flex Instrumentation Nodes	Main Board	D103	Raw PCB	128565	B
		D104	Schematic	129224	G
		D105	Assembly	128565ASSY	B
		D106	BOM	128565BOM	C
		*	Dimension Drawing	125760	A
	Wiring Board	D107	Raw PCB	142980	A
		D108	Schematic	142982	A
		D109	Assembly	142981	A
		D110	BOM	142981BOM	A
		*	Dimension Drawing	194755	A
MGAGE Standard Nodes	Main Board	D111	Raw PCB	127993	E
		D112	Schematic	131605	D
		D113	Assembly MGAGE Radio	127993ASSY	D
		D114	BOM MGAGE Radio	127993BOM	D

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
		*	Dimension Drawing	125760	A
Battery Supply	Single Cell Board Variant 1	D117	Raw PCB	126234	-
		D118	Schematic	130024	A
		D119	Assembly	126235	A
		D120	BOM	126235BOM	-
		D121	Dimension Drawing	130023	-
	Single Cell Board Variant 2	D199	Raw PCB	173010	A
		D200	Schematic	173009	A
		D201	Assembly	173553	A
		D202	BOM	173553BOM	A
		*	Dimension Drawing	194755	A
HP 4422 Discrete/ Analog	Main Board	D130	Raw PCB	148594	B
		D131	Schematic	148595	B
		D132	Assembly	148594ASSY	A
		D133	BOM	148594BOM	B
		*	Dimension Drawing	125760	A
	Wiring Board A, B	D26	Raw PCB	139367	B
		D27	Schematic	139369	A
		D28	Assembly	143727	A
		D29	BOM	143727BOM	A
		*	Dimension Drawing	194755	A
	Wiring Board Ext 4422 P2	D134	Raw PCB	161972	A
		D135	Schematic	161973	B
		D136	Assembly	161974	A
		D137	BOM	161974BOM	A
		*	Dimension Drawing	194755	A
FLEX HP W/Boost	Main Board	D138	Raw PCB	147932	B
		D139	Schematic	147933	I
		D140	Assembly	147932ASSY	B
		D141	BOM	147932BOM	B
		*	Dimension Drawing	125760	A
	Wiring Board	*	Raw PCB	142974	*
		*	Schematic	142976	*
		*	Assembly	142975	*
		*	BOM	142975BOM	*
		*	Dimension Drawing	194755	A
	P1,P5 Wiring Board	D142	Raw PCB	172051	A
		D143	Schematic	172052	A
		D144	Assembly	172053	A
		D145	BOM	172053BOM	A
		D146	Assembly	176857	A
		D147	BOM	176857BOM	A
		*	Dimension Drawing	194755	A
		D148	Raw PCB	155782	A
		D149	Schematic	155783	A

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
	ENV Wiring Board	D150	Assembly	155782ASSY	A
		D151	BOM	155782BOM	A
		D152	Dimension Drawing	155781	A
HP Flex Instrum.	Main Board	D153	Raw PCB	148133	A
		D154	Schematic	148134	D
		D155	Assembly	148133ASSY	A
		D156	BOM	148133BOM	A
		*	Dimension Drawing	125760	A
	Wiring Board	*	Raw PCB	142980	*
		*	Schematic	142982	*
		*	Assembly	142981	*
		*	BOM	142981BOM	*
		*	Dimension Drawing	194755	A
	DX81 Battery W20 Wiring Board	D158	Raw PCB	180333	A
		D159	Schematic	180334	A
		D160	Assembly	180333ASSY	A
		D161	BOM	180333BOM	A
		*	Dimension Drawing	194755	A
	ENV Wiring Board	D163	Raw PCB	156189	A
		D164	Schematic	156190	A
		D165	Assembly	156191	A
		D166	BOM	156191BOM	A
		*	Dimension Drawing	155781	*
Flex 12 IO NPN	Main Board	D167	Raw PCB	148980	B
		D168	Schematic	148981	E
		D169	Assembly	148980ASSY	B
		D170	BOM	148980BOM	B
		*	Dimension Drawing	125760	A
	Wiring Board	*	Raw PCB	142974	*
		*	Schematic	142976	*
		*	Assembly	142975	*
		*	BOM	142975BOM	*
		*	Dimension Drawing	194755	A
FLEX 12 IO PNP	Main Board	D171	Raw PCB	155014	A
		D172	Schematic	155015	F
		D173	Assembly	155014ASSY	A
		D174	BOM	155014BOM	B
		*	Dimension Drawing	125760	A
	Wiring Board	*	Raw PCB	139367	*
		*	Schematic	139369	*
		*	Assembly	143727	*
		*	BOM	143727BOM	*
		*	Dimension Drawing	194755	A
	PM Wiring Board	*	Raw PCB	161972	*
		*	Schematic	161973	*
		D175	Assembly	175079	A

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
		D176	BOM	175079BOM	A
		*	Dimension Drawing	194755	A
High Speed Data Radio	Main Board	D177	Raw PCB	147324	C
		D178	Schematic	147325	E
		D179	Assembly	147324ASSY	C
		D180	BOM	147324BOM	C
		*	Dimension Drawing	125760	A
	LAN Wiring Board	D182	Raw PCB	180837	A
		D183	Schematic	180838	A
		D184	Assembly	180839	B
		D185	BOM	180839BOM	B
		*	Dimension Drawing	194755	A
	Serial Wiring Board	D186	Raw PCB	169134	A
		D187	Schematic	169135	A
		D188	Assembly	169136	A
		D189	BOM	169136BOM	A
		*	Dimension Drawing	194755	A
HB1 Flex 222 2SWP	Main Board	D190	Raw PCB	154708	B
		D191	Schematic	154709	D
		D192	Assembly	154708ASSY	B
		D193	BOM	154708BOM	B
		D194	Dimension Drawing	157052	A
TH3Q RS-485 Probe	Main Board	D203	Raw PCB	161259	B
		D204	Schematic	161260	D
		D205	Assembly	163506	B
		D206	BOM	163506BOM	B
		D207	Dimension Drawing	161258	A
TH4Q Single Wire Probe	Main Board	*	Raw PCB	161259	*
		*	Schematic	161260	*
		D208	Assembly	161261	A
		D209	BOM	161261BOM	A
		*	Dimension Drawing	161258	*
Other Docs	Other Docs	O1	CSA Lab Work Order - DX70/80/85	150323-2095494	-
		O2	CSA Test Report - DX91-D2 (for reference)	150323-1921239	-
		O3	CSA Test Report - DX99-D1/Z0	150323-	-

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Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
			(for reference)	2008243	
		O4	CSA Limatherm Enclosure Certificate	231723-1823706	-
		O5	FM Limatherm Enclosure Certificate	3026118	-
		O6	ATEX Limatherm Enclosure Certificate	FTZU 04 ATEX 0332U	-
Spec Sheets	Spec Sheets	S1	Plastic Housing Material	-	-
		S2	Connector Cement - Resin Technology Group LLC OXY-BOND 119EX Epoxy	-	-
		S3	XENO XL-205F Lithium Cell	-	-
		S4	Pluggable Terminal Blocks	-	-
		S5	Connector Cement - EFI 30030-40031	-	-
		S6	Connector Cement - URA-BOND 21-MVNA	-	-
		S7	Pluggable Term. Blocks – Molex 5.08mm pitch Plug	395300009	-
		S8	Pluggable Term. Blocks – Molex 5.08mm pitch Header	395320009	-
		S9	Pluggable Term. Blocks – General Molex Specification 3.50mm & 5.08mm	PS-39500-001	-
		S10	Pluggable Term. Blocks – Molex 3.50mm pitch Plug	395000009	-
		S11	Pluggable Term. Blocks – Molex 3.50mm pitch Header	395021009	-
		S12	Pluggable Term. Blocks – OST Plug	OSTTJXX11530	-
		S13	Pluggable Term. Blocks – OST Header	OSTOQXX1251	-
		S14	Pluggable Term. Blocks – Phoenix Plug	1840434	-
		S15	Pluggable Term. Blocks – Phoenix Header	1844281	-
ExTRs	ExTRs	T1	ExTR Cover	-	-
		T2	IEC 60079-0:2007 ExTR	-	-
		T3	IEC 60079-15:2005 ExTR	-	-
		T4	IEC 61241-1:2004 ExTR	-	-

Note: A "*" indicates that the drawing is already listed for another version.

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TEST HISTORY

Project 1921239 – Edition 1

The following samples were tested as representative for all other variants covered by this report:

Sample	Model	Type
1	DX91G9M6S4P8	Digital 4/8/0/0
2	DX91G9M6S0P0M4M4	Analog 0/0/4/4
3	DX91G9M6S4P4M2M2	Mixed 4/4/2/2

1. Rating: Std. C22.2 No 142-M1987, Cl 6.3
UL916, Para. 39.1

Sample	Model	Type	Input Voltage	Input Current		Condition
				Estimated	Measured	
1	DX91G9M6S4P8	Digital 4/8/0/0	30Vdc	900mA	902mA	Outputs fully loaded.
2	DX91G9M6S0P0M4M4	Analog 0/0/4/4	30Vdc	200mA	198mA	Outputs fully loaded.
3	DX91G9M6S4P4M2M2	Mixed 4/4/2/2	30Vdc	550mA	558mA	Outputs fully loaded.

2. Temperature: Std. C22.2 No 142-M1987, Cl 6.4
UL916, Para. 40

3. Temperature Code Rating:

Std. C22.2 No 213-M1987, Cl 6.2
UL 1604, Para. 9

The test samples were operated with the outputs fully loaded as in the rating test above. Component temperatures were measured by thermocouple applied directly the component surface. Ambient temperatures were measured by thermometer.

Sample	Model	Type	Component	Measured Temperature (°C)
1	DX91G9M6S4P8	Digital 4/8/0/0	REG2	89
			TVS23	78
			R170	83
			IC12	95
			REG1	90
2	DX91G9M6S0P0M4M4	Analog 0/0/4/4	REG1	104
			REG2	102
			Q24	113
			Q11	111
			Q10	112
3	DX91G9M6S4P4M2M2	Mixed 4/4/2/2	Q10	**116**
			Q11	110
			REG2	90
			D9	95
			REG1	92

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Ambient	24

Based on a maximum measured temperature of 116°C corrected to an ambient temperature of 80°C, the maximum temperature in the apparatus is 172°C [116°C + (80°C-24°C)]. A Temperature Code of T3A (180°C) is therefore assigned.

4. Leakage Current: Std. C22.2 No 142-M1987, Cl 6.5.3
UL916, Para. 42

Test waived as the apparatus is supplied by 30Vdc.

5. Dielectric Strength: Std. C22.2 No 142-M1987, Cl 6.8.1(c)
UL 916, Para. 49

500Vrms applied between all external circuits and the body of the metallic power connector.

Sample	Model	Result
1	DX91G9M6S4P8	No breakdown
2	DX91G9M6S0P0M4M4	No breakdown
3	DX91G9M6S4P4M2M2	No breakdown

6. Pull Test: CSA-C22.2 No.213-M1987, Cl. 4.2.2
UL1604, Para. 5.2

The connectors (glued as described in this report) were subjected to the 15N Pull Test in accordance with the referenced clause as recorded in the table below:

Results:

Sample	Model	Type	Circuit Board	Connector	Result
3	DX91G9M6S4P4M2M2	Digital 4/8/0/0	Header	P8 (ribbon cable)	Connector remained intact.
			Main	P4 (ribbon cable)	Connector remained intact.

7. Evaluation of Non-Incendive Circuits: CSA-C22.2 No 213-M1987, Cl. 6.4.1 (b)
UL1604, Para. 6

The following circuits were assessed as essentially resistive low level in accordance with the referenced clause when compared to the published curves:

Circuit	Available Voltage / Current / Power
Rotary Switches (SW2 & SW3)	3.0Vdc / 300μA (3.0Vdc through 10KΩ)
Push-Button Switches (SW1 & SW4)	3.0Vdc / 300μA (3.0Vdc through 10KΩ)
DIP Switch (SW5)	3.0Vdc / 300μA (3.0Vdc through 10KΩ)
Antenna	0.1W (RF output of on-board radio)

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Project 1966858 – Edition 2

This project covers the update of the drawing as shown below:

Subject	Existing Drawing		New Drawing		Description/Explanation of Revision
	Number	Rev.	Number	Rev.	
Control Drawing	134217	R1	134217	R2	The Control drawings was updated to add note 7 on page 2 which reads as follows: "The antenna circuit is non-incendive. As such, the antenna may be installed on the outside of the enclosure. Alternatively, it may be installed remote from the enclosure without the need for Class I, Division 2 wiring methods." This is acceptable as the antenna circuit was previously evaluated as non-incendive under project 1921239. No further testing was deemed necessary.

Project 2095494 – Edition 3

The following evaluation/tests were conducted in consideration of new Models DX70, DX80 and DX85.

1. The following tests were conducted under this project:

1.1 Temperature Std. C22.2 No 142-M1987, Cl. 6.4
UL916, Para. 40

Temperature Code Rating Std. C22.2 No 213-M1987, Cl. 6.2
ANSI/ISA-12.12.01-2007, Cl. 10.1

CAN/CSA - C22.2 No. 60079-0-07, Cl. 5.3
UL 60079-0:2005, Cl. 5.3
(IEC 60079-0:2007, Cl. 26.5.1.3)

The test samples were operated under the worst case normal operating conditions. Component temperatures were measured by thermocouple applied directly the component surface. Ambient temperatures were measured by thermometer. These tests are representative for all of the other versions.

1.1.1 FlexPower "Flex Boost" Node: Model DX80N9X2S2N2M2C

- powered by 90% to 110% of 3.6Vdc to 5Vdc → (+) to euro-cable grey wire and (-) to blue wire
- powered by 90% to 110% of 10Vdc to 30Vdc → (+) to euro-cable brown wire and (-) to blue wire
- configured at 95% duty cycle 24V boost (worst case)
- output loaded to maximum (20mA) → load connected across 24V Vboost (brown wire) and Analog 1+ (white wire)
- MGAGE powered in order for FlexPower "Flex Boost" Node to operate → battery pack connected to euro-connector → right button pressed 2 times until green LED turned on continuously
- the FlexPower "Flex Boost" Node left LED flickered green once per second indicating that it was synchronized with the MGAGE Gateway

Board	Component	Maximum Temperature Based on Input Voltage (°C)			
		3.24 Vdc	5.50 Vdc	9.0 Vdc	33.0 Vdc
Main	U6	29	29	35	36

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Main	L5	38	38	51	52
Main	D6	34	35	52	54
Main	R176	33	34	48	51
Main	IC4	32	32	41	42
	Ambient	25	25	25	25

1.1.2 Data Radio: Model DX80DR9M

- powered by 90% to 110% of 3.6Vdc to 5Vdc → (+) to euro-cable grey wire and (-) to blue wire data radio setup with special code to produce the maximum amount of heat possible by the electronics (RF output power set to maximum value allowed by FCC/IC; worst case normal operation)

Board	Component	Maximum Temperature Based on Test Setting and Input Voltage (°C)		
		3.24 Vdc	3.60 Vdc	5.50 Vdc
Main	U9	40	48	47
Radio	U2	45	57	57
Radio	U4	53	**71**	70
Main	U1	42	53	53
Radio	U3	47	63	62
	Ambient	26	**26**	26

Notes: The temperatures measured at an input voltage of 3.24 Vdc should be disregarded as the voltage was too low for the sample to function properly. The minimum operating voltage is 3.60 Vdc.

The maximum temperature rise above is on U4 above (radio board) as follows: 71°C - 26°C = **45°C.**

1.1.3 FlexPower Serial Node with Internal Lithium Cell: Model DX80N9X1S1S

- one XENO XL-205F Lithium Cell installed as intended
- unit operated in "non-synchronized" mode to draw the maximum amount of current from the internal lithium cell and produce the maximum amount of heat possible in the electronics
-

Board	Component	Max. Temp. (°C)
Main	U6	27
Main	REG1	28
	XENO XL-205F "Internal" Lithium Cell	27
	Ambient	25

1.1.4 DX81 FlexPower Battery Supply: Model DX81

- one XENO XL-205F Lithium Cell installed as intended
- output loaded to maximum 320mA, simulating worst case normal load → load connected across euro-cable grey and blue wires

Board	Component	Max. Temp. (°C)
Main	FET100	29
	XENO XL-205F "Internal" Lithium Cell	31
	Ambient	25

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1.1.5 Temperature Testing Notes:

1.1.5.1 A temperature code of T4 (135°C) is assigned to the apparatus based on the maximum temperature rise in the above tests (45°K) and the following calculation:

Tmax = 80°C ($T_{ambient}$) + 45°K (T_{rise}) + 5°K ($T_{measurement\ uncertainty}$) = 130°C

1.1.5.2 The XENO XL-205F lithium cell did not exceed its rated temperature (100°C) per IEC 60079-15:2005, Clause 22.2.5 based on the maximum temperature cell rise in the above tests (6°K) and the following calculation:

Tmax = 80°C ($T_{ambient}$) + 6°K (T_{rise}) + 5°K ($T_{measurement\ uncertainty}$) = 91°C

1.2 Pull Test CSA-C22.2 No.213-M1987, Cl. 4.2.2
ANSI/ISA-12.12.01-2007, Cl. 8.2

CAN/CSA-E60079-15-02 (R2006), Cl. 14.2
UL 60079-15:2002, Cl. 15
(IEC 60079-15:2005, Cl. 20.3)

The connectors were subjected to the 15N Pull Test in accordance with the referenced clause as recorded in the table below:

Results:

Circuit Board	Connector	Result
Internal Wiring Board with Pluggable Terminal Blocks	Pluggable Terminal Blocks	No Separation
Main Board	Glued DIN Board Connector	No Separation
N/A	Lithium Cell in Holder	No Separation

2. The following tests were conducted under other projects:

2.1 The following tests were conducted under CSA Project No. 150323-1921239 in consideration of DX91 Division 2 version of the product. These tests were considered representative for the DX70/80/85 versions as they are electrically identical (the DX70/80/85 versions just use a different internal wiring board with pluggable terminal blocks).

Temperature Std. C22.2 No 142-M1987, Cl 6.4
UL916, Para. 40

Temperature Code Rating Std. C22.2 No 213-M1987, Cl 6.2
UL 1604, Para. 9

The test samples were operated with the outputs fully loaded. Component temperatures were measured by thermocouple applied directly the component surface. Ambient temperatures were measured by thermometer.

Sample	Model	Type	Component	Measured Temperature (°C)

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1	DX91G9M6S4P8	Digital 4/8/0/0	REG2	89
			TVS23	78
			R170	83
			IC12	95
			REG1	90
2	DX91G9M6S0P0M4M4	Analog 0/0/4/4	REG1	104
			REG2	102
			Q24	113
			Q11	111
			Q10	112
3	DX91G9M6S4P4M2M2	Mixed 4/4/2/2	Q10	**116**
			Q11	110
			REG2	90
			D9	95
			REG1	92
			Ambient	24

A temperature code of T4 is assigned to the apparatus based on the above components having a surface area of less than 1000mm^2, a surface temperature of less than 200°C and power dissipation of less than 1W at an ambient temperature of 80°C as allowed by CSA C22.2 No. 60079-0-07, Cl. 5.5.

2.2 The following test was conducted under CSA Project No. 150323-2008243 in consideration of the DX99-I.S. Ex ia Aluminum Enclosure (Limatherm) version of the product. It resulted in an external surface temperature rise of 7K based on an internal temperature rise of 75K on components dissipating a power of 12.36W. That surface temperature rise was considered representative for that resulting from the DX70/80/85 circuit board components based on the simulated lithium cell having a much larger mass / available power and therefore capability of heating the enclosure.

Measurement for Maximum Surface Temperature — CSA-C22.2 No. 25-1966, Cl. 5.3
UL913:2006, Cl. 8

(IEC 61241-1:2004, Cl. 8.2.2.1)
(IEC 60079-31:2008, Cl. 6.1.2)
(IEC 70079-0:2007, Cl. 26.5.1.3)

Temperature was measured by a thermocouple applied directly to the enclosure surface; ambient by thermometer.

Apparatus: FlexPower/Instrumentation Aluminum Enclosure (Limatherm) Version

- the maximum surface temperature of the lithium cell under short-circuit conditions was determined in other testing to be 82.6°C at an ambient of 23°C
- the worst case power of the lithium cell under short-circuit conditions was determined in other testing to be 12.36W based on the maximum cell voltage (3.7V) and the maximum cell short-circuit current of (3.34A)
- the shorted lithium cell was simulated with twenty-two 100Ω/5W resistors connected in parallel connected to a 7.7V dc power supply
- the resultant current was measured to be 1.71A giving a power of 7.7V x 1.71A = 13.17W which is more than the worst case power of the lithium cell under short-circuit conditions (12.36W)
- the measured surface temperature of the resistors was at least 100°C which is more than the maximum surface temperature of the lithium cell under short-circuit conditions (82.6°C) → based on a Ta = 25°C, the temperature rise of the resistors was at least 75K

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- the maximum enclosure surface temperature location and enclosure orientation was determined at room temperature as recorded below
- the apparatus was placed in a chamber with the temperature adjusted to the rated ambient temperature of the apparatus (80°C)
- the maximum surface temperature of the apparatus was recorded below

Apparatus Orientation	Measurement Location	Test Chamber Temperature (°C)	Measured Surface Temperature (°C)	Maximum Surface Temperature Rise (°K)
Battery Compartment Cover Facing Up	Centre of Battery Compartment Cover	80	87	7

Max surface temperature based on T_{amb} of 80 °C was calculated to be 92°C based on 80°C (T_{amb}) + 7°C (T_{rise}) + 5°C ($T_{measurement\ uncertainty}$).

2.3 The following tests were conducted under CSA Project No. 150323-1921239 in consideration of DX91 Division 2 version of the product. This test was considered representative for the DX70/80/85 versions as they use the same glued ribbon cable connectors.

Pull Test: CSA-C22.2 No.213-M1987, Cl. 4.2.2
UL1604, Para. 5.2

(IEC 60079-15:2005, Cl. 20.3)

The glued connectors were subjected to the 15N Pull Test in accordance with the referenced clause as recorded in the table below:

Results:

Model	Type	Circuit Board	Connector	Result
DX91G9M6S4P4M2M2	Digital 4/8/0/0	Header	P8 (ribbon cable)	Connector remained intact.
		Main	P4 (ribbon cable)	Connector remained intact.

3. The following evaluation was conducted under this project:

3.1 Evaluation of Non-Incendive Circuits: CSA-C22.2 No 213-M1987, Cl. 6.4.1 (b)
ANSI/ISA-12.12.01-2007, Cl. 7.1 (b)

CAN/CSA-E60079-15-02 (R2006), Cl. 26.7
UL 60079-15:2002, Cl. 22.1
(IEC 60079-15:2005, Cl. 33.6)

The following circuits were assessed as non-incendive in accordance with the referenced clause when compared to the published curves:

Version	Circuit	Available Voltage / Current / Power
All	Rotary Switches	3.0Vdc / 300µA (3.0Vdc through 10KΩ)

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	Push-Button Switches	3.0Vdc / 300µA (3.0Vdc through 10KΩ)
	DIP Switch	3.0Vdc / 300µA (3.0Vdc through 10KΩ)
Data Radio and Flex Gateway Radio	Jumpers	3.0Vdc / 9.1mA (3.0Vdc through 330Ω)
All Versions except Data Radio and Flex Gateway Radio	Antenna	Series blocking capacitors (note 1) 0.1W RF output of on-board radio (note 2)
Data Radio and Flex Gateway Radio	Antenna	Series blocking capacitors (note1) 2W max including antenna gain (note 2)

Notes:

1. The RF output power of the radios without antenna is:

Radio	Power	FCC ID
900MHz	0.1W	TGUDX80
1W	1.0W	UE3RM1809
2.4GHz	0.057W	UE300DX80-2400

Antenna system gain is limited to maximum 3dB in order to assure RF power transmission below 2W when using the 1W radio. (See note 6 on control drawing C4-143086)

2. Antenna interfacing circuitry incorporates 200pF series blocking capacitors.

Project 2406567 – Edition 4: Update to cover minor alternative constructions and drawing revisions as follows:

1. Drawing Revisions:

Banner Engineering DX70/80/85 - CSA & LCIE Documents Changes										
				Existing Drawing			New Drawing			
Component	Function	Item	Subject	Document No.	Rev.	Shts	Document No.	Rev.	Shts	Description/Explanation of Revision
		C3	Label Drawing	134430_D2Z2	1	6	134430	B	7	- revision change from number to letter for administrative reasons - LCIE markings changed to match Certificate - LCIE certificate numbers updated - DX80 1 Watt Models added (new page 5) → same as existing DX80DR models except for model coding and firmware differences
Common Drawings	Common Drawings	C4	DX8x Control Drawing	143086	-	28	143086	A	30	- Banner text added (page 2) - slight format changes (page 4) - DX80 1 Watt Model codes added (new page 6) → same as existing DX80DR models except for model coding and firmware differences - multi-hop option added to model code (page 7) - minor layout changes (page 14) - minor layout changes (page 16) - minor layout changes (page 18) - DX80 1 Watt Models installation added (new page 20) → same as existing DX80DR models except for model coding and firmware differences - minor layout changes (page 24) - certification information added (page 28)

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Banner Engineering DX70/80/85 - CSA & LCIE Documents Changes										
				Existing Drawing			New Drawing			
Component	Function	Item	Subject	Document No.	Rev.	Shts	Document No.	Rev.	Shts	Description/Explanation of Revision
										- Banner contact information added and general reformatting (page 30)
		C5	Document Map	134429	A	6	134429	C	6	- updated to show latest drawing revisions
		C6	Document List	B_083034	2	2	B_083034	3	2	- updated to show latest drawing revisions
		C9	Limatherm Technical Document	B_083034	1	9	B_083040	1	9	- correction to document number in document list only (document did not change)
						0				
Radios	1Watt Radio	D11	Schematic	135496	A	2	135496	B	2	- changes L1 to 150 Ohms and C6 to 100pF → previous evaluation remains representative
		D12	Assembly	127767	6	1	127767	B	1	
		D13	BOM	127767BOM	6	3	127767BOM	B	3	
						0				
Mixed I/O	Main Board	D16	Schematic	128652	I	6	128652	J	6	- change of TVS part-number
		D18	BOM	126989BOM	B	12	126989BOM	C	12	- add R176 & R188 (1KΩ each) for RS485 bias → previous evaluation remains representative - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
	Wiring Board A, B	D23	Assembly Screw	133852	R1	1	133852	-	1	- revision change from number to letter for administrative reasons
		D24	BOM	132145BOM	-	1	133852 BOM	-	1	
	Wiring Board C	D28	Assembly	143727	1	1	143727	A	1	
		D29	BOM	143727BOM	1	1	143727 BOM	A	1	
						0				
Analog I/O	Main Board	D32	Schematic	137669	C	6	137669	E	6	- minor changes to option tables in schematic
		D34	BOM	131558BOM	B	14	131558 BOM	C	12	- add R176 & R188 (1KΩ each) for RS485 bias → previous evaluation remains representative - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
	Wiring Board A, B	D38	Assembly Screw	133981	R1	1	133981	-	1	- revision change from number to letter for administrative reasons
		D39	BOM	133420BOM	1	1	133981 BOM	-	1	
	Wiring Board C	D42	Assembly	143731	1	1	143731	A	1	
		D43	BOM	143731BOM	1	1	143731 BOM	A	1	
						0				
Digital I/O	Main Board	D45	Schematic	131689	D	10	131689	G	10	- change of TVS part-number
		D47	BOM	130122BOM	C	14	130122 BOM	D	14	- add R176 & R188 (1KΩ each) for RS485 bias → previous evaluation remains representative - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
	6600 Wiring Board C	D55	Assembly	143730	1	1	143730	A	1	- revision change from number to letter for administrative reasons
		D56	BOM	143730BOM	1	1	143730 BOM	A	1	
	8400	D60	Assembly Screw	133850	R1	1	133850	-	1	

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Banner Engineering DX70/80/85 - CSA & LCIE Documents Changes										
				Existing Drawing			New Drawing			
Component	Function	Item	Subject	Document No.	Rev.	Shts	Document No.	Rev.	Shts	Description/Explanation of Revision
	Wiring Board A, B	D61	BOM	132139BOM	1	1	133850_BOM	-	1	
	8400 Wiring Board C	D64	Assembly	143728	1	1	143728	A	1	
		D65	BOM	143728BOM	1	1	143728 BOM	A	1	
	4800 Wiring Board A, B	D69	Assembly Screw	133851	R1	1	133851	-		
		D70	BOM	132142BOM	1	1	133851 BOM	-		
	4800 Wiring Board C	D73	Assembly	143729	1	1	143729	A	1	
		D74	BOM	143729BOM	1	1	143729 BOM	A	1	
						0				
Flex Gateway and Data Radio	Main Board	D75	Raw PCB	129333	C	11	129333	D	11	- minor changes to option tables in schematic - add C80,C81 (22pF each) → previous evaluation remains representative - add R56 & R66 (1KΩ each) for RS485 bias → previous evaluation remains representative - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
		D76	Schematic	135497	B	4	135497	G	4	
		D77	Assembly 900MHz	137165	B	2	137165	F	2	
		D78	Assembly 2.4GHz	140809	2	2	140809	C	2	
		D79	BOM 900MHz	137165BOM	B	7	137165 BOM	F	7	
		D80	BOM 2.4GHz	140809BOM	2	7	140809 BOM	C	7	
						0				
Flex Boost Nodes	Main Board	D87	Schematic	129223	I	5	129223	J	5	- minor changes to option tables in schematic - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
		D89	BOM	127647BOM	C	10	127647 BOM	D	10	
	Wiring Board	D92	Assembly	142975	1	1	142975	A	1	- revision change from number to letter for administrative reasons
		D93	BOM	142975BOM	1	1	142975 BOM	A	1	
						0				
Flex 4400 Nodes	Main Board	D96	Schematic	135291	C	6	135291	D	6	- minor changes to option tables in schematic - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
		D98	BOM	135289BOM	B	10	135289 BOM	C	10	
	Wiring Board	D101	Assembly	142978	1	1	142978	A	1	- revision change from number to letter for administrative reasons
		D102	BOM	142978BOM	1	1	142978 BOM	A	1	
						0				
Flex Instrumentation Nodes	Main Board	D104	Schematic	129224	F	8	129224	G	8	- minor changes to option tables in schematic - 3.0V regulators changed to 3.3V → this is acceptable as shown in the non-incendive circuit evaluation section below this table → this is also acceptable from a temperature perspective as the 3.3V regulators sink less current and therefore dissipate less power than the previous 3.0V regulators
		D106	BOM	128565BOM	B	12	128565 BOM	C	12	
	Wiring Board	D109	Assembly	142981	1	1	142981	A	1	- revision change from number to letter for administrative reasons
		D110	BOM	142981BOM	1	1	142981 BOM	A	1	
						0				
MGAGE Standard	Main Board	D112	Schematic	131605	B	6	131605	C	6	- revision change from number to letter for administrative reasons

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Banner Engineering DX70/80/85 - CSA & LCIE Documents Changes										
				Existing Drawing			New Drawing			
Component	Function	Item	Subject	Document No.	Rev.	Shts	Document No.	Rev.	Shts	Description/Explanation of Revision
Nodes										

2. The following evaluation was conducted in consideration of the 3.0V regulators being changed to 3.3V.

Evaluation of Non-Incendive Circuits: CSA-C22.2 No 213-M1987, Cl. 6.4.1 (b)
UL1604, Para. 6
IEC 60079-15:2005, Cl. 30.4

The following circuits were assessed as essentially resistive low level in accordance with the referenced clause when compared to the published curves:

Version	Circuit	Available Voltage / Current / Power
All	Rotary Switches	3.**3**Vdc / 3**3**0µA (3.**3**Vdc through 10KΩ)
	Push-Button Switches	3.**3**Vdc / 3**3**0µA (3.**3**Vdc through 10KΩ)
	DIP Switch	3.**3**Vdc / 3**3**0µA (3.**3**Vdc through 10KΩ)
Data Radio and Flex Gateway Radio	Jumpers	3.**3**Vdc / **10**mA (3.**3**Vdc through 330Ω)

Tests and/or evaluation conducted previously in this report remained representative. No further testing was deemed necessary.

Project 2562697 - Edition 5

This project covers the update of the drawing as shown below:

Subject	Existing Drawing		New Drawing		Description/Explanation of Revision
	Number	Rev.	Number	Rev.	
Connector Gluing	134433	A	134433	B	- new connector glues were added - these new connector glues were subjected to testing below

Update Assessment/Tests:

1. Pull Test CSA-C22.2 No.213-M1987, Cl. 4.2.2
ANSI/ISA-12.12.01-2011, Cl. 8.2

CAN/CSA-C22.2 No. 60079-15:12, Cl. 20.3
UL 60079-15:2009, Cl. 20.3
(IEC 60079-15:2010, Cl. 7.3.5 (a))

The connectors (as listed below) were subjected to the 15N Pull Test in accordance with the referenced clause as recorded in the table below:

Results:

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Connector	Connector Adhesive	
	EFI Polymers 30030/40031 Two-Component Urethane	Resin Technology Group URA-BOND 21-MVNA Two-Component Polyurethane
Main Circuit Board Ribbon Cable	No separation.	No separation.
Header Circuit Board Ribbon Cable	No separation.	No separation.
DIN Board	No separation.	No separation.

Project 70012202 - Edition 6

This project covers:

1. New Models/variants.
2. Revised documents.

The new/revised documents as shown in the table below:

Component	Function	Item	Subject	Existing Drawing			New Drawing			Document Change Description/Explanation
				Document No.	Rev.	Shts	Document No.	Rev.	Shts	
Common Drawings	Common Drawings	C3	Label Drawing	134430_D2Z2	B	6	134430	C	9	- added labels for new models
		C4	DX8x Control Drawing	143086A	A	28+	143086	B	58	-added new models
		C5	Document Map	134429	C	6+	134429	D	13	- added new models
		C7	Exploded Mechanical View	134431	A	8	134431	E	19	- added new models
		C8	Enclosure Dimensions	134432	A	8	134432	C	15	- added new models
						0				
Mixed I/O	Main Board	D15	Raw PCB	126989	B	11	126989	E	11	- document change only → changed Note 1 on page 11 from "THIS IS A SIX LAYER THRU-HOLE AND SMD AND COB TECHNOLOGY DESIGN." to "THIS IS A SIX LAYER THRU-HOLE AND SMD TECHNOLOGY DESIGN."
		D16	Schematic	128652	J	6	128652	L	6	- correction to revision history (Rev. I was listed twice, so the second Rev. I becomes Rev. J, Rev. J becomes Rev. K) - variant table update done under Rev. L - the previous evaluation remains representative
		D17	Assembly	126989ASSY	B	2	126989ASSY	D	2	- document Rev. changed resulting from schematic Rev. change
		D18	BOM	126989BOM	C	12	126989BOM	E	12	- document Rev. changed resulting from schematic Rev. change
	Wiring Board Weatherford	D122	Raw PCB	-	-	-	176216	A	7	- the Weatherford wiring board is an alternative wiring board for use with the 4422 Line Powered (Mixed IO) devices - this board is designed specifically for Weatherford (a particular customer of Banner Engineering) - it has an added resistor divider to lower the voltage analog output from the standard 0-10V range to the millivolts range for a Weatherford terminal - the previous evaluation remains representative
		D123	Schematic	-	-	-	176217	A	1	
		D124	Assembly	-	-	-	176218	1	1	
		D125	BOM	-	-	-	176218BOM	1	1	
		*	Dimension Drawing	-	-	-	134266	*	0	
						0				
Analog I/O	Main Board	D31	Raw PCB	131558	B	11	131558	C	11	- document change only → changed Note 6 on page 11 from "FINISH PER BANNER ENGINEERING FLASH GOLD." to "FINISH PER BANNER ENGINEERING FINISH SPECIFICATION 120597 LATEST REV."
		D32	Schematic	137669	E	6	137669	F	6	- document change only → added circle to call out regulators changed for Rev E
		D34	BOM	131558BOM	C	12	131558BOM	E	12	- document change only → in header of documents, assembly number changed from "All ASSY" to "ALL PARTS" and Raw PCB revision changed from "B" to "C"
	Wiring Board C	D41	Schematic	139381	A	1	139381	B	1	- added no LED variant (option of not placing LED9) - the previous evaluation remains representative
						0				
Digital I/O	Main Board	D44	Raw PCB	130122	C	11	130122	D	11	- document change only → changed note 6 on page 11 from "FINISH PER BANNER ENGINEERING FLASH GOLD." to "FINISH PER BANNER ENGINEERING FINISH SPECIFICATION 120597 LATEST REV."
		D45	Schematic	131689	G	10	131689	H	10	- document changes only → updated variant table to include C18, IC14, R41, & R42 in the table and updated Variant table to include changes in R173, R176, R188, R189 & R195 - the previous evaluation remains representative
		D47	BOM	130122BOM	D	14	130122BOM	E	11	- document change only → increased raw PCB revision level
						0				
Flex Gateway and Data Radio	Main Board	D76	Schematic	135497	G	4	135497	H	4	- remove R70, R71, R72, R73, R74, R147, R165, R166, C31, C33, C36, C38, C39, C40, L2, D12, and U6 to remove Vbuck circuit (not being used/cost reduction) - add R167 to provide Vdd power to radio - replace U5 and U11 to go from 3.0V to 3.3 V regulators - the previous evaluation remains representative
		D77	Assembly 900MHz DX DATA RADIO	137165	F	2	129333ASSY	D	2	- individual assembly documents for 900MHz and 2.4GHz radios replaced by one document covering all radio versions → no change to construction
		D78	Assembly 2.4GHz	140809	C	2				
		D79	BOM 900MHz DX DATA RADIO	137165BOM	F	7	129333BOM	D	9	- individual BOM documents for 900MHz and 2.4GHz radios replaced by one document covering all radio versions → no change to construction
		D80	BOM 2.4GHz	140809BOM	C	7				
						0				

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Component	Function	Item	Subject	Existing Drawing			New Drawing			Document Change Description/Explanation
				Document No.	Rev.	Shts	Document No.	Rev.	Shts	
Flex Boost Nodes	Main Board	D86	Raw PCB	127647	C	11	127647	D	11	- document change only → changed note 6 on page 11 from "FINISH PER BANNER ENGINEERING FLASH GOLD." to "FINISH PER BANNER ENGINEERING FINISH SPECIFICATION 120597 LATEST REV."
		D89	BOM	127647BOM	D	10	127647BOM	E	10	- document change only → increased raw PCB revision level
						0				
MGAGE Standard Nodes	Main Board	D111	Raw PCB	127993	D	9	127993	E	9	- document change only → changed note 6 on page 11 from "FINISH PER BANNER ENGINEERING FLASH GOLD." to "FINISH PER BANNER ENGINEERING FINISH SPECIFICATION 120597 LATEST REV." and changed note 8 on page 11 from "ALL VIAS SHOULD BE FULLY TINTED" to "ALL VIAS SHOULD BE FULLY TENTED" ("tented" means that the solder mask is left over the via instead of being cleared)
		D112	Schematic	131605	B	6	131605	D	6	- updated regulators U11, U12, and REG4 from 3.0V to 3.3V - the previous evaluation remains representative
		D113	900MHz Assembly MGAGE Radio	131362	D	2	127993ASSY	D	2	- individual assembly documents for 900MHz and 2.4GHz radios replaced by one document covering all radio versions → no change to construction
		D115	2.4GHz Assembly	131604	R1	2				
		D114	900MHz BOM MGAGE Radio	131362BOM	D	6	127993BOM	D	11	- individual assembly documents for 900MHz and 2.4GHz radios replaced by one document covering all radio versions → no change to construction
		D116	2.4GHz BOM	131604BOM	R1	6				
						0				
Battery Supply	Single Cell Board' Variant 1	D118	Schematic	130024	-	1	130024	A	1	- C103 (super capacitor) updated from 550mF to 900mF
		D119	Assembly	126235	-	1	126235	A	1	- the previous evaluation remains representative as this component is not in a non-incendive circuit
						0				
Spec Sheets	Spec Sheets	S7	Pluggable Term. Blocks – Molex 5.08mm pitch Plug	-	-	0	395300009	-	1	- these are spec sheets for alternative plug/header terminal blocks to be used on existing and new units
		S8	Pluggable Term. Blocks – Molex 5.08mm pitch Header	-	-	0	395320009	-	1	- the following tests were deemed necessary: Pull Test - the new plug/header terminal blocks combinations were subject to a pull test under this project - refer to evaluation/test section below
		S9	Pluggable Term. Blocks – General Molex Specification 3.50mm & 5.08mm	-	-	0	PS-39500-001	-	2	
		S10	Pluggable Term. Blocks – Molex 3.50mm pitch Plug	-	-	0	395000009	-	1	
		S11	Pluggable Term. Blocks – Molex 3.50mm pitch Header	-	-	0	395021009	-	1	
		S12	Pluggable Term. Blocks – OST Plug	-	-	0	OSTTJXX11530	-	1	
		S13	Pluggable Term. Blocks – OST Header	-	-	0	OSTOQXX1251	-	1	
		S14	Pluggable Term. Blocks – Phoenix Plug	-	-	0	1840434	-	1	
		S15	Pluggable Term. Blocks – Phoenix Header	-	-	0	1844281	-	1	
						0				
Radios	HS 900MHz 1Watt Radio	D126	Raw PCB	-	-	-	161303	A	8	- this is a new radio module which is used in High Speed Data Radio below - refer to High Speed Data Radio section below for evaluation
		D127	Schematic	-	-	-	161304	C	2	
		D128	Assembly	-	-	-	161305	B	1	
		D129	BOM	-	-	-	161305BOM	B	4	
		*	Dimension Drawing	-	-	-	137867	*		
				-	-	-				
HP 4422 Discrete/ Analog	Main Board	D130	Raw PCB	-	-	-	148594	B	11	- this wireless network controller version (a.k.a. high power/multi-hop) is a variant of the previously certified Mixed I/O version with: - the existing wiring board or new wiring board - new main PCB - existing 1W radio - previous "C" plastic enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switches → same - front panel rotary switches → same - internal DIP switches → same - antenna → same Pull Test - ribbon cable glued → same Temperature - heat producing components → same
		D131	Schematic	-	-	-	148595	B	5	
		D132	Assembly	-	-	-	148594ASSY	A	2	
		D133	BOM	-	-	-	148594BOM	B	13	
		*	Dimension Drawing	-	-	-	125760	*		
	Wiring Board A, B	*	Raw PCB	-	-	-	139367	*		- this is the existing Mixed I/O wiring board
		*	Schematic	-	-	-	139369	*		
		*	Assembly	-	-	-	143727	*		
		*	BOM	-	-	-	143727BOM	*		
		*	Dimension Drawing	-	-	-	134266	*		
	Wiring Board Ext 4422 P2	D134	Raw PCB	-	-	-	161972	A	5	- this is a new wiring board - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - the following tests were deemed necessary: Pull Test - the new plug/header terminal blocks combinations were subject to a pull test under this project - refer to evaluation/test section below
		D135	Schematic	-	-	-	161973	B	1	
		D136	Assembly	-	-	-	161974	A	1	
		D137	BOM	-	-	-	161974BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	*	1	
FLEX HP W/Boost	Main Board	D138	Raw PCB	-	-	-	147932	B	11	- this wireless network controller version is a variant of the previously certified Flex Boost Node with: - the existing wiring board or one of two new wiring boards - new main PCB - existing 1W radio - previous "C" plastic enclosure or new "environmental enclosure" Note: the new "environmental enclosure" still must be installed in an IP54 enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switches → same
		D139	Schematic	-	-	-	147933	I	11	
		D140	Assembly	-	-	-	147932ASSY	B	2	
		D141	BOM	-	-	-	147932BOM	B	14	
		*	Dimension Drawing	-	-	-	125760	*		

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Component	Function	Item	Subject	Existing Drawing			New Drawing			Document Change Description/Explanation
				Document No.	Rev.	Shts	Document No.	Rev.	Shts	
										- front panel rotary switches → same - internal DIP switches → same - antenna → same Pull Test - ribbon cable glued → same Temperature - heat producing components → same
	Wiring Board	*	Raw PCB	-	-	-	142974	*		- this is the existing Flex Boost Node wiring board
		*	Schematic	-	-	-	142976	*		
		*	Assembly	-	-	-	142975	*		
		*	BOM	-	-	-	142975BOM	*		
		*	Dimension Drawing	-	-	-	134266	*		
	P1,P5 Wiring Board	D142	Raw PCB	-	-	-	172051	A	5	- this is a new wiring board - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - the following tests were deemed necessary: Pull Test - the new plug/header terminal blocks combinations were subject to a pull test under this project
		D143	Schematic	-	-	-	172052	A	1	
		D144	Assembly	-	-	-	172053	A	1	
		D145	BOM	-	-	-	172053BOM	A	1	
		D146	Assembly	-	-	-	176857	A	1	
		D147	BOM	-	-	-	176857BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	*		
	ENV Wiring Board	D148	Raw PCB	-	-	-	155782	A	5	- this is a new wiring board (Environmental Wiring Board) - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - terminal blocks are fixed type (not plug/header type) - the following tests were deemed necessary: Pull Test - pull test on Xeno Lithium cell in metal cell holder done under this project - refer to evaluation/test section below
		D149	Schematic	-	-	-	155783	A	1	
		D150	Assembly	-	-	-	155782ASSY	A	1	
		D151	BOM	-	-	-	155782BOM	A	1	
		D152	Dimension Drawing	-	-	-	155781	A	1	
HP Flex Instrum.	Main Board	D153	Raw PCB	-	-	-	148133	A	11	- this wireless network controller version is a variant of the previously certified Flex Instrumentation Nodes with: - the existing wiring board or one of two new wiring boards - new main PCB - existing 1W radio - previous "A" IP67 plastic enclosure or new "environmental enclosure" Note: the previous "A" IP67 plastic enclosure and new "environmental enclosure" still must be installed in an IP54 enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switches → same - front panel rotary switches → same - internal DIP switches → same - antenna → same Pull Test - ribbon cable glued → same Temperature - heat producing components → same
		D154	Schematic	-	-	-	148134	D	8	
		D155	Assembly	-	-	-	148133ASSY	A	2	
		D156	BOM	-	-	-	148133BOM	A	12	
		*	Dimension Drawing	-	-	-	125760	*		
	Wiring Board	*	Raw PCB	-	-	-	142980	*		- this is the Existing Flex instrumentation Node wiring board
		*	Schematic	-	-	-	142982	*		
		*	Assembly	-	-	-	142981	*		
		*	BOM	-	-	-	142981BOM	*		
		*	Dimension Drawing	-	-	-	134266	*		
	DX81 Battery W20 Wiring Board	D158	Raw PCB	-	-	-	180333	A	6	- this is one of the new wiring boards - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - pull test on Xeno Lithium cell in plastic cell holder previously done under project 2095494 - external connection made via a connector threaded into the enclosure NPT entry (the connector is secured with threaded screw collar) - no terminal blocks
		D159	Schematic	-	-	-	180334	A	1	
		D160	Assembly	-	-	-	180333ASSY	A	2	
		D161	BOM	-	-	-	180333BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	*		
	ENV Wiring Board	D163	Raw PCB	-	-	-	156189	A	5	- this is a new wiring board (Environmental Wiring Board) - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - terminal blocks are fixed type (not plug/header type) - the following tests were deemed necessary: Pull Test - pull test on Xeno Lithium cell in metal cell holder to be done - refer to evaluation/test section below
		D164	Schematic	-	-	-	156190	A	1	
		D165	Assembly	-	-	-	156191	A	1	
		D166	BOM	-	-	-	156191BOM	A	1	
		*	Dimension Drawing	-	-	-	155781	*		
Flex 12 IO NPN	Main Board	D167	Raw PCB	-	-	-	148980	B	11	- this wireless network controller version is a variant of the previously certified Digital I/O version (in this one, each I/O can be individually selected as an input or output through firmware) with: - the existing wiring board - new main PCB - existing 1W radio - previous "C" plastic enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switches → same - front panel rotary switches → same - internal DIP switches → same - antenna → same
		D168	Schematic	-	-	-	148981	E	5	
		D169	Assembly	-	-	-	148980ASSY	B	2	
		D170	BOM	-	-	-	148980BOM	B	10	
		*	Dimension Drawing	-	-	-	125760	*		

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Component	Function	Item	Subject	Existing Drawing			New Drawing			Document Change Description/Explanation
				Document No.	Rev.	Shts	Document No.	Rev.	Shts	
										Pull Test - ribbon cable glued → same Temperature - heat producing components → same
	Wiring Board	*	Raw PCB	-	-	-	142974	*		- this is the existing Flex Boost Node wiring board
		*	Schematic	-	-	-	142976	*		
		*	Assembly	-	-	-	142975	*		
		*	BOM	-	-	-	142975BOM	*		
		*	Dimension Drawing	-	-	-	134266	*		
FLEX 12 IO PNP	Main Board	D171	Raw PCB	-	-	-	155014	A	11	- this wireless network controller version is a variant of the previously certified Digital I/O version (in this one, each I/O can be individually selected as an input or output through firmware), with: - the existing wiring board or a new wiring board - new main PCB - existing 1W radio - previous "C" plastic enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switches → same - front panel rotary switches → same - internal DIP switches → same - antenna → same Pull Test - ribbon cable glued → same Temperature - heat producing components → same
		D172	Schematic	-	-	-	155015	F	8	
		D173	Assembly	-	-	-	155014ASSY	A	2	
		D174	BOM	-	-	-	155014BOM	B	11	
		*	Dimension Drawing	-	-	-	125760			
	Wiring Board	*	Raw PCB	-	-	-	139367	*		- this is the existing Mixed I/O wiring board
		*	Schematic	-	-	-	139369	*		
		*	Assembly	-	-	-	143727	*		
		*	BOM	-	-	-	143727BOM	*		
		*	Dimension Drawing	-	-	-	134266			
	PM Wiring Board	*	Raw PCB	-	-	-	161972	*		- this is a new wiring board - the previous evaluation remains representative due to the similarity in design as follows: Pull Test - ribbon cable glued → same - the following tests were deemed necessary: Pull Test - the new plug/header terminal blocks combinations were subject to a pull test under this project - refer to evaluation/test section below
		*	Schematic	-	-	-	161973	*		
		D175	Assembly	-	-	-	175079	A	1	
		D176	BOM	-	-	-	175079BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	A	1	
High Speed Data Radio	Main Board	D177	Raw PCB	-	-	-	147324	C	9	- this wireless network controller version is completely new model which can be used as a "RF wire replacement" - it consists of: - a new LAN wiring board or a new serial wiring board - new main PCB - the new HS 900MHz 1Watt Radio module - previous "C" plastic enclosure - look at LAN jack, push-buttons, DIP switches, jumpers, look at micro SD card slot - the following tests were deemed necessary: Rating Test - refer to evaluation/test section below Non-Incendive Evaluation - refer to evaluation/test section below Pull Test - refer to evaluation/test section below Temperature Test - refer to evaluation/test section below
		D178	Schematic	-	-	-	147325	E	5	
		D179	Assembly	-	-	-	147324ASSY	C	2	
		D180	BOM	-	-	-	147324BOM	C	9	
		*	Dimension Drawing	-	-	-	125760	*		
	LAN Wiring Board	D182	Raw PCB	-	-	-	180837	A	11	- this is a new wiring board - the following tests were deemed necessary: Non-Incendive Evaluation - refer to evaluation/test section below Pull Test - refer to evaluation/test section below Temperature Test - refer to evaluation/test section below
		D183	Schematic	-	-	-	180838	A	7	
		D184	Assembly	-	-	-	180839	B	2	
		D185	BOM	-	-	-	180839BOM	B	10	
		*	Dimension Drawing	-	-	-	134266	*		
	Serial Wiring Board	D186	Raw PCB	-	-	-	169134	A	5	- this is a new wiring board - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - there are no non-incendive circuits Pull Test - ribbon cable glued → same - terminal blocks are fixed type (not plug/header type) Temperature Test - there are no heat producing components
		D187	Schematic	-	-	-	169135	A	1	
		D188	Assembly	-	-	-	169136	A	1	
		D189	BOM	-	-	-	169136BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	*		
HB1 Flex 222 2SWP	Main Board	D190	Raw PCB	-	-	-	154708	B	9	- this wireless network controller version is a low cost variant of the previously certified Flex Boost Node with: - the wiring board and the main board being combined - no LCD display - only one push-button - direct soldered terminal block (not plug/header type) - existing 1W radio - line powered or battery powered - new plastic enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation
		D191	Schematic	-	-	-	154709	D	6	
		D192	Assembly	-	-	-	154708ASSY	B	2	
		D193	BOM	-	-	-	154708BOM	B	8	
		D194	Dimension Drawing	-	-	-	157052	A	1	

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Component	Function	Item	Subject	Existing Drawing			New Drawing			Document Change Description/Explanation
				Document No.	Rev.	Shts	Document No.	Rev.	Shts	
										- front panel push-button switch → same - front panel rotary switches → same - front panel DIP switches → same - antenna → same Pull Test - terminal blocks are fixed type (not plug/header type) Temperature - heat producing components → same
HB2 Flex 222 2AOT	Main Board	D195	Raw PCB	-	-	-	163673	A	9	- this wireless network controller version is a low cost variant of the previously certified Flex Boost Node with: - the wiring board and the main board being combined - no LCD display - only one push-button - direct soldered terminal block (not plug/header type) - existing 1W radio - battery powered only - new plastic enclosure - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - front panel push-button switch → same - front panel rotary switches → same - front panel DIP switches → same - antenna → same Pull Test - terminal blocks are fixed type (not plug/header type) Temperature - heat producing components → same
		D196	Schematic	-	-	-	163675	C	7	
		D197	Assembly	-	-	-	163673ASSY	A	2	
		D198	BOM	-	-	-	163673BOM	A	9	
		*	Dimension Drawing	-	-	-	157052	*		
Battery Supply	Single Cell Board Variant 2	D199	Raw PCB	-	-	-	173010	A	7	- this Battery Supply is a variant of the DX81 version with: - same Xeno Lithium cell - new electrolytic super-caps (2)installed on the circuit board instead of the soft-type super-cap - nothing else - previous DX81 "A" plastic enclosure - same flying lead terminated with a connector (the connector is secured with threaded screw collar) - the previous evaluation remains representative due to the similarity in design as follows: Non-Incendive Evaluation - none (there are no unsecured connectors, jumpers or normally arcing parts) Pull Test - pull test on Xeno Lithium cell in plastic cell holder previously done under project 2095494 Temperature - the only heat producing component is Xeno lithium cell → same
		D200	Schematic	-	-	-	173009	A	1	
		D201	Assembly	-	-	-	173553	A	1	
		D202	BOM	-	-	-	173553BOM	A	1	
		*	Dimension Drawing	-	-	-	134266	*		
TH3Q RS-485 Probe	Main Board	D203	Raw PCB	-	-	-	161259	B	9	- this is a new temperature/humidity probe, which: - is for Div 2 only - is line or battery powered - included RS-485 chip - has a 12mm threaded barrel - has a threaded connector - is fully encapsulated - will protrude from an IP54 enclosure (the connector and the cable will be in side of the IP54 enclosure) - the following tests were deemed necessary: Rating Test - refer to evaluation/test section below Non-Incendive Evaluation - refer to evaluation/test section below Pull Test - refer to evaluation/test section below Temperature Test - refer to evaluation/test section below Dielectric Strength Test - refer to evaluation/test section below
		D204	Schematic	-	-	-	161260	D	2	
		D205	Assembly	-	-	-	163506	B	2	
		D206	BOM	-	-	-	163506BOM	B	4	
		D207	Dimension Drawing	-	-	-	161258	A	1	
TH4Q Single Wire Probe	Main Board	*	Raw PCB	-	-	-	161259	*		- this is a new temperature/humidity probe, which: - battery powered only - has no RS-485 chip - has a 12mm threaded barrel - is fully encapsulated - refer to the evaluation above for the TH3Q RS-485 probe as it is representative
		*	Schematic	-	-	-	161260	*		
		D208	Assembly	-	-	-	161261	A	2	
		D209	BOM	-	-	-	161261BOM	A	4	
		*	Dimension Drawing	-	-	-	161258	*	*	

Note: A "*" indicates that the drawing is already listed for another version.

Project 70180491 – Edition 7: Update to cover alternate plastic material Enviroplas 122 for base enclosure used in models DX80DR9M-H3E, DX80DR2M-H3E, DX80DR9M-H4E, DX80DR2M-H4E. The dimensions, color and surface treatment will remain unchanged.

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The Enviroplas 122 has an f(1) rating for UV exposure and a relative temperature index 125°C (which is 45°C above the maximum service temperature of 80C). The minimum wall thickness is .11 inch (2.8 mm) with a V-0/5VA for 3.0 mm.

UPDATE ASSESSMENT/TESTS

The following was conducted in consideration of the revised/new documents outlined above:

1. Rating: Std. C22.2 No 142-M1987, Cl 6.3
UL916, Para. 39.1

Model	Input Voltage (Vdc)	Measured Input Current (A)	Condition
High Speed Data Radio	10Vdc	0.355	- apparatus configured for maximum power dissipation
	30Vdc	0.112	

Model	Input Voltage (Vdc)	Measured Input Current (A)	Condition
TH3Q RS-485 Probe	3.6Vdc	0.0036	- apparatus configured for maximum power dissipation
	24Vdc	0.0055	

2. Temperature Std. C22.2 No 142-M1987, Cl. 6.4
UL916, Para. 40

3. Temperature Code Rating Std. C22.2 No 213-M1987, Cl. 6.2
ANSI/ISA-12.12.01-2007, Cl. 10.1

CAN/CSA - C22.2 No. 60079-0-07, Cl. 5.3
UL 60079-0:2005, Cl. 5.3
(IEC 60079-0:2007, Cl. 26.5.1.3)

The test samples were operated under the worst case normal operating conditions. Component temperatures were measured by thermocouple applied directly the component surface. Ambient temperatures were measured by thermometer. These tests are representative for all of the other similar versions.

Model	Board	Component	Maximum Temperature (°C)	
			10Vdc	30Vdc
High Speed Data Radio	Main	L6	60.1	60.4
		U7	55.0	55.9
		L5	51.6	59.4
		D9	52.0	**60.5**
	LAN Wiring	IC9	46.3	47.0
		Ambient	24	24

Model	Board	Component	Maximum Temperature (°C)	
			3.6Vdc	24Vdc
TH3Q RS-485 Temperature/ Humidity Probe	Main	probe barrel	24.6	25.5
		thermistor	24.5	24.7

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		humidity IC	24.2	24.4
		LED window	24.5	25.5
		Ambient	24	24

Temperature Code Calculation

T = 60.5°C + (80°C - 24°C) = 116.5°C → Temperature Code T4 (135°C)

4. Dielectric Strength — Std. C22.2 No 142-M1987, Cl. 6.8.1(c)
UL916, Para. 49

Model: TH3Q RS-485 Temperature/Humidity Probe

500V applied between probe cable conductors and metal housing.

Results: No breakdown

5. Pull Test — CSA-C22.2 No.213-M1987, Cl. 4.2.2
ANSI/ISA-12.12.01-2011, Cl. 8.2

CAN/CSA-C22.2 No. 60079-15:12, Cl. 20.3
UL 60079-15:2009, Cl. 20.3
(IEC 60079-15:2010, Cl. 7.3.5 (a))

The applicable connectors (as listed in 6 below) were subjected to the 15N Pull Test in accordance with the referenced clause as recorded in the table below:

6. Evaluation of Non-Incendive Circuits: — CSA-C22.2 No 213-M1987, Cl. 6.4.1 (b)
ANSI/ISA-12.12.01-2007, Cl. 7.1 (b)

CAN/CSA-E60079-15-02 (R2006), Cl. 26.7
UL 60079-15:2002, Cl. 22.1
(IEC 60079-15:2005, Cl. 33.6)

The applicable circuits (as listed below) were assessed as essentially resistive low level in accordance with the referenced clause when compared to the published curves (Group IIC/ABCD).

Results:

Model	Board	Component	Pull Test		Non-Incendive Circuit
			Force	Pullout?	Voltage/Current/Power
All With "C" enclosure	Wiring	Molex terminal block plug w Molex header (5.08mm)	15N	No	-
		Molex terminal block plug w Amphenol header (5.08mm)	15N	No	-
		Amphenol terminal block plug w Molex header (5.08mm)	15N	No	-
		Amphenol terminal block plug w Amphenol header (5.08mm)	15N	No	-
		Molex terminal block plug w Molex header (3.50mm)	15N	No	-
		Molex terminal block plug w Phoenix Contact header (3.50mm)	15N	No	-
		Molex terminal block plug w O.S.T. header (3.50mm)	15N	No	-
		Phoenix Contact terminal block plug w Molex header (3.50mm)	15N	No	-
		Phoenix Contact terminal block plug w Phoenix Contact header (3.50mm)	15N	No	-
		Phoenix Contact terminal block plug w O.S.T. header (3.50mm)	15N	No	-
		O.S.T. terminal block plug w Molex header (3.50mm)	15N	No	-
		O.S.T. terminal block plug w Phoenix Contact header (3.50mm)	15N	No	-

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Model	Board	Component	Pull Test		Non-Incendive Circuit Voltage/Current/Power
			Force	Pullout?	
		O.S.T. terminal block plug w O.S.T. header (3.50mm)	15N	No	-
Flex HP w Boost & HP Flex Inst.	ENV Wiring	Xeno lithium cell in metal battery holder	15N	No	-
High Speed Data Radio	Main	Front Panel Push-Button Switches	-	-	3.3Vdc / 330µA (3.3Vdc through 10KΩ)
		Front Panel Rotary Switches (installed for units using the LAN wiring board)	-	-	3.3Vdc / 330µA (3.3Vdc through 10KΩ)
		SW3 (installed for units using the serial wiring board)	-	-	3.3Vdc / 330µA (3.3Vdc through 10KΩ)
		Internal DIP Switches	-	-	3.3Vdc / 330µA (3.3Vdc through 10KΩ)
		Jumper JP1 on P14 pins 1 & 2 or 2 & 3 Jumper JP2 on P13 pins 2 & 4 or 4 & 6 Jumper JP3 on P13 pins 1 & 3 or 3 & 5	10x mass	No	-
		RF	-	-	30dBm / 1W w new HS 900MHz 1W radio module
		Ribbon Cable Connector P7 → glued and previously pull tested	-	-	-
		Programming Connectors P4 & P8→ programming only	-	-	-
	LAN Wiring	Jumper J3 on P14 pins 1 & 3 or 3 & 5 Jumper J4 on P14 pins 2 & 4 or 4 & 6	10x mass	No	-
		Battery B1 → soldered	-	-	-
		Micro SD Card	10x mass	No	-
		Jumper J5 on P33 pins 1 & 2 or 2 & 3	10x mass	No	-
		LAN Jack J1 → mechanically secured	-	-	-
		Internal DIP Switches SW1	-	-	3.3Vdc / 33µA (3.3Vdc through 100KΩ)
		Push Button Switch SW2	-	-	3.3Vdc / 330µA (3.3Vdc through 10KΩ)
		Ribbon Cable Connector P9 → glued and previously pull tested	-	-	-
		Programming Connectors P11→ programming only	-	-	-
		USB Connector → no connection in the Hazardous Location	-	-	-
Temperature/ Humidity Probes	Main	Thermistor	-	-	3.3Vdc / 4.4mA (3.3Vdc through 1KΩ // 3KΩ)
		Humidity IC	-	-	refer to Spark Test below

7. Spark Ignition: CSA-C22.2 No 213-M1987, Cl. 6.5
ANSI/ISA-12.12.01-2007, Cl. 11

The following was conducted under worst case normal operating conditions.

Test Mixture: Hydrogen/Air

Model: TH3Q RS-485 Temperature/Humidity Probe

- input voltage: 24Vdc
- "VDD" was shorted to "VASW" for the purpose of the spark test (to ensure that the short circuit current was available for the duration of the spark test)
- voltage regulator REG3 was allowed to limit current according to its normal function

Tester Contacts: shorting humidity IC circuit positive to negative as it is exposed at the tip of the probe

OCV (Volts)	SCC (Amps)	Result
3.28	0.286	No Ignition

Evaluates humidity IC circuit.

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Project 70180491 Edition 7

With the alternate plastic material for the enclosure base, no testing is deemed necessary.

Project 70192069 Edition 8

Construction Review:

Construction review not applicable. The report was updated due to Ed. 7 Report numbering error, which is corrected in this edition of the report.

Project 80121014 – Edition 9

The scope of this project includes:

Address FIR issues – dated 05-26-2022, 12-15-2021, 03-17-2021, 08-24-2020, 06-18-2020

Item	FIR issue	Client Response	CSA Comment	Verdict	CSA action
1	CSA Descriptive Report Page No: 14, Banner Engineering DX70/80/85 Docs, calls for: FLEX 12IO PNP - Main Board, DWG: 155014ASSY, Rev. A, however, during the inspection, the following component was found: FLEX 12IO PNP -Main Board, DWG: 155016, Rev. E.	- 155014 illustrates the base component used for different model variations - 155016 is assy for a 900Mhz version and calls the 155014 assy board as a component -dwg 155016 provided	- 155014 is the base part used across all models - BOMs are used for model variations and clarify the use of DWG 155014 - Drawing 155016 Rev E is used as an instruction document by client and cannot be representative of the product where 155014 does	Pass	- Not added to descriptive documents as 155016 is an internal document to track changes for a specific variation that is not important to assessment
2	Report Page No. 31, 4.1 Plastic Enclosure Versions, - cites LCD lens top: Sabic polycarbonate Lexan Resin 123 - Lens Material used : Makrolon, 2407.	Sabic 123 in report - RTI 100C (20K over max service temp) - Mtl data sheet provided for Sabic and Makrolon -Makrolon shows better properties than Sabic 123	-Reviewed comparison sheet provided -properties exceed original matl - May be added as alternate	Pass	- Add Makrolon matl to report as alternate - Add spec sheets to folder
3	Enclosure Top Material: FIR finding: Made of PC Sabic Lexan CFR7431. Report cites made with Sabic PC Lexan 505RU.	Not address by response. Confirmed use is 505RU and CFR7431 CFR7431 Datasheet	- New Material properties compared - find CFR 7431 would be acceptable for application - confirmation needed	Pass	- add material as an alternate in report - Add Material spec sheet to folder

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4	Enclosure (Base): - Matl in Report Sabic Resin 143R. - Being Used - ENVIROPLAS 122-70820 Black, p/n: 197840	- Confirmed enclosure Base material Sabic 143R Sabic Lexan Resin 143R - Sabic material has RTI 130°C - 50°C above 80C maximum service temperature EnviroPlas 122 - yellow card provided - CSA Accepted under report 70180491 - RTI 125C (45C over max service temp) - Flammabilty rated V-0 - rated f1 for UV outdoor use	- Report edition 7 accepted Enviroplas material - EnviroPlas 122 data sheet indicate better properties than Sabic 143	Pass	No action required
5	DESCRIPTIVE DOCUMENTS: DWG: 143086, DX8x Control Drawing, Rev. C * The report is showing Rev. B	The change from Rev. B to Rev. C was to remove obsoleted models, converted to current document format and updated warranty - Rev C dwg provided	This is an instruction Manual. Changes do not impact previous assessment - Acceptable	Pass	- Document change and Update rev level in report - Add rev C document to folder
6	DESCRIPTIVE DOCUMENTS: DWG: 134429, Document Map, Rev. A * The report shows Rev. D	- Rev D provided in previous report update - However, Banner dwg error … Rev level on doc. Shown as A - error in Banner documentation	- 134429 rev D Previously accepted under report update Edition 6	Pass	- Make sure Rev D included in DD
7	DESCRIPTIVE DOCUMENTS: - DWG: 134431, Exploded View, Rev. F - The report has Rev. E	Change was made to Mechanical design Result : Has improved for single-chamber Limatherm DX99 devices	Reviewed Document This a drawing illustrating construction via exploded view. There is no detail that would affect certification	Pass	-Upgrade report rev level in descriptive documents
8	DESCRIPTIVE DOCUMENTS: - DWG: 134433, Connector Gluing, Rev. A - The report is at Rev. B	Revision "B" introduced via Project 2562697 - Edition 5 Drawing submitted to CSA may have had an Rev level error	Finding: Document in project folder already Rev B. Accepted per Edition 5 Update	Pass	Nothing to do

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9	Descriptive Documents DWG: 128446, Raw PCB, Rev. B - The CSA report shows the revision at A	Revision B, listing alternate adhesive, has been uploaded to ORACLE as evidenced by the screen shot below: Dwg 128446 Rev B supplied	- Rev B was to SWITCH TO BANNER STANDARD FINISH 120597. - Std finish documented and accepted in report	Pass	- drawing in folder from previous update - change rev level in report
10	Descriptive Documents - Part # 131755, PCB ASSY DX80 INST RTD B128565. (Not found in the report) DRW No. 131755 - PCB Assembly REV A (Not as per the report)	- 131755 included in 128565/128565ASSY/ 128565BOM - documents listed in the report due to similarities B128565 and 128565. - Dwg131755 provided	- Drawing 131755 not previously identified as critical - considered this as supplementary document for Banner use - guidance for processing - CSA does not require manufacturer's instructions be included	Pass	Does not need to be added

Ordinary Location Assessment

An evaluation check conducted by a qualified CSA certifier was deemed acceptable for the applicable ordinary location standards list in this report.

Acceptance is based on a review of responses provided from the client tabled above.
Evidence is documented in this project folder. Please see email stored the communications folder of this report.

Construction Review:

Construction review performed on relevant clauses affected by the modifications as follows.

CSA C22.2 No. 94-M1991			
Clause	Requirement - Test	Result - Remarks	Verdict
6.13	Polymeric Enclosure Materials		
6.13.1	Flammability of Enclosure		

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CSA C22.2 No. 94-M1991			
Clause	Requirement - Test	Result - Remarks	Verdict
6.13.1.4	(a) the enclosure material shall not continue to burn for more than 1 min after the fifth application of the test flame; (b) particles shall not drip from the test sample at any time during the test; and (c) the material shall not be destroyed in the area of the test flame to the extent that the integrity of the enclosure is affected.	Alternate Material: - EnviroPlas 122: Flammabilty V-0 @ 1.5 mm (UL Yellow Card E192776-101601832) This material has been accepted under project 70180491 of this report. Furthermore, The Flammability rating of this material V-0 @1.5mm is better than the preciously accepted material Sabic polycarbonate Lexan Resin 143R which has Flammability rating HB @0.76mm. - Lexan Elcres CFR7431: Flammability V-0 @ 1.2mm (UL Yellow Card E121562-100922880) This Flammability rating of this material V-0 @1.2mm is better than the previously Sabic polycarbonate Lexan Resin 505RU which has Flammability rating V-0 @ 1.5mm. - Makrolon 2407: Flammability HB @ 2.7mm (UL Yellow Card E41613-104520401/233136) Product comparation show that the Flammability of this material is a bit better than the previously accepted material Sabic 123.	Test waived Test waived Test waived

CAN/CSA-E60079-15:02			
Clause	Requirement - Test	Result - Remarks	Verdict
5.5	Non-metallic enclosures, non-metallic parts of enclosures		
5.1	… Canadian Deviations Electrical enclosures shall meet the requirements in Clauses 5.1.1 to 5.1.3 or, where permitted by other Canadian National Standards for electrical and fire safety, the enclosures shall be acceptable when constructed in accordance with those standards.	The alternate enclosure materials, as shown on the above section of this project, are at least better than the existing materials, which have been accepted on previous editions of the report, meet the applicable standard CSA C22.2 No. 94-M1991. The requirement of this clause is waived.	Test waived
5.1.3	Where the enclosure is completed by the installation of the apparatus the marking shall include the symbol "X" and the manufacturer shall provide relevant information in the documentation in accordance with clause 29.	Complied. See Notes/Special Condition for Safe Use in Products section of this report.	Pass

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CAN/CSA-E60079-15:02			
Clause	Requirement - Test	Result - Remarks	Verdict
5.5.1	Non-metallic materials shall have a temperature index TI corresponding to the 20 000 h point (see IEC 60216-1 and IEC 60216-2) or a continuous operating temperature (COT) of at least 10 K greater than the temperature of the hottest point of the enclosure or part of the enclosure having regard to the maximum ambient temperature in rated service according to data supplied by the material manufacturer.	Alternate Material: - EnviroPlas 122: RTI 125°C @ 1.5mm - Lexan Elcres CFR743: RTI 125°C @ 1.0mm - Makrolon 2407: RTI 125°C @ 1.5mm The RTI of the above alternate materials are at 45C above the maximum service temperature of 80°C	Test waived

Product changes are minor.

Material changes cited in FIR are not changes or additions.
Report updated to document alternate materials and include supporting engineering rationale where required.
Changes to report do not affect previous assessment

Consideration of Notices:

CSA Informs Hazardous Locations Products No. 25A specifies **withdrawal of CSA C22.2 No. 142-M1987**, and replacement with CAN/CSA C22.2 No. 61010-1-12. The manufacturer has been provided with a copy of this Informs.

As per Attachment 2, Clause 2 c) (i) of CSA Informs Hazardous Locations Products No. 25A, the following CSA Standards apply to previously certified equipment with no changes or minor alterations:
(i) C22.2 No. 142-M1987; or
(ii) CAN/CSA C22.2 No. 1010.1-92; or
(iii) CAN/CSA C22.2 No. 61010-1-04; or
(iv) CAN/CSA C22.2 No. 61010-1-12.

To Update this Report as per the scope of the project, for the previously certified models we can still apply C22.2 No. 142-M1987 and update the report accordingly.

CSA Certification Notice Hazardous Locations Products No. 28 specifies the **withdrawal of CSA C22.2 No 213-M1987**, and replacement with CAN/CSA C22.2 No 213-17. The manufacturer has been provided with a copy of this Notice.

Up until December 31, 2022U, the following CSA Standards apply when evaluating any revision of existing CSA certified Non-Incendive electrical equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 hazardous (classified) location:
(i) CSA C22.2 No. 213-M1987;
(ii) CSA C22.2 No. 213-2016;
(iii) CSA C22.2 No. 213-2017

Class Number 3218 02 are identified by CSA Notice: Hazardous Locations No. 35 (issue date: May 14, 2021). Existing certified Enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations; Up until

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December 31, 2022, the following CSA Standards apply when evaluating any revision of existing CSA certified Enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations:

(i) CSA C22.2 No. 25-1966 (reaffirmed 2014);
(ii) CSA C22.2 No. 25-17;

CSA Notice Enclosures No. 3 - The manufacturer has been provided with Notice Enclosures No. 3 that specify the date regarding the withdrawal of C22.2 No . 94-M91. Manufacturers of environmentally rated devices currently certified using C22.2 No. 94-M91 must have their products re-evaluated for compliance with requirements of CSA C22.2 No. 94.2-15 or latest version.

CSA C22.2 No. 0:M91 is being removed from the list of applicable standards list with this edition of the report. This standard is a horizontal standard, not a product standard not required to be listed in the Applicable Requirements.

Project 80153555 – Edition 10

Update report 1921239 for addition of alternate equivalent component enclosure material Tristar PC-10FRN. This project assumes there will be a follow up project to perform mandatory standard updates.

Material Comparison current materials.

Originally specified component(s):				
Designation	Value / Rating	Manufacturer	Part Number	Certification
Lexan 143R	• UV stabilizer added • Flammabilty HB @ 1.5mm • RTI 130C	Sabic	N/A	UL Yellow Card E121562-220862
Enviroplas 122	• UV protected for outdoor use • Flammabilty V-0 @ 1.5mm • RTI 125C	Enviroplas	N/A	UL Yellow Card E192776-101601832

The following alternative equivalent component enclosure material with equivalent ratings is added in the descriptive section of this report.

Replacement components:				
Designation	Value / Rating	Manufacturer	Part Number	Certification
Tristar PC-10FRN	• UV protected for outdoor use • Flammabilty V-0 @ 1.5mm • RTI 125C	Amco Polymers	N/A	UL Yellow Card E155285-223920

Construction Review:

Construction review performed on relevant clauses affected by the modifications as follows.

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Standard	Clause	Requirement	Result	Verdict
CSA C22.2 No. 94-M1991	6.13.1.4	a) the enclosure material shall not continue to burn for more than 1 min after the fifth application of the test flame; (b) particles shall not drip from the test sample at any time during the test; and (c) the material shall not be destroyed in the area of the test flame to the extent that the integrity of the enclosure is affected.	Tristar PC-10FRN; Flammability V-0 @ 1.5mm UL Yellow Card E155285-223920	Test Waived
CSA C22.2 No. 142-M1987	4.2.9 6.11	Flammability of Polymeric Enclosures	Tristar PC-10FRN; Flammability V-0 @ 1.5mm UL Yellow Card E155285-223920	Test Waived
CSA C22.2 No. 213-M1987	5.2	Enclosures must provide a suitable degree of protection against deterioration of the equipment which would adversely affect its suitability for use in Class I, Division 2 Locations.	New Alternate enclosure base Polymeric Material is of equivalent material, temperature rating, and flammability.	Accepted.
CSA / UL 60079-0	7.1.2.2	Plastic Enclosures The specification for plastic materials shall include the following: a) the name or registered trademark of the resin manufacturer or compounder; b) the identification of the material, including its type designation and colour; c) the possible surface treatments, such as varnishes, etc.; d) the temperature index TI, corresponding to the 20 000 h point on the thermal endurance graph without loss of flexural strength exceeding 50 %, determined in accordance with IEC 60216-1 and IEC 60216-2 and based on the flexing property in accordance with ISO 178. If the material does not break in this test before exposure to the heat, the index shall be based on the tensile strength in accordance with ISO 527-2 with test bars of Type 1A or 1B. As an alternative to the TI, the relative thermal index (either RTI – mechanical strength or RTI – mechanical impact) may be determined in accordance with ANSI/UL 746B. e) when applicable, data supporting compliance with 7.3 (resistance to ultraviolet light).	Amco Polymers Tristar PC-10FRN; Flammability V-0 @ 1.5mm, yellow or black, no fillers, UV protected for outdoor use RTI 125°C UL Yellow Card E155285-223920	Accepted.

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Standard	Clause	Requirement	Result	Verdict
CAN/CSA-E60079-15:02	5.1	Canadian Deviations Electrical enclosures shall meet the requirements in Clauses 5.1.1 to 5.1.3 or, where permitted by other Canadian National Standards for electrical and fire safety, the enclosures shall be acceptable when constructed in accordance with those standards.	The alternate enclosure materials, as shown on the above section of this project, are at least better than the existing materials, which have been accepted on previous editions of the report, meet the applicable standard CSA C22.2 No. 94-M1991. The requirement of this clause is waived.	Test waived
CAN/CSA-E60079-15:02	5.1.3	Where the enclosure is completed by the installation of the apparatus the marking shall include the symbol "X" and the manufacturer shall provide relevant information in the documentation in accordance with clause 29.	Complied. See Notes/Special Condition for Safe Use in Products section of this report.	Pass
CAN/CSA-E60079-15:02	5.5.1	Non-metallic materials shall have a temperature index TI corresponding to the 20 000 h point (see IEC 60216-1 and IEC 60216-2) or a continuous operating temperature (COT) of at least 10 K greater than the temperature of the hottest point of the enclosure or part of the enclosure having regard to the maximum ambient temperature in rated service according to data supplied by the material manufacturer.	Alternate Material: - EnviroPlas 122: RTI 125°C @ 1.5mm - Lexan 143R: RTI 130°C @ 1.5mm - Tristar PC-10FRN: RTI 125°C @ 1.5mm The RTI of the above alternate materials are at 45°C above the maximum service temperature of 80°C	Test waived

Due to the minor alteration to the report, CSA C22.2 No. 142-M1987 and CSA C22.2 No. 213-M1987 are accepted. The client is hereby notified to immediately perform a subsequent update (Projects 80080329 and 800803331) to satisfy the following:

See Hazardous Locations Certification Informs 25A regarding withdrawal dates for Standard C22.2 No. 142-M1987. The modifications in this report are considered major alterations, therefore C22.2 No. 142-M197 Is being removed as confirmed by CSA's TI group. See Attachment 2, Section (2) on previously certified equipment, sub paragraph (b), at which time Standard CAN/CSA-C22.2 No. 61010-1-12 applies after January 1, 2018.

See Notice Hazardous Locations Products No. 28 regarding the publication of CSA C22.2 No. 213-2017 which recommends the upgrade from CSA C22.2 No. 213-M1987 after December 31, 2022 when evaluating any revision of existing CSA certified Nonincendive electrical Equipment for use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (classified) location.

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Project 80179349 – Edition 11

Update of Certificate 1921239 to address issues noted in FC# 226070, FIR dated May 31, 2023, and FIR dated Dec. 6, 2023, and FIR dated March 19, 2024. Marking needs review, revised descriptive drawing required.

FIR's and Client Response are stored in Supporting Documents for this project.

The PRODUCTS section of this edition of report has been updated, Temperature Codes added to markings line and Ambient Temperature Range moved.

FIR dated May 31, 2023

Item	FIR issue	Client Response	CSA Comment	Verdict	CSA action
1	Nonconforming Products Page 1 FIR May 31, 2023, item 1	- 155014 illustrates the base component used for different model variations - 155016 is assy for a 900Mhz version and calls the 155014 assy board as a component -dwg 155016 provided	"Resolved Comment - Verified material for the enclosure top, bottom, and clear plastic satisfactory. Resolved 12-06-2023 17:49".	Pass	Material specified in Edition 10 of this report.
2	Nonconforming Products Page 1 FIR May 31, 2023, item 2	The delisted DX80N9X6S-PB2 (162616) includes the 155267 PCB assembly (populated circuit board).	Remove HB2 Flex 222 2AOT drawings from report.	Pass	Remove HB2 Flex 222 2AOT drawings from report.
3	Nonconforming Products Page 1 FIR May 31, 2023, item 3	Found the following nonconformance CSA 09 1921239X Which differs from section Markings Section, Page 4 of CSA Descriptive Report which calls for CSA 22 CA1921239X	Report Edition #10 had a typo 09/22 where the 09 is actually correct as the first use of 60079 (per 2023-08-14 e-mail). The typo had been corrected in the draft report.	Pass	Markings Section of this report is corrected to CSA 09 CA1921239X

FIR dated Dec. 6, 2023

Item	FIR issue	Client Response	CSA Comment	Verdict	CSA action
1	Nonconforming Products Page 1 FIR Dec 6, 2023, item 1	D11, D12, D13 to be corrected to Rev C D126 to be corrected to Rev C D127 to be corrected to Rev E D128, D129 to be corrected to Rev D D16 to be corrected to Rev N. Remove Mixed I/O drawings D19 correct to Rev A	Update in this report, below.	Pass	Update Drawings below
2	Nonconforming Products Page 2 FIR Dec 6, 2023, item 2	25196 DX80N9X6S-PB2 includes subassembly node 162616. 162616 BOM callout for base Banner part number 156026 Base which is composed of Polylac PA765. From report 1921239 page 36 Tested, Project 2095494 – Edition 3 The following evaluation/tests were conducted in consideration of new Models DX70, DX80 and DX85. These tests are representative for all of the other versions. Subassembly Node 143764 includes part	Alternate Materials were added in previous Editions of this Report.	Pass	No Changes

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Item	FIR issue	Client Response	CSA Comment	Verdict	CSA action
		number 128111 cover DX80 of Polylac 765, part number 151643.			

FIR dated March 19, 2024

Item	FIR issue	Client Response	CSA Comment	Verdict	CSA action
1	Nonconforming Products Page 1 FIR March 19, 2024, item 1	Same as Item 2 of FIR May 31, 2023 - We request that section "HB2 Flex 222 2AOT" be removed from the report.	Remove HB2 Flex 222 2AOT drawings from report.	Pass	Remove HB2 Flex 222 2AOT drawings from report. drawings 163673, 157052 and 163675

Descriptive Documents Removed

The following drawings are removed from the Descriptive Documents List of this report:

Remove from part B Documents

The client has discontinued build of the HB2 Flex 222 2AOT, and requests that these drawings be removed from the descriptive documents list.

Banner Engineering DX70/80/85 Documents					
Component	Function	Item	Subject	Document No.	Rev.
HB2 Flex 222 2AOT	Main Board	D195	Raw PCB	163673	A
		D196	Schematic	163675	C
		D197	Assembly	163673ASSY	A
		D198	BOM	163673BOM	A
		*	Dimension Drawing	157052	*

Mixed I/O	Main Board	D15	Raw PCB	126989	E
		D16	Schematic	128652	L
		D17	Assembly	126989ASSY	D
		D18	BOM	126989BOM	E
		D19	Dimension Drawing	125760	-
	Wiring Board A, B	D20	Raw PCB	132145	A
		D21	Schematic	132147	B
		D22	Assembly Lever	132146	A
		D23	Assembly Screw	133852	-
		D24	BOM	133852BOM	-
		D25	Dimension Drawing	133510	-
	Wiring Board C	D26	Raw PCB	139367	A
		D27	Schematic	139369	A
		D28	Assembly	143727	A
		D29	BOM	143727BOM	A
		D30	Dimension Drawing	134266	-
	Wiring Board Weatherford	D122	Raw PCB	176216	A
		D123	Schematic	176217	A
		D124	Assembly	176218	1
		D125	BOM	176218BOM	1
		*	Dimension Drawing	134266	*

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Remove from Part A Documents
Models DX90, DX91, and DX95

Subject	Doc #	Drawing No.	Rev.
Mixed 4422 Main PCB Component Layout	2 or 9 or D15	126989	D
Mixed 4422 Main PCB Bill of Materials	2 or 9 or D15	126989	D
Mixed 4422 Header PCB Drill Details	11 or D20	132145	A
Mixed 4422 Header PCB Bill of Material	11 or D20	132145	A

Descriptive Documents Revised or Replaced
The following drawings are revised or replaced in the Descriptive Documents List of this report:

Item	Number	Prev.	Rev	Acceptability
D11	135496	B	C	Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D12	127767	B	C	Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D13	127767BOM	B	C	Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D126	161303	A	C	Rev B ADF7023, replaced by Rev C. Rev C Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D127	161304	C	E	Rev D ADF7023, replaced by Rev C. Rev E Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D128	161305	B	D	Rev C ADF7023, replaced by Rev C. Rev D Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
D129	161305BOM	B	D	Rev C ADF7023, replaced by Rev C. Rev D Per UPG2009TB-E3-A datasheet (Rev B U3), CG2409M2 (Rev C IC2) is a drop in replacement. No effect to Temperature Ratings, or protection methods.
*	125760	---	A	Dimension Drawing replaced by Rev. A., renamed for document management systems use. No effect to Temperature Ratings, or protection methods.
*	134266	---	---	Dimension Drawing Replaced by 194755 A
*	194755	---	A	Replaces 134266 for Panel of 2 notes added for manufacturability. No effect to Temperature Ratings, or protection methods.
D26	139367	A	B	Rev B – Updated Score Depth – notes added for manufacturability, No effect to Temperature Ratings, or protection methods.

Construction Review:

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Construction review not applicable. IC Change is drop-in replacement with no effect to ratings, temperature, or protection method.

The Manufacturer has advised that the DX80 will not carry Hazloc Markings at the end of notice dates and will delist at that time.

Notice of Applicable Requirements Update
CAN/CSA-C22.2 No. 94-M91 / UL 50E 2nd Ed:2007
CSA Notice Enclosures No. 3 - The manufacturer has been provided with Notice Enclosures No. 3 that specify the date regarding the withdrawal of C22.2 No. 94-M91. Manufacturers of environmentally rated devices currently certified using C22.2 No. 94-M91 must have their products re-evaluated for compliance with requirements of CSA C22.2 No. 94.2-15 or latest version.

CSA Std. C22.2 No. 142-M1987 / UL Std. No. 916:1998
CSA Informs Hazardous Locations Products No. 25A specifies **withdrawal of CSA C22.2 No. 142-M1987**, and replacement with CAN/CSA C22.2 No. 61010-1-12. The manufacturer has been provided with a copy of this Informs.

CSA Std. C22.2 No. 213-M1987 / ANSI/ISA-12.12.01-2007
CSA Certification Notice Hazardous Locations Products No. 28 specifies the **withdrawal of CSA C22.2 No 213-M1987**, and replacement with CAN/CSA C22.2 No 213-17 or later. The manufacturer has been provided with a copy of this Notice.

CSA Std. C22.2 No. 25-1966 / UL 1203
Class Number 3218 02 are identified by CSA Notice: Hazardous Locations No. 35 (issue date: May 14, 2021). Existing certified Enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations; Up until December 31, 2022, the following CSA Standards apply when evaluating any revision of existing CSA certified Enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations: (i) CSA C22.2 No. 25-1966 (reaffirmed 2014); (ii) CSA C22.2 No. 25-17.

This Edition supersedes all previous editions.

---End of Report---

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