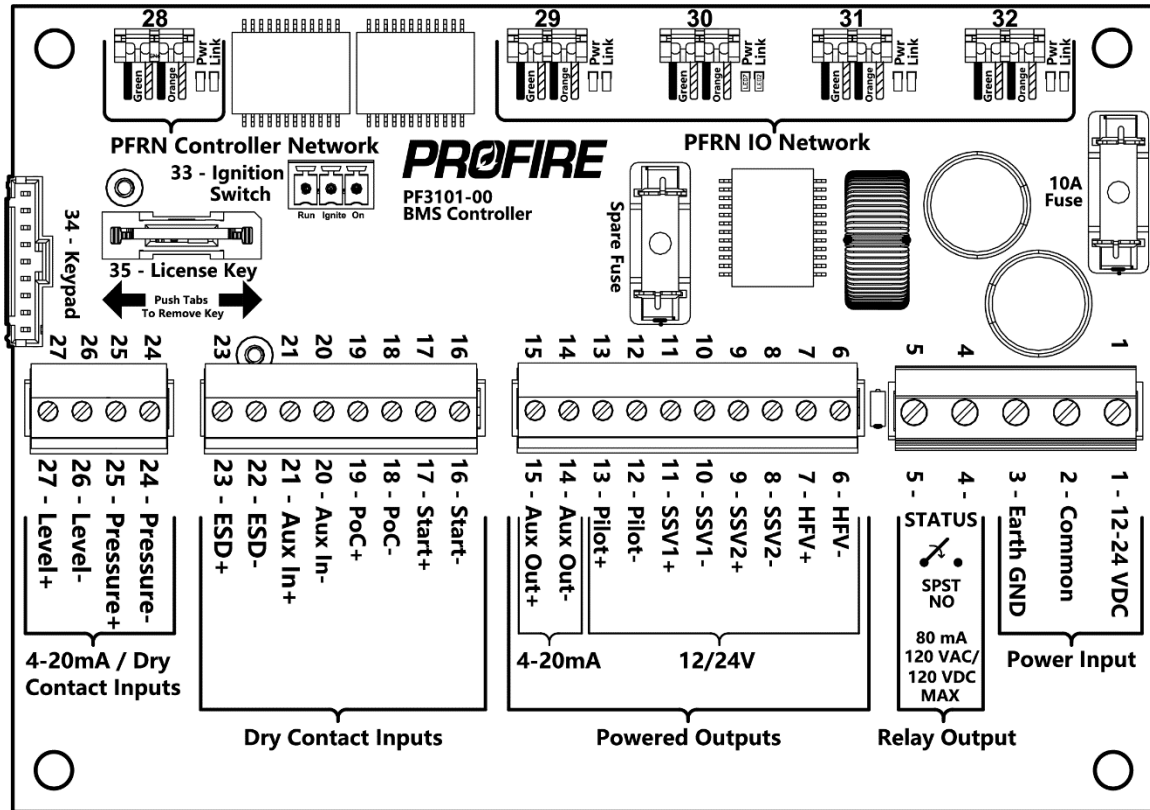


PROFIRE PF3100 BMS Controller Card

PF3101-00



The PROFIRE PF3100 BMS Controller Card is the hub for most of the wiring: it is a power producer, meaning that other cards may draw power from it.

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1. Introduction

Functional Description

The PROFIRE PF3100 BMS Controller Card is the hub for most of the wiring coming from the valve train. This card accepts 12-24 VDC input and is responsible for re-distributing power to attached peripheral devices.

Model Types

Model Number	Name	Description
PF3101-00A	BMS Controller Card - Standalone	Small polyester painted steel enclosure, Ignition Switch, Status Lamp, no other cards included.
PF3101-00B	BMS Controller Card - Composite with Network Switch Card	Polyester painted steel enclosure, PF3106-00 card included.

2. Certifications

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

Certification: Class I, Div 2, Grp ABCD; T4
IEC 61508 SIL2, CSA 22.2 No. 60730-2-5, UL 60730-2-5.



The board includes the following symbols:



Caution: possibility of electric shock.



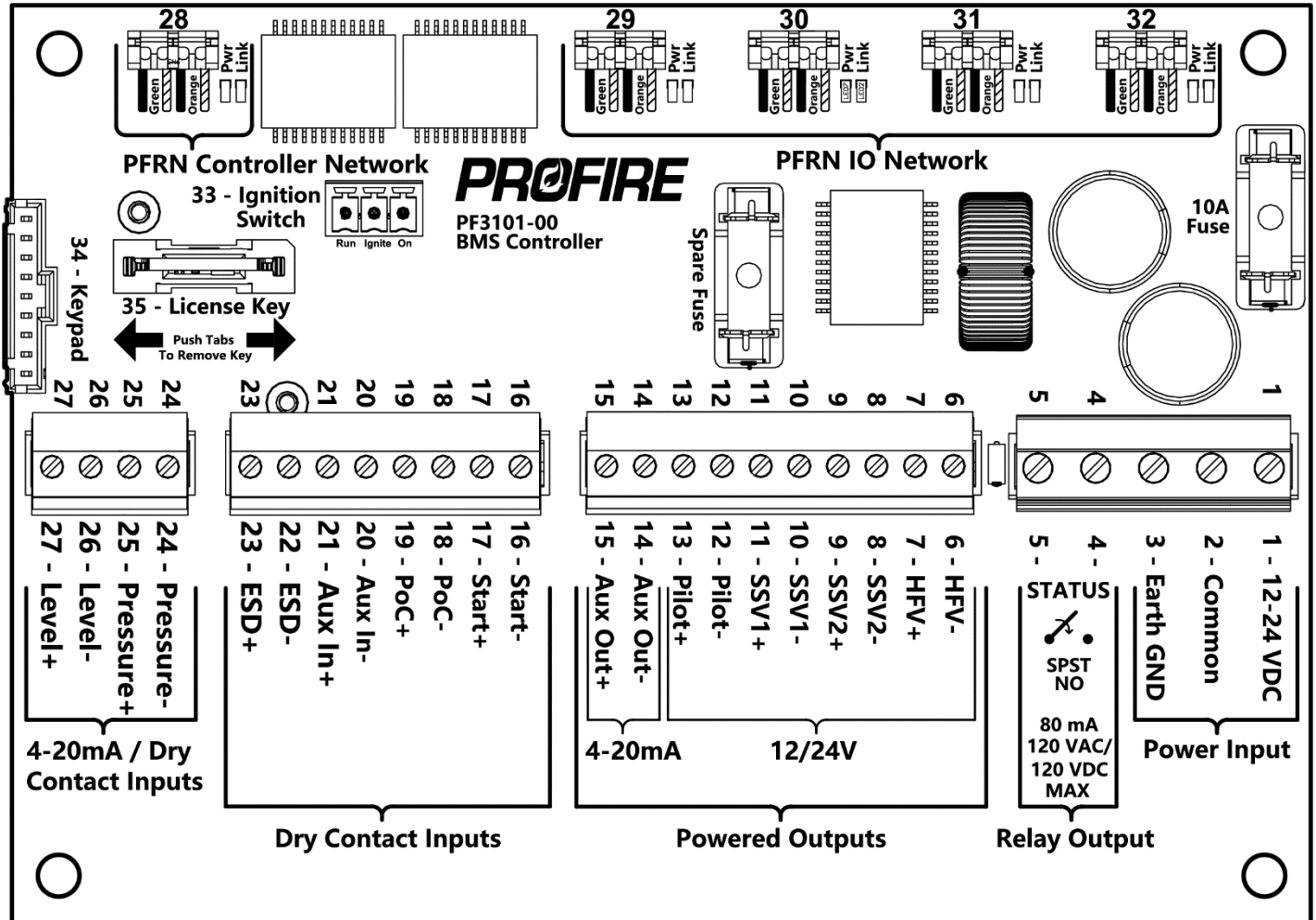
Caution: documentation must be consulted in all cases where this symbol is marked.

3. Card Information

Card Specifications

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

Card Diagram



Terminal Specifications

Designation	Terminal		I/O	Safety Rated	Description	Electrical Ratings	
	Name	No.				Voltage	Current
Power Input	12-24 VDC	1	I	N/A	Input power from a DC source; 12/24 VDC	12-24 VDC	10A Max
	Common	2	GND	N/A	Ground back to DC source	12-24 VDC	10A Max
	Earth GND	3	GND	N/A	Earth ground	N/A	N/A
Relay Output	Status +/-	4 - 5	O	N	Dry contact output to indicate system status to an external device (e.g. - PLC). These wires are interchangeable (not polarized).	120 VAC/VDC	80mA Max
Powered Outputs	HFV -	6	O	Y	High Fire Valve (negative terminal). Do NOT connect to ground. Powered output.	12-24 VDC Max	2A Max
	HFV +	7	O	Y	High Fire Valve (positive terminal). Powered output.	12/24 VDC Max	2A Max
	SSV2 -	8	O	Y	Safety Shutoff Valve 2 (negative terminal). Do NOT connect to ground.	12-24 VDC Max	2A Max
	SSV2 +	9	O	Y	Safety Shutoff Valve 2 (positive terminal).	12-24 VDC Max	2A Max
	SSV1 -	10	O	Y	Safety Shutoff Valve 1 (negative terminal). Do NOT connect to ground.	12-24 VDC Max	2A Max
	SSV1 +	11	O	Y	Safety Shutoff Valve 1 (positive terminal).	12-24 VDC Max	2A Max
	Pilot -	12	O	Y	Pilot Valve (negative terminal). Do NOT connect to ground.	12-24 VDC Max	2A Max
	Pilot +	13	O	Y	Pilot Valve (positive terminal).	12-24 VDC Max	2A Max
	Aux Out -	14	O	N	Temperature Control Valve 4-20mA Input or 4-20mA Input pin on a PLC or similar device. Current Return (grounded).	12-24 VDC	25mA Max
	Aux Out +	15	O	N	Temperature Control Valve 4-20mA Input or 4-20mA Input pin on a PLC or similar device. 4-20mA Current Source.	12-24 VDC	25mA Max
Dry Contact Inputs	Start -	16	I	Y	Connect to a digital output on a PLC or similar device. Digital input.	12-24 VDC	2mA Sink
	Start +	17	O	Y	Connect to a digital output on a PLC or similar device. 12/24 VDC power output.	12-24 VDC	100mA Max
	(POC) -	18	I	Y	Connect to the Proof of Closure switch in one or more main valves. Digital Input.	12-24 VDC	2mA Sink
	(POC) +	19	O	Y	Connect to the Proof of Closure switch in one or more main valves. 12/24 VDC power output.	12-24 VDC	100mA Max

Designation	Terminal		I/O	Safety Rated	Description	Electrical Ratings	
	Name	No.				Voltage	Current
	Aux In -	20	I	Y	A dry contact switch or PLC. See Terminal Descriptions below for details. Digital input.	12-24 VDC	2mA Sink
	Aux In +	21	O	Y	A dry contact switch or PLC. See Terminal Descriptions below for details. 12/24 VDC power output.	12-24 VDC	100mA Max
	ESD -	22	I	Y	External Shutdown; typically ESD loop. Digital input.	12-24 VDC	2mA Sink
	ESD +	23	O	Y	External Shutdown; typically ESD loop. 12/24 VDC power output.	12-24 VDC	100mA Max
4-20mA/Dry Contact Inputs	Pressure -	24	I	Y	Input from a Fuel Pressure switch or transmitter. Digital/4-20mA Input.	12-24 VDC	25mA Max
	Pressure +	25	O	Y	Power output from a Fuel Pressure switch or transmitter. 12/24 VDC power output.	12-24 VDC	100mA Max
	Level -	26	I	Y	Input from a Tank Level switch or transmitter. Digital/4-20mA input.	12-24 VDC	25mA Max
	Level +	27	O	Y	Power output from a Tank Level switch or transmitter. 12/24 VDC power output.	12-24 VDC	100mA Max
Designation	Port		I/O	Safety Rated	Description	Electrical Ratings	
	Name	Number				Voltage	Current
PFRN Controller Network	Master PFRN Connect	28	I/O	Y	The master PFRN connect that allows communication with other boards and the user interface.	36 VDC	1A Max
PFRN IO Network	PFRN IO Connect	29	I/O	N/A	The PFRN IO Connect ports are used for IO modules to communicate with the BMS card.	36 VDC	1A Max
	PFRN IO Connect	30	I/O	N/A	The PFRN IO Connect ports are used for IO modules to communicate with the BMS card.	36 VDC	1A Max
	PFRN IO Connect	31	I/O	N/A	The PFRN IO Connect ports are used for IO modules to communicate with the BMS card.	36 VDC	1A Max
	PFRN IO Connect	32	I/O	N/A	The PFRN IO Connect ports are used for IO modules to communicate with the BMS card.	36 VDC	1A Max
Ignition Switch	Ignition Switch	33	I	N	External switch on the enclosure with run, stop, and ignite capabilities.	3.3 VDC	N/A
Keypad	Keypad	34	O	N	Controls status LEDs on front of enclosure.	3.3 VDC	N/A
License Key	License Key	35	N/A	N/A	Not in use.	3.3 VDC	N/A

Terminal Descriptions

The max supply voltage for all outputs is the power supply input voltage (12/24 VDC).

Power, Common

Input power 12/24 VDC, 10 A max.

EGND

Internally connected to Common.

Status

By default, the status contacts will be closed while the system is running, and opened when the system is shut down. This output can also be configured via software settings to behave in different ways that are useful for remote callouts. Please note: the contacts are not internally connected to power or ground. Status contact rating: 120 VAC/DC, 80mA max.

HFV, SSV1, SSV2, Pilot

Solenoid valves must be connected between the positive and negative terminals for each of these. Software selectable PWM options are available if low power solenoid valves are required.

The negative terminal is **NOT** directly connected to ground, so a common return wire for these valves cannot be used. These terminals also have a limitation of 4-A maximum per output, with a combined maximum of 9-A total.

Aux Out

This is a 4-20mA output signal.

Software selectable modes include:

- Control of a temperature control valve
- Echo a measure metric (process temperature, level, pressure etc.) to a PLC or similar device.

Start

This input is used to start the BMS, stop the BMS, and clear alarms. When the input is low (open), the BMS stops. If an alarm is present, toggling the input low and then high (open and then closed) acknowledges the alarm. When there are no alarms present, driving the input high (closed) starts the BMS.

Proof of Closure

If enabled in software, the Proof of Closure (POC) contact behaves as described:

- The POC must be closed for the duration of the purge time, otherwise the purge time starts over again.
- The contact must close within 2 seconds of the BMS commanding the main valves to close, otherwise the system shuts down.

If multiple main valves using Proof of Closure exist in the system, these must be wired to the contact in series.

Aux In

This dry input can be configured in software to perform several functions including:

- Proof of Low Fire
- Proof of Closure on the Pilot Valve
- Low Pressure Switch Input
- Chamber Pressure input for forced-draft fan proving.

ESD

When low (open), the BMS shuts down. When high (closed), the BMS is permitted to start if instructed to do so via the Start Contact, the User Interface, or the Modbus card.

Pressure

This input can be configured via software to work with either a dry contact or a 4-20mA signal. The following options are available:

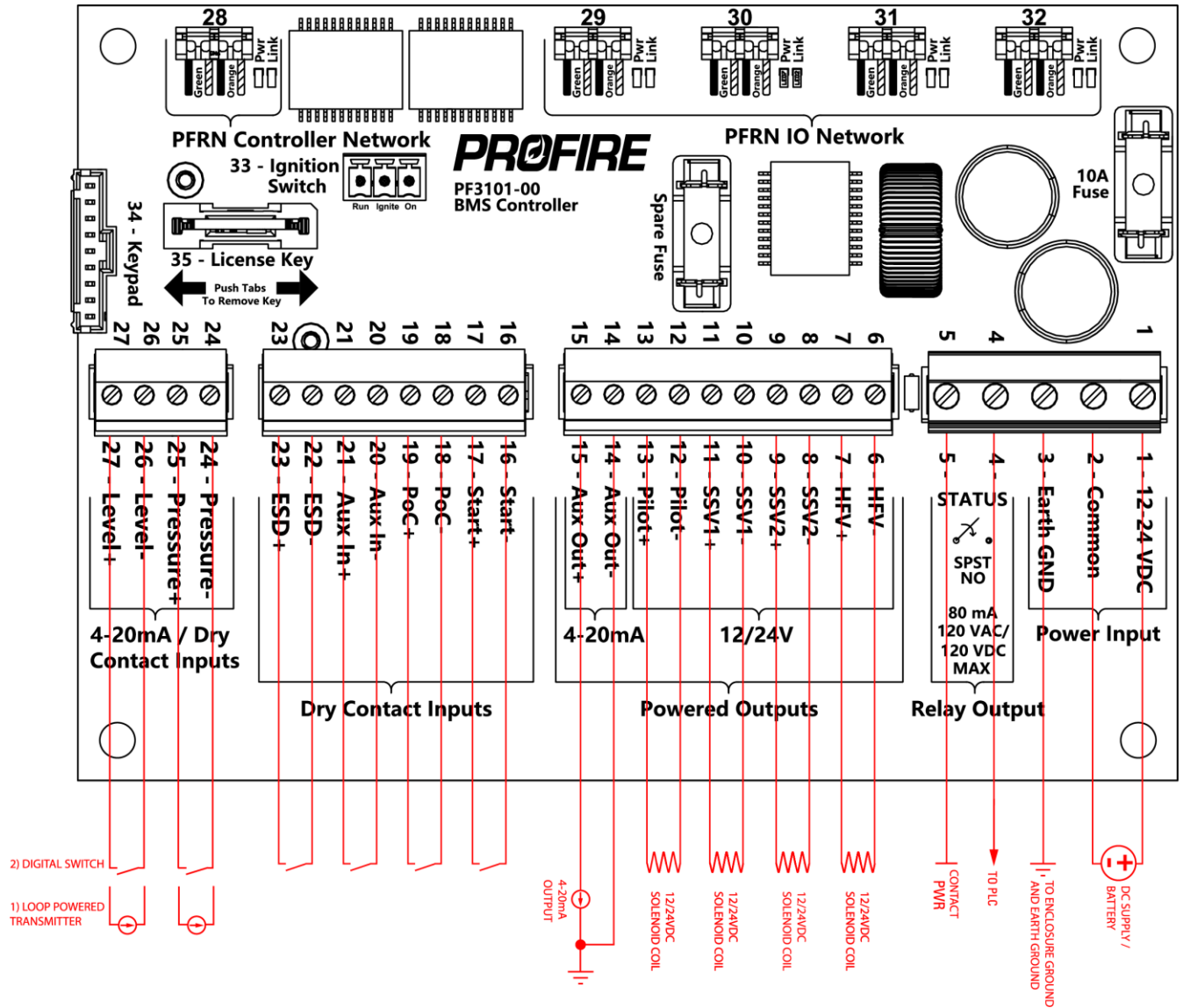
- 4-20mA Pressure input (with high and low trip points)
- High Pressure Switch input only (with option to wire the Low Pressure switch input to the Aux In contact)
- High and Low Pressure Switch input (wired in series)

Level

This input can be configured via software to work with either a dry contact or a 4-20mA signal. The following options are available:

- 4-20mA Level input (with high and low trip points)
- High Level Switch input only
- High and Low Level Switch input (wired in series)

4. Wiring Diagrams



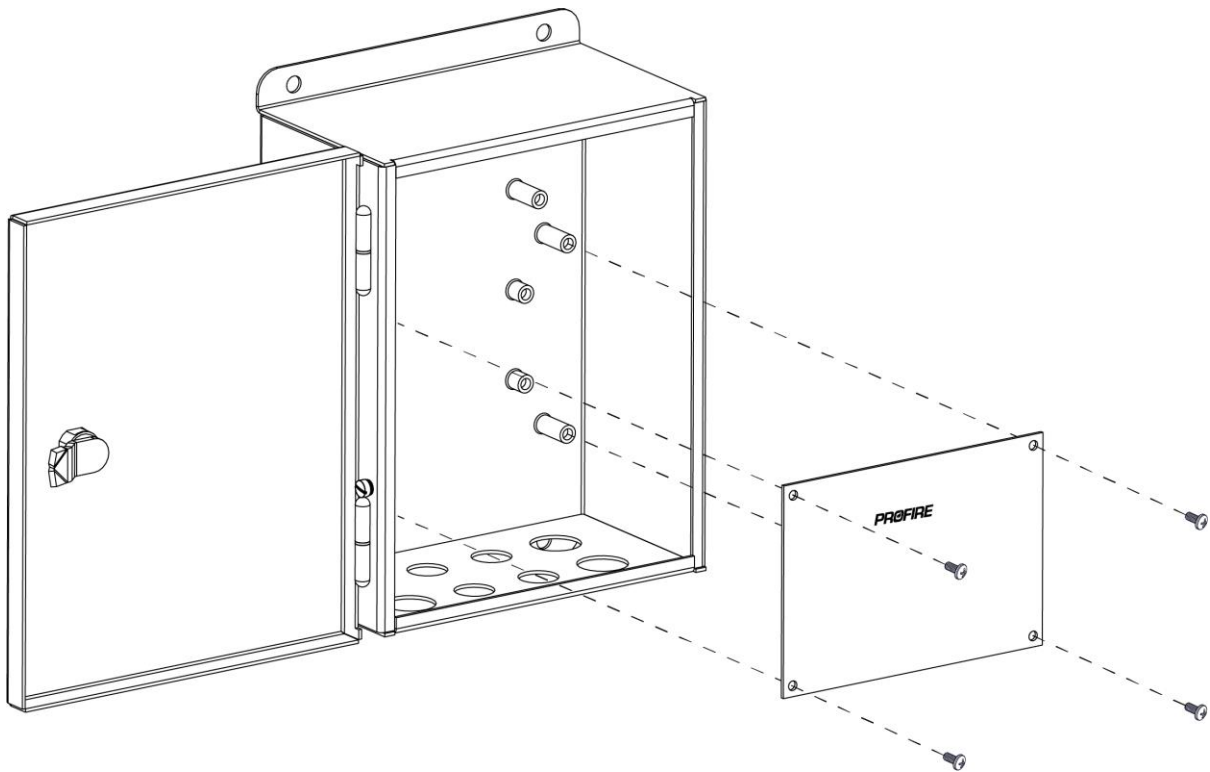
Wiring Specifications

12-30 AWG can be used for all connections. 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

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



6. Enclosure Specifications

The BMS controller 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 BMS Controller 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 the Terminal Descriptions section above.

8. Preventative Maintenance & Inspection

In order to ensure that the BMS Controller card works correctly and efficiently, the following maintenance and inspection procedures should be followed:

- Ensure that all wires are connected correctly.
- 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).
- Check that the board does not show any sign of electrical damage. This means that no components should be burnt or damaged in any way.
- 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.

Please note: care should be taken to ensure that testing does NOT damage the equipment in any way.

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 should any replacement parts be required.

9. Important Safety Information

Before installing the PF3100 BMS Controller 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.

10. PROFIRE Contact Information

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

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