



M2004-GND - ATG Grounding Procedures

Reference Guide



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Section 1 Introduction

This guide shows electrical connection and earth/ground information for OPW Fuel Management Systems ATG equipment.

Follow all applicable Federal, State and local codes for installation of this equipment.

The Intrinsic safety ground must be a minimum wire size of 4 mm² (12 AWG USA). This wiring must be a continuous run with no splices from the controller back to the panel/ground point for the building.

The resistance must be less than 1 ohm.



NOTE: The Nano console must have two (2) grounds, one for shock hazards and one for intrinsic safety.

Section 2 Integra Control Drawing

NOTES:

- Associated Apparatus Entity Parameters: Group IIA:

$$V_{oc} \text{ (or } U_o) = 14.85V_{dc}$$

$$I_{sc} \text{ (or } I_o) = 305mA$$

$$P_o = 974mW$$

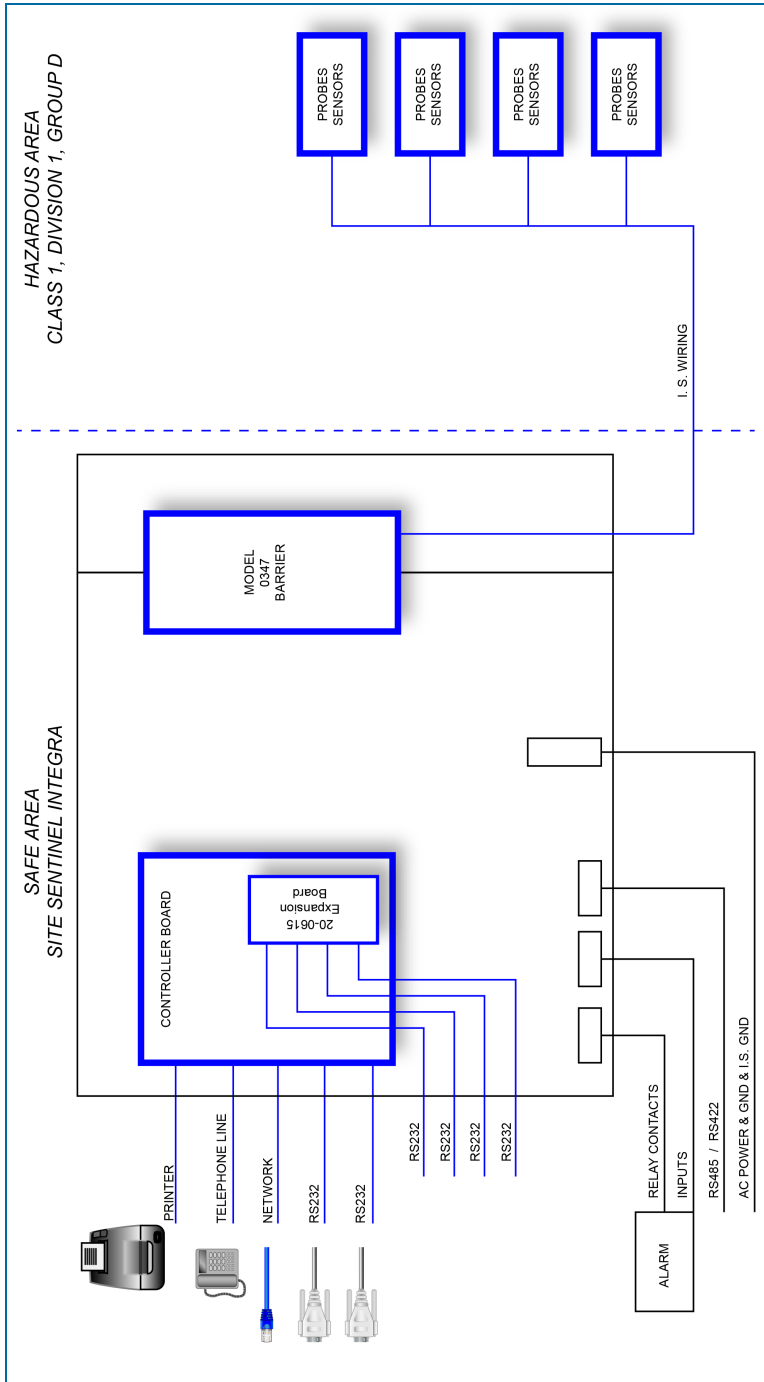
$$C_a \text{ (or } C_o) = 7.15\mu F$$

$$L_a \text{ (or } L_o) = 1.52mH$$

- The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current .
- Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA		
I.S. EQUIPMENT		ASSOCIATED APPARATUS
v MAX (or U_i)	\geq	V_{oc} or V_t (or U_o)= 14.85V
I max (or I_i)	\geq	I_{sc} or I_t (or I_o) = 305mA
P max P_i	\geq	$P_o = 974mW$
$C_i + C_{cable}$	\leq	C_a (or C_o) = 7.15 μF
$L_i + L_{cable}$	\leq	L_a (or L_o) = 1.52mH

- This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with Article 504.10(B) of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_a (or C_o), shown on any associated apparatus used. The same applies for inductance (L_{cable} , L_i and L_a or L_o , respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: $C_{cab/e} = 60pF /ft.$, $L_{cab/e} = 0.2\mu H/ft.$
- The associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
- Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing Intrinsically safe equipment.
- Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes as applicable.
- This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- Control equipment must not use or generate more than 250V rms or dc with respect to earth.



Section 3 Nano Control Drawing

NOTES:

- Associated Apparatus Entity Parameters: Group IIA

$$V_{oc} \text{ (or } U_o) = 14.85V_{dc}$$

$$I_{sc} \text{ (or } I_o) = 305mA$$

$$P_o = 974mW$$

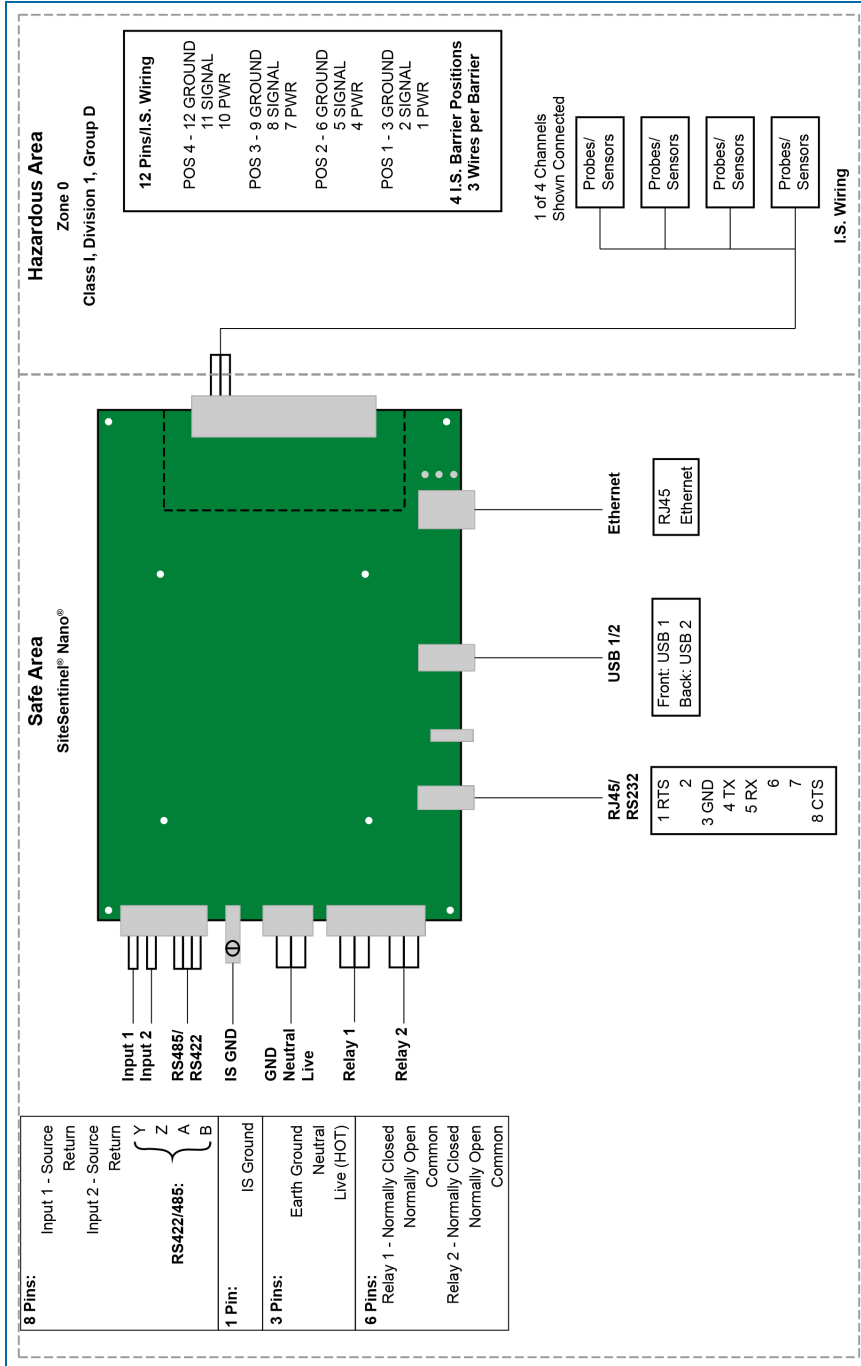
$$C_a \text{ (or } C_o) = 7.15\mu F$$

$$L_a \text{ (or } L_o) = 1.52mH$$

- The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
- Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA		
I.S. EQUIPMENT		ASSOCIATED APPARATUS
v MAX (or U _i)	≥	V _{oc} or V _t (or U _o)= 14.85V
I max (or I _i)	≥	I _{sc} or I _t (or I _o) = 305mA
P max P _i	≥	P _o = 974mW
C _i + C _{cable}	≤	C _a (or C _o) = 7.15μF
L _i + L _{cable}	≤	L _a (or L _o) = 1.52mH

- This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with Article 504.10(B) of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, C_{cable}, plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_a (or C_o), shown on any associated apparatus used. The same applies for inductance (L_{cable}, L_i and L_a or L_o, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: C_{cable} = 60pF/ft., L_{cable} = 0.2μH/ft.
- The associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
- Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing Intrinsically safe equipment.
- Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes as applicable.
- This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- Control equipment must not use or generate more than 250V rms or dc with respect to earth



Section 4 iTouch Control Drawing

NOTES:

- Associated Apparatus Entity Parameters: Group IIA:

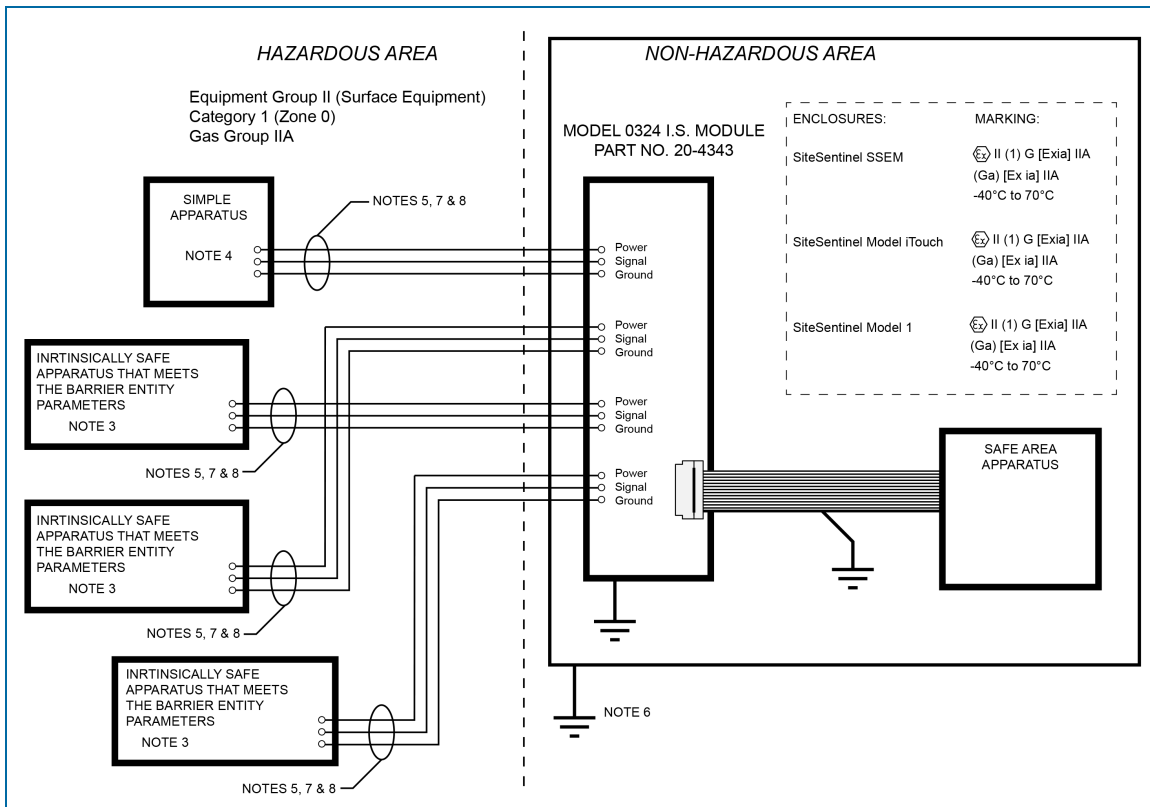
$$\begin{aligned}
 U_o &= 14.85\text{Vdc} \\
 I_o &= 305\text{mA} \\
 P_o &= 974\text{mW} \\
 C_o &= 3.0\mu\text{F}, L_o = 1.52\text{mH} \\
 &\text{or} \\
 C_o &= 5.0\mu\text{F}, L_o = 600\mu\text{H}
 \end{aligned}$$

- The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
- Selected intrinsically safe apparatus must be ATEX and/or IECEx Certified as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA		
I.S. EQUIPMENT		ASSOCIATED APPARATUS
U_i	\geq	$U_o = 14.85\text{V}$
I_i	\geq	$I_o = 305\text{mA}$
P_i	\geq	$P_o = 974\text{mW}$
$C_i + C_{\text{cable}}$	\leq	$C_o = 3.0\mu\text{F}, L_i + L_{\text{cable}} \leq L_o = 1.52\text{mH}$
-or-		
$C_i + C_{\text{cable}}$	\leq	$C_o = 5.0\mu\text{F}, L_i + L_{\text{cable}} \leq L_o = 600\mu\text{H}$

- This associated apparatus may also be connected to simple apparatus as defined in Clause 5.7 of IEC60079-11:2012 and or EN60079-11:2012 and installed in accordance with applicable local codes.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_o , shown on any associated apparatus used. The same applies for inductance ($L_{\text{cable}}, L_i, L_o$, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: $C_{\text{cable}} = 197\text{pF/m.}, L_{\text{cable}} = 0.66\mu\text{H/m.}$
- The associated apparatus must be connected to a suitable ground electrode or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
- Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation.
- Intrinsically safe circuits must be wired and separated in accordance with applicable local codes.
- This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- Conditions for Safe Use:
 - U_m must not exceed 250V.

- b. Must be installed in accordance with the applicable control drawings.
 - c. All openings (slots) must be provided with an intrinsic safety barrier or (plates) which must be firmly screwed in place.
11. Unit must be mounted to the wall using mounting holes integral to the enclosure. See installation manual for details.
12. Standards to which conformity is declared:
- EN 60079-0:2012+A11:2013
 - EN 60079-11:2012
 - EN 60079-26:2007
 - IEC 60079-0: Edition 6
 - IEC 60079-11: Edition 6
 - IEC60079-26: Edition 2



Section 5 924B Probe Control Drawing

NOTES:

1. Entity Parameters:

$(V_{max}), U_i = 14.9V$ $(I_{max}), I_i = 362mA$
 $C_i = 0\mu F$ $L_i = 363\mu H$
 For $P_i \leq 1.3W$ $-40^\circ C \leq T_{amb} \leq 40^\circ C$
 For $P_i \leq 1.2W$ $-40^\circ C \leq T_{amb} \leq 60^\circ C$
 For $P_i \leq 1.0W$ $-40^\circ C \leq T_{amb} \leq 70^\circ C$

- Associated Apparatus output current must be limited by a resistor such that the output voltage-current plot is a straight line between open-circuit voltage and short-circuit current.
- Selected Associated Apparatus must be third party listed as providing intrinsically safe circuits for the application and have V_{oc} or V_t not exceeding V_{max} (or U_o not exceeding U_i), I_{sc} or I_t not exceeding I_{max} (or I_o not exceeding I_i), and the P_o of the associated apparatus must be less than or equal to the P_{max} or P_i of the intrinsically safe equipment as shown below.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the Associated Apparatus shall be calculated and must be included in the system calculations as shown below. Cable capacitance, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_a (or C_o), shown on any associated apparatus used. The same applies for inductance (L_{cable} , L_i and L_a or L_o , respectively). Where the cable capacitance of inductance per foot are known, the following values shall be used: $C_{cable} = 60pF/ft.$, $L_{cable} = 0.2\mu H/ft.$

Use the following to determine the suitability of connections:

924B entity parameters		Associated Apparatus
14.9V (U_i)	\geq	V_{oc} or V_t or U_o
362mA (I_i)	\geq	I_{sc} or I_t or I_o
1.3W (P_i)	\geq	P_o
0 μF (C_i)+ C_{cable}	\leq	C_a or C_o
363 μH (L_i)+ L_{cable}	\leq	L_a or L_o

If P_o of the associated apparatus is not known, it may be calculated using the following formula, $P_o = (U_o \cdot I_o) / 4$

Example of a single 924B probe connected to a single position on the Associated Apparatus:

EXAMPLE:

Example Associated Apparatus 14.28V (U_o), 361mA (I_o), 6.4 μF (C_o), 2,100 μH (L_o)

Cable 1,000 feet, 60pF/ft, 0.2 $\mu H/ft = 0.060\mu F$ (60,000pf), 200 μH

924B entity parameters		Associated Apparatus
14.9V (Ui)	≥	14.28V (Uo)
362mA (Ii)	≥	361mA (Io)
1.3W (Pi)	≥	$(14.28 \times 0.361) / 4 = 1.29W$ (Po)
0uF (Ci)+0.060uF (Ccable)=0.060uF	≤	6.4uF (Co)
363uH (Li)+200uH (Lcable) = 563uF	≤	2,100uH (Lo)

If the above statements are true (which they are) then it is safe to connect.

Example of 4 x 924B probes connected to a single position an the Associated Apparatus:

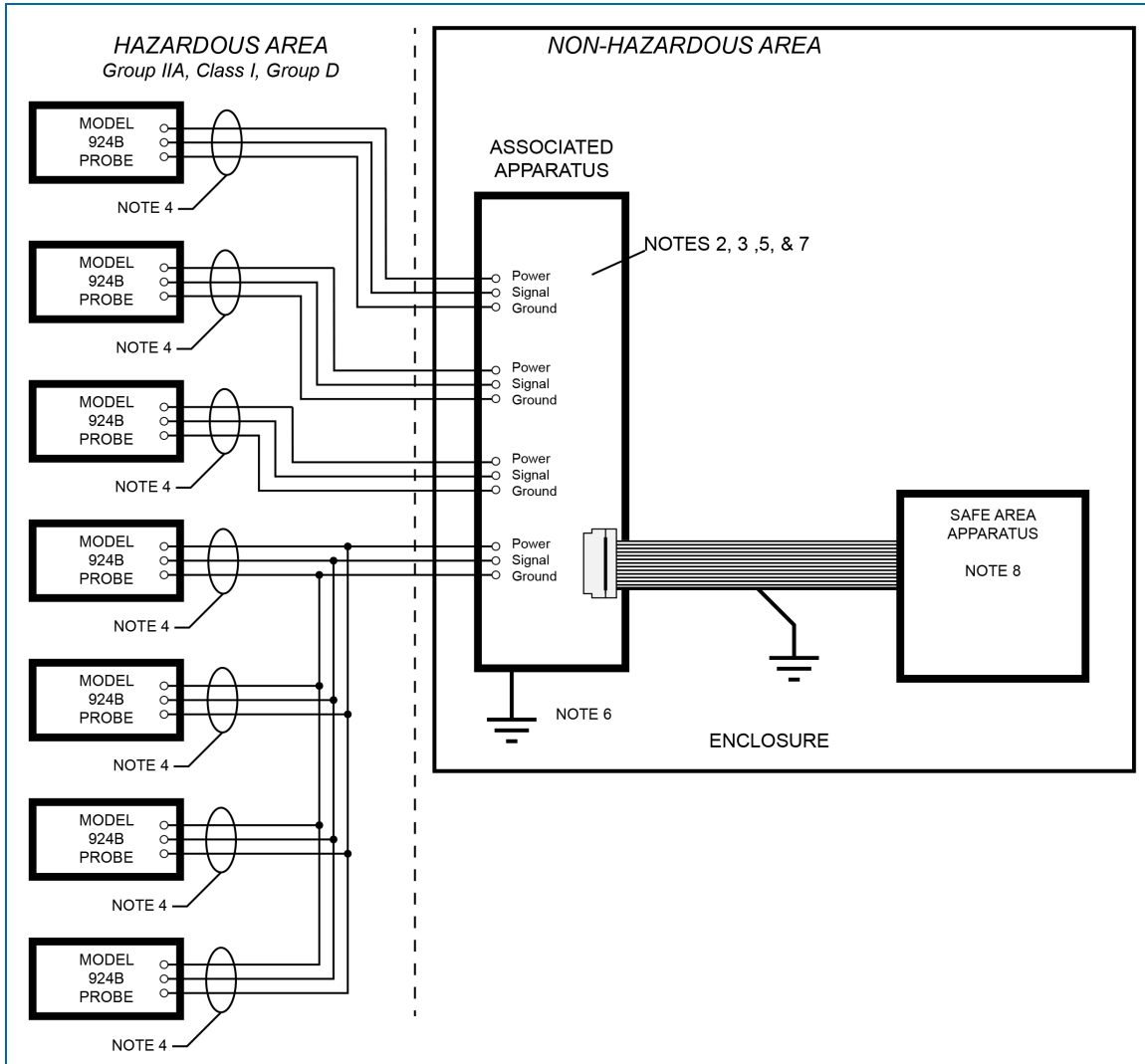
EXAMPLE:

Example Associated Apparatus 14.28V (Uo), 338mA (Io), 16.1 uF (Co), 2,240uH (Lo)
 Cable 2,000 feet, 60pF/ft, 0.2uH/ft = 0.120uF (120,000pf), 400uH

924B entity parameters		Associated Apparatus
14.9V (Ui)	≥	14.28V (Uo)
362mA (Ii)	≥	338mA (Io)
1.3W (Pi)	≥	$(14.28 \times 0.338) / 4 = 1.21W$ (Po)
0uF (Ci)+0.060uF (Ccable)=0.060uF	≤	16.1uF (Co)
363uHx4(Li)400uH (Lcable)= 1,852uF	≤	2,240uH (Lo)

If the above statements are true (which they are) then it is safe to connect.

5. Associated apparatus must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada. other local codes, as applicable.
6. When required by the manufacturer's control drawing, the associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code, or other local installation codes as applicable. The resistance of the ground path must be less than 1 ohm⁷
7. Associated apparatus must not be used in combination unless permitted by the associated apparatus certification.
8. Control equipment must not use or generate more than 250Vrms or dc with respect to earth.



Section 6 ISIM Control Drawing

NOTES:

1. Description

The Intelligent Sensor Interface Module (ISI) allows multiple sensors (maximum of 16) connected to a single cable run and a single barrier position. The equipment is intended for installation in Category 1, Group IIA Hazardous Locations.

2. Model numbers covered in this control drawing

ISI with small single float switch , brass	Model 30-0230-S	
ISI with small single float switch , plastic	Model 30-0231-S	
ISI with large single float switch , plastic	Model 30-0231-L	
ISI with dual float switch, plastic	Model 30-0232-D-XX	
ISI with dual float switch with hydrocarbon detection, plastic	Model 30-0232-DH-XX	
ISI with hydrocarbon detection, interstitial	Model 30-0233-H	
ISI with hydrocarbon and water detection, interstitial	Model 30-0233-HW	
ISI with hydrocarbon detection liquid phase	Model 30-0234-H-XX	
ISI with hydrocarbon and water detection liquid phase	Model 30-0234-HW-XX	
ISI with hydrocarbon vapor detection	Model 30-0235-V	
ISI with hydrocarbon vapor detection and water	Model 30-0235-VW	
ISI with liquid detection	Model 30-0236-L	Only UL Certified
ISI with liquid and water detection	Model 30-0236-LW	Only UL Certified

ISI standalone for attaching to a third party certified device Model 20-0349-ISI

3. Entity parameters

Entity input parameters of Intelligent Sensor Interface Module (ISI) when attached to sensor Includes a maximum 15m cable between sensor and ISI.

V _{max,Ui} 14.9 V	I _{max, li} 305 mA	C _i 0u F	Li 50uH	P _i 1.0 W
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Entity input and output parameters of Intelligent Sensor Interface Module (ISI) for attaching to unspecified approved sensor. Includes a maximum 15 m cable between sensor and ISI.

V _{max,Ui} 14.9 V	I _{max, li} 305 mA	C _i 0u F	Li 165mH	P _i 1.0 W
V _{t, Uo} 14.9V	I _{t, lo} 148mA	Ca, Co 2uF	La, Lo 0.15mH	Po 0.56 W

Associated Apparatus must be third party listed (certified) as providing intrinsically safe circuits for the application. Use the following to determine suitability of connections:

$$14.9V (V_{max, Ui}) \geq V_{oc} \text{ or } V_t \text{ or } U_o$$

$$305mA (I_{max, li}) \geq I_{sc} \text{ or } I_t \text{ or } I_o$$

$$1.0W (P_i) \geq P_o$$

If P_o of the associated apparatus is not known, it may be calculated using the following formula: $P_o = (U_o \cdot I_o) / 4$

Associated Apparatus output current must be limited by resistor such that the output voltage current plot is a straight line between open-circuit voltage and short-circuit current.

4. Calculating Capacitance

Capacitance of the field wiring from the intrinsically safe equipment to the Associated Apparatus shall be calculated and must be included in the system calculations. Capacitance of the cable is C_{cable}. When the cable capacitance per foot is not known, the following value shall be used: C_{cable} = 60pF/ft

The ISI, with or without sensor, has a C_i of OuF, so only the capacitance of the field wiring cable need to be totaled and compared with the Associated Apparatus.

$$\begin{array}{l} \text{Total ISI(s) } C_i + C_{\text{cable}} \\ C_i(s) + C_{\text{cable}} \end{array} \leq \begin{array}{l} \text{Associated Apparatus output parameters} \\ C_a, C_o \end{array}$$

5. Calculating Inductance

Inductance of the field wiring from the intrinsically safe equipment to the Associated Apparatus shall be calculated and must be included in the system calculations. Inductance of the cable is L_{cable}. When the cable inductance per foot is not known, the following value shall be used: L_{cable} 0.2uH/Ft.

Add the L_i Inductance of all the Sensors connected to the network and the cable inductance and compare it to the Associated Apparatus.

$$\begin{array}{l} \text{Total ISI(s) } L_i + L_{\text{cable}} \\ L_i(s) + L_{\text{cable}} \end{array} \leq \begin{array}{l} \text{Associated Apparatus output parameters} \\ L_a, L_o \end{array}$$

EXAMPLE:

1,000 ft cable	$0.0002 * 1000$	= 0.2mH
8 sensors L _i = 0.165mH	$0.165 * 8$	= 1.32mH
8 sensors L _i = 50uH	$0.00005 * 8$	= 0.0004mH
Total inductance in network	$0.2\text{mH} + 1.32\text{mH} + .0004\text{mH}$	= 1.5204mH

6. Connecting a third party sensor to standalone ISI

To determine the safe connection of the ISI stand alone to a third party approved sensor with entity parameters the following considerations should be used.

The maximum cable length used to connect the ISI to the sensor shall be less than 15M. The L_o entity parameter has already factored in the sensor / ISI connecting cable of 15M. maximum.

The sensor must meet the following criteria:

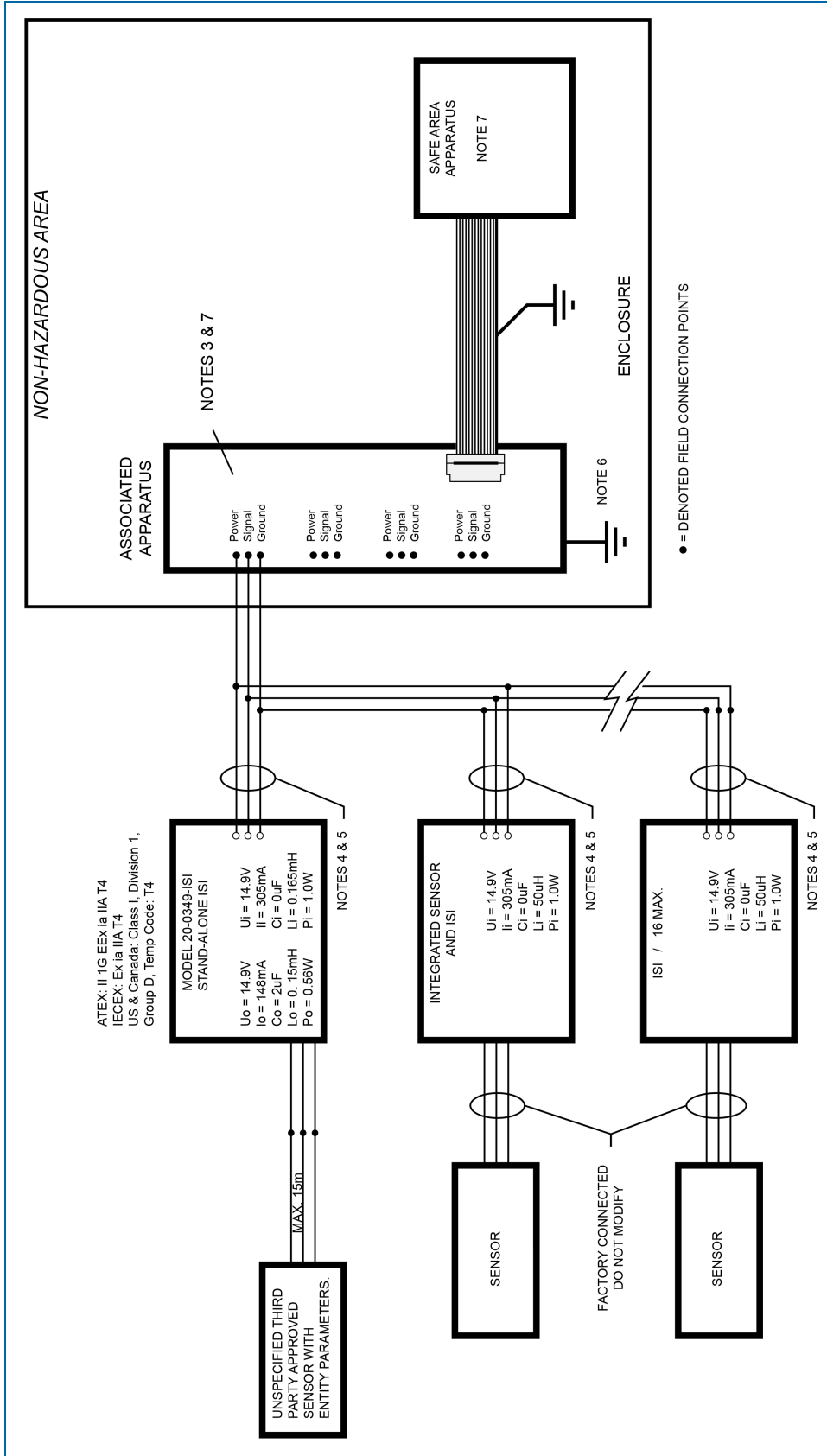
Sensor entity parameters		ISI output entity parameters
Vmax, Ui	≥	Vt, Uo 14.9V
Imax, li	≥	It,lo 148mA
Pi	≥	Po 0.56W
Ci	≤	Ca, Co 2uF
Li	≤	La, Lo 0.15mH

7. Installation

Associated apparatus must be installed in accordance with its manufacturers control drawing and Article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada or other local codes as applicable.

When required by manufacturer's control drawing, the associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code or other local installation codes as applicable. The resistance of the ground path must be less than 1 ohm.

Associated Apparatus must not be used in combination unless permitted by the Associated Apparatus Control drawing. Must not use or generate more than 250Vrms or dc with respect to earth.



Section 7 VSmart Model 0347 (Green Label) Control Drawing

NOTES:

1. Associated Apparatus Entity Parameters: Group IIA:

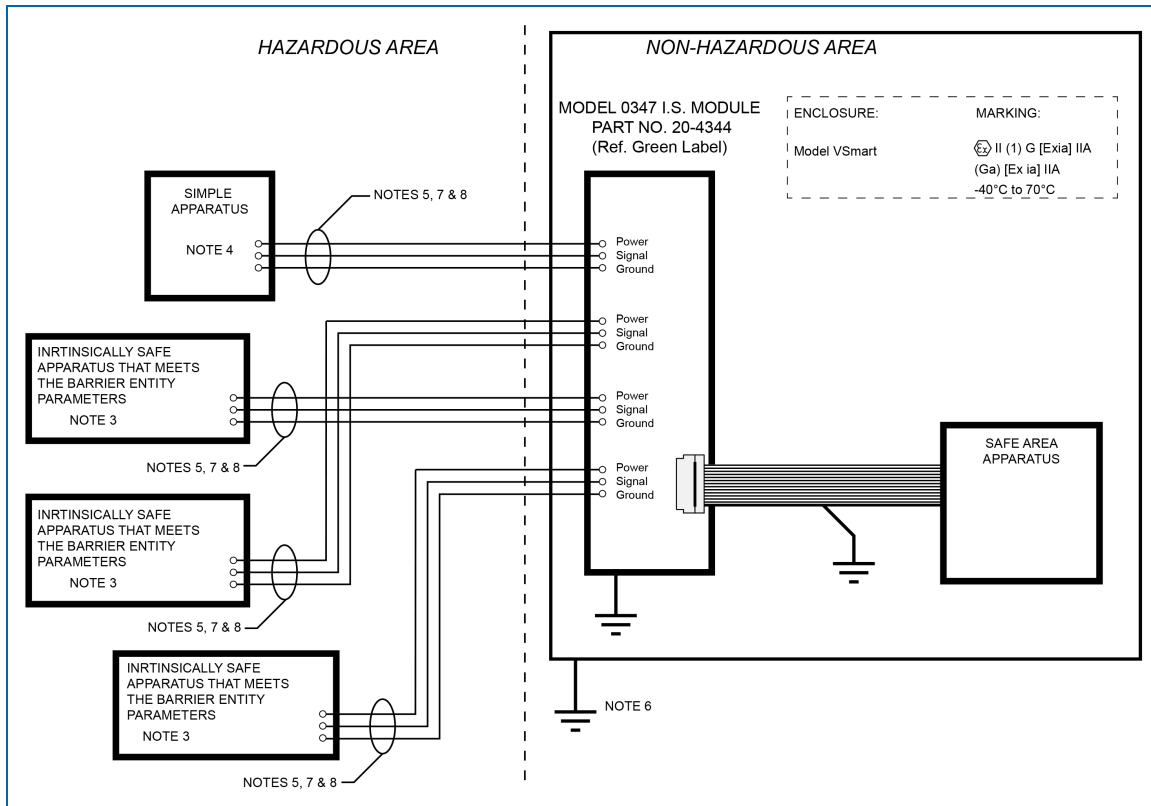
$$\begin{aligned}
 U_o &= 14.85\text{Vdc} \\
 I_o &= 305\text{mA} \\
 P_o &= 974\text{mW} \\
 C_o &= 3.0\mu\text{F}, L_o = 1.52\text{mH} \\
 &\text{or} \\
 C_o &= 5.0\mu\text{F}, L_o = 600\mu\text{H}
 \end{aligned}$$

2. The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
3. Selected intrinsically safe apparatus must be ATEX and/or IECEx Certified as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA		
I.S. EQUIPMENT		ASSOCIATED APPARATUS
U_i	\geq	$U_o = 14.85\text{V}$
I_i	\geq	$I_o = 305\text{mA}$
P_i	\geq	$P_o = 974\text{mW}$
$C_i + C_{\text{cable}}$	\leq	$C_o = 3.0\mu\text{F}, L_i + L_{\text{cable}} \leq L_o = 1.52\text{mH}$
-or-		
$C_i + C_{\text{cable}}$	\leq	$C_o = 5.0\mu\text{F}, L_i + L_{\text{cable}} \leq L_o = 600\mu\text{H}$

4. This associated apparatus may also be connected to simple apparatus as defined in Clause 5.7 of IEC60079-11:2012 and or EN60079-11:2012 and installed in accordance with applicable local codes.
5. Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_o , shown on any associated apparatus used. The same applies for inductance ($L_{\text{cable}}, L_i, L_o$, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: $C_{\text{cable}} = 197\text{pF/m.}, L_{\text{cable}} = 0.66\mu\text{H/m.}$
6. The associated apparatus must be connected to a suitable ground electrode or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
7. Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation.
8. Intrinsically safe circuits must be wired and separated in accordance with applicable local codes.
9. This associated apparatus has not been evaluated for use in combination with another associated apparatus.
10. Conditions for Safe Use:

- a. Um must not exceed 250V.
 - b. Must be installed in accordance with the applicable control drawings.
 - c. All openings (slots) must be provided with an intrinsic safety barrier or (plates) which must be firmly screwed in place.
11. Unit must be mounted to the wall using mounting holes integral to the enclosure. See installation manual for details.
 12. Standards to which conformity is declared:
 - EN 60079-0:2012+A11:2013
 - EN 60079-11:2012
 - EN 60079-26:2007
 - IEC 60079-0: Edition 6
 - IEC 60079-11: Edition 6
 - IEC60079-26: Edition 2
 13. Model 0347 I.S. Module is identified with a Green label.



Section 8 VSmart Model 0348 (Orange Label) Control Drawing

NOTES:

- Associated Apparatus Entity Parameters: Group IIA:

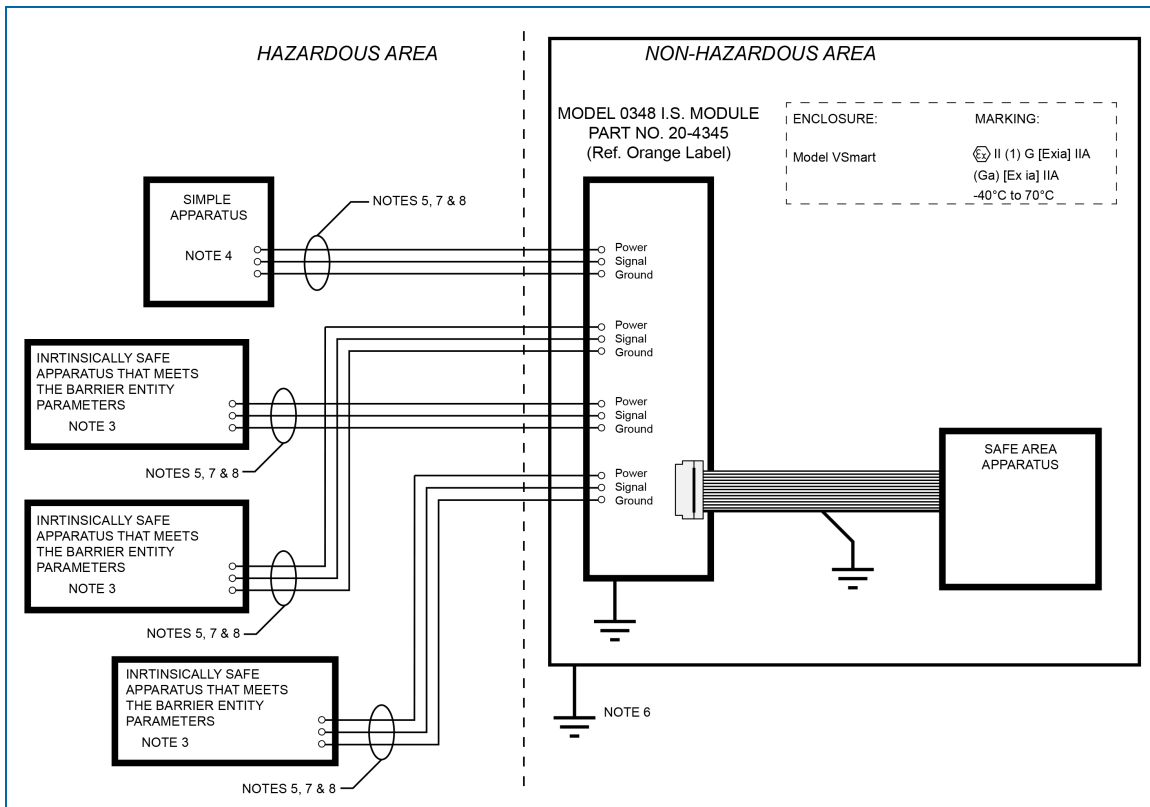
$U_o = 25.83V$
 $I_o = 155mA$
 $P_o = 974mW$
 $C_o = 0.8\mu F$
 $L_o = 5.91mH$

- The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
- Selected intrinsically safe apparatus must be ATEX and/or IECEx Certified as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA		
I.S. EQUIPMENT		ASSOCIATED APPARATUS
U_i	\geq	$U_o = 25.83V$
I_i	\geq	$I_o = 155mA$
P_i	\geq	$P_o = 974mW$
$C_i + C_{cable}$	\leq	$C_o = 0.8\mu F$
$L_i + L_{cable}$	\leq	$L_o = 5.91mH$

- This associated apparatus may also be connected to simple apparatus as defined in Clause 5.7 of IEC60079-11:2012 and or EN60079-11:2012 and installed in accordance with applicable local codes.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_o , shown on any associated apparatus used. The same applies for inductance (L_{cable} , L_i , L_o , respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: $C_{cab/e} = 197pF/m.$, $L_{cable} = 0.66\mu H/m.$
- The associated apparatus must be connected to a suitable ground electrode or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
- Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation.
- Intrinsically safe circuits must be wired and separated in accordance with applicable local codes.
- This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- Conditions for Safe Use:
 - U_m must not exceed 250V.
 - Must be installed in accordance with the applicable control drawings.

- c. All openings (slots) must be provided with an intrinsic safety barrier or (plates) which must be firmly screwed in place.
- 11. Unit must be mounted to the wall using mounting holes integral to the enclosure. See installation manual for details.
- 12. Standards to which conformity is declared:
 - EN 60079-0:2012+A11:2013
 - EN 60079-11:2012
 - EN 60079-26:2007
 - IEC 60079-0: Edition 6
 - IEC 60079-11: Edition 6
 - IEC60079-26: Edition 2
- 13. Model 0348 I.S. Module is identified with an Orange label.



Section 9 0324 Barrier Control Drawing

NOTES:

1. Associated Apparatus Entity Parameters: Group IIA

Voc (or Uo) = 14.85Vdc

Isc (or Io) = 305mA

Po = 974mW

Ca (or Co) = 7.15uF

La (or Lo) = 1.52mH

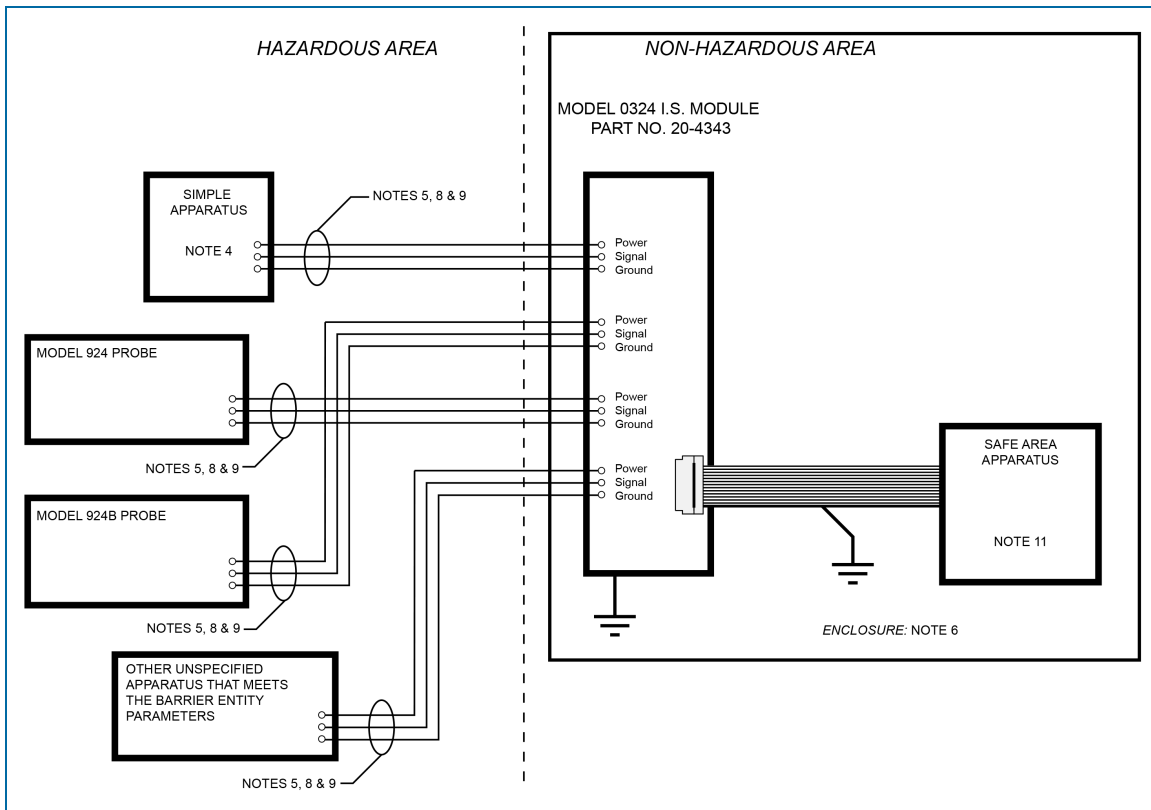
2. The voltage current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
3. Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application and have intrinsically safe entity parameters conforming with the following:

TABLE 1 Group IIA

I.S. EQUIPMENT		ASSOCIATED APPARATUS
v MAX (or Ui)	≥	Voc or Vt (or Uo)= 14.85V
I max (or Ii)	≥	Isc or It (or Io) = 305mA
P max Pi	≥	Po = 974mW
Ci + Ccable	≤	Ca (or Co) = 7.15uF
Li + Lcable	≤	La (or Lo) = 1.52mH

4. This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with Article 504.10(8) of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.
5. Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60pF/ ft., Lcable = 0.2uH/ft.
6. Associated apparatus must be installed in an enclosure suitable for the application in accordance with the National Electrical Code (ANSI/NFPA 70) for the installation in the United States, the Canadian Electrical Code for installations in Canada or other local codes, as applicable.
7. The associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
8. Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice /SA RP12.6 for installing Intrinsically safe equipment.
9. Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes as applicable.

- 10. This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- 11. Control equipment must not use or generate more than 250V rms or dc with respect to earth.



Revisions

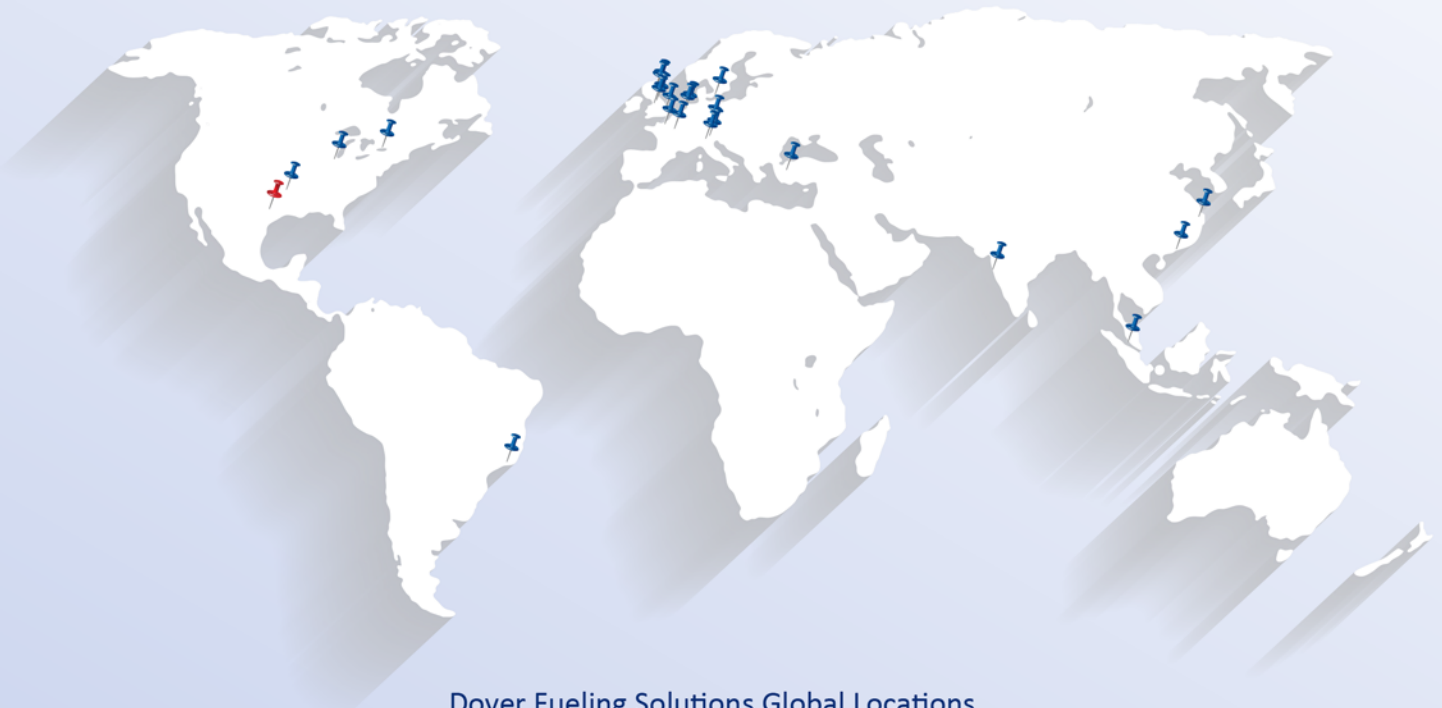
Revision #	ECO	Effective	Software Version	Key Changes
0	1184	10/16/2017	na	Initial Release



NOTE: It is possible that older software versions might not support all features



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