

Sure Cross[®] Intrinsically Safe Control Drawings

Instruction Manual

Original Instructions
141513 Rev. G
10 December 2015



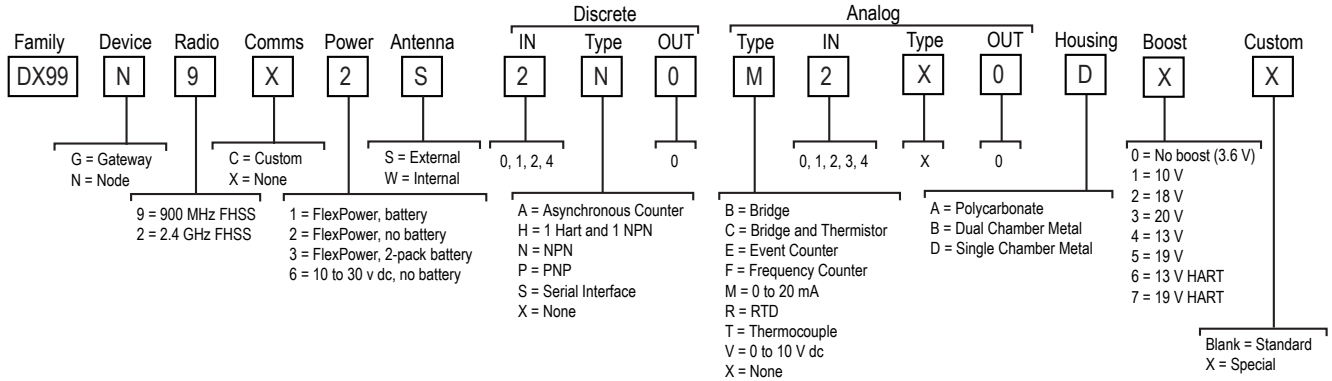
141513

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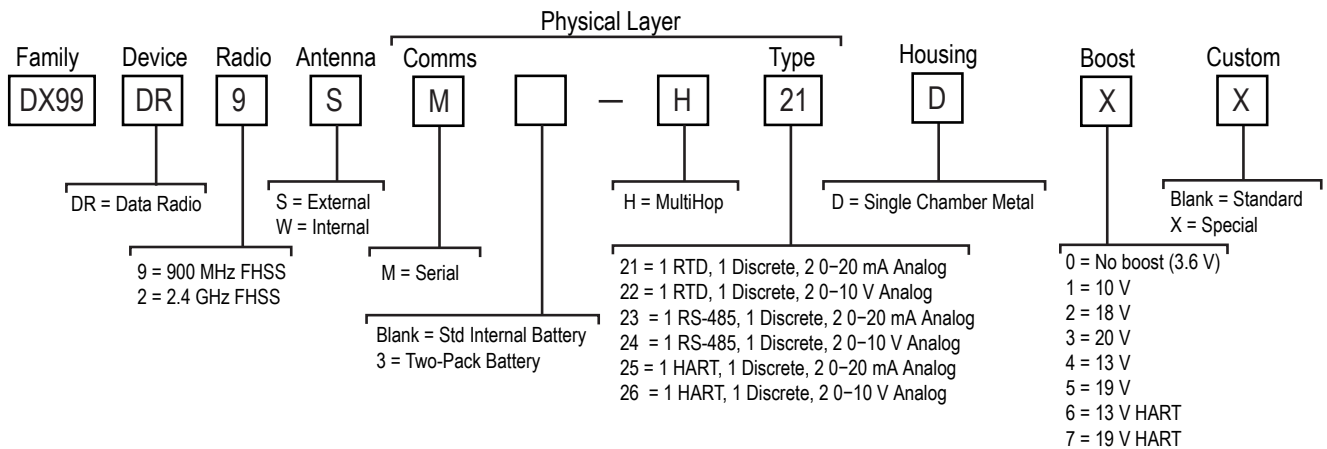
1 Model Numbering Schemes

1.1 Model Numbering Scheme for DX99 Gateways and Nodes



External battery-powered DX99 devices must only use the DX81H battery devices.

1.2 Model Numbering Scheme for DX99DR MultiHop Data Radios



For example, DX99DR9SM-H21D1 - MultiHop Data Radio, 900 MHz, External antenna, RTD and Analog (0-20 mA) I/O, Low profile metal housing, 10 V Boost Voltage

External battery-powered DX99 devices must only use the DX81H battery devices.

2 Control Drawing Notes



WARNING: Do not open when an explosive dust atmosphere may be present (versions with metal enclosure).



WARNING: Potential electrostatic charging hazard - Only clean with a damp cloth (versions with plastic enclosure).

Ex ia is defined as INTRINSICALLY SAFE



WARNING: Substitution of components may impair intrinsic safety.

When using battery-powered DX99 devices in plastic enclosures, only use the IS battery unit, model DX81H, to power the devices. When replacing the battery, only use a 3.6 V lithium battery from Xeno, model number XL-205F. When replacing the IS 2-pack lithium battery supply, only use Banner model number BWA-BATT-IS2P.

Choose peripheral devices and associated apparatuses such that the following conditions are met:

- $U_i/V_{max} \geq U_o/V_{oc}$
- $I_i/I_{max} \geq I_o/I_{sc}$
- $P_i \geq P_o$
- $C_o/C_a \geq C_i + C_{cable}$
- $L_o/L_a \geq L_i + L_{cable}$

If a remote antenna is used, the cable length should not exceed 30 meters or 100 feet.

When the Limatherm enclosure is used in Dust Atmospheres, use approved cable glands (with suitable cable) or other acceptable wiring methods for Class II/III Division 1 in accordance with local installation codes (CEC for Canada and NEC for the United States). For Europe, the cable glands must be Certified for the ATEX rating II 1 D. Available approved Banner Engineering antenna feedthroughs and antennas:

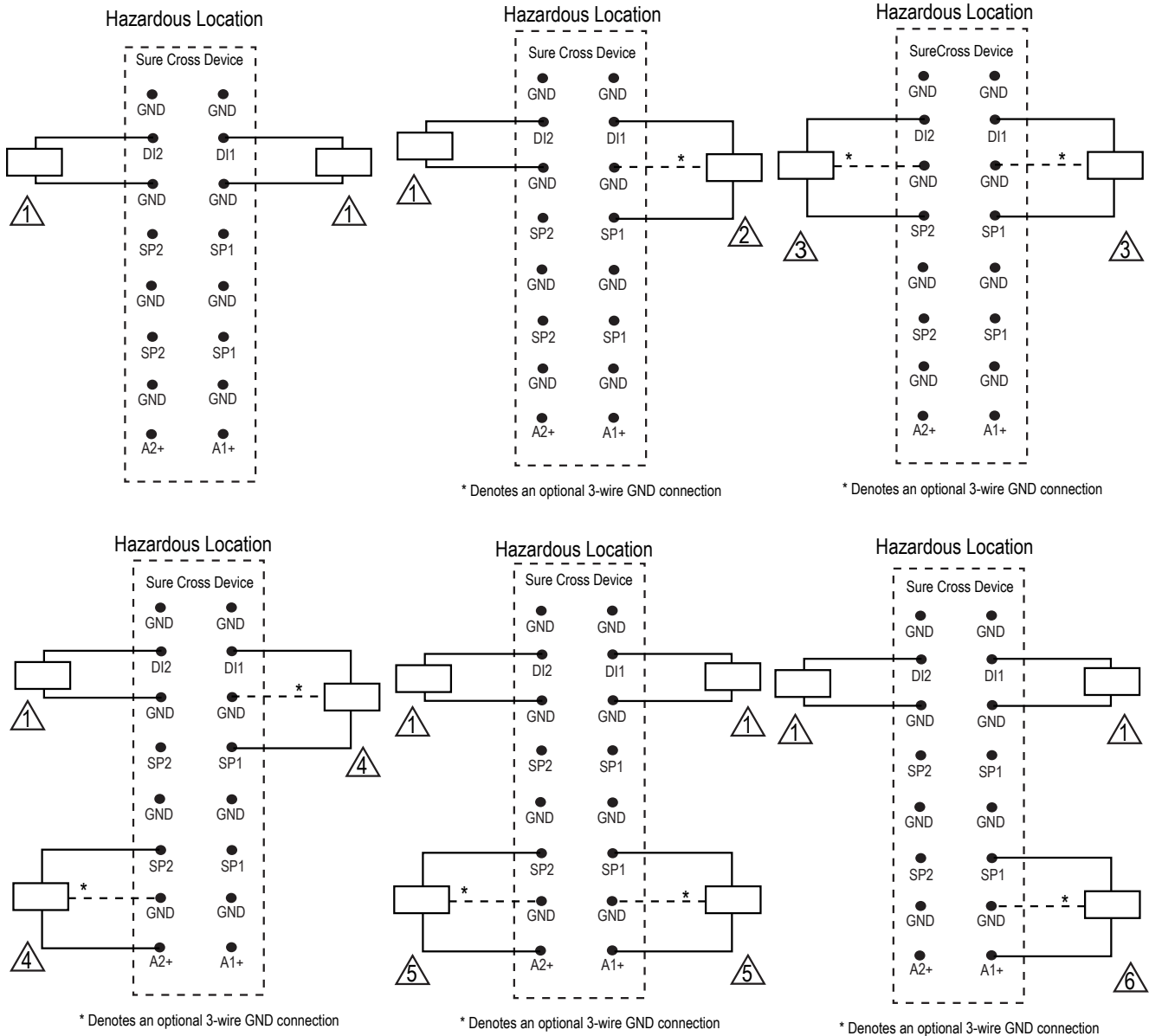
- BWA-HW-016 Antenna Feedthrough, Stainless Steel, 1/2 inch NPT
- BWA-HW-017 Antenna Feedthrough, Stainless Steel, 3/4 inch NPT
- BWA-AXFS0130 AXF™ Explosion-proof Antenna Coupler ¹
- BWA-9O2-001 Dome Antenna, 900 MHz 2 dBi, 1/2 inch Stainless Steel NPT
- BWA-9O2-002 Dome Antenna, 900 MHz 2 dBi, 3/4 inch Stainless Steel NPT
- BWA-2O2-001 Dome Antenna, 2.4 GHz 2 dBi, 1/2 inch Stainless Steel NPT
- BWA-2O2-002 Dome Antenna, 2.4 GHz 2 dBi, 3/4 inch Stainless Steel NPT

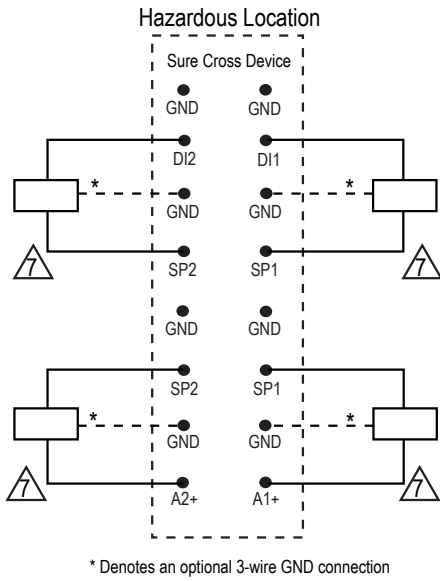
All devices and barriers connected to the DX99 units use different Intrinsically Safe circuits that must be kept separate from each other at all times. This may be achieved in one of two ways: (1) route different circuits in separate cables, or (2) route different circuits in the same cable separated by a grounded shield. The circuits of different devices that are all connected to powered outputs (SP1, SP2, SP3, and/or SP4) do not need to be separated from each other.

¹ Not approved for use in hazardous dust environments; Class II Division 1, Group E; Class III, Division 1 (C/US); or Zone 20 (ATEX).

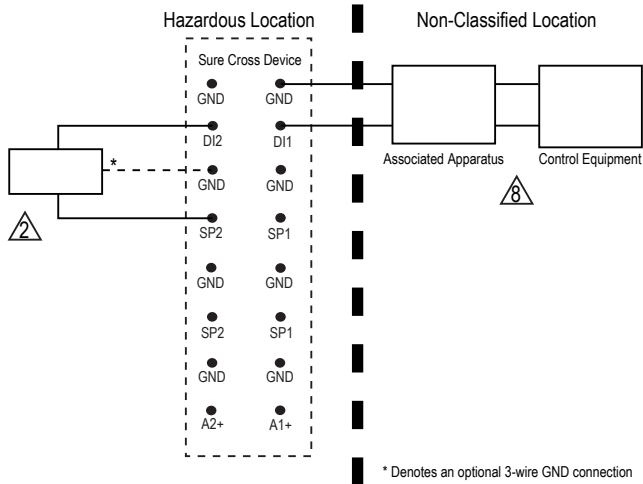
3 FlexPower Node (2020)

For the DX99..A, DX99..B, and DX99..D with the IS 2-pack battery supply.

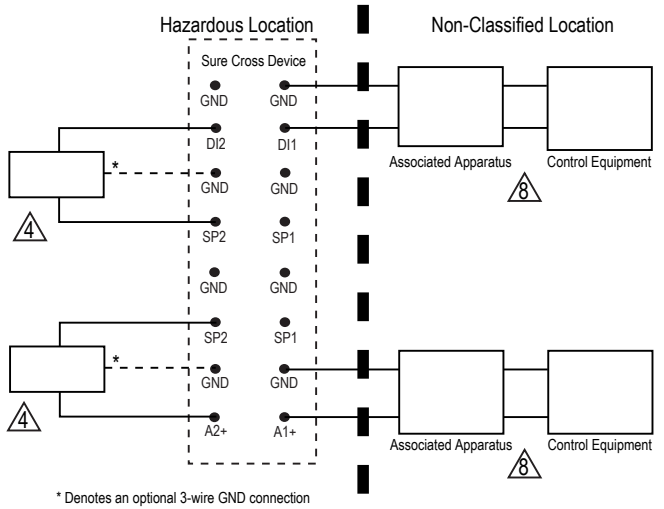




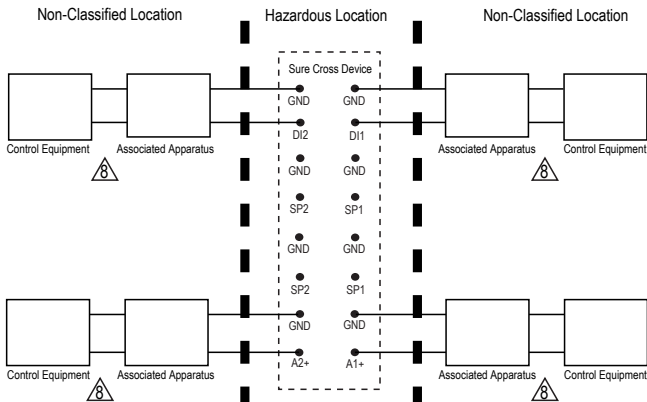
Powered Externally from FlexPower Node



Powered Externally from FlexPower Node



Powered Externally from FlexPower Node



Entity Parameters - 1	
Uo/Voc	5.88 V
Io/Isc	2.02 mA
Po	2.97 mW
Co/Ca	43 µF
Lo/La	9.8 H

Entity Parameters - 2			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	36.55 mA	96.38 mA	95.47 mA
Po	115.1 mW	506.0 mW	601.5 mW
Co/Ca	1105 nF	142.9 nF	61.9 nF
Lo/La	29.94 mH	4.30 mH	4.38 mH

Entity Parameters - 3			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	38.57 mA	98.40 mA	97.48 mA
Po	121.5 mW	516.6 mW	614.1 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	13.4 mH	2.06 mH	2.10 mH

Entity Parameters - 4			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	36.64 mA	96.47 mA	95.56 mA
Po	115.4 mW	506.5 mW	602.0 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	14.9 mH	2.14 mH	2.19 mH

Entity Parameters - 5			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	34.71 mA	94.54 mA	93.63 mA
Po	109.3 mW	496.3 mW	589.9 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	16.6 mH	2.23 mH	2.28 mH

Entity Parameters - 6			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	34.62 mA	94.45 mA	93.54 mA
Po	109.1 mW	495.9 mW	589.3 mW
Co/Ca	1105 nF	142.9 nF	61.9 nF
Lo/La	33.3 mH	4.48 mH	4.57 mH

Entity Parameters - 7			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	38.75 mA	98.58 mA	97.66 mA
Po	122.1 mW	517.5 mW	615.3 mW
Co/Ca	276 nF	35.7 nF	15.4 nF
Lo/La	6.65 mH	1.02 mH	1.04 mH

Entity Parameters - 8			
	10 V SP	18 V SP	20 V SP
Ui/Vmax	30 V	30 V	30 V
Ii/Imax	100 mA	100 mA	100 mA
Pi	3 W	3 W	3 W
Ci	0	0	0
Li	0	0	0

Plastic Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0

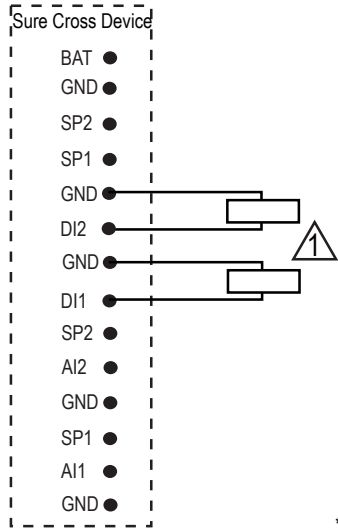
Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models		
DX99N9X2S2N0M2X0A1	DX99N2X2S2N0V2X0A1	DX99N9X1S2N0E2X0B1
DX99N2X2S2N0M2X0A1	DX99N9X2S2N0V2X0A2	DX99N2X1S2N0E2X0B1
DX99N9X2S2N0M2X0A2	DX99N2X2S2N0V2X0A2	DX99N9X2S2N0F1X0A1
DX99N2X2S2N0M2X0A2	DX99N9X1S2N0V2X0B2	DX99N2X2S2N0F1X0A1
DX99N9X1S2N0M2X0B1	DX99N2X1S2N0V2X0B2	DX99N9X3S2N0F1X0D1
DX99N2X1S2N0M2X0B1	DX99N9X3S2N0V2X0D1	DX99N2X3S2N0F1X0D1
DX99N9X1S2N0M2X0B2	DX99N2X3S2N0V2X0D1	DX99N9X2S2N0E2X0A1
DX99N2X1S2N0M2X0B2	DX99N9X3S2N0V2X0D2	DX99N2X2S2N0E2X0A1
DX99N9X3S2N0M2X0D1	DX99N2X3S2N0V2X0D2	DX99N9X3S2N0E2X0D1
DX99N2X3S2N0M2X0D1	DX99N9X1S2N0V2X0B1	DX99N2X3S2N0E2X0D1
DX99N9X3S2N0M2X0D2	DX99N2X1S2N0V2X0B1	
DX99N2X3S2N0M2X0D2	DX99N9X1S2N0F2X0B1	
DX99N9X2S2N0V2X0A1	DX99N2X1S2N0F2X0B1	

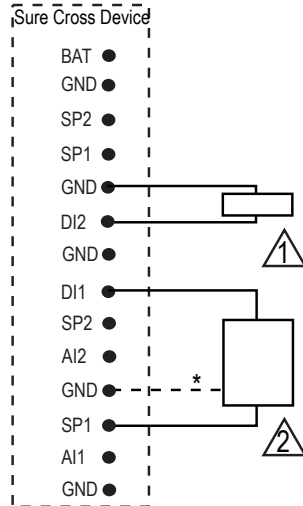
4 FlexPower Node (2020) - Single Chamber Metal Housing (DX99..D)

For the DX99..D with the single battery supply.

Hazardous Location

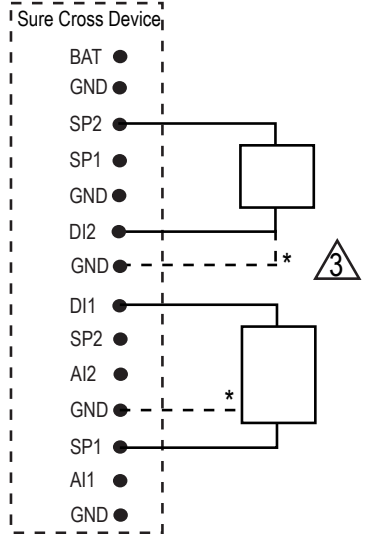


Hazardous Location



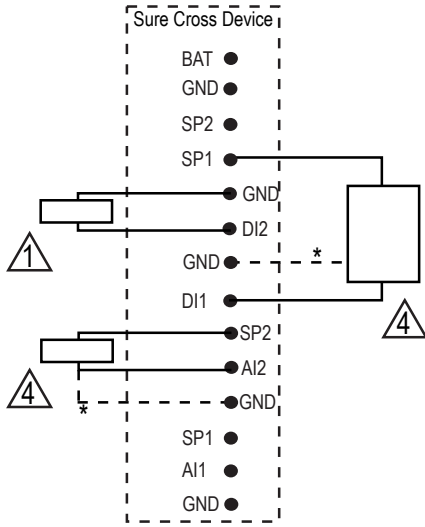
* Denotes an optional 3-wire GND connection

Hazardous Location



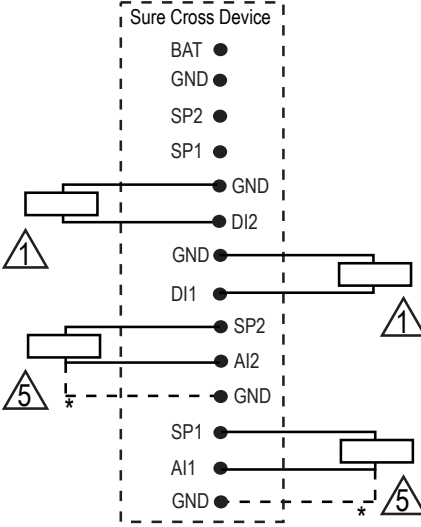
* Denotes an optional 3-wire GND connection

Hazardous Location



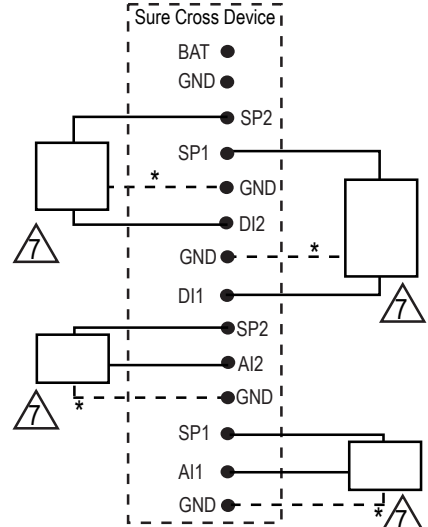
* Denotes an optional 3-wire GND connection

Hazardous Location

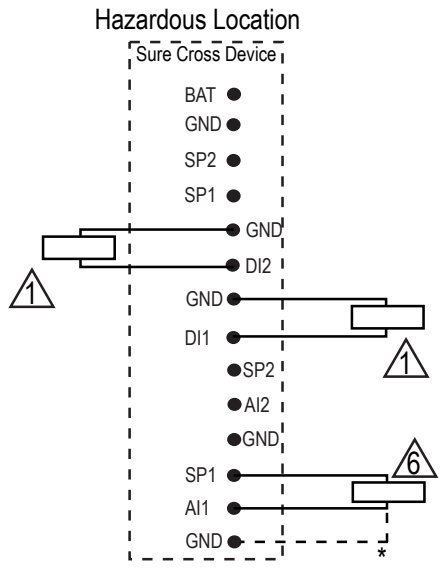


* Denotes an optional 3-wire GND connection

Hazardous Location

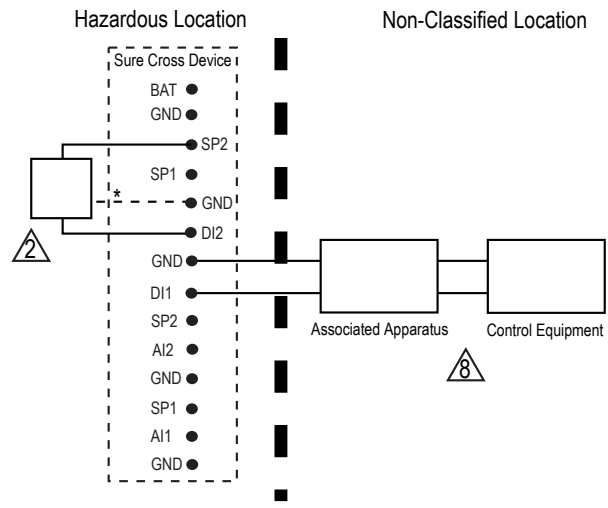


* Denotes an optional 3-wire GND connection



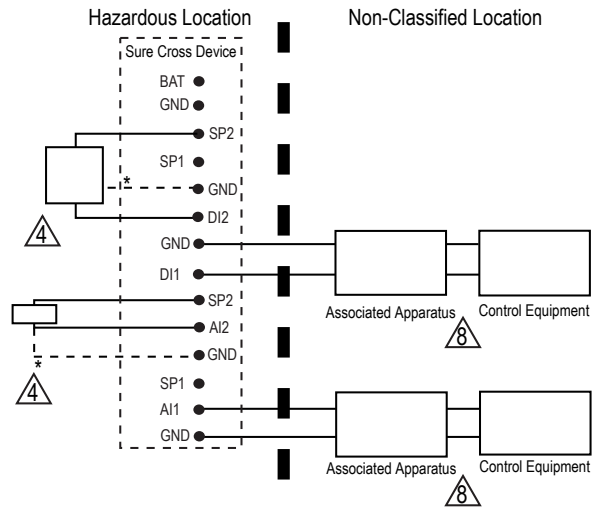
* Denotes an optional 3-wire GND connection

Powered Externally from FlexPower Node



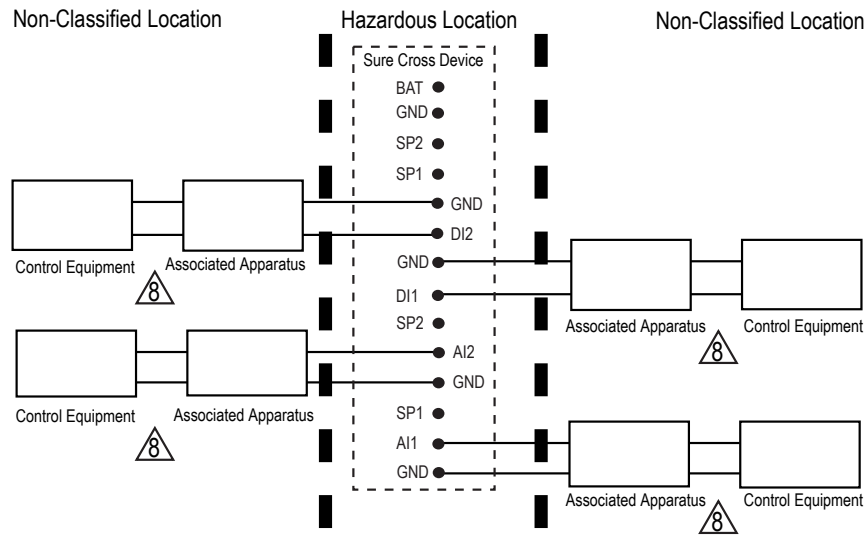
* Denotes an optional 3-wire GND connection

Powered Externally from FlexPower Node



* Denotes an optional 3-wire GND connection

Powered Externally from FlexPower Node



Entity Parameters - 1	
Uo/Voc	5.88 V
Io/Isc	2.02 mA
Po	2.97 mW
Co/Ca	43 µF
Lo/La	9.8 H

	Entity Parameters - 2		
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	36.55 mA	96.38 mA	95.47 mA
Po	115.1 mW	506.0 mW	601.5 mW
Co/Ca	1105 nF	142.9 nF	61.9 nF
Lo/La	29.94 mH	4.30 mH	4.38 mH

	Entity Parameters - 3		
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	38.57 mA	98.40 mA	97.48 mA
Po	121.5 mW	516.6 mW	614.1 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	13.4 mH	2.06 mH	2.10 mH

	Entity Parameters - 4		
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	36.64 mA	96.47 mA	95.56 mA
Po	115.4 mW	506.5 mW	602.0 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	14.9 mH	2.14 mH	2.19 mH

	Entity Parameters - 5		
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	34.71 mA	94.54 mA	93.63 mA
Po	109.3 mW	496.3 mW	589.9 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	16.6 mH	2.23 mH	2.28 mH

	Entity Parameters - 6		
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	34.62 mA	94.45 mA	93.54 mA
Po	109.1 mW	495.9 mW	589.3 mW
Co/Ca	1105 nF	142.9 nF	61.9 nF
Lo/La	33.3 mH	4.48 mH	4.57 mH

Entity Parameters - 7			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	38.75 mA	98.58 mA	97.66 mA
Po	122.1 mW	517.5 mW	615.3 mW
Co/Ca	276 nF	35.7 nF	15.4 nF
Lo/La	6.65 mH	1.02 mH	1.04 mH

Entity Parameters - 8			
	10 V SP	18 V SP	20 V SP
Ui/Vmax	30 V	30 V	30 V
Ii/Imax	100 mA	100 mA	100 mA
Pi	3 W	3 W	3 W
Ci	0	0	0
Li	0	0	0

Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
 Class II, Division 1, Groups E, F, G
 Class III, Division 1
 Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0
 Dust, Zone 20

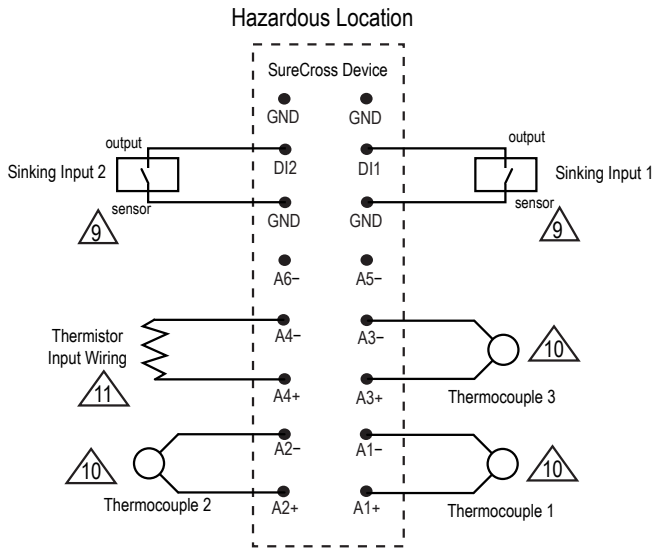
Models

DX99N9X1S2N0M2X0D1	DX99N9X1S2N0V2X0D2
DX99N2X1S2N0M2X0D1	DX99N2X1S2N0V2X0D2
DX99N9X1S2N0M2X0D2	DX99N9X1S2N0F1X0D1
DX99N2X1S2N0M2X0D2	DX99N2X1S2N0F1X0D1
DX99N9X1S2N0V2X0D1	DX99N9X1S2N0E2X0D1
DX99N2X1S2N0V2X0D1	DX99N2X1S2N0E2X0D1

5 Temperature Nodes

5.1 Thermocouple Nodes

For the DX99..A, DX99..B, and DX99..D with the IS 2-pack battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 µF
Lo/La	27.7 H

Entity Parameters - 10	
Uo/Voc	3.9 V
Io/Isc	7.88 mA
Po	7.69 mW
Co/Ca	670 µF
Lo/La	644 mH

Entity Parameters - 11	
Uo/Voc	3.9 V
Io/Isc	68.59 mA
Po	66.88 mW
Co/Ca	670 µF
Lo/La	8.5 mH

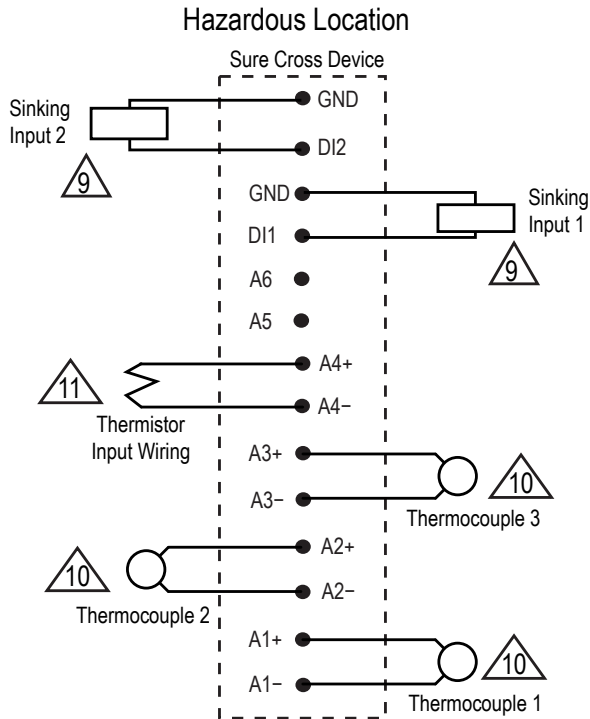
Models	
DX99N9X2S2N0T4X0A0	DX99N2X1S2N0T4X0B0
DX99N2X2S2N0T4X0A0	DX99N9X3S2N0T4X0D0
DX99N9X1S2N0T4X0B0	DX99N2X3S2N0T4X0D0

Plastic Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

5.2 Thermocouple Node - Single Chamber Metal Housing (DX99..D)

For the DX99..D with the single battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 µF
Lo/La	27.7 H

Entity Parameters - 10	
Uo/Voc	3.9 V
Io/Isc	7.88 mA
Po	7.69 mW
Co/Ca	670 µF
Lo/La	644 mH

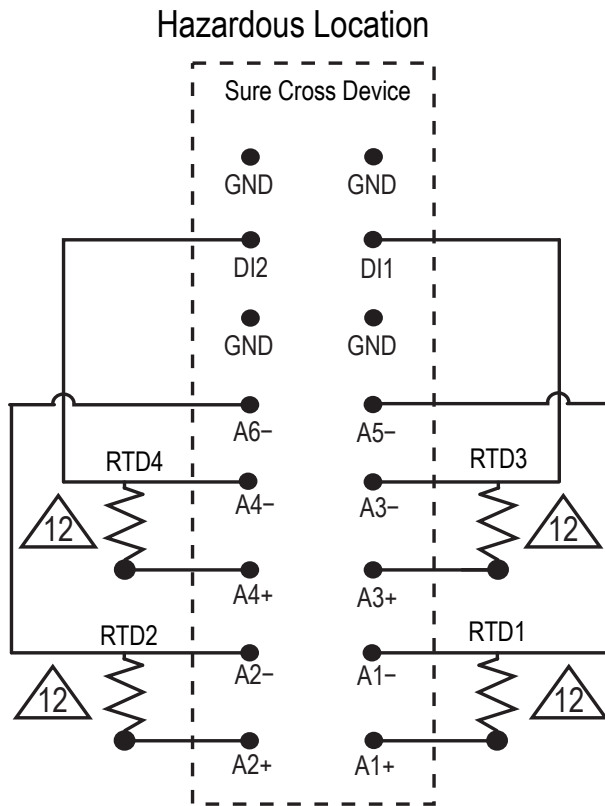
Entity Parameters - 11	
Uo/Voc	3.9 V
Io/Isc	68.59 mA
Po	66.88 mW
Co/Ca	670 µF
Lo/La	8.5 mH

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X1S2N0T4X0D0	DX99N2X1S2N0T4X0D0

5.3 RTD Node

For the DX99..A, DX99..B, and DX99..D with the IS 2-pack battery supply.



Entity Parameters - 12	
Uo/Voc	3.9 V
Io/Isc	70.1 mA
Po	68.35 mW
Co/Ca	670 µF
Lo/La	8.13 mH

Models	
DX99N9X2S0N0R4X0A0	DX99N2X1S0N0R4X0B0
DX99N2X2S0N0R4X0A0	DX99N9X3S0N0R4X0D0
DX99N9X1S0N0R4X0B0	DX99N2X3S0N0R4X0D0

Plastic Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0

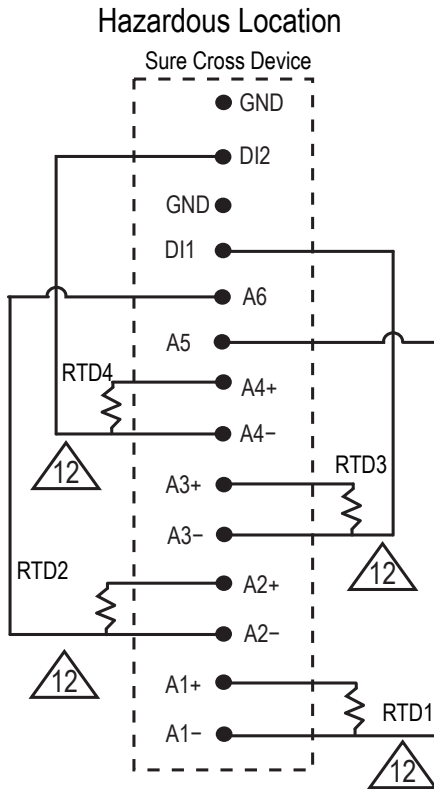
Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1
Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0
Dust, Zone 20

5.4 RTD Node - Single Chamber Metal Housing (DX99..D)

For the DX99..D with the single battery supply.



Entity Parameters - 12	
Uo/Voc	3.9 V
Io/Isc	70.1 mA
Po	68.35 mW
Co/Ca	670 μ F
Lo/La	8.13 mH

Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
 Class II, Division 1, Groups E, F, G
 Class III, Division 1
 Class I, Zone 0, Group IIC

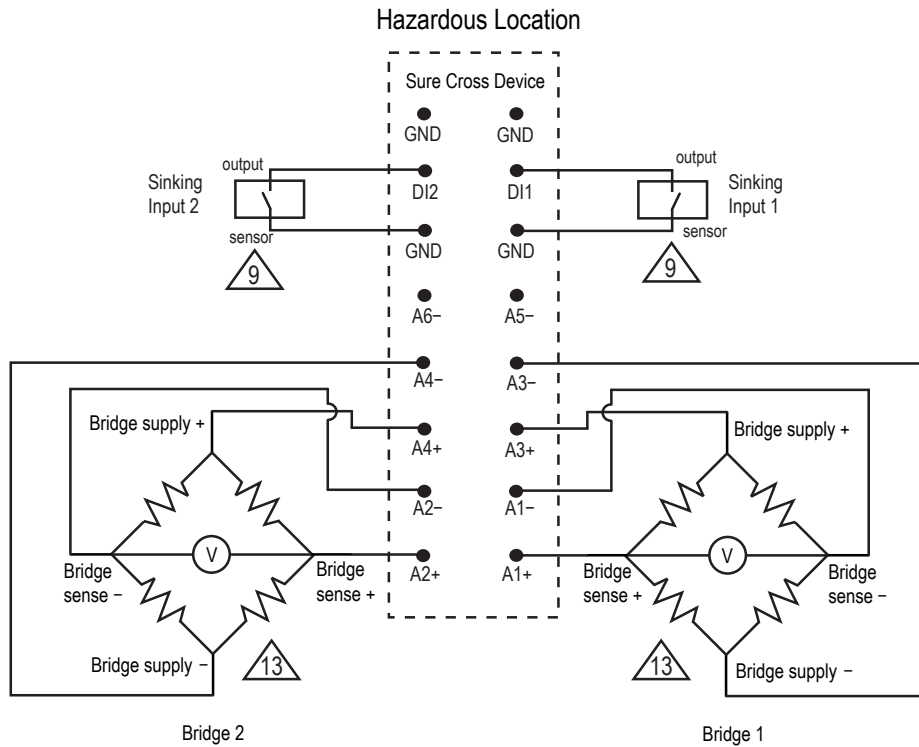
LCIE/ATEX Group IIC, Zone 0
 Dust, Zone 20

Models	
DX99N9X1S0N0R4X0D0	DX99N2X1S0N0R4X0D0

6 Bridge Nodes

6.1 Bridge Node

For the DX99..A, DX99..B, and DX99..D with the IS 2-pack battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 μF
Lo/La	27.7 H

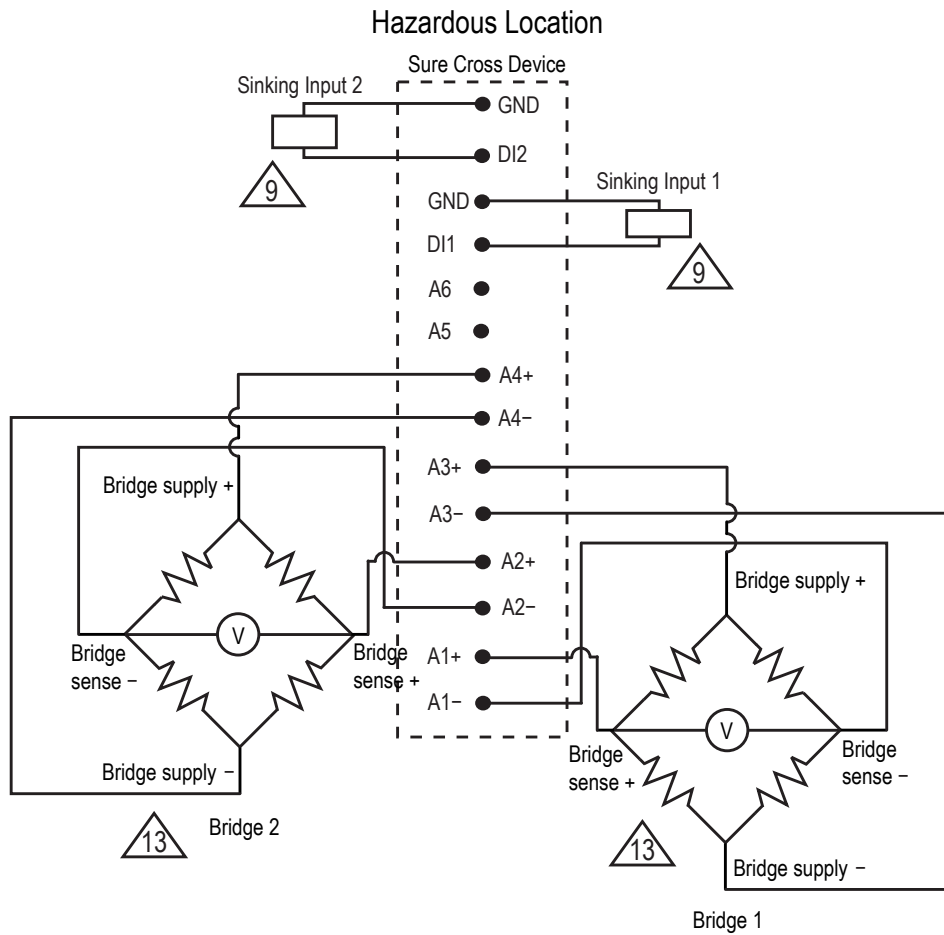
Entity Parameters - 13	
Uo/Voc	3.9 V
Io/Isc	98.94 mA
Po	96.47 mW
Co/Ca	670 μF
Lo/La	4.08 mH

Models	
DX99N9X2S2N0B2X0A0	DX99N2X1S2N0B2X0B0
DX99N2X2S2N0B2X0A0	DX99N9X3S2N0B2X0D0
DX99N9X1S2N0B2X0B0	DX99N2X3S2N0B2X0D0

Plastic Enclosure		Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class I, Zone 0, Group IIC	CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0	LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

6.2 Bridge Node - Single Chamber Metal Housing (DX99..D)

For the DX99..D with the single battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 µF
Lo/La	27.7 H

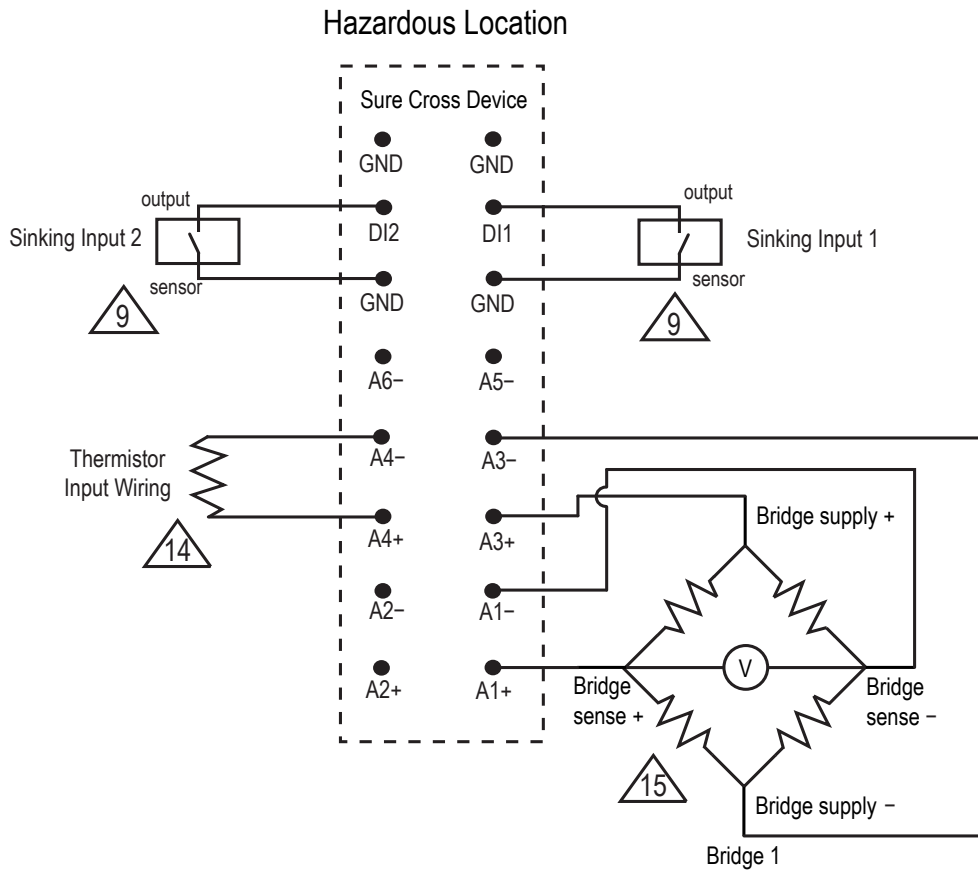
Entity Parameters - 13	
Uo/Voc	3.9 V
Io/Isc	98.94 mA
Po	96.47 mW
Co/Ca	670 µF
Lo/La	4.08 mH

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X1S2N0B2X0D0	DX99N9X1W2N0B2X0D0
DX99N2X1S2N0B2X0D0	DX99N2X1W2N0B2X0D0

6.3 Bridge and Thermistor Node

For the DX99..A, DX99..B, and DX99..D with the IS 2-pack battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 µF
Lo/La	27.7 H

Entity Parameters - 14	
Uo/Voc	3.9 V
Io/Isc	68.59 mA
Po	66.88 mW
Co/Ca	670 µF
Lo/La	8.5 mH

Entity Parameters - 15	
Uo/Voc	3.9 V
Io/Isc	98.94 mA
Po	96.47 mW
Co/Ca	670 µF
Lo/La	4.08 mH

Models	
DX99N9X2S2N0C2X0A0	DX99N2X1S2N0C2X0B0
DX99N2X2S2N0C2X0A0	DX99N9X3S2N0C2X0D0
DX99N9X1S2N0C2X0B0	DX99N2X3S2N0C2X0D0

Plastic Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
 Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0

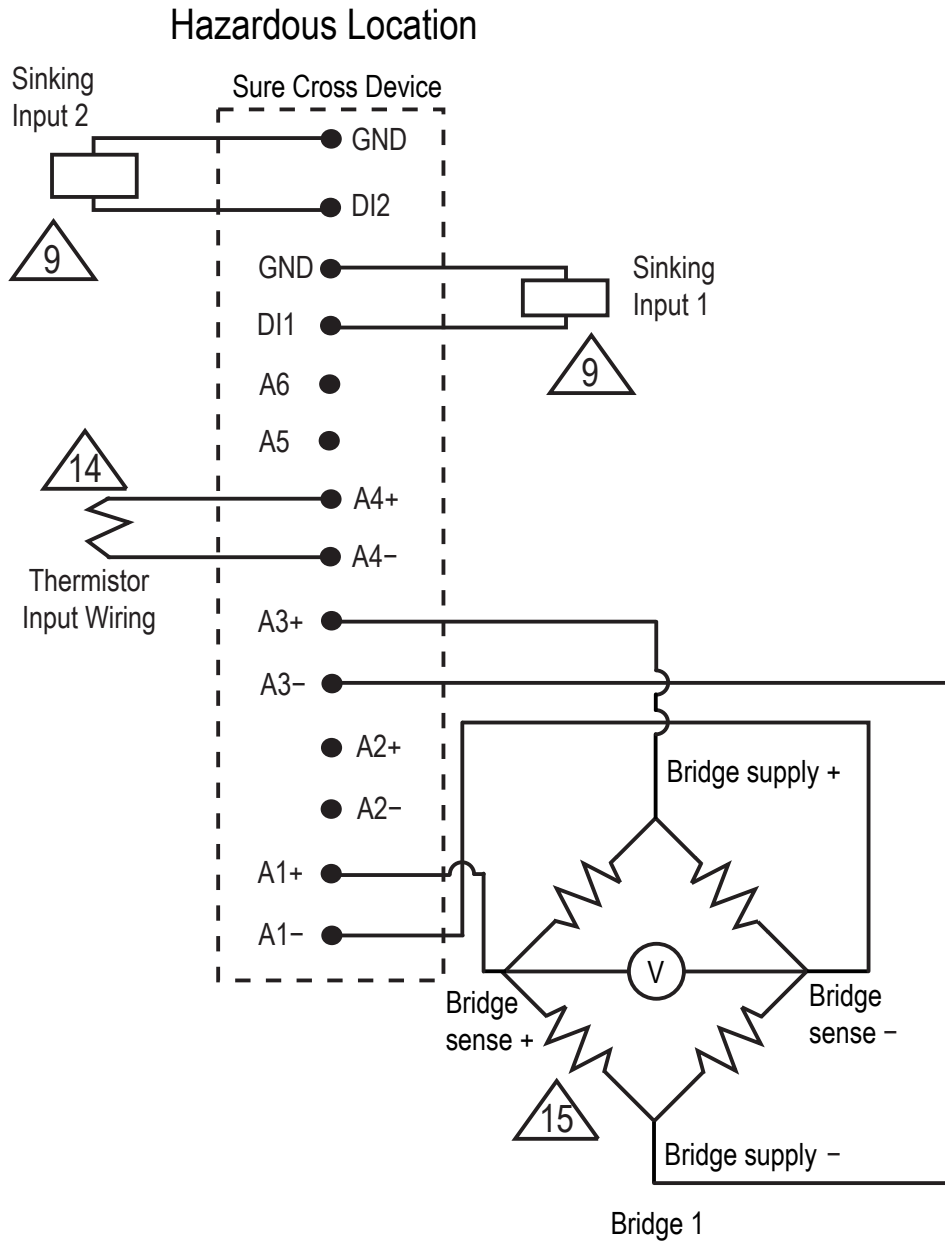
Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
 Class II, Division 1, Groups E, F, G
 Class III, Division 1
 Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0
 Dust, Zone 20

6.4 Bridge and Thermistor Node - Single Chamber Metal Housing (DX99..D)

For the DX99..D with the single battery supply.



Entity Parameters - 9	
Uo/Voc	3.9 V
Io/Isc	1.20 mA
Po	1.17 mW
Co/Ca	670 µF
Lo/La	27.7 H

Entity Parameters - 14	
Uo/Voc	3.9 V
Io/Isc	68.59 mA
Po	66.88 mW
Co/Ca	670 µF
Lo/La	8.5 mH

Entity Parameters - 15	
Uo/Voc	3.9 V
Io/Isc	98.94 mA
Po	96.47 mW
Co/Ca	670 µF
Lo/La	4.08 mH

Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
 Class II, Division 1, Groups E, F, G
 Class III, Division 1
 Class I, Zone 0, Group IIC

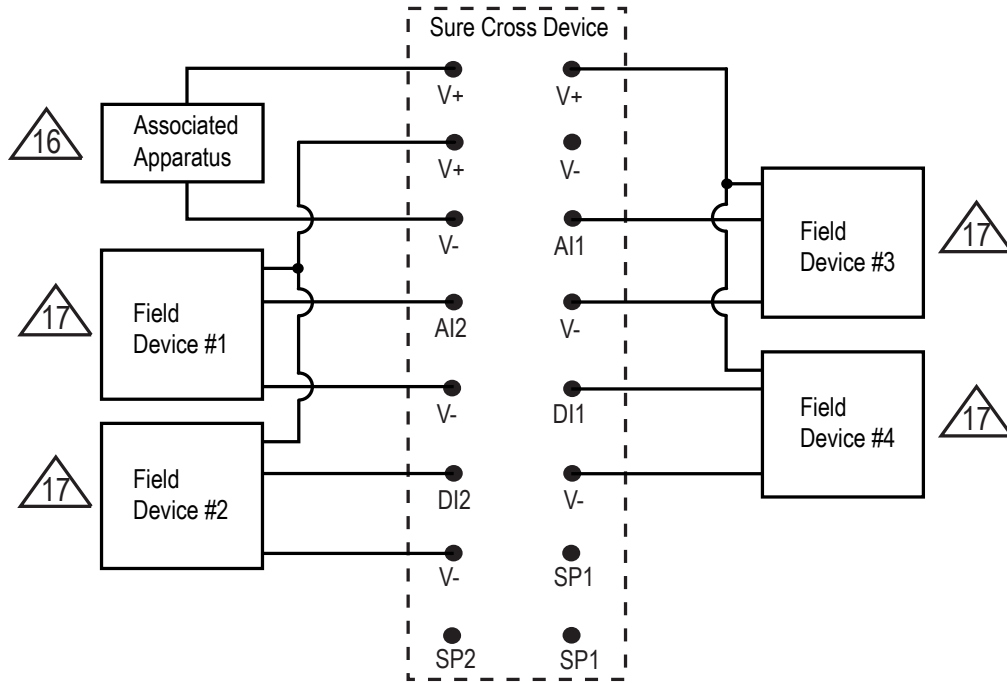
LCIE/ATEX Group IIC, Zone 0
 Dust, Zone 20

Models

DX99N9X1S2N0C2X0D0	DX99N2X1S2N0C2X0D0
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7 IS Power Converter Nodes

7.1 IS Power Converter Node - Configuration A (4 V+)



Entity Parameters - 16	
Ui/Vmax	30 V
Ii/Imax	100 mA
Pi	750 mW
Ci	48 nF
Li	2.18 mH

Entity Parameters - 17	
Uo/Voc	30 V
Io/Isc	100 mA
Po	750 mW
Co/Ca	12 nF
Lo/La	0.50 mH

Plastic Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class I, Zone 0, Group IIC

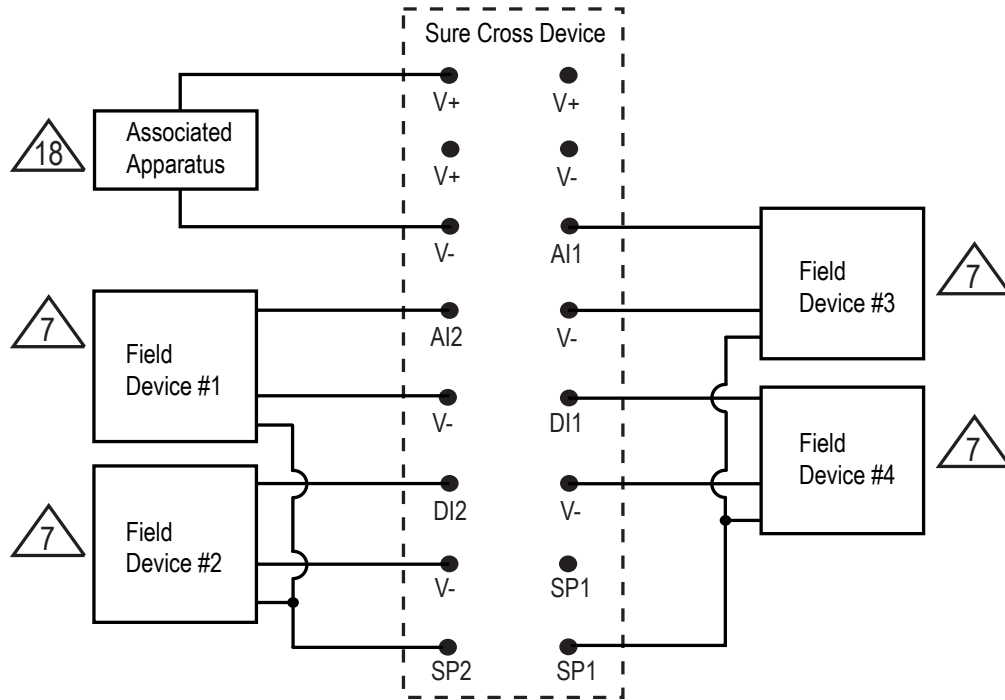
LCIE/ATEX Group IIC, Zone 0

Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1
Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0
Dust, Zone 20

7.2 IS Power Converter Node - Configuration B (4 SP)



Entity Parameters - 7			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	38.75 mA	98.58 mA	97.66 mA
Po	122.1 mW	517.5 mW	615.3 mW
Co/Ca	276 nF	35.7 nF	15.4 nF
Lo/La	6.65 mH	1.02 mH	1.04 mH

Entity Parameters - 18	
Ui/Vmax	30 V
Ii/Imax	100 mA
Pi	750 mW
Ci	0 nF
Li	0.18 mH

Plastic Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class I, Zone 0, Group IIC

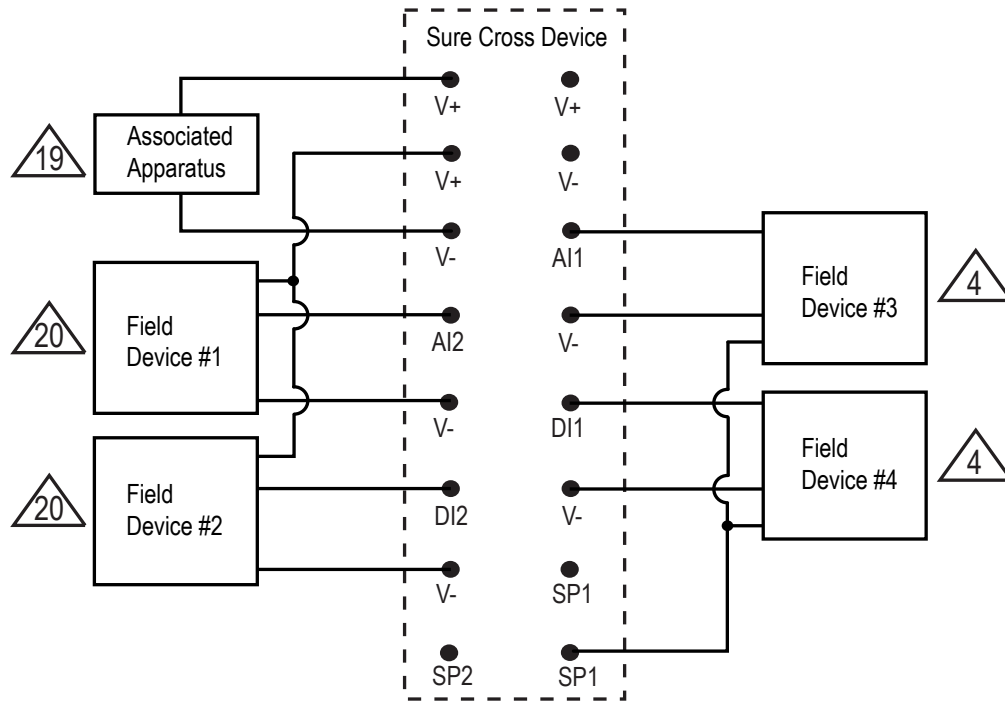
LCIE/ATEX Group IIC, Zone 0

Metal Enclosure

CSA C/US Class I, Division 1, Groups A, B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1
Class I, Zone 0, Group IIC

LCIE/ATEX Group IIC, Zone 0
Dust, Zone 20

7.3 IS Power Converter Node - Configuration C (2 V+ and 2 SP)



Entity Parameters - 4			
	10 V SP	18 V SP	20 V SP
Uo/Voc	12.6 V	21.0 V	25.2 V
Io/Isc	36.64 mA	96.47 mA	95.56 mA
Po	115.4 mW	506.5 mW	602.0 mW
Co/Ca	552 nF	71.4 nF	30.9 nF
Lo/La	14.9 mH	2.14 mH	2.19 mH

Entity Parameters - 19	
Ui/Vmax	30 V
Ii/Imax	100 mA
Pi	750 mW
Ci	48 nF
Li	2.18 mH

Entity Parameters - 20	
Uo/Voc	30 V
Io/Isc	100 mA
Po	750 mW
Co/Ca	24 nF
Lo/La	1 mH

Sure Cross® Intrinsically Safe Control Drawings

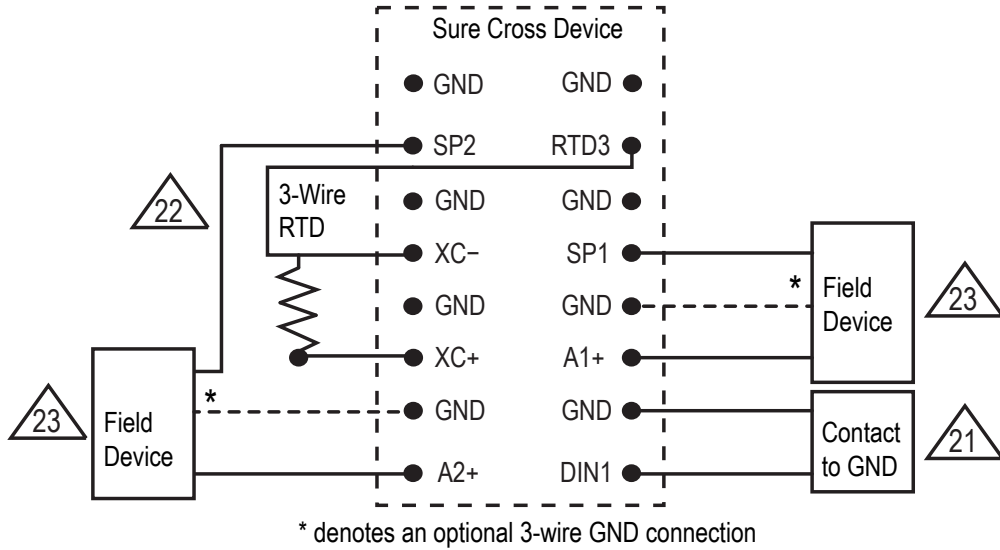
Plastic Enclosure		Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class I, Zone 0, Group IIC	CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0	LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

8 Comms RTD Nodes

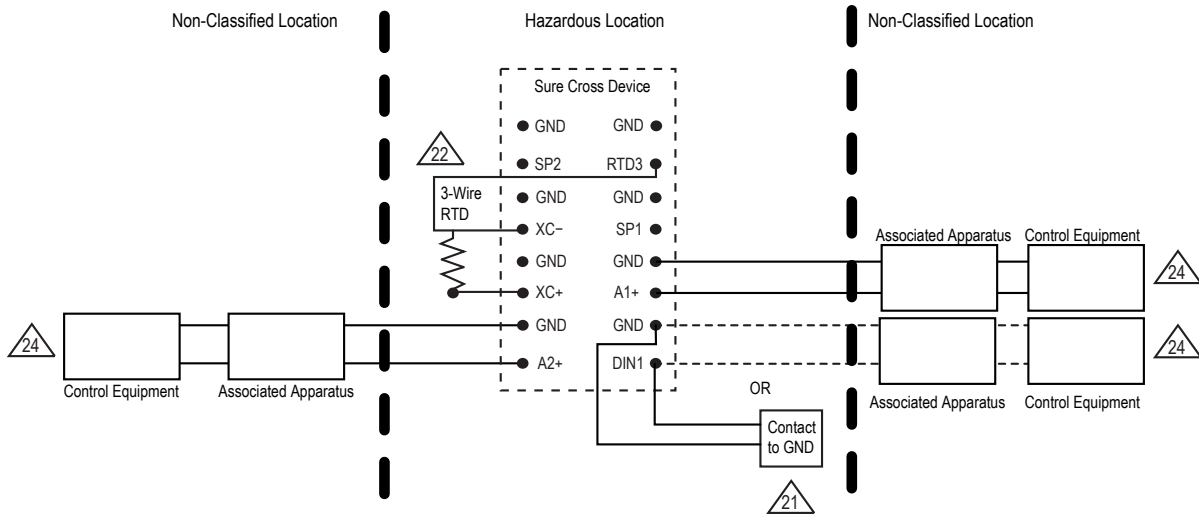
8.1 RTD Cin/Vin

For the DX99...A and DX99...D housings with the IS, 2-pack, battery supply.

RTD Cin/Vin - Any Boost Voltage



RTD Cin/Vin - Any Boost Voltage (Powered Externally from the FlexPower Node)



Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 22	
Uo/Voc	5.88 V
Io/Isc	77.2 mA
Po	113.5 mW
Co/Ca	43 µF
Lo/La	6.7 mH

Entity Parameters - 23				
	10 V	13 V	18 V	19 V
Uo/Voc	12.6 V	15.75 V	21 V	23.1 V
Io/Iscc	34.89 mA	78.22 mA	94.75 mA	114.56 mA
Po	110 mW	308 mW	498 mW	662 mW
Co/Ca	1104 nF	432 nF	142 nF	94 nF
Lo/La	32.8 mH	6.5 mH	4.4 mH	3.0 mH

Entity Parameters - 24	
Ui/Vmax	30 V
Ii/Imax	120 mA
Pi	840 mW
Ci	0
Li	0

Notes:

1. The total capacitance of all field devices/ cables that may be connected to terminals of Group 23 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 23 must not exceed the Lo/La values shown in the table.

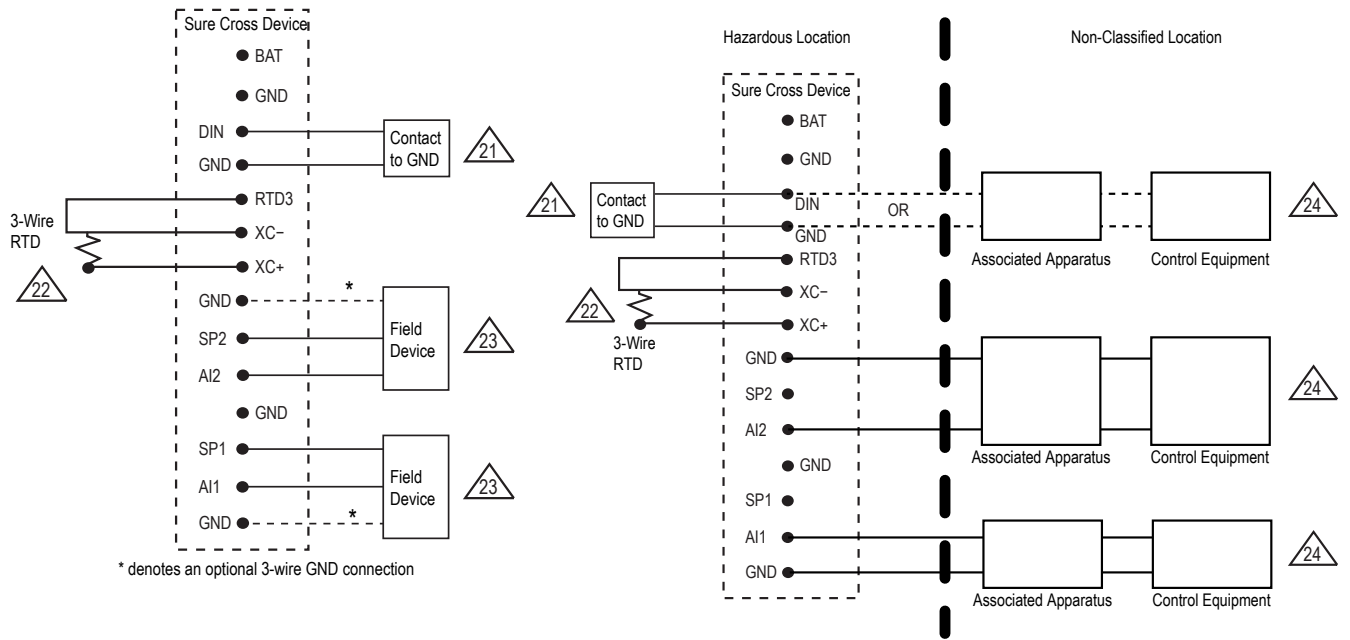
Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X3S1N0M3X0D5	DX99N2X3S1N0M3X0D5

8.2 RTD Cin/Vin - Single Chamber Metal Housing (DX99..D)

RTD Cin/Vin - Any Boost Voltage

RTD Cin/Vin - Any Boost Voltage (Powered Externally from the FlexPower Node)



* denotes an optional 3-wire GND connection

Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 22	
Uo/Voc	5.88 V
Io/Isc	77.2 mA
Po	113.5 mW
Co/Ca	43 µF
Lo/La	6.7 mH

Entity Parameters - 24	
Ui/Vmax	30 V
Ii/Imax	120 mA
Pi	840 mW
Ci	0
Li	0

Notes:

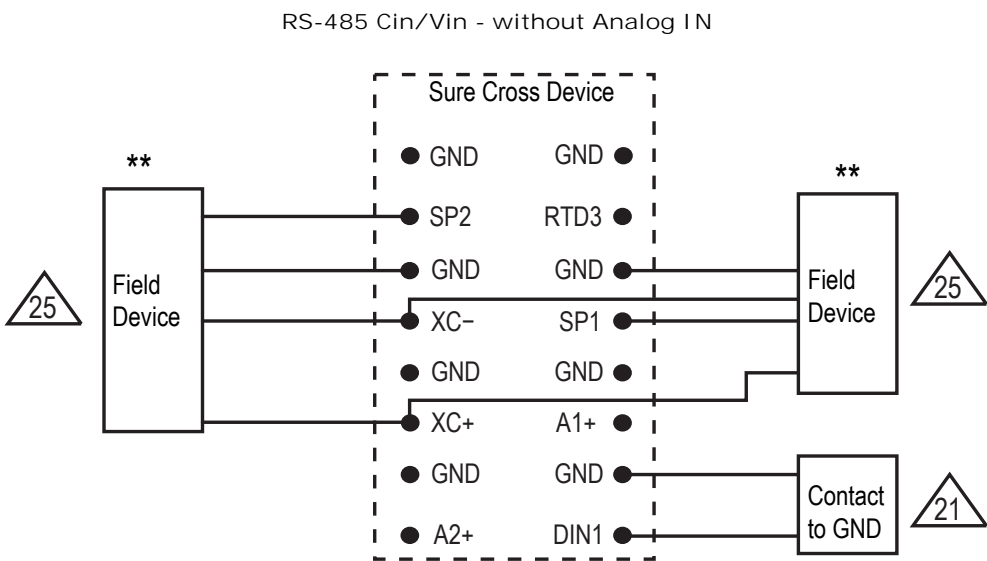
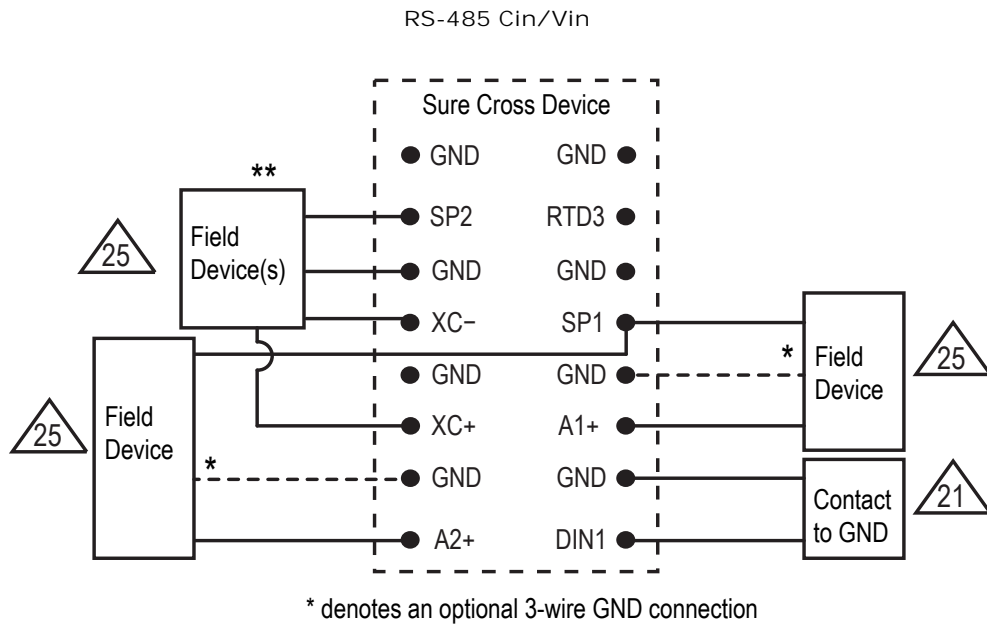
1. The total capacitance of all field devices/ cables that may be connected to terminals of Group 23 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 23 must not exceed the Lo/La values shown in the table.

Entity Parameters - 23				
	10 V	13 V	18 V	19 V
Uo/Voc	12.6 V	15.75 V	21 V	23.1 V
Io/Isc	34.89 mA	78.22 mA	94.75 mA	114.56 mA
Po	110 mW	308 mW	498 mW	662 mW
Co/Ca	1104 nF	432 nF	142 nF	94 nF
Lo/La	32.8 mH	6.5 mH	4.4 mH	3.0 mH

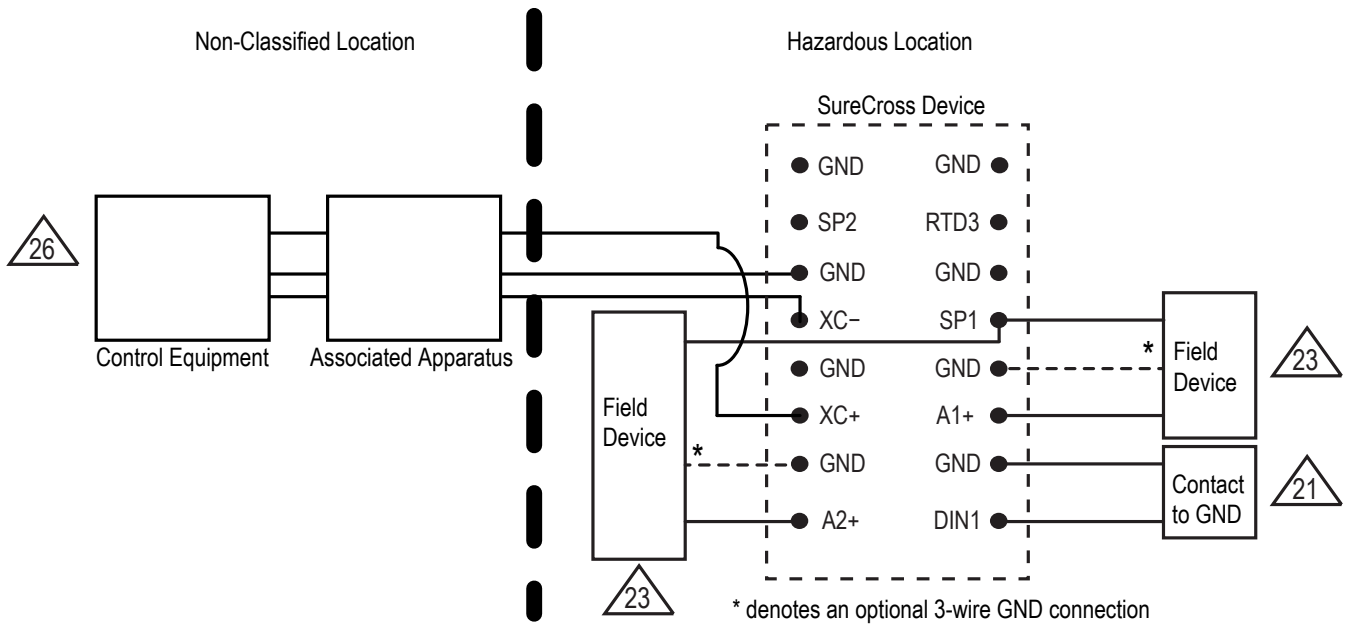
Metal Enclosure		Models	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC	DX99N9X1S1N0M3X0D5	DX99N2X1S1N0M3X0D5
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20		

8.3 RS-485 Cin/Vin

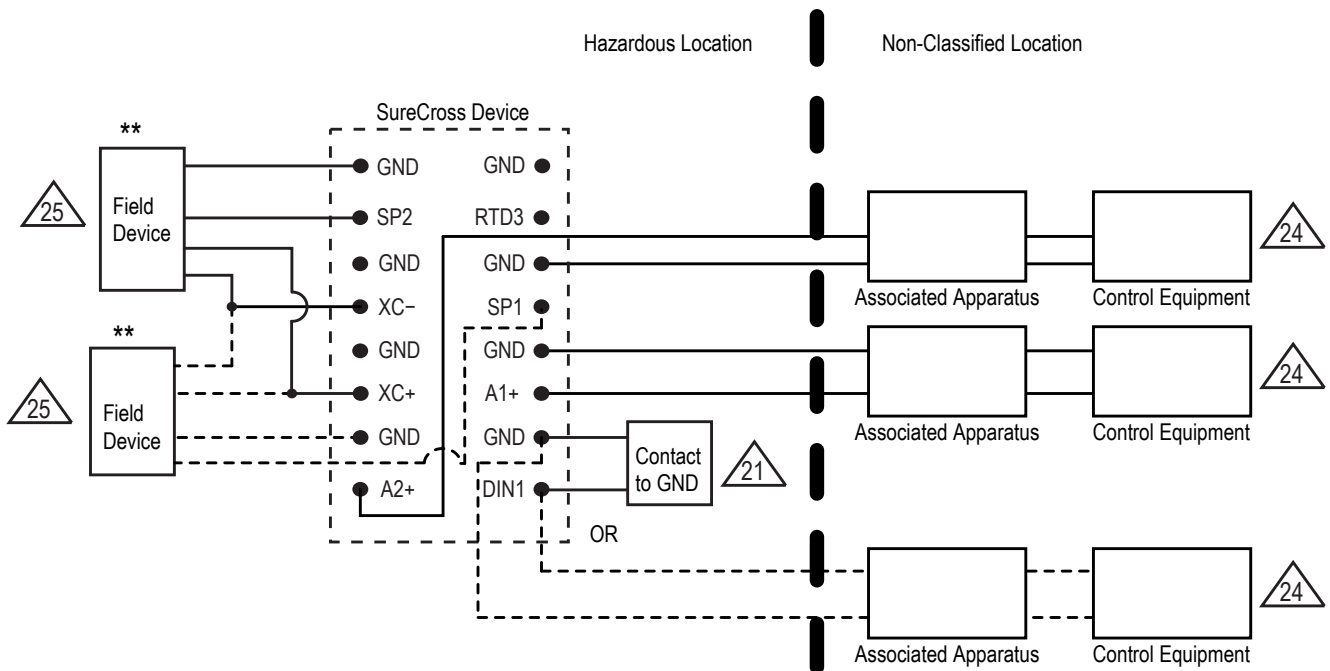
For the DX99..A and DX99..D with the IS, 2-pack, battery supply.



RS-485 Cin/Vin - Powered Externally from the FlexPower Node



RS-485 Cin/Vin - Powered Externally from the FlexPower Node



Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 23				
	10 V	13 V	18 V	19 V
Uo/Voc	12.6 V	15.75 V	21 V	23.1 V
Io/Isc	34.89 mA	78.22 mA	94.75 mA	114.56 mA
Po	110 mW	308 mW	498 mW	662 mW
Co/Ca	1104 nF	432 nF	142 nF	94 nF
Lo/La	32.8 mH	6.5 mH	4.4 mH	3.0 mH

Entity Parameters - 24	
Ui/Vmax	30 V
Ii/Imax	120 mA
Pi	840 mW
Ci	0
Li	0

Entity Parameters - 25				
		10 V	13 V	18 V
Uo/Voc		12.6 V	15.75 V	21 V
Io/Isc		44.59 mA	87.92 mA	104.45 mA
Po		141 mW	347 mW	549 mW
Co/Ca				
	Group A, B, IIC	1.104 µF	0.432 µF	0.142 µF
	Group C, IIB	7.35 µF	2.83 µF	1.22 µF
	Group D, IIA	26.95 µF	11.55 µF	4.73 µF
Lo/La				
	Group A, B, IIC	20.1 mH	5.1 mH	3.6 mH
	Group C, IIB	80.4 mH	20.6 mH	14.6 mH
	Group D, IIA	160.9 mH	41.3 mH	29.3 mH

** The number of field devices connected to XC-, XC+, GND, SPx are limited by the following notes 1 and 2.

Notes:

1. The total capacitance of all field devices/ cables that may be connected to terminals of Group 23 and Group 25 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 23 and Group 25 must not exceed the Lo/La values shown in the table.

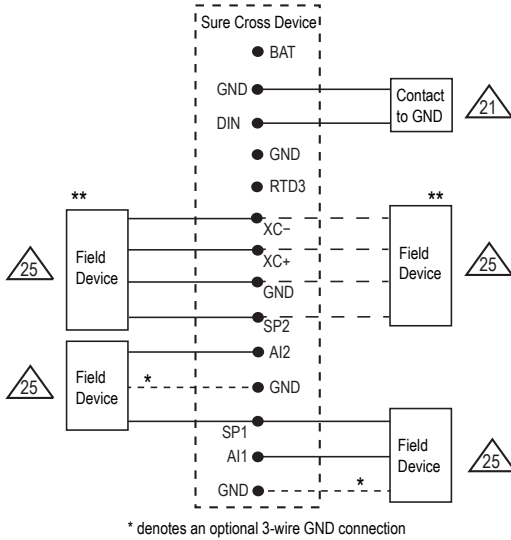
Entity Parameters - 26		
Ui/Vmax	18 V	27 V
Ii/Imax	1 A	200 mA
Pi	3.25 W	333 mW
Ci	0	0
Li	0	0

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

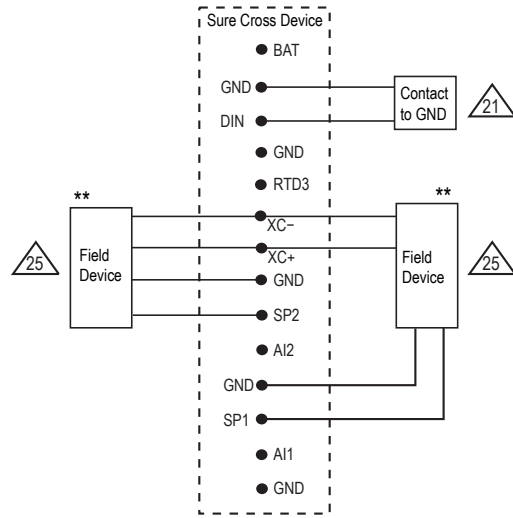
Models	
DX99N9X3S1S0V2X0D4	DX99DR9SM3-H24D2
DX99N2X3S1S0V2X0D4	DX99DR2SM3-H24D2

8.4 RS-485 Cin/Vin - Single Chamber Metal Housing (DX99..D)

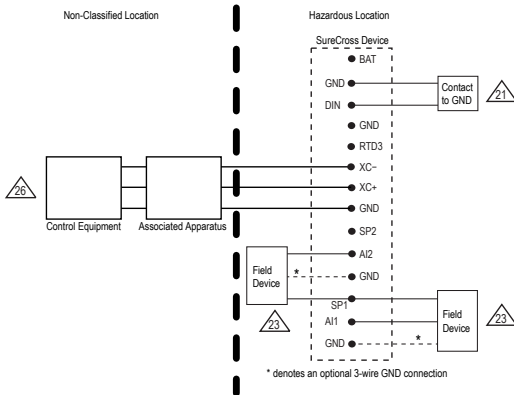
RS-485 Cin/Vin



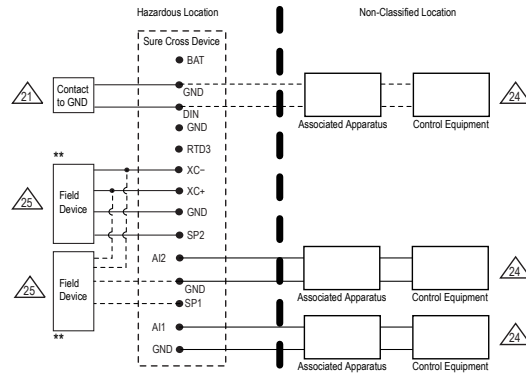
RS-485 Cin/Vin - without Analog I N



RS-485 Cin/Vin - Powered Externally from the FlexPower Node



RS-485 Cin/Vin - Powered Externally from the FlexPower Node



Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 24	
Ui/Vmax	30 V
Ii/Imax	120 mA
Pi	840 mW
Ci	0
Li	0

Entity Parameters - 23				
	10 V	13 V	18 V	19 V
Uo/Voc	12.6 V	15.75 V	21 V	23.1 V
Io/Isc	34.89 mA	78.22 mA	94.75 mA	114.56 mA
Po	110 mW	308 mW	498 mW	662 mW
Co/Ca	1104 nF	432 nF	142 nF	94 nF
Lo/La	32.8 mH	6.5 mH	4.4 mH	3.0 mH

Entity Parameters - 25				
		10 V	13 V	18 V
Uo/Voc		12.6 V	15.75 V	21 V
Io/Isc		44.59 mA	87.92 mA	104.45 mA
Po		141 mW	347 mW	549 mW
Co/Ca				
	Group A, B, IIC	1.104 µF	0.432 µF	0.142 µF
	Group C, IIB	7.35 µF	2.83 µF	1.22 µF
	Group D, IIA	26.95 µF	11.55 µF	4.73 µF
Lo/La				
	Group A, B, IIC	20.1 mH	5.1 mH	3.6 mH
	Group C, IIB	80.4 mH	20.6 mH	14.6 mH
	Group D, IIA	160.9 mH	41.3 mH	29.3 mH

Entity Parameters - 26		
Ui/Vmax	18 V	27 V
Ii/Imax	1 A	200 mA
Pi	3.25 W	333 mW
Ci	0	0
Li	0	0

** The number of field devices connected to XC-, XC+, GND, SPx are limited by the following notes 1 and 2.

1. The total capacitance of all field devices/ cables that may be connected to terminals of Group 23 and Group 25 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 23 and Group 25 must not exceed the Lo/La values shown in the table.

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

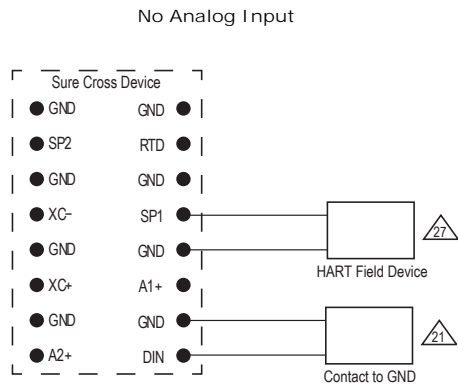
Models	
DX99N9X1S1S0V2X0D4	DX99DR9SM-H24D2
DX99N2X1S1S0V2X0D4	DX99DR2SM-H24D2

9 HART Nodes

9.1 HART FlexPower Node without Analog Inputs

Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X3S2H0M2X0D6	DX99N9X3S2H0M2X0D7
DX99N2X3S2H0M2X0D6	DX99N2X3S2H0M2X0D7



Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 27		
	13 V	19 V
Uo/Voc	15.75 V	23.1 V
Io/Isc	95.87 mA	111.88 mA
Po	377.5 mW	646.2 mW
Co/Ca	425 nF	87 nF
Lo/La	3.86 mH	2.84 mH

Notes:

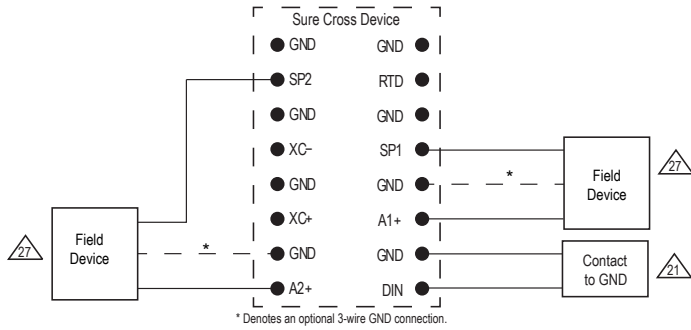
1. The total capacitance of all field devices/cables that may be connected to terminals of Group 27 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 27 must not exceed the Lo/La values shown in the table.

9.2 HART FlexPower Node with Analog Inputs

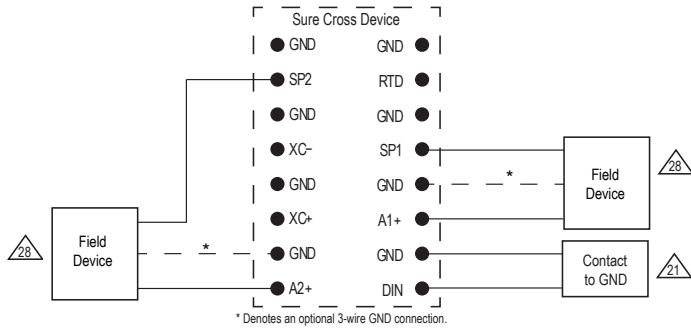
Metal Enclosure	
CSA C/US	Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1 Class I, Zone 0, Group IIC
LCIE/ATEX	Group IIC, Zone 0 Dust, Zone 20

Models	
DX99N9X3S2H0M2X0D6	DX99N9X3S2H0M2X0D7
DX99N2X3S2H0M2X0D6	DX99N2X3S2H0M2X0D7
DX99N9X3S2H0V2X0D6	DX99N9X3S2H0V2X0D7
DX99N2X3S2H0V2X0D6	DX99N2X3S2H0V2X0D7

Analogue Current Input



Analogue Voltage Input



Notes:

1. The total capacitance of all field devices/cables that may be connected to terminals of Group 27 and Group 28 must not exceed the Co/Ca value shown in the table.
2. The total inductance of all field devices/cables that may be connected to terminals of Group 27 and Group 28 must not exceed the Lo/La values shown in the table.

Entity Parameters - 21	
Uo/Voc	5.88 V
Io/Isc	1.80 mA
Po	2.65 mW
Co/Ca	43 µF
Lo/La	12.3 H

Entity Parameters - 27		
	13 V	19 V
Uo/Voc	15.75 V	23.1 V
Io/Isc	95.87 mA	111.88 mA
Po	377.5 mW	646.2 mW
Co/Ca	425 nF	87 nF
Lo/La	3.86 mH	2.84 mH

Entity Parameters - 28		
	13 V	19 V
Uo/Voc	15.75 V	23.1 V
Io/Isc	95.98 mA	111.99 mA
Po	378.0 mW	646.8 mW
Co/Ca	425 nF	87 nF
Lo/La	3.85 mH	2.83 mH

10 Weatherproofing Glands and Plugs

10.1 Watertight Glands and NPT Ports

To make glands and plugs watertight, use PTFE tape and follow these steps.

1. Wrap four to eight passes of polytetrafluoroethylene (PTFE) tape around the threads as close as possible to the hexagonal body of the gland.
2. Manually thread the gland into the housing hole. Never apply more than 5 in-lbf of torque to the gland or its cable clamp nut. ²



Seal any unused PG-7 access holes with one of the supplied black plastic plugs. To install a watertight PG-7 plug:

1. Wrap four to eight passes of PTFE tape around the plug's threads, as close as possible to the flanged surface.
2. Carefully thread the plastic plug into the vacant hole in the housing and tighten using a slotting screwdriver. Never apply more than 10 in-lbf torque to the plastic plug.

Seal the 1/2-inch or 3/4-inch NPT port(s) if it is not used. To install a watertight NPT plug:

1. Wrap 12 to 16 passes of PTFE tape evenly across the length of the threads.
2. Manually thread the plug into the housing port until reaching some resistance.
3. Using a crescent wrench, turn the plug until all the plug's threads are engaged by the housing port or until the resistance doubles. Do not over-tighten as this will damage the Sure Cross unit. These threads are tapered and will create a waterproof seal without over-tightening.

10.2 Replacing the Rotary Dial Access Cover

Check the rotary dial access cover o-ring every time the access cover is removed.



Replace the o-ring when it is damaged, discolored, or showing signs of wear. The o-ring should be:

- Seated firmly against the threads without stretching to fit or without bulging loosely, and
- Pushed against the flanged cover.

When removing or closing the rotary dial access cover, manually twist the cover into position. Do not allow cross-threading between the cover and the device's face. After the cover is in place and manually tightened, use a small screwdriver (no longer than five inches total length) as a lever to apply enough torque to bring the rotary dial access cover even with the cover surface.

² This is not a lot of torque and is equivalent to the torque generated without using tools. If a wrench is used, apply only very light pressure. Torquing these fittings excessively damages the device.

11 Replacing the Battery

11.1 Replacing the Battery

When the FlexPower Supply Module is installed outdoors or in a high humidity environment, apply dielectric grease to the battery terminals to prevent moisture and corrosion buildup.

To replace the lithium "D" cell battery in the FlexPower Supply Module, follow these steps.

1. Unplug the battery module from the SureCross device it powers.
2. Remove the four screws mounting the battery module face plate to the body and remove the face plate.
3. Remove the discharged battery by pressing the battery towards the negative terminal to compress the spring. Pry up on the battery's positive end to remove from the battery holder.
4. Replace with a new battery. Only use a 3.6 V lithium battery from Xeno, model number XL-205F.
5. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case. Caution: There is a risk of explosion if the battery is replaced incorrectly.
6. After replacing the battery, allow up to 60 seconds for the device to power up.
7. Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or any other facility qualified to accept lithium batteries.



As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

The battery may be replaced in explosive gas atmospheres.

Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.



WARNING:

- Potential electrostatic charging hazard — only clean with a damp cloth.
- The replacement battery **MUST** be a Banner approved battery, model number BWA-BATT-001. Use of a different battery will **VOID** the intrinsic safety rating of this device and may result in an explosion!
- When replacing the battery, the negative end of the battery holder is the side with the spring terminal. This side is marked with a minus (–) sign.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.

11.2 DX99 Battery Replacement (DX99...B Housings)

To replace the lithium "D" cell battery in the metal housings with integrated batteries, follow these steps.



1. Unscrew the lid on the back side of the metal enclosure.
2. Remove the discharged battery by pressing the battery towards the negative terminal to compress the spring. Pry up on the battery's positive end to remove from the battery holder.
3. Replace with a new battery. Only use a 3.6V lithium battery from Xeno, model number XL-205F.
4. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case. The negative end is toward the spring. Caution: There is a risk of explosion if the battery is replaced incorrectly.
5. Screw on the lid and tighten.
6. After replacing the battery, allow up to 60 seconds for the device to power up.
7. Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or other facility qualified to accept lithium batteries.

As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

The battery may be replaced in explosive gas atmospheres.

Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.



WARNING:

- Do not replace battery when an explosive dust atmosphere may be present.
- The replacement battery **MUST** be a Banner approved battery, model number BWA-BATT-001. Use of a different battery will **VOID** the intrinsic safety rating of this device and may result in an explosion!
- When replacing the battery, the negative end of the battery holder is the side with the spring terminal. This side is marked with a minus (-) sign.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.

11.3 Replacing the Battery (DX99...D Models)

To replace the lithium "D" cell battery in the metal housings, follow these steps.

1. Unscrew the lid of the metal enclosure.
2. Lift the radio out of the metal enclosure and pull the spacer frame off the back side of the radio.
3. Disconnect the radio by unplugging the ribbon cable from the radio board and set aside the radio and spacer frame.
4. Remove the discharged battery.
5. Replace with a new battery. Only use a 3.6 V lithium battery from Xeno, model number XL-205F.
6. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case. Caution: There is a risk of explosion if the battery is replaced incorrectly.
7. Wait two minutes.
8. Insert the ribbon cable through the center of the spacer frame, then plug the ribbon cable back into the radio board.
9. Insert the radio back onto the spacer frame pins. Push the radio and spacer frame assembly back into the enclosure until it is seated.
10. Screw on the lid and tighten.
11. After replacing the battery, allow up to 60 seconds for the device to power up.
12. Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or other facility qualified to accept lithium batteries.



As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

The battery may be replaced in explosive gas atmospheres. Replacement battery model number: BWA-BATT-001. For pricing and availability, contact Banner Engineering.



WARNING:

- Do not replace battery when an explosive dust atmosphere may be present.
- The replacement battery **MUST** be a Banner approved battery, model number BWA-BATT-001. Use of a different battery will **VOID** the intrinsic safety rating of this device and may result in an explosion!
- When replacing the battery, the negative end of the battery holder is the side by the large capacitors. This side is marked with a minus (–) sign.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.

11.4 Replacing the IS 2-Pack Battery Supply (DX99...D Models)

To replace the intrinsically safe lithium 2-pack battery supply, in the metal housings, follow these steps.

1. Unscrew the lid of the metal enclosure.
2. Remove the radio and radio wiring board.
3. Unplug the battery pack connector from the wiring assembly connector.
4. Remove the discharged battery pack from the battery clip.
5. Replace with a new battery pack. Only use the approved Banner replacement battery pack, model BWA-BATT-IS2P.
6. Verify the battery pack connector's positive and negative terminals align to the positive and negative terminals of the wiring assembly's connector. The connectors are keyed to ensure proper installation.
7. Plug the battery pack connector into the wiring assembly's connector. Press together until the latch clicks.
8. Replace the radio and radio wiring board.
9. Screw on the lid and tighten.
10. After replacing the battery, allow up to 60 seconds for the device to power up.
11. Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or other facility qualified to accept lithium batteries.

As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

The battery may be replaced in explosive gas atmospheres.



WARNING:

- Do not replace battery when an explosive dust atmosphere may be present.
- The replacement battery **MUST** be a Banner approved battery, model number BWA-BATT-IS2P. Use of a different battery will **VOID** the intrinsic safety rating of this device and may result in an explosion!
- The red wire coming from the battery pack is the positive lead; the black wire is the negative lead.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.

12 Warnings

Antenna Installations. Install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors invalidate the manufacturer's warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross device during a thunderstorm.

Exporting Sure Cross® Radios. It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country. A list of approved countries appears in the *Radio Certifications* section of the product manual. The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. Consult with Banner Engineering Corp. if the destination country is not on this list.

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