



# ***PF3100 TROUBLESHOOTING***

SOLUTIONS TO COMMON PROBLEMS

v1.1

Revised Nov 29, 2016



## Table of Contents

1	Common Alarms and Warnings .....	1
2	Common Issues.....	6
2.1	Communication problems.....	6
2.1.1	Controller communication problems.....	6
2.1.2	Module communication problems .....	7
2.2	Status contact not working as expected .....	7
2.3	Level or pressure contact not working.....	8
2.4	BMS Dry Inputs.....	8
2.5	Aux in chamber pressure and HFV fan control.....	8
2.6	4-20 Aux out mode and PID control.....	9
2.7	Minimum controllers running .....	9
3	How to.....	10
3.1	Swap a BMS.....	10
3.2	Swap a temperature or ignition module .....	11
3.3	Swap a user interface.....	11
4	Device Specific Troubleshooting.....	12
4.1	Ion Pilot Card.....	12
4.1.1	Wiring check.....	12
4.1.2	Wiring lengths .....	13
4.1.3	LED Indication .....	13
4.1.4	Flame Detection and Ignition .....	14
4.2	Temperature Card .....	15
4.2.1	Wiring Check .....	15
4.2.2	Wiring lengths .....	15
4.2.3	LED Indication .....	15
4.2.4	Thermocouples.....	16
4.3	BMS Controller .....	17
4.3.1	Wiring Check .....	17
4.3.2	LED Indication .....	18
5	Document Revision History .....	19



## 1 Common Alarms and Warnings

---

### *IO Communication Error*

This alarm will appear if a controller or one of its IO is not communicating. The alarm will only specify which controller has an issue. It will not show which module.

*Solution:*

Determine if the controller or if an IO module is not communicating by following through the communication problems section.

### *Appliance Communication Error*

An appliance communication error can occur if there is a loss of communication to a controller in the appliance or if there is an incorrect network map across controllers.

*Solution:*

If it appears that all controllers are communicating but this alarm still appears it could be that one or more controllers has the incorrect network map. This can happen if a controller has been swapped and not fully commissioned. Re-run the Appliance manager to push out an identical map to all controllers.

### *Pilot or main flame detected while off*

The ignition module is detecting flame when it shouldn't be. This can occur if flame is detected before the system tries to start.

*Solution:*

This may be that there is flame in the chamber before the system tries to start.

### *Proof of closure contact open*

The BMS has a proof of closure contact enabled in the settings and it is open when it should be closed.

*Solution:*

Check that the POC valves used are wired correctly. The valve contacts should be in series with the POC terminal.



***Proof of closure contact failed to open***

The BMS has a proof of closure contact enabled in the settings and it is closed when it should be open.

***Solution:***

Check that the POC valves are wired correctly and that the solenoid wiring is also correct. The valve may not be opening or the POC signal may not be correct back to the BMS.

***ESD or start contact open***

The ESD or Start contact on the BMS is open. Both need to be closed before the system will be allowed to start.

***Solution:***

Check that the ESD or Start wiring is correct. The signals are closed when power is applied to the negative contact (signal input) from the positive contact.

***Thermocouple error or no valid process/aux temperature***

It is likely that a thermocouple is open or not connected.

If the temperature module is completely disconnected this alarm along with an IO Communication error will show up.

***Solution:***

Determine if the temperature module is still communicating by opening the Swap wizard or Temperature wizard. If the module is not communicating, follow the troubleshooting instructions for communication errors. If the module is communicating, check the thermocouple wiring.

***Solenoid LSS error***

This can show up for any of the valves. It means that the low side of the valve has been connected to ground when it shouldn't be.

***Solution:***

Check if the low side valve is grounded with a multi-meter. If it is re-wire the valve so that it connects directly to the BMS valve – and not to ground.



***Solenoid HSS error***

This can show up for any of the valves. It means that the high side of the valve has been connected to power when it shouldn't be.

***Solution:***

Determine where the power is coming from with a multi-meter. Remove the source of power from the valve. Re-wire the valve so that it connects directly to the BMS valve + and not to any other source.

***Incomplete commissioning***

When commissioning a fresh system, it is required to enter the date of commissioning in the settings. If the date is not added the system will display this alarm.

***Solution:***

Go into the appliance settings, confirm that all settings are correct for the application. Enter today's data under the menu SETUP > Commissioning > Commission Date.

***Settings out of range error***

This alarm occurs if a setting is out of bounds from what it is expected to be. This may occur if a new BMS is added to a pre-existing appliance. This can also occur if a setting is incorrectly set. As an example the process temperature setpoint is configured to be above the high temp setpoint.

***Solution:***

Run the temperature wizard and confirm all of the settings are as expected. Run the ignition wizard and confirm all settings are as expected. Confirm all settings in the menu match the application. If the error still occurs, you can restore previous settings or a reset to defaults can be performed.

***Pilot flame fail***

The pilot failed to ignite after the allocated number of retries due to the ignition module failing to detect flame.

***Solution:***

Make sure all solenoids are connected properly and valves are open. Check that there is gas flow for the pilot and the ignition is sparking correctly. Position the flame detection rod in the flame envelope. Confirm proper grounding back to the ignition board. Test the ion input DC and AC voltage levels. Test that the flame rod is not grounded.



**Main flame fail**

The main flame ion failed to detect flame after the main valves opened.

**Solution:**

Check that the main flame detect rod is positioned in the flame. Test the ion input DC and AC voltage levels. Confirm main gas is flowing.

**Level or pressure contact range error**

The input to the level or pressure input is out of bounds from what is expected. The signal may be too low (in the case of 4-20mA input) or too high.

**Solution:**

In the case of the 4-20mA signal check the current and confirm it is within range (4 to 20mA). If used as a digital input, check that the voltage does not exceed the input range of 12 or 24VDC depending on the system power supply.

**Feature Key Alarm**

The feature key is not present or is the incorrect one for the system.

**Solution:**

You can confirm the feature key details in settings > Setup > Feature Key menu. Here a feature key status is available that shows if the key is currently detected, is invalid or has a fault. A list of system restrictions is shown for items such as pilot per controller, IO per appliance and number of controllers per appliance. If any of these items are violated a feature key alarm will be set.

**Low or High voltage warning**

If low the system voltage is below it's desired operating range. If the voltage continues any lower the system will shutdown. If high the system voltage is above its desired operating range. If the voltage continues any higher the system will shutdown.

**Solution:**

Confirm the voltage settings match the power supplied to the system by going to Settings > Setup > System Voltage. The Controller voltage should match the input power of the system. Check with a multi-meter that the power supplied to the system is correct – either 12 or 24VDC. If the voltage drops when the valves turn on confirm the power supply is sized appropriately for the current load.



***Grounded Thermocouple***

The system is detecting a grounded thermocouple.

***Solution:***

The system will not work correctly with a grounded thermocouple. To find which thermocouple is grounded each thermocouple connector on the temperature module can be unplugged one at a time. Check to see if the alarm goes away when a specific connector is unplugged. Confirm the thermocouple is grounded by measuring continuity from it to ground with a multi-meter.

***Partially Running Appliance***

One or more of the controllers in the appliance is shutdown.

***Solution:***

This can be normal system operation. One of more controllers may be shutdown on purpose while the remaining controllers are running. If it is not desired to have some of the units shutdown then the controllers can be investigated individually.



## 2 Common Issues

---

### 2.1 Communication problems

Communication problems can occur for the following reasons:

- PFRN wiring issues
- Incorrectly commissioned appliance
- Missing or un-configured modules

Before diagnosing a communication issue confirm that there is a minimum of one temperature module installed and configured per appliance and a minimum of one ion pilot installed and configured per controller.

1. Check to see if the controller is communicating with the user interface by checking the appliance screen (System Overview > Appliance) or the appliance wizard: System Overview > Settings > Appliance Wizard > Assign controllers.
2. In the appliance wizard you can see the controllers that have a link but are not setup yet under *Unassigned controllers*. Controllers here are communicating but still need to be commissioned. If the controller you are looking for exists in the table, then commission the unit.
3. Controllers that have been previously commissioned but are currently not communicating are shown under their associated appliance. The name of the controller if it is not communicating will be shown as “Not Set”. If the controller you are looking for is shown here but without communication or if the controller does not show up in the list at all, then troubleshoot the link between the user interface and the controller.
4. If the controller shows up as having a link but there is still a communication alarm for the BMS, then there is either a commissioning issue or a peripheral module (temperature, ignition, etc) has lost communication.

#### 2.1.1 **Controller communication problems**

Check the following items if there is a controller communication problem.

1. Check that the controller is powered up. It should have 12 or 24VDC from a minimum of a 2 Amp supply plus the required current for valves.
2. Update the system firmware. The firmware bundle on the UI and the controller must match in order for them to communicate. If the controller does not show up in the firmware update screen continue troubleshooting the connection.
3. Check the PFRN connection. Make sure the wiring is in the correct order and all connections are secure. Re-crimp if necessary. Make sure none of the wires are touching each other, often this can happen if the wires are stripped too long for the connector.
4. Check the continuity of the PFRN wires. When using hardwire sometimes the wire can break during installation. Use a multi-meter to loopback the wires and check the continuity.
5. The link LED on the module should be a solid green. The link LED on the controller should be flashing green. This indicates that there is some sort of communication, however it does not necessarily mean that the communication is bidirectional. The LED can be flashing with one of the PFRN wires disconnected. If the LED is off, this means there is no communication at all.
6. The Power LED should be solid blue on both the UI and controller. This indicates that the UI is receiving power and that the controller is providing power.





### 2.1.2 *Module communication problems*

If a controller's IO are not commissioned (temperature and ignition module MAC addresses allocated to the controller) the controller will display this alarm. Check the following items if there is a module communication problem.

1. Confirm that the temperature module has been allocated to the controller by running the temperature wizard.
  - a. Open the temperature wizard: System Overview > Settings > Temperature Wizard.
  - b. Go to the Assign Inputs screen.
  - c. Each controller will be listed with the connected temperature modules displayed. If the temperature module can be found in this list, then it is communicating properly and needs to be commissioned. If the temperature module is not in this list, then it is not communicating. Check the PFRN wiring and make sure the device has power.
2. Confirm that the ignition module has been allocated to the controller by running the ignition wizard.
  - a. Open the ignition wizard: System Overview > Settings > Ignition Wizard.
  - b. Go to the Allocate Ignition screen.
  - c. Each ignition that is used should be allocated to a slot in this table. Open the first slot and check the MAC address dialog. It should show a list of all ignition modules that are currently connected and communicating. If the ignition module is in the list, then it is communicating properly and the system needs to be commissioned. The module must be set to Enabled on this screen in order for it to work. If it is not in the list, then it is not communicating. Check the PFRN wiring and make sure the device has power.

### 2.2 *Status contact not working as expected*

If the status contact is not working as expected check the following:

1. Check the current mode of the status contact in Settings > Outputs > Status Contact > Status contact Mode. Make sure this is set to a mode that matches the expected operation of the system.
2. Check the voltage to and from the status contact. The voltage can be 12 or 24VDC or it can be 120VAC. Turn the system off and confirm only one side of the contact has the signal. Start the system and confirm that the status contact closes.
3. Check that the current for the input is not exceeding its rating. 80mA is the point where the internal PTC will begin to open. We recommend not using more than 40mA in a normal application.
4. If using multiple status contacts in series check that the total drop across all contacts is not larger than what is acceptable. Each contact may drop 1V or more depending on the current through them.
5. If the current draw is too large for the status contact an external relay may be used. The status contact can power the primary side of a low current relay. The signal back to the PLC or other device can connect through the secondary side.



### **2.3 Level or pressure input not working**

If you are not getting a reading on the level or pressure input, check the following:

1. Check the settings
  - Confirm the level input is enabled in settings: Settings > Inputs > Tank Level Input. The Tank Level Input Mode should be set to the type of input used either 4-20mA or as a digital input.
  - Set the Local Level Input to Enable if the BMS has a level sensor connected directly to it. If the BMS will be sharing a sensor from another controller set the Local Level Input to disabled.
  - Set the level setpoints to match the application and sensor.
  - The Pressure input must be enabled in settings: Settings > Inputs > Fuel Pressure Input > Fuel Pressure Input Mode. The input should be set to the type of input used either 4-20mA or as a digital input.
  - The pressure input does not have sharing capability so each controller that uses a pressure input will need to have its own sensor.
  - Set the pressure setpoints to match the application and sensor.
2. Check the wiring
  - The positive terminal from either the Pressure or Level input is PTC fused power. In the 4-20mA case the power can be used for an inline sensor. Make sure the current of the sensor doesn't exceed the output rating. The maximum supply current is 100mA. When the input is used in dry contact (digital mode) the positive terminal is used to feed power back to the negative terminal through the external pressure or level switch.
  - If using a standalone 4-20mA transmitter wire the source side of the transmitter to the negative pressure or level input. The transmitter must be reference to system ground for an accurate reading.

### **2.4 BMS Dry Inputs**

If the dry inputs are not working as expected (ESD, AUX IN, POC, START, Pressure, Level) check that they are wired correctly.

- These inputs are designed to work with an external dry contact such as a relay or a switch. They are not designed to work with an external power source. In order to use them wire the input from the positive terminal, through a contact then back to the negative terminal. When the contact is closed the negative terminal will be energized from the positive terminal.
- Do not connect power from an external source directly to the negative terminal. Only use the signal provided from the positive terminal.

### **2.5 Aux in chamber pressure and HFV fan control**

If chamber pressure is used (Settings > Inputs > Aux In contact > Aux in Contact Mode), do not forget to also enable the HFV fan control override (Settings > Outputs > Valves > HFV Fan Control Override).



## **2.6 4-20 Aux out mode and PID control**

When using the 4-20 aux output for PID control (Settings > Outputs > 4-20 Aux Out > 4-20 Aux Out Mode) the Purge position, Pilot position and PID Minimum Position must also be set.

- The Purge position is the position the variable valve is in any time the system is purging. This includes shutdown.
- The Pilot position is the position the variable valve is in when the system is igniting or in pilot.
- The PID minimum position is the minimum position the valve will close to during PID control while running. The range of modulation for the valve in this state is from the minimum position to 100% open.

## **2.7 Minimum controllers running**

The settings out of range error will occur if the minimum controllers running is higher than the number of controllers in the appliance. The minimum controllers running setting can be found in Settings > Setup > Commissioning > Min Controller Running. Set this number to be equal to or less than the number of controllers in the appliance.



### 3 How to...

---

#### 3.1 Swap a BMS

If you need to change a BMS controller on an existing system you can perform the following procedure.

1. Backup settings
  - a. In the System Overview Settings screen open the Backup Settings.
  - b. Save all system settings to USB.
2. Remove the old controller.
3. Install the new controller.
4. Update the system firmware to the desired version for all units. This is necessary for the replacement controller to talk to the rest of the system.
5. In the System Overview settings screen, open the Appliance Wizard.
6. In the Appliance wizard the controller that was removed will be shown as having NO LINK. Remove this controller from the appliance.
7. In the Appliance wizard the unassigned controllers will be listed, add the replacement controller into the appliance and apply the changes.
8. The recently added controller will now have settings that are different from the rest of the appliance. This controller must now be commissioned in order for the system to properly work.
9. Restore settings
  - a. In the System Overview Settings screen open the Restore Settings.
  - b. Select the previously saved settings.
  - c. Select all settings.
  - d. The controller that was removed will show up as Not Set with a warning symbol. Open this controller.
  - e. A dialog will appear showing available controllers select the replacement controller.
  - f. Review and load the new settings.
10. After applying the changes, the controllers have successfully been swapped.



### **3.2 Swap a temperature or ignition module**

If you need to change one or more temperature or ignition modules on an existing system you can perform the following procedure.

1. Remove the old module.
2. Install the new module.
3. Update the system firmware to the desired version for all units. This is necessary for the replacement module to talk to the rest of the system.
4. In the System Overview Settings screen open the Swap Wizard.
5. The swap wizard will list any hardware that is missing. Select the ignition or temperature module that you would like to swap.
6. A dialog will appear that shows the existing configuration of the old module and a list of available modules found to replace it.
7. Select a new module from the list.
8. If there is more than one module to swap you can select replacements for them now.
9. Press the right arrow when complete, a review page will show any issues. You will only be allowed to apply the changes if there are no issues.
10. After applying the changes, the modules have successfully been swapped.

### **3.3 Swap a user interface**

If you need to swap a user interface on an existing system perform the following procedure.

1. If the user interface is still accessible (not damaged) then backup the settings to a USB drive.
  - a. In the System Overview Settings screen open the Backup Settings.
  - b. Save all system settings.
2. Remove the old user interface.
3. Install the new user interface.
4. Firmware update the system to the desired version.
5. If a backup of the settings had been previously made, you can now restore them.
  - a. In the System Overview Settings screen open the Restore Settings.
  - b. Select the previously saved settings.
  - c. Select all settings.
  - d. Review and load the new settings.
6. If a backup was not made the Appliance network map will now need to be updated.
  - a. In the System Overview Settings screen open the Appliance Wizard.
  - b. Add a new appliance.
  - c. Assign all the necessary controllers to it.
  - d. Review and apply the changes.
7. The user interface will now be successfully swapped.



## 4 Device Specific Troubleshooting

### 4.1 Ion Pilot Card

#### 4.1.1 Wiring check

Connection	Description
<b>Main Ion +</b>	Optional - If main flame detection is used this terminal must be connected to a flame detection rod. Do not ground.  See Flame Detection and Ignition for details.
<b>Pilot Ion +</b>	Must be connected to the red wire on the provided ignition coil.  See Flame Detection and Ignition for details.
<b>EGND</b>	Must be connected to the enclosure ground and to a ground from the nozzle assembly.
<b>Enclosure Ground</b>	Connect the enclosure ground to earth ground.
<b>Valve +</b>	Optional – This is a powered output. Connect to one side of a 12VDC pilot valve. Do not ground the other side of the valve, connect it to Valve -.  When running this terminal should have a proportional voltage output according to the pilot PWM settings in the UI. If the valve is not staying open, adjust the PWM setting.
<b>Valve -</b>	Optional – This is not ground, it is a controlled output. Connect to the other side of the 12V pilot valve. Do not connect to ground.
<b>Coil +</b>	Must be connected to the white wire on the provided ignition coil.  When igniting this terminal will show around 12 to 14VDC.
<b>Coil -</b>	Must be connected to the black wire on the provided ignition coil. Do not connect to ground.  This is the ignition switching side, when sparking this terminal can be higher than 200V.
<b>High voltage Ignition Wiring</b>	An ignition cable must be field installed and connected to the high voltage side of the provided ignition coil. The cable will be connected to a flame rod for sparking and flame detection.
<b>PFRN Wiring</b>	The PFRN port on the ignition module is a power receiver. It will need to be connected to a BMS controller PFRN port or a network card depending on the installation.



### 4.1.2 Wiring lengths

Wire	Description
Ignition coil control wires	It is suggested to keep the ignition coil in the enclosure and the wires to it (red, white and black) as short as possible.
High voltage ignition	The ignition wire should be 10 feet or less from the coil.
PFRN	Up to 250 feet.

### 4.1.3 LED Indication

LED	Indication
Link	Solid green when there is a link or off without a link. If the link LED is not solid green check the PFRN wiring.
Power	Solid blue when the port is powered or off if not powered. If the power LED is not solid blue check the PFRN wiring and the host card power (switch or BMS depending on the install).
LEL Fault	<ol style="list-style-type: none"> <li>6. Internal LEL input circuit fault.</li> <li>7. LEL out of range alarm.</li> <li>8. Calibration error</li> </ol>
Coil Fault	<ol style="list-style-type: none"> <li>9. Calibration error</li> </ol>
Main Fault	<ol style="list-style-type: none"> <li>10. Main flame detection internal circuit fault.</li> <li>11. Internal calibration error</li> <li>12. Main Ion+ wiring error including a grounded probe.</li> </ol>
Pilot Fault	<ol style="list-style-type: none"> <li>13. Pilot flame detection internal circuit fault.</li> <li>14. Internal calibration error.</li> <li>15. Pilot Ion + wiring error. A grounded probe may not trigger this fault due to the internal resistance of the ignition coil.</li> </ol>



#### 4.1.4 Flame Detection and Ignition

1. Ion voltage tests
  - a. When the system is not running, at the board connectors measure the AC value of the main ion and pilot ion to ground. They should cycle between 0 and a value greater than 25Vrms.
    - i. If the detection value is lower than 25Vrms check the flame detection gain settings in the UI. The gain may be set too low and can be increased.
    - ii. Check that the rods are not grounded.
  - b. At the terminals measure the DC value of the main ion and pilot ion to ground. Without flame they should be around 4.5VDC. With flame they will be lower.
    - i. If the DC value is low without flame there may be an issue with the board or the rods may be grounded.
    - ii. If the DC value does not go low with flame there may be an open in the flame detection wiring, a bad ignition coil or the rod could be incorrectly placed.
  - c. Measure both the DC and AC value of the coil high voltage output to ground (while the system is not sparking or running). The AC value should be above 25Vrms and the DC value around 4.5VDC.
    - i. If there is no output from the coil it may not be wired correctly or it may be damaged.





## 4.2 Temperature Card

### 4.2.1 Wiring Check

Connection	Description
Thermocouples	<p>1. There are 4 thermocouple inputs on the temperature card labeled as TC1A, TC1B, TC2A, TC2B. If a dual thermocouple is used make sure it is either paired between TC1A and TC1B or between TC2A and TC2B.</p> <p>Don't use a grounded thermocouple. They are not supported.</p> <p>Only use type K thermocouples.</p> <p>Yellow wire goes to the positive terminal. Red wire goes to the negative board terminal.</p> <p>Do not parallel a single thermocouple by daisy chaining two thermocouple inputs together. Doing this may give you a cross wiring error. Use a proper dual thermocouple or change the input to a single in the settings.</p>
PFRN Wiring	<p>The PFRN port on the temperature module is a power receiver. It will need to be connected to a BMS controller PFRN port or a network card depending on the installation.</p>

### 4.2.2 Wiring lengths

Wire	Description
Thermocouples	It is suggested to keep thermocouple lengths below 50 feet with a maximum run length of 100 feet.
PFRN	Up to 250 feet.

### 4.2.3 LED Indication

LED	Indication
Link	<p>Solid green when there is a link or off without a link.</p> <p>If the link LED is not solid green check the PFRN wiring.</p>
Power	<p>Solid blue when the port is powered or off if not powered.</p> <p>If the power LED is not solid blue check the PFRN wiring and the host card power (switch or BMS depending on the install).</p>
Fault	<p>The fault LEDs will turn red if an input is open or cross wired or if there is a mismatch between two dual inputs.</p> <p>If the inputs are configured as singles and the thermocouples do not match the LEDs may turn on, this is normal. The LEDs are indicating that the two inputs are configured as singles and do not match, it has no effect on the system otherwise.</p>



	If there is a fault LED and the temperature is not showing up correctly on the UI (either as NA or as ambient temperature) check the thermocouple wiring.
--	---

#### 4.2.4 Thermocouples

3. Thermocouple connectors
  - a. It is possible a thermocouple connector may be damaged and appear as an open to the system. In the UI the temperature will show up as NA. To confirm the connector is the problem – try a different connector in the same spot.
4. Open thermocouples
  - a. If you are getting an NA reading for a temperature input. Check to see if the thermocouple is open.
5. Shorted thermocouples
  - a. If you are seeing ambient temperature when you should be seeing a higher temperature, check to see if the thermocouple is shorted or grounded.



### 4.3 BMS Controller

#### 4.3.1 Wiring Check

Connection	Description
<b>Power wiring</b>	Make sure the power supplied to the BMS is either 12 or 24VDC. This should be connected between 12-24VDC and the common terminal.
<b>Earth Ground</b>	This terminal is internally connected to board common. Connect this to earth ground.
<b>Valves</b>	Connect the valve + to one side of the solenoid, connect valve – to the other side. Do not ground the valve -. The valve should match the power rating of the system, for example if it's a 12VDC system, use a 12VDC valve.
<b>TCV Output</b>	<p>TCV out – is internally connected to GND. It can be used as a ground reference of the output signal. TCV out+ is a current source output. The maximum voltage out of this port is the same as the power supply to the board (12 or 24V).</p> <p>When wiring an external current sink wire the TCV out+ to the signal input of the device. Reference the device to ground via the TCV out- terminal.</p>
<b>Dry Inputs</b>	<p>Dry inputs include: Start, ESD, Proof of Closure, Aux In, Pressure and Level (Pressure and level are dry inputs when configured as such in the UI). These are digital inputs and take a 0V low and 12 or 24VDC high signal.</p> <p>The signal input is the negative terminal. Protected power for the input is available from the positive terminal.</p> <p>To correctly use these inputs wire them from the positive terminal through a dry contact and back into the negative terminal. The contact may be a relay or a switch.</p> <p>The positive terminal is current limited to 100mA.</p>
<b>4-20 Inputs</b>	<p>Both the Pressure and Level can be configured as 4-20 inputs. Power is provided from the positive terminal. This can be used to power an external sensor. The voltage out of this terminal matches the system voltage as either 12 or 24VDC. The output is limited to 100mA of current.</p> <p>The negative terminal is the signal input. The input is reference to ground.</p>



### 4.3.2 LED Indication

LED	Indication
User Interface Link	Solid green when there is a link or off without a link. If the link LED is not solid green check the PFRN wiring.
IO Link	If the IO link LED is off it means that there is no communication.  If the link LED is flashing it means that there is communication but it might only be in one direction. If the link LED is flashing, but you are not able to talk to the device it likely means that one of the wires is open on the PFRN connection.
Power	Solid blue when the port is providing power. If the power LED is not solid blue, there is an issue with the BMS's power supply. Check the power to the controller and check the fuse.



## 5 Document Revision History

---

Version Number	Date	Who	Description of Changes
v1.0	2016-05-30	Ryan Baron	Initial Release
V1.1	2016-11-29	Ryan Baron	Removed blank page