

Instruction

MI 020-543

July 2020

**Pressure Transmitters
FM/CSA Safety Information**

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

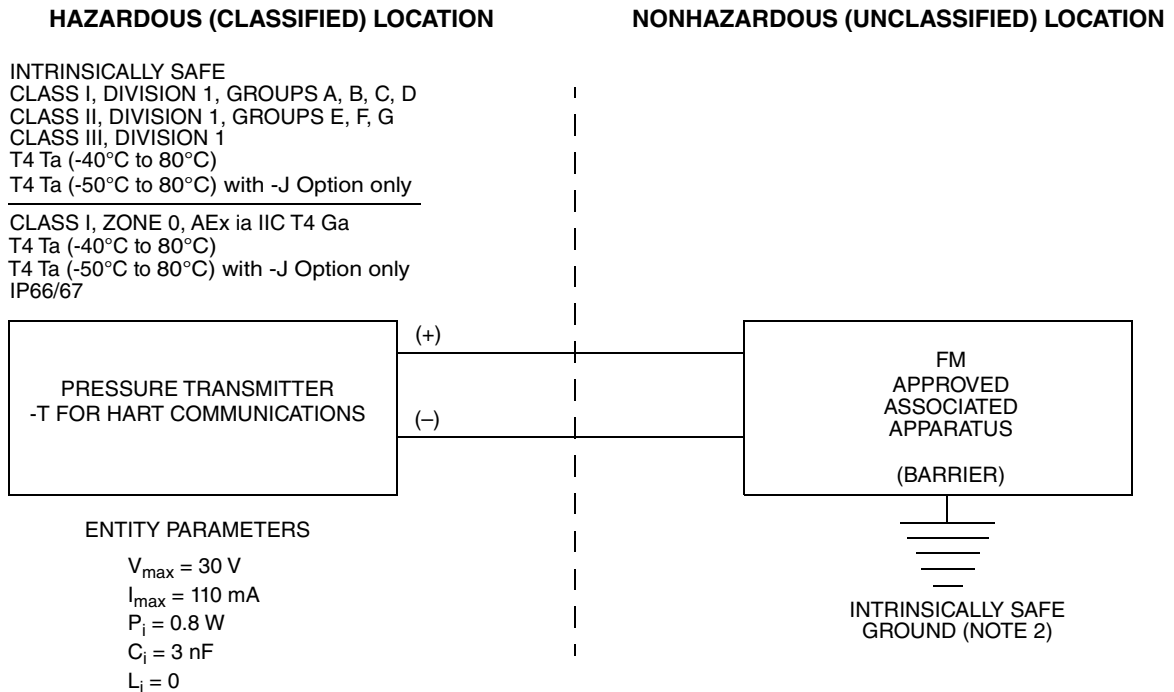
A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

HART Communication Protocol

If your transmitter with HART communication protocol is classified as intrinsically safe, connect per the following control diagrams for the appropriate agency.

FM Approvals

Figure 1. Loop Diagram for HART Transmitters Using Entity Parameters



— **NOTE** —

1. No revision to drawing without prior FM approval.
2. Total resistance between Intrinsic Safety Ground and Earth Ground must be less than 1 ohm.
3. Barriers must be FM certified and must be installed in accordance with manufacturer's instructions.
4. Control equipment connected to associated apparatus or barrier must not use or generate more than 250 V_{rms} or V dc or marked U_m of the associated apparatus.
5. Installation should be in accordance with ANSI/ISA RP 12.6 "Installation of Intrinsically Safe Systems For Hazardous (Classified) Locations":

$$V_{max} \text{ or } U_i \geq V_{oc} \text{ or } V_t$$

$$I_{max} \text{ or } I_i \geq I_{sc} \text{ or } I_t$$

$$P_i \geq P_o$$

$$C_i + C_{cable} \leq C_o \text{ or } C_a$$

$$L_i + L_{cable} \leq L_o \text{ or } L_a$$

(Terms defined in document) ANSI/NFPA 70 "National Electrical Code" and manufacturer's control drawing for associated apparatus.

6. When installed in a hazardous location where a flammable dust may be present, the installer must help ensure that the cable entry maintains the dust-tightness of the enclosure.
-

Specific Conditions of Use:

1. The transmitter's enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken into account to prevent against impact or friction when installed in a Division 1 or Zone 0 location.
2. The maximum permitted ambient temperature of the transmitters is 80°C. To avoid the effects of process temperature and other thermal effects, care must be taken to help ensure that the electronics temperature does not exceed an ambient temperature of 80°C.
3. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

▲ WARNING

EXPLOSION HAZARD

To help prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
--

Failure to follow these instructions can result in death or serious injury.
--

▲ WARNING

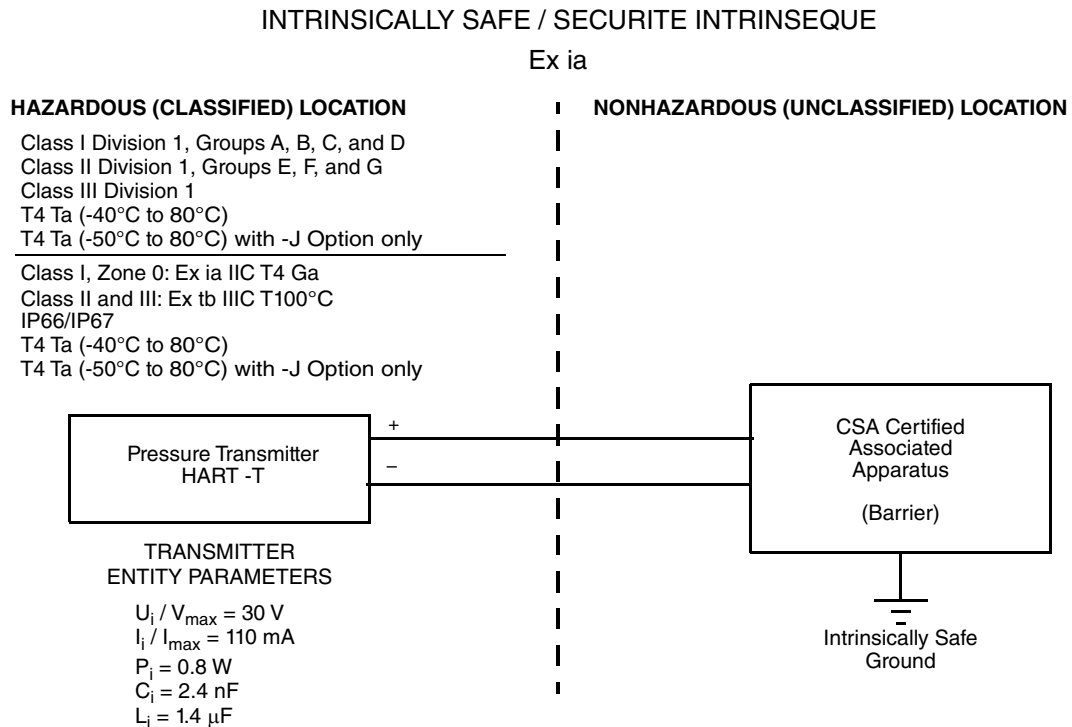
EXPLOSION HAZARD

Do not substitute components. Substitution of components may impair intrinsic safety rating.
--

Failure to follow these instructions can result in death, serious injury, or equipment damage.

CSA Intrinsically Safe

Figure 2. Loop Diagram for HART Transmitters Using Entity Parameters



NOTE

1. No revision to drawing without prior CSA approval.
2. Barriers must be CSA certified and must be installed in accordance with manufacturer's instructions.
3. Maximum nonhazardous area voltage must not exceed 250 V.
4. Intrinsically safe circuits must be wired and separated in accordance with the wiring methods of the Canadian Electrical Code C22.1 or in accordance with the authority having jurisdiction.
5. Entity parameters must meet the following requirements:

$$U_o / V_{oc} \leq U_i / V_{\max}$$

$$I_o / I_{sc} \leq I_i / I_{\max}$$

$$P_i \geq P_o$$

$$C_i + C_{\text{cable}} \leq C_o \text{ or } C_a$$

$$L_i + L_{\text{cable}} \leq L_o \text{ or } L_a$$
6. Total resistance between Intrinsic Safety Ground and Earth Ground must be less than 1 ohm.
7. Some models have the main electronics enclosure manufactured from aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This must be considered during installation, particularly if the equipment is installed in a Zone 0 location.

8. When installed in a hazardous location where a flammable dust may be present, under certain extreme circumstances an incendive electrostatic charge may build up on the painted surfaces, which are non-conducting. Therefore, the user/installer must implement precautions to help prevent the buildup of electrostatic charge; for example, place the equipment in a location where a charge-generating mechanism (such as wind-blown dust) is unlikely to be present and clean with a damp cloth.
 9. When installed in a hazardous location where a flammable dust may be present, the installer must help ensure that the cable entry maintains the dust-tightness of the enclosure.
 10. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.
-

▲ WARNING

EXPLOSION HAZARD

Do not substitute components. Substitution of components may impair intrinsic safety rating.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

▲ AVERTISSEMENT

RISQUE D'EXPLOSION

La substitution de composants peut compromettre la sécurité intrinsèque.
Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.

FOUNDATION™ Fieldbus Communication Protocol FISCO

FISCO Concept

The Fieldbus Intrinsically Safe COnccept (FISCO) allows the interconnection of one FISCO certified power supply, an unlimited number of FISCO certified intrinsically safe field apparatus, and two FISCO certified terminators, one of each end of the trunk cable. (Note: The FISCO Terminator at the supply end is usually incorporated in to the FISCO Power Supply.)

Each piece of apparatus will be marked with the word "FISCO" followed by the indication of its function, i.e. "Power Supply", "Field Device" or "Terminator".

The criterion for such interconnection is Division or Zone and Group Dependent. Therefore, all apparatus shall be labeled for the same applicable Division or Zone and Group(s).

The FISCO power supply shall be located not more than 30 meters from one end of the trunk. Where the power supply is connected via a spur, then that spur is restricted to a length of 30 meters.

The cable used to interconnect the devices needs to comply with the following parameters:

- ◆ Loop resistance R_c : 15 Ω /km to 150 Ω /km
- ◆ Inductance per unit length L_c : 0.4mH/km to 1mH/km
- ◆ Capacitance per unit length C_c : 45nF/km to 200nF/km
- ◆ Maximum length of spur cable: 60m for IIC and IIB
- ◆ Maximum length of each trunk cable, including the length of all spurs: 1km in IIC and 5km in IIB and IIIC

Terminators

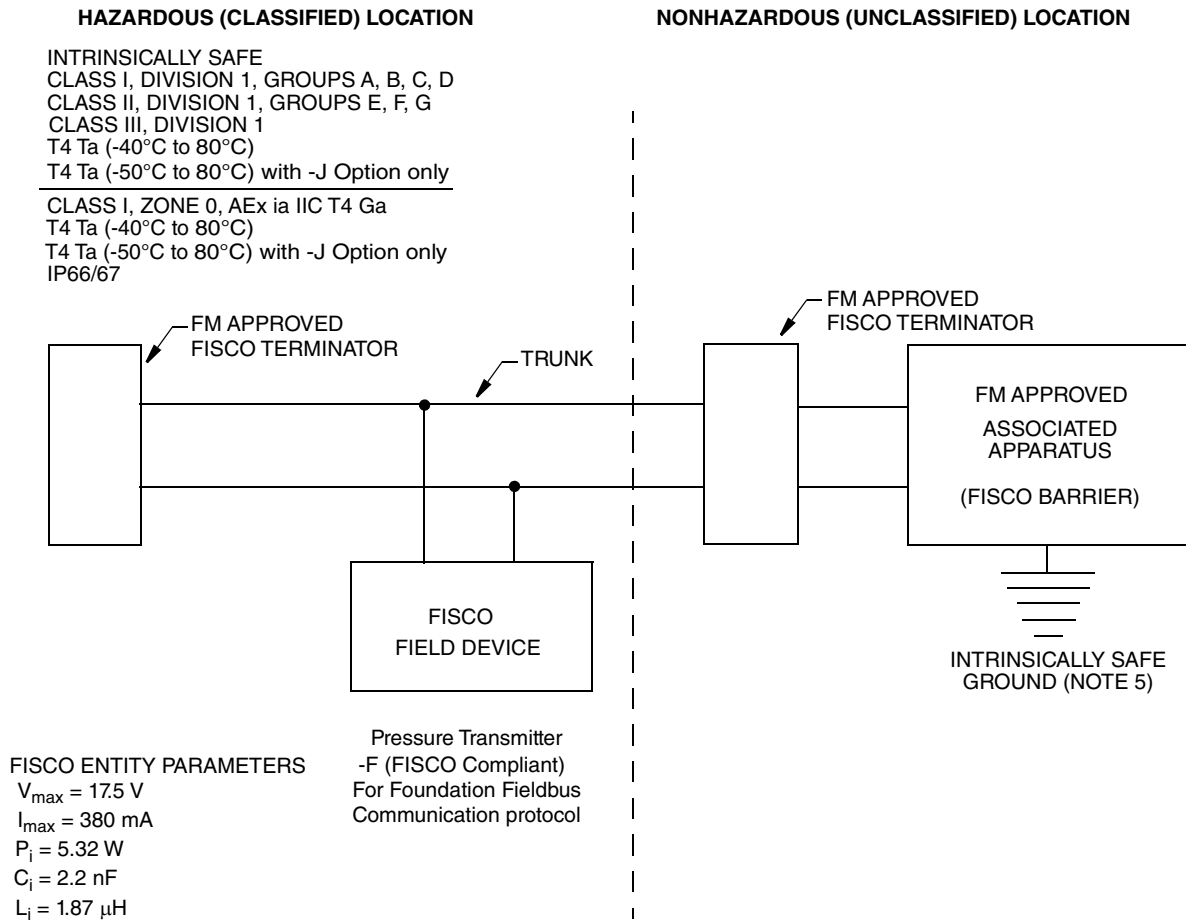
At each end of the trunk cable, a line terminator with the following parameters is suitable:

- ◆ Resistance $R = 90$ to 102Ω
- ◆ Capacitance $C = 0$ to $2.2 \mu\text{F}$

If your transmitters with FOUNDATION™ Fieldbus communication protocol is classified as intrinsically safe Fieldbus Intrinsically Safe COnccept (FISCO) compliant, connect per the following control diagrams for the appropriate agency.

FM Approvals

Figure 3. Loop Diagram for FISCO Compliant Transmitters



NOTE

1. No revision to drawing without prior FM approval.
2. Associated apparatus manufacturer’s installation drawings must be followed when installing this equipment.
3. The FISCO Supply, FISCO Field Device(s), and FISCO Terminators shall be FM approved.
4. Control equipment connected to FISCO barrier must not use or generate more than 250 V_{rms} or V dc or the marked U_m on the associated apparatus
5. Resistance between FISCO Intrinsically Safe ground and earth ground must be less than 1.0 ohm.
6. Installation should be in accordance with ANSI/ISA RP 12.06.01 “Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations”, and the latest edition of the National Electrical Code (ANSI/NFPA 70).

7. The FISCO Concept allows the interconnection of Fieldbus intrinsically safe apparatus with FISCO associated apparatus when the following is true:
- $$V_{\max} \text{ or } U_i \geq V_{oc}, V_t \text{ or } U_o$$
- $$I_{\max} \text{ or } I_t \geq I_{sc}, I_t \text{ or } I_o$$
- $$P_{\max} \text{ or } P_i \geq P_o$$
8. An approved dust-tight seal is required for Class II and III applications.
-

Specific Conditions of Use:

1. The transmitter's enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken into account to prevent against impact or friction when installed in a Division 1 or Zone 0 location.
2. The maximum permitted ambient temperature of the transmitters is 80°C. To avoid the effects of process temperature and other thermal effects, care shall be taken to help ensure that the electronics temperature does not exceed an ambient temperature of 80°C.
3. The transmitter with Fieldbus communications (-F) does not withstand a 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
4. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

⚠ WARNING

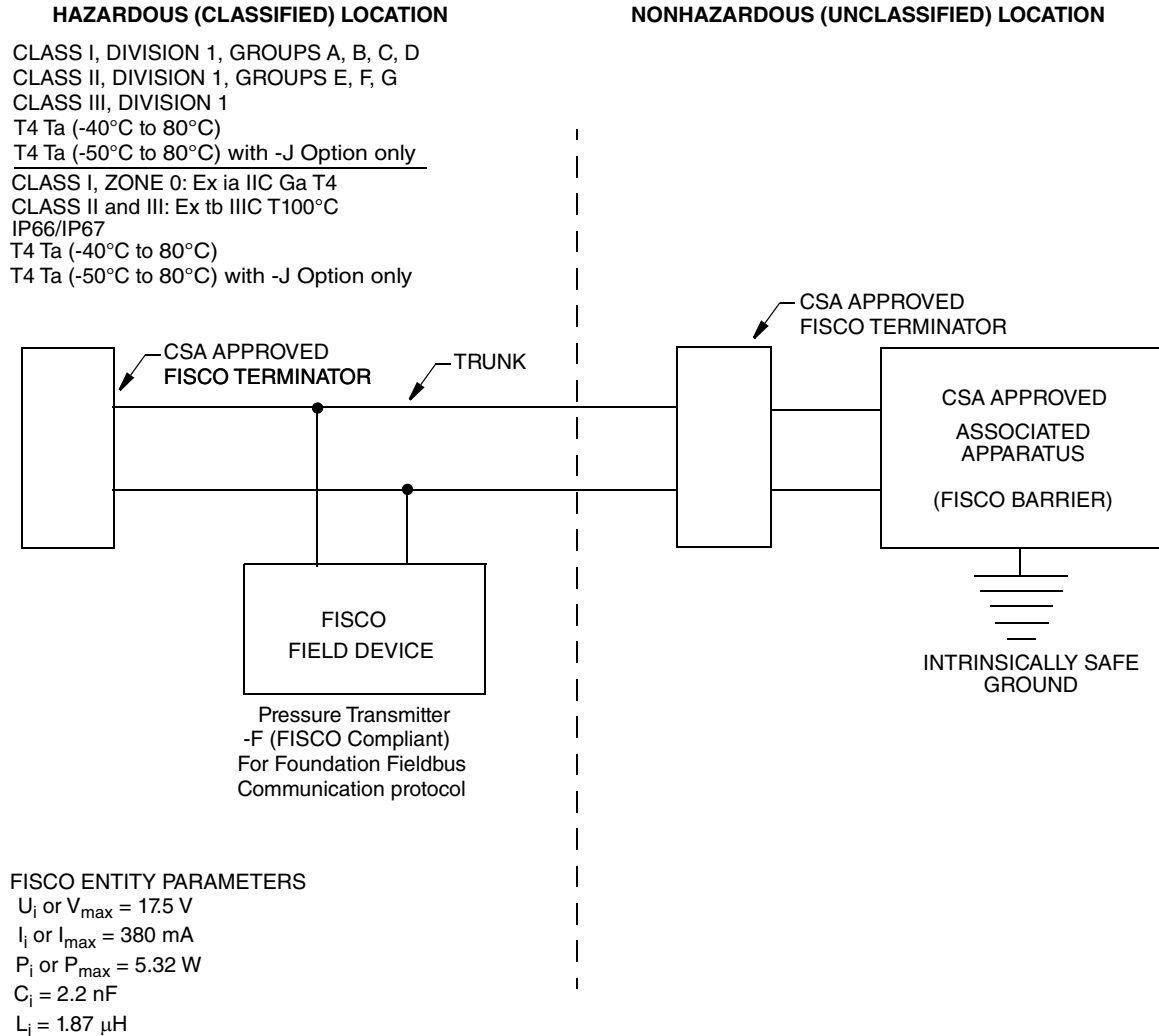
EXPLOSION HAZARD

To help prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
--

Failure to follow these instructions can result in death or serious injury.
--

CSA Intrinsically Safe / Securite Intrinseque Ex ia

Figure 4. Loop Diagram for FISCO Compliant Transmitters



NOTE

1. No revision to drawing without prior CSA approval.
2. Associated apparatus manufacturer’s installation drawings must be followed when installing this equipment.
3. The FISCO Supply, FISCO Field Device(s), and FISCO Terminators shall be CSA approved.
4. Resistance between FISCO Intrinsically Safe ground and earth ground must be less than 1.0 ohm.

5. The FISCO Concept allows the interconnection of Fieldbus intrinsically safe apparatus with FISCO associated apparatus when the following is true:
 - V_{\max} or $U_i \geq V_{oc}$, or U_o
 - I_{\max} or $I_t \geq I_{sc}$, or I_o
 - P_{\max} or $P_i \geq P_o$
 - $C_i \leq C_o$
 - $L_i \leq L_o$
6. Barriers must be CSA certified and must be installed in accordance with manufacturer's instructions.
7. Maximum nonhazardous area voltage must not exceed 250 V.
8. Install in accordance with the latest edition of the Canadian Electrical Code, Part 1.
9. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

▲ WARNING

EXPLOSION HAZARD

<p>Do not substitute components. Substitution of components may impair intrinsic safety rating. Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>
--

▲ AVERTISSEMENT

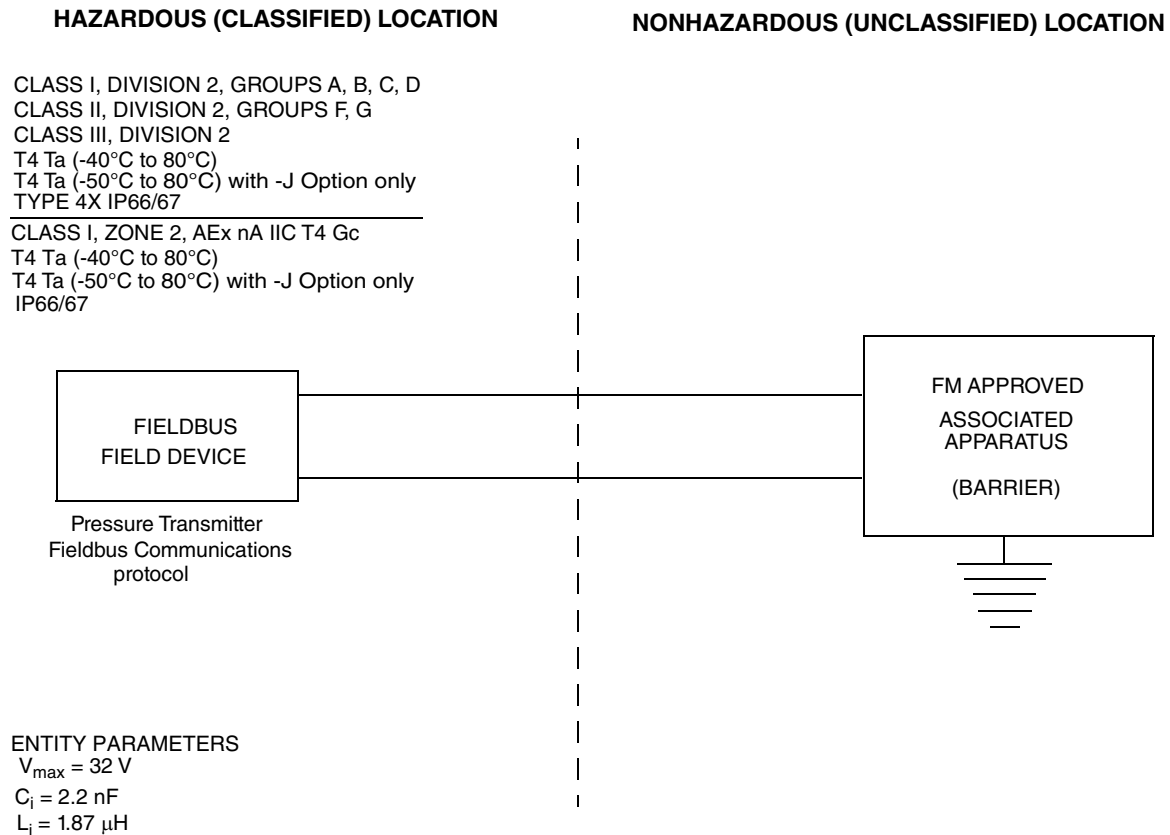
RISQUE D'EXPLOSION

<p>La substitution de composants peut compromettre la sécurité intrinsèque. Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.</p>
--

FM Approvals

Fieldbus Non Incendive (Division and Zone)

Figure 5. Loop Diagram for Division 2 NON INCENDIVE Compliant Transmitters



NOTE

1. No revision to drawing without prior FM approval.
2. Associated apparatus manufacturer’s installation drawings must be followed when installing this equipment.
3. Resistance between Field Device ground and earth ground must be less than 1.0 ohm.
4. Depending on location, install per National Electrical Code (NEC) using wiring methods described in article 500 through article 510.
5. The Nonincendive Field Wiring Circuit Concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specifically examined in combination as a system using any of the wiring methods permitted for unclassified locations, when $V_{oc} \leq V_{max}$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$.
6. Transmitter Nonincendive Field Wiring parameters are as follows:
 U_i or $V_{max} \leq 32 \text{ V dc}$ $C_i = 2.1 \text{ nF}$ $L_i = 2\mu\text{H}$

7. An approved dust-tight seal is required for Class II and III applications.
8. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

▲ WARNING

EXPLOSION HAZARD

To help prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
--

Failure to follow these instructions can result in death or serious injury.
--

▲ WARNING

COMPONENT REPLACEMENT OR SUBSTITUTION HAZARD

Do not substitute components. Substitution of components may impair suitability for Division 2.

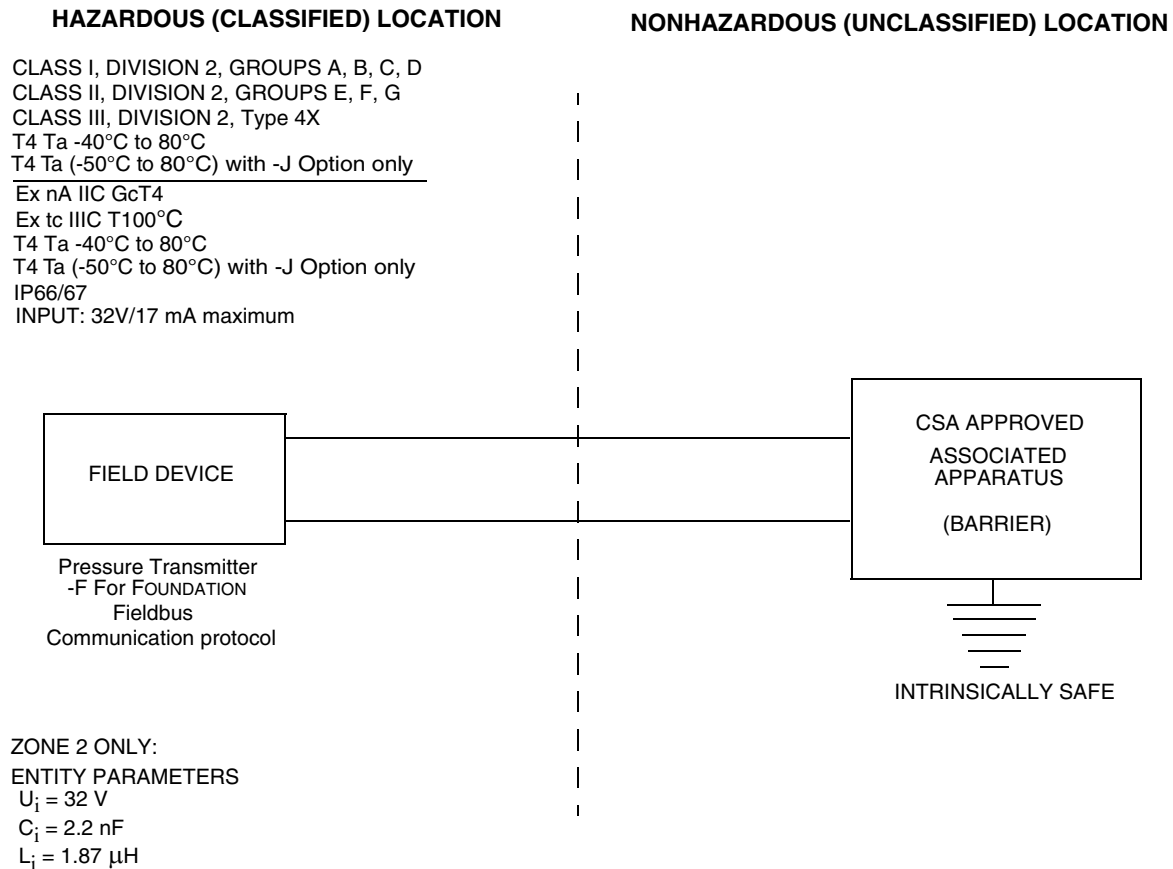
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Specific Conditions of Use:

1. The maximum permitted ambient temperature of the transmitters is 80°C. To avoid the effects of process temperature and other thermal effects, care shall be taken to help ensure that the electronics temperature does not exceed an ambient temperature of 80°C.
2. The transmitter with Fieldbus communications (-F) does not withstand a 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.

CSA Fieldbus Non Incendive (Division and Zone)

Figure 6. Loop Diagram for Fieldbus Division 2 Compliant Transmitters



— **NOTE** —

1. No revision to drawing without prior CSA approval.
2. Associated apparatus manufacturer’s installation drawings must be followed when installing this equipment.
3. The Associated Apparatus must be CSA approved.
4. Resistance between field device ground and earth ground must be less than 1.0 ohm.
5. Barriers must be CSA certified and must be installed in accordance with manufacturer’s instructions.
6. Maximum nonhazardous area voltage must not exceed 250 V.
7. Install in accordance with Canadian Electrical Code, Part 1.

8. The Nonincendive Field Wiring Circuit Concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specifically examined in combination as a system using any of the wiring methods permitted for unclassified locations, when $V_{oc} \leq V_{max}$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$.
9. Transmitter Nonincendive Field Wiring parameters are as follows:
 U_i or $V_{max} \leq 32$ V dc $C_i = 2.1$ nF $L_i = 2$ uH
10. An approved dust-tight seal is required for Class II and III applications.
11. The inside of the electronics enclosure shall be periodically inspected in locations where high external humidity and internal temperature variations may cause condensation inside the enclosure (due to frequent removal of the covers).
12. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

▲ WARNING

EXPLOSION HAZARD

<p>Do not substitute components. Substitution of components may impair intrinsic safety rating. Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>
--

▲ AVERTISSEMENT

RISQUE D'EXPLOSION

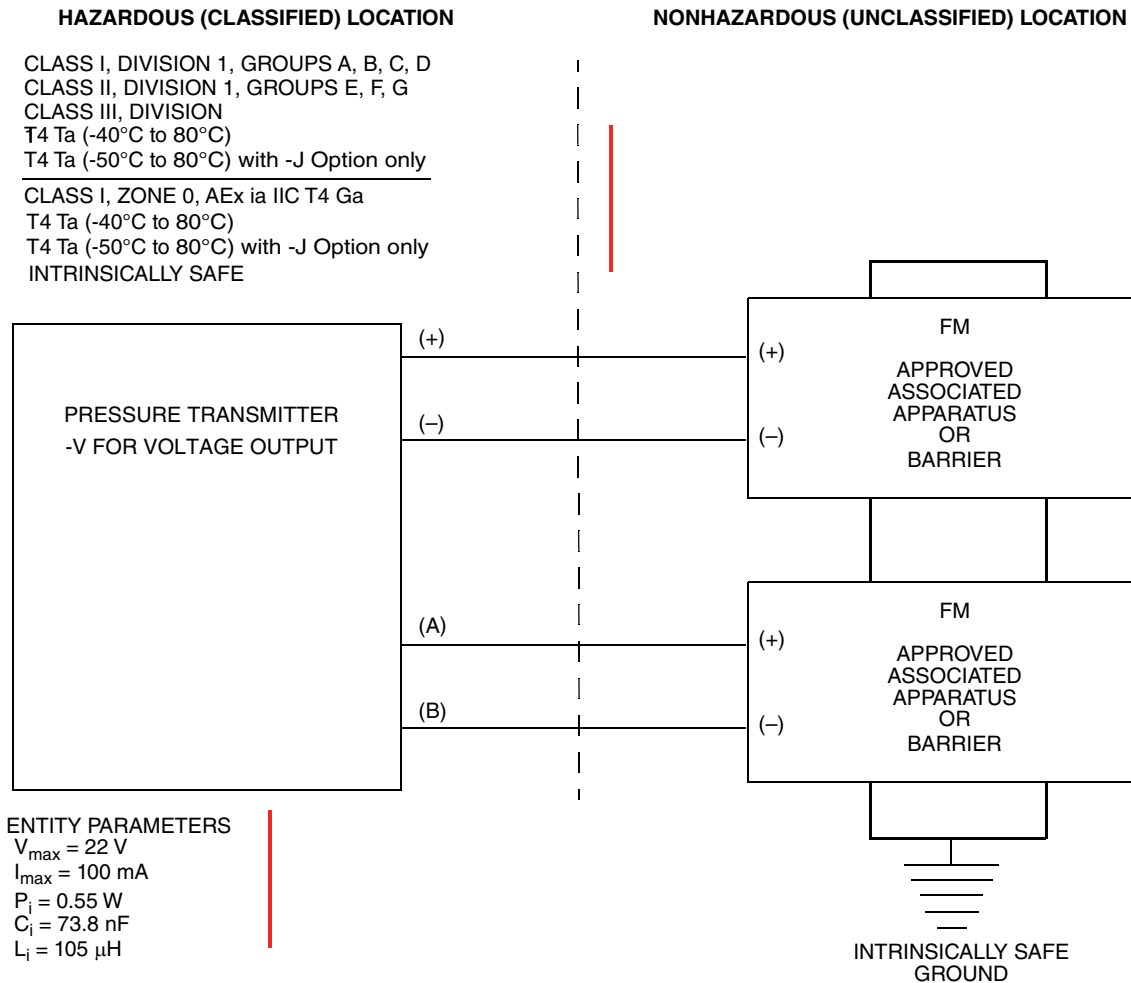
<p>La substitution de composants peut compromettre la sécurité intrinsèque. Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.</p>
--

Voltage Output Signal

If you transmitters with voltage output is classified as intrinsically safe, connect per the following control diagram for the appropriate agency.

FM Approvals

Figure 7. Loop Diagram for Voltage Output



NOTE

1. No revision to drawing without prior FM approval.
2. Total resistance between Intrinsic Safety Ground and Earth Ground must be less than 1 ohm.
3. Barriers must be FM certified and must be installed in accordance with manufacturer's instructions.
4. Control equipment connected to associated apparatus or barrier must not use or generate more than 250 V_{rms} or V dc or the marked U_m on the associated apparatus.

5. Installation should be in accordance with ANSI/ISA RP 12.6 “Installation of Intrinsically Safe Systems For Hazardous (Classified) Locations”:

$$V_{\max} \text{ or } U_i \geq V_{oc} \text{ or } V_t$$

$$I_{\max} \text{ or } I_i \geq I_{sc} \text{ or } I_t$$

$$P_i \geq P_o$$

$$C_i + C_{\text{cable}} \leq C_o \text{ or } C_a$$

$$L_i + L_{\text{cable}} \leq L_o \text{ or } L_a$$

(Terms defined in document) ANSI/NFPA 70 “National Electrical Code” and manufacturer’s control drawing for associated apparatus.

6. When installed in a hazardous location where a flammable dust may be present, the installer must help ensure that the cable entry maintains the dust-tightness of the enclosure.

Specific Conditions of Use:

1. The transmitter's enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken into account to prevent against impact or friction when installed in a Division 1 or Zone 0 location.
2. The maximum permitted ambient temperature of the transmitters is 80°C. To avoid the effects of process temperature and other thermal effects, care shall be taken to help ensure that the electronics temperature does not exceed an ambient temperature of 80°C.
3. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.

⚠ WARNING

EXPLOSION HAZARD

To help prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

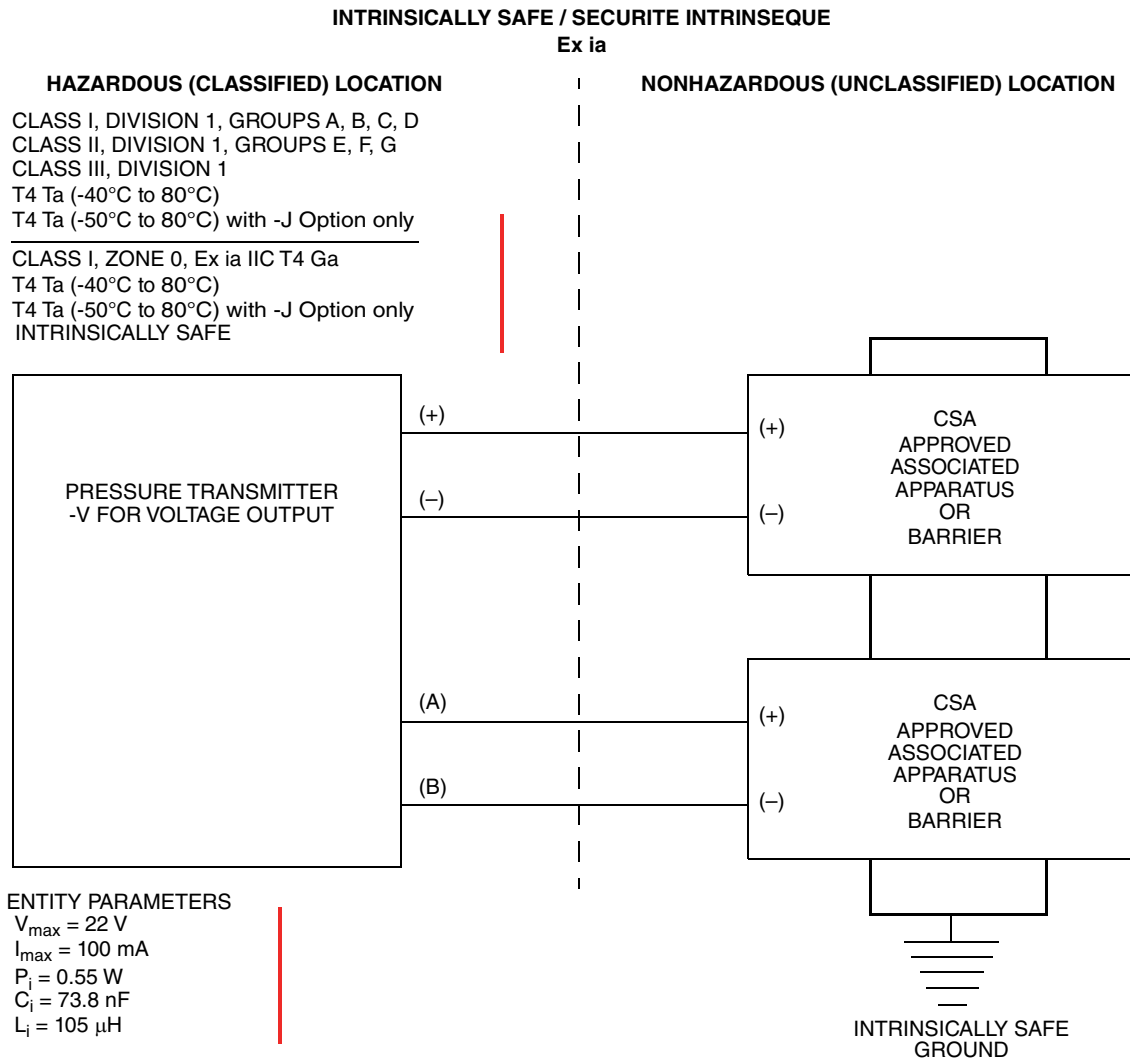
EXPLOSION HAZARD

Do not substitute components. Substitution of components may impair intrinsic safety rating.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

CSA Intrinsically Safe

Figure 8. Loop Diagram for Voltage Output



NOTE

1. No revision to drawing without prior CSA approval.
2. Barriers must be CSA certified and must be installed in accordance with manufacturer's instructions.
3. Maximum nonhazardous area voltage must not exceed 250 V.
4. Intrinsically safe circuits must be wired and separated in accordance with the wiring methods of the Canadian Electrical Code C22.1 or in accordance with the authority having jurisdiction.

5. Entity parameters must meet the following requirements:

$$U_o / V_{oc} \leq U_i / V_{max}$$

$$I_o / I_{sc} \leq I_i / I_{max}$$

$$P_i \geq P_o$$

$$C_i + C_{cable} \leq C_o \text{ or } C_a$$

$$L_i + L_{cable} \leq L_o \text{ or } L_a$$

6. Total resistance between Intrinsic Safety Ground and Earth Ground must be less than 1 ohm.
7. Some models have the main electronics enclosure manufactured from aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This must be considered during installation, particularly if the equipment is installed in a Zone 0 location.
8. When installed in a hazardous location where a flammable dust may be present, under certain extreme circumstances an incendive electrostatic charge may build up on the painted surfaces, which are non-conducting. Therefore, the user/installer must implement precautions to help prevent the buildup of electrostatic charge; for example, place the equipment in a location where a charge-generating mechanism (such as wind-blown dust) is unlikely to be present and clean with a damp cloth.
9. When installed in a hazardous location where a flammable dust may be present, the installer must help ensure that the cable entry maintains the dust-tightness of the enclosure.
10. The permitted working temperature of the field wiring shall be at least the maximum ambient temperature of the application increased by 5°C.
-

ISSUE DATES

JAN 2019
JUL 2020

Vertical lines to the right of text or illustrations indicate areas changed at last issue date.

Schneider Electric Systems USA, Inc. Global Customer Support
38 Neponset Avenue Inside U.S.: 1-866-746-6477
Foxboro, MA 02035 Outside U.S.: 1-508-549-2424
United States of America <https://pasupport.schneider-electric.com>
<http://www.se.com>

Copyright 2019-2020 Schneider Electric Systems USA, Inc. All rights reserved.

The Schneider Electric brand and any trademarks of Schneider Electric SE or its subsidiaries are the property of Schneider Electric SE or its subsidiaries. All other trademarks are the property of their respective owners.

