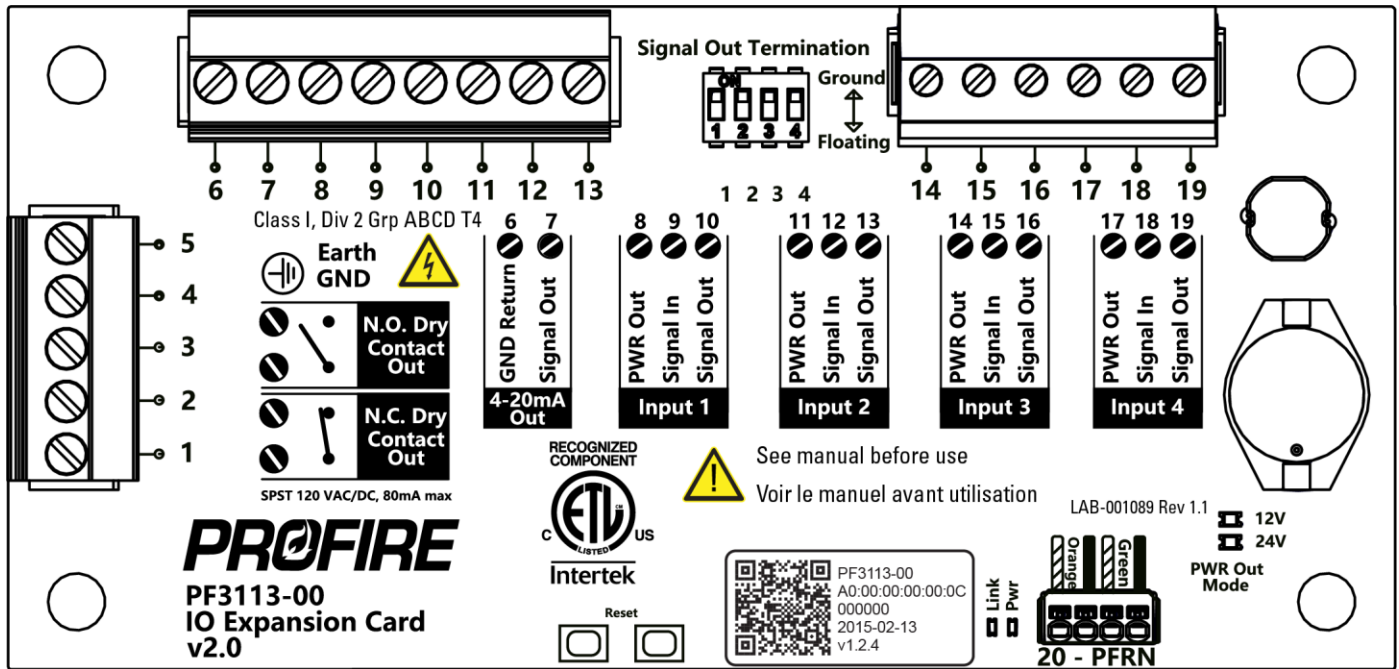


# PROFIRE PF3100 IO Expansion Card

**PF3113-00**



*The PROFIRE PF3100 IO Expansion Card provides increased input and output capabilities.*

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## 1. Introduction

### Functional Description

The PROFIRE PF3100 IO Expansion Card is designed to be a generic input/output device which is highly configurable through the aid of the user interface.

The function of this module is to offer customizable, safe, and reliable monitoring and control of additional process variables that are related to appliances that are currently being served by a PF3100 BMS controller. The IO expansion card can be used for tasks such as: adding pressure, flow, or level inputs, bringing in appliance firing rate information from the plant DCS, controlling a pump, or to control fuel/air ratio.

### Model Types

Model Number	Name	Description
PF3113-00	IO Expansion Module	PCBA (Card) Circuit Board Assembly with Firmware

## 2. Certifications

PROFIRE strives to ensure that certifications are updated as quickly as they become available for all of our products.

### IO Expansion Card - Hazardous Location Rating

Certification: Class I, Div 2, Groups A, B, C, D, T4 [CSA C22.2#213:2016 Ed.2]  
IEC 61508 SIL2, CSA C22.2#61010-1:2012 Ed.3  
UL61010-1:2012 Ed.3+R:29Apr2016  
ISA 12.12.01:2016 Ed. 7



The board includes the following symbols:



Caution: possibility of electric shock.



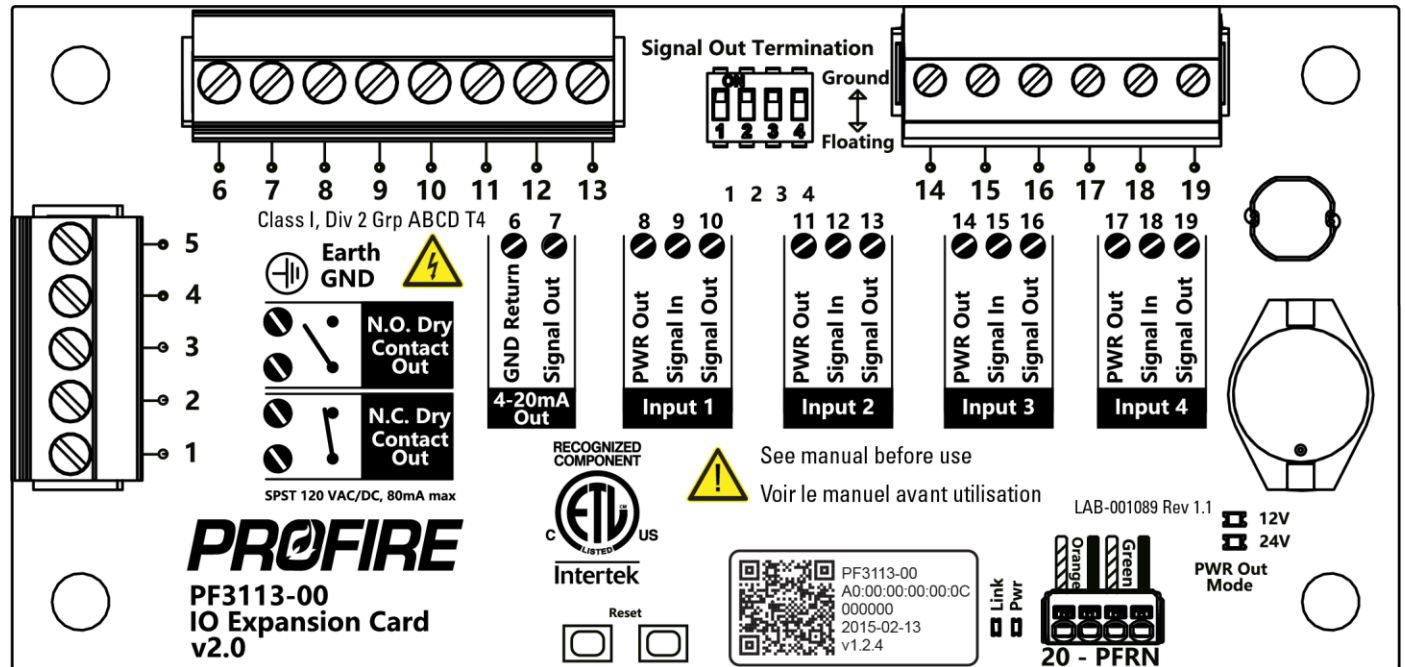
Caution: documentation must be consulted in all cases where this symbol is marked.

### 3. Card Information

#### Card Specifications

The ambient temperature rating for the IO Expansion Card is -40°C (-40°F) to +60°C (+140°F).

#### Card Diagram



## Terminal Specifications

PIN		I/O	Description	Electrical Ratings	
Name	No.			Voltage	Current
N.C. Dry Contact	1-2	O	Dry Output - 120 VAC/VDC, 80mA Max	120 VAC	80mA
N.O. Dry Contact	3-4	O	Dry Output - 120 VAC/VDC, 80mA Max	120 VAC	80mA
Earth Ground	5	N/A	Common return path for electric current; usually tied to a physical connection to the Earth.	-	-
4-20mA Out	6-7	O	4-20mA Output - 12/24 VDC, 25mA Max	12/24 VDC	25mA
Input 1 PWR Out	8	O	Power Output - 12/24 VDC, 50mA Max	12/24 VDC	50mA
Input 1 Signal In	9	I	4-20mA/Digital Input - 30 VDC, 25mA Max	30 VDC	25mA
Input 1 Signal Out	10	N/A	Pass-through output for 4-20mA mode - 12/24 VDC, 50mA Max	12/24 VDC	25mA
Input 2 PWR Out	11	O	Power Output - 12/24 VDC, 50mA Max	12/24 VDC	50mA
Input 2 Signal In	12	I	4-20mA/Digital Input - 30 VDC, 25mA Max	30 VDC	25mA
Input 2 Signal Out	13	N/A	Pass-through output for 4-20mA mode - 12/24 VDC, 25mA Max	12/24 VDC	50mA
Input 3 PWR Out	14	O	Power Output - 12/24 VDC, 50mA Max	12/24 VDC	25mA
Input 3 Signal In	15	I	4-20mA/Digital Input - 30 VDC, 25mA Max	30 VDC	25mA
Input 3 Signal Out	16	N/A	Pass-through output for 4-20mA mode - 12/24 VDC, 25mA Max	12/24 VDC	25mA
Input 4 PWR Out	17	O	Power Output - 12/24 VDC, 50mA Max	12/24 VDC	50mA
Input 4 Signal In	18	I	4-20mA/Digital Input - 30 VDC, 25mA Max	30 VDC	25mA
Input 4 Signal Out	19	N/A	Pass-through output for 4-20mA mode - 12/24 VDC, 25mA Max	12/24 VDC	25mA
PFRN	20	I	Power Input/Network Port - 36VDC, 2 x 500mA Max	36 VDC	500mA

## Terminal Descriptions

### 4-20mA/Digital Inputs (Inputs 1-4)

The IO Expansion card contains four 4-20mA/digital inputs. These inputs are programmable through the user interface, and have selectable termination. This means that the inputs have a third terminal (labelled “out”). This output is user-selectable whether it is grounded or left floating. Floating termination is useful when the user wants to link a single 4-20mA transmitter to multiple inputs.

When this input is in digital mode the current is limited to 2-3mA. This is to serve as a wetting current for certain dry contacts that don’t fully close.

The signal power out for each of the inputs is connected to the 12/24V line through a positive temperature coefficient (PTC) fuse (one PTC per input). The PTC (0ZCA0005FF2E) is rated to hold at 50mA at 25°C (37.5mA at 60°C), and should therefore only be used to power transmitters since it has limited current capability. This 12/24V power output is software configurable (12V or 24V modes).

### 4-20mA/Digital Output (4-20mA Out)

The IO Expansion card has one (1) 4-20mA output (pins 6 and 7) that is rated for 12/24 VDC and 25mA max.

### DIP Switches (Signal Out Terminations 1-4)

The DIP switches are used to relay input signals to another IO expansion board when set in floating position. The port adjacent to the input will repeat or relay the signal that is sent to the device. Please see the 4-20mA/Digital Input description above for details.

These switches are not intended for use in normal operation and should remain in the grounded state. The grounded state is safety rated, while the floating state is not.

### Dry Outputs

The IO Expansion card has two (2) independent dry outputs: one that is normally closed, and one that is normally open. 4-20mA Output.

### PFRN/Power (20)

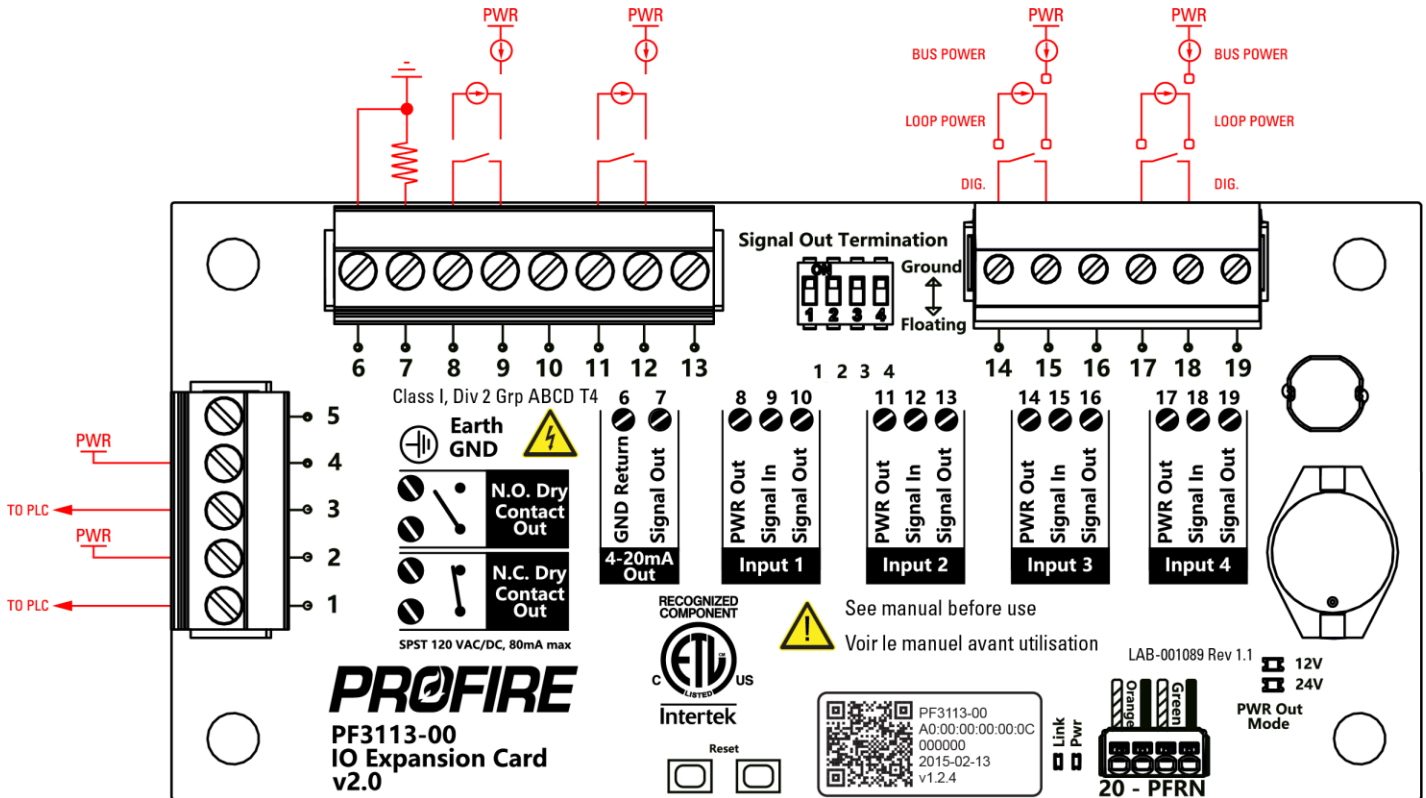
Input power to the IO Expansion card is 36VDC from the PFRN network. There is a 12-24V power output that is software configurable (12V or 24V modes). The PFRN port is rated 36 V, 1A.

### Reset Switches

These switches are not intended for use in normal operations.

## 4. Wiring Diagram

The following diagram represents a few sample connections of the IO Expansion card.



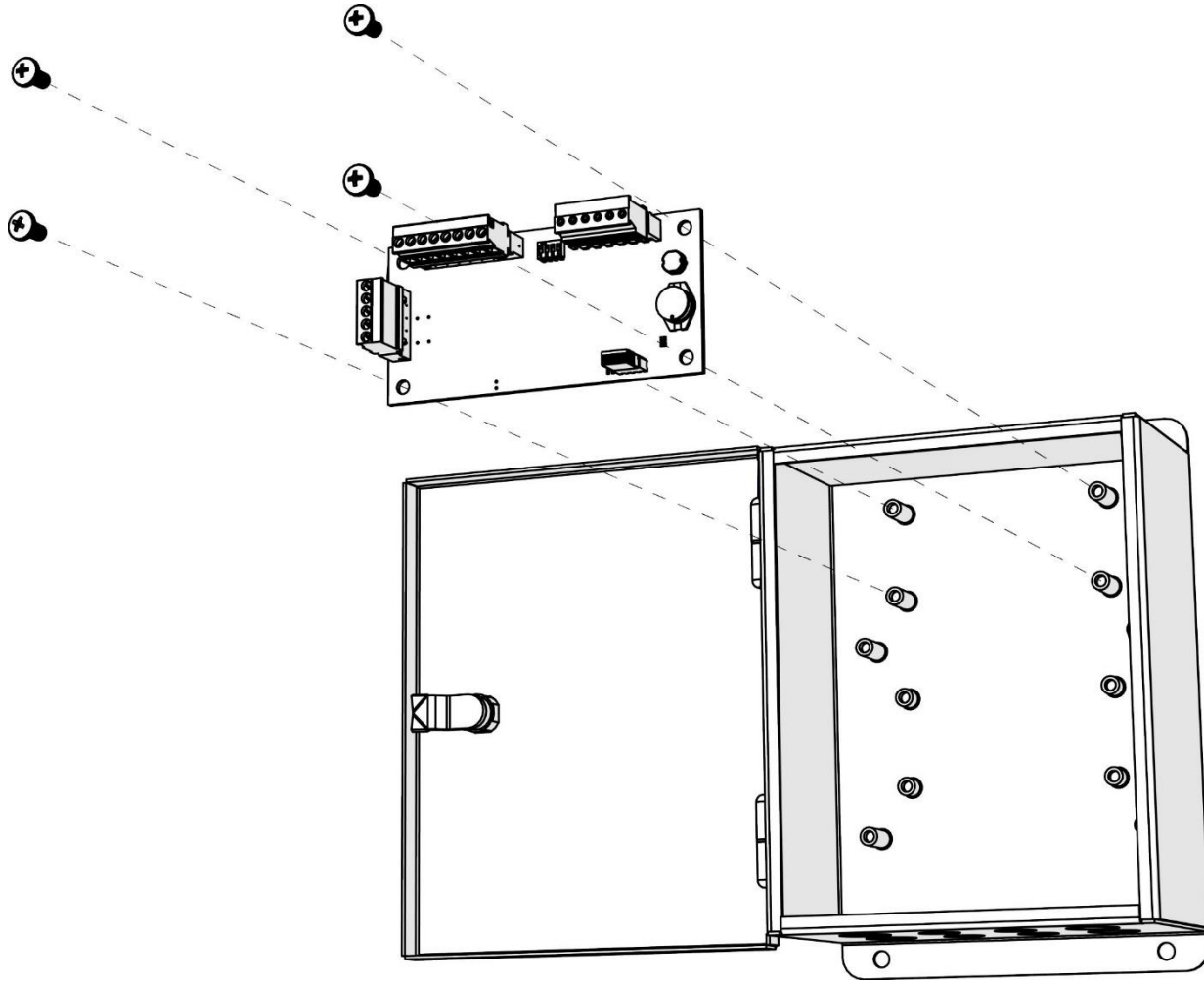
## Wiring Specifications

12-30 AWG can be used for all connections. PFRN connection should be CAT5 cable or better. External fuses must be installed according to the local electrical code. Wire gauge size must also be selected in accordance with local electrical codes.

## 5. Mounting Instructions

### Mounting the Card in the Enclosure

Install four (4) #10-32 screws through the IO Expansion card (as indicated in the image below) and attach them to the upper set of enclosure stand-offs. Please note the board orientation. Torque to 26 in\*lb.





## 6. Enclosure Specifications

The IO Expansion card can be mounted in a fire-proof enclosure that is safe for the area of operation (e.g. – hazardous/non-hazardous.) The UIX and CTX enclosures described below are examples:

Specifications	Enclosure Type	
	UIX	CTX
Dimensions	Height 30.9cm (12.15 inches) Width 23.4cm (9.23 inches) Depth 13.4cm (5.28 inches)	Height 30.9cm (12.15 inches) Width 23.4cm (9.23 inches) Depth 13.4cm (5.28 inches)
Hazloc Rating	Class I Div 2	Class I Div 2
Mounting	Channel Bar or Direct Mount	Channel Bar or Direct Mount
Enclosure Construction	Poly Painted Steel	Poly Painted Steel
Operating Temperature	-40°C (-40°F) to 60°C (140°F)	-40°C (-40°F) to 60°C (140°F)
Storage Temperature	-40°C (-40°F) to 60°C (140°F)	-40°C (-40°F) to 60°C (140°F)

## 7. Instructions for Use

The IO Expansion card is designed to be used with a certified BMS controller as part of the PF3100 platform. The only connection to the BMS is the PFRN. External power is not required for the board. Configuration of the card settings are performed on the PF3100 User Interface.

### Operation

Operating controls and their uses are described under Terminal Descriptions above.

The IO Expansion card has three (3) types of IO: Power, 4-20mA or Digital Input, and Dry Contacts.

#### Power

The board can be set to 12V or 24V. This will change the voltage of the PWR output terminals. 12V mode is actually running at 13.5V nominal.

#### 4-20mA or Digital Inputs

This can be set in the Settings area of the User Interface.

#### Dry Contacts

Dry contacts can be set to different operating modes. Please see PROFIRE’s PF3100 Software Setup Guide at the following site for details: <http://3100.profireenergy.com/pf3100-documentation/>.

#### Reset Switches

These switches are not intended for use in normal operations.

### DIP Switches

Grounded: The signal is internally grounded in the PF3113-00 IO Expansion board.

Floating: The signal is repeated out through the Signal Out port adjacent to the corresponding Signal In port. This signal must be terminated by the customer. The floating state is not safety rated.

## 8. Preventative Maintenance & Inspection

In order to ensure that this product works correctly and efficiently, the following maintenance and inspection procedures should be followed:

- Ensure that all wires are connected correctly
- Minimize copper wire exposure.
- Routinely check for corrosion.
- Wires must not be frayed or worn, and all insulation must be intact.
- Ensure that no moisture or condensation is apparent on the board or within the enclosure.
- Check that the board does not show any sign of mechanical damage (e.g. – damage from impact from a dropped item such as a screw driver).
- Confirm that the temperature of the board is within ambient temperature operating limits.
- Check that the device is not subject to excessive vibration.
- Routine inspections should be performed on all equipment. If any abnormality is found, corrective actions should be taken. If the abnormality cannot be corrected, contact PROFIRE as soon as possible.
- A qualified technician should perform any tests necessary to confirm that the equipment is still in a safe condition. The board may be tested for correct operation in a safe, non-hazardous environment as follows:
  - The Dry Contact outputs can be tested by putting them into a run status mode.
    - When the system is in a non-running state, the N.O. contact will be open and the N.C. contact will be closed.
    - When the system is in a running state (started or in a wait state) the N.O. contact will be closed and the N.C. contact will be open.
  - The 4-20mA Output can be set to manual mode. The operation can be tested by setting different output percentages through a multimeter or load.
  - The 4-20mA Inputs can be tested by sending a known good 4-20mA input signal into them. The value can be read on the PF3100 Appliance Status Screen. The range alarms can be checked by setting the 4-20mA signal out of range or by opening the signal.
  - The Digital Inputs can be tested by sending a logic high (board PWR Out to the signal in). This will show as closed on the Appliance Status Screen. Open the input – this should show as open on the Appliance Status Screen.

### Cleaning

If the card becomes dirty it can be cleaned with compressed air. Do NOT use solvents, cleaners, or liquids to clean the board. Caution must be exercised when cleaning the board in order to prevent damage from ESD (electrostatic discharge).

## Replacement Parts

Please contact PROFIRE for any replacement parts required.

## 9. Important Safety Information

Before installing the PF3100 IO Expansion Card, please review the list of warnings below. Product use in a manner not specified by PROFIRE is not recommended. Failure to observe the following warnings may result in death, electrocution, property damage, product damage, government fines, or malfunction of the product itself.

### **WARNING: Explosion Hazard**

- Do not disconnect while circuit is live unless area is known to be non-hazardous or equivalent.
- Substitution of components may impair suitability for specified zones.
- Do not service unless the area is known to be non-hazardous.
- Do not open when energized.
- Installation and use must conform to the directions in this guide.
- System must be properly connected to earth-ground for effective operation of flame detection circuitry.

### **Installation Warnings**

- Ensure that the PF3100 enclosures are securely closed each time after opening the enclosure. This protects the internal circuitry from moisture damage and other environmental concerns. Moisture damage is not covered by the product warranty.
- Do not connect wires or handle the device when powered.
- Properly fuse the board according to local codes.
- Do not disassemble or modify the board in any way. The board is not field repairable and must be sent back to PROFIRE for replacement if damaged.
- IO Expansion inputs must never be configured in a parallel fashion (e.g. – connecting like terminals of multiple boards).

### **Other Warnings**

- Installation of the IO Expansion Card should be performed according to the local electrical code by a capable electrician using de-energized wire. Live modifications should NOT be performed.
- The enclosure should not be opened while energized. If access is required and the enclosure is opened, ensure it is de-energized first.
- 4-20mA/dry outputs can only be used for non-safety critical functions.
- Equipment must be housed inside a fire-proof enclosure that is suitable for the environment and can only be accessed with the use of a tool.
- Evaluation for the IO Expansion Card as part of the system assembly is required after final installation.
- Equipment MUST be installed with a PF3100 controller.
- IO expansion inputs can only be used in a safety critical application as per the guidelines outlined in the PF3100 Safety Manual.
- IO expansion inputs that are utilizing the signal-out feature (e.g. – floating output) CANNOT be used in safety critical applications.

## 10. PROFIRE Contact Information

If you have any concerns or questions about this product, please contact PROFIRE as follows:

### U.S.

1.801.796.5127  
321 South, 1250 West Suite 1  
Lindon, UT  
84042, USA

[solutions@profireenergy.com](mailto:solutions@profireenergy.com)

### CANADA

1.780.960.5278  
Box 3313, Bay 12, 55 Alberta Ave  
Spruce Grove, AB  
T7X 3A6, Canada

[solutions@profireenergy.com](mailto:solutions@profireenergy.com)

[www.profireenergy.com](http://www.profireenergy.com)