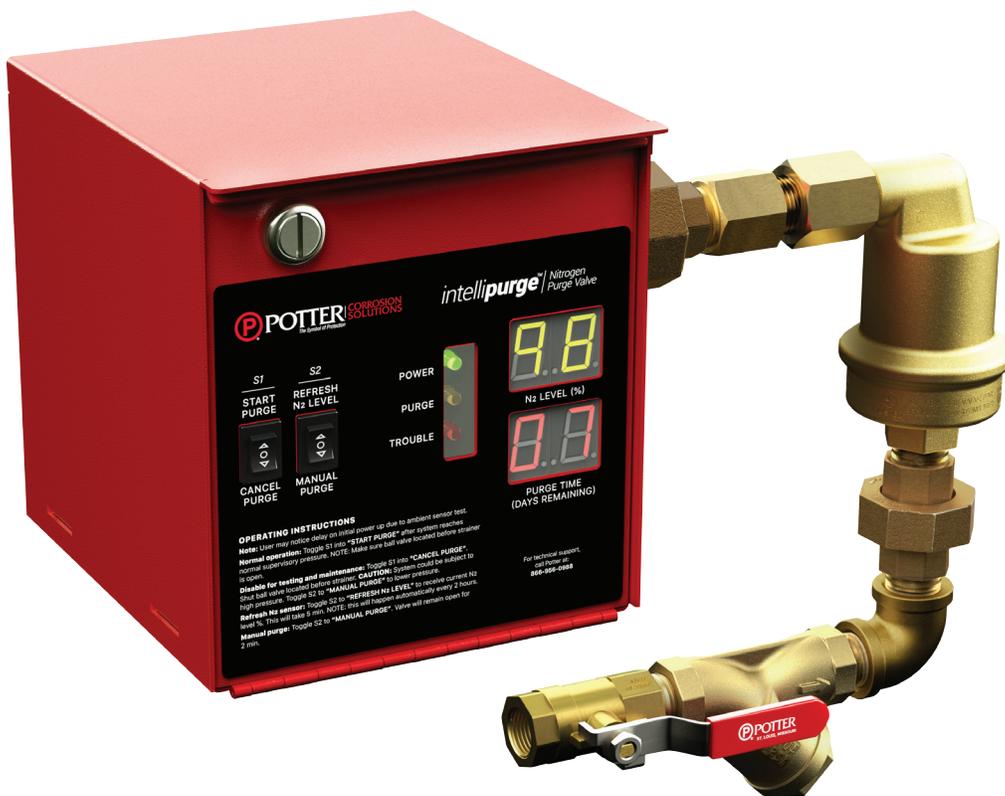


INS-PV Potter IntelliPurge® Nitrogen Purge Valve

Installation, Operation, & Service Manual



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1. Safety

Safety Guidelines

This manual contains safety information that is important to know and understand. This information is provided for the safety of installers, operators, and users of the Potter Nitrogen Generator as well as equipment. To help recognize this information, observe the following symbols.



DANGER

Danger indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.



WARNING

Warning indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.



CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.

NOTICE

Notice indicates important information, that if not followed may cause damage to equipment or property.

Important Notice to Users

The Installation and Owner's Manual supplied with each unit must be read thoroughly and completely understood before installation and operation of the Potter Nitrogen Generator. All appropriate safety standards for handling of gases as determined by local or national laws and regulations should be followed at all times.

Unpacking

After unpacking unit, carefully inspect all parts and equipment for any damage that may have occurred during transit. Make sure to tighten fittings, bolts, etc. before putting unit into service.



WARNING

Do not operate if damage occurred during shipping, handling, or use. Contact Potter immediately.

General Safety Information

Important: Read all of the safety information in this manual before operating this equipment. Use of the equipment in a manner not specified within this manual may impair the protection provided by the generator and could result in an unplanned release of pressure, which may cause serious injury or damage. Only competent personnel, who have been trained, qualified, and approved by Potter Electric Signal Company, LLC should perform commissioning, servicing, and repair procedures.

When handling, installing, or operating this equipment, personnel must employ safe engineering practices and observe all related local regulations, health, and safety procedures, and legal requirements for safety.

Ensure that the equipment is depressurized and electrically isolated before carrying out any of the scheduled maintenance instructions specified in this manual.

The warnings in this manual cover the most known potential hazards, but by definition cannot be all-inclusive. If the user employs an operating procedure, item of equipment, or a method of working that is not specifically recommended by Potter Electric Signal Company, the user must ensure that the equipment will not be damaged or become hazardous to persons or property.

2. System Overview

The Potter IntelliPurge® Nitrogen Purge Valve (INS-PV) is designed to work with Potter IntelliGen® Series Nitrogen Generators to effectively purge corrosive oxygen from a fire sprinkler system while maintaining adequate system pressure. Potter's IntelliPurge® Nitrogen Purge Valve is the easiest way to ensure high purity nitrogen is equally distributed throughout the fire sprinkler system. Simply install the INS-PV at the end of the sprinkler system, near a 24 Volt AC/DC electrical connection. When the nitrogen generator is in operation the INS-PV bleeds out the oxygen using one of three modes that are selectable using DIP switch configuration, or by selecting the mode on the IntelliGen® Nitrogen Generator. The three Purge Modes for the INS-PV include:

- Perfect Purge - When the INS-PV is in Perfect Purge Mode, the unit purges the air out of the system until 98% N₂ purity is reached. This mode is the unit's default setting.
- Single Shot - In this mode, a Purge Time is selected and the valve automatically shuts off after that time expires.
- IntelliDry - This mode is designed for freezers or ice plug applications. After the system reaches 98% purity, it will cyclically open and close. This allows any excess, trapped moisture to be periodically purged, while still lowering the duty cycle at the compressor.
- For additional information on Purge Modes, see page 29.

In the event of a system activation, the INS-PV has a built in high pressure water shut-off valve that automatically closes when the water reaches the vent. A ball valve allows for isolation of the assembly, maintenance of strainer screen, replacement of air vent, or maintenance of the purge orifice. See Figure 1 for INS-PV System Diagram.

Figure 1: INS-PV System Diagram

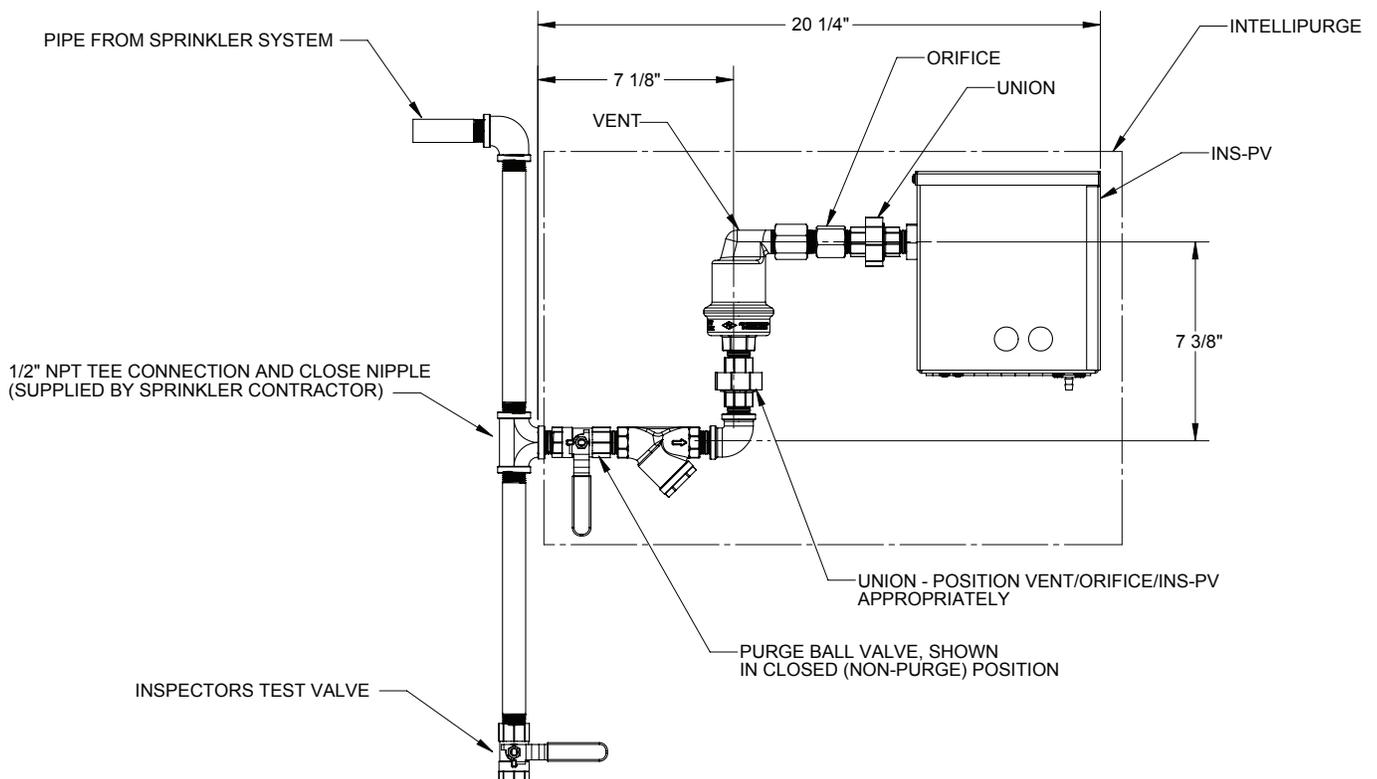
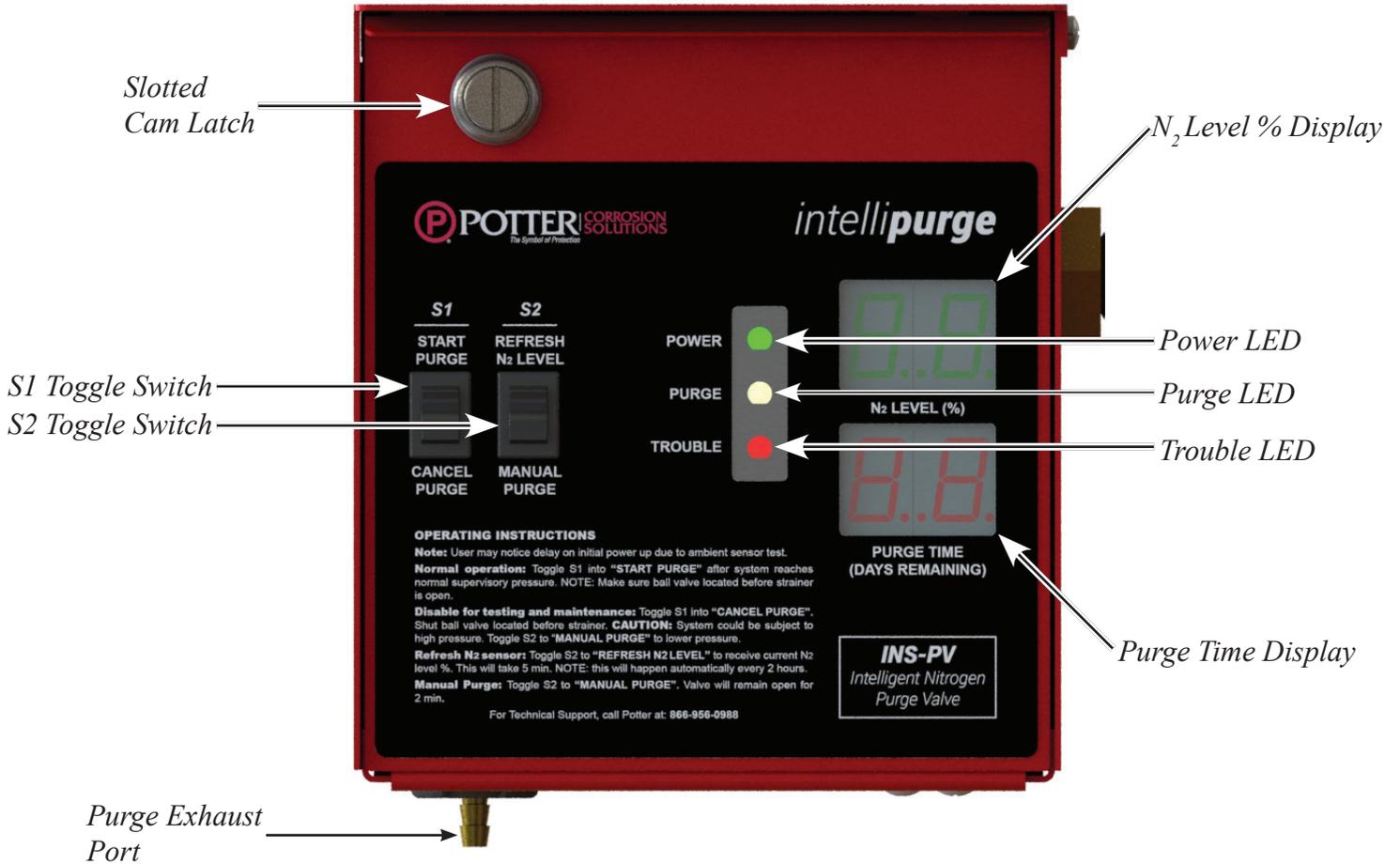


Figure 2: Typical INS-PV External View



See Definitions on page 30 for further information.

3. Before Going To The Jobsite

1. On arrival, do a full inspection by checking all packages and crates in the shipment for damage. If damage is found, sign for the damage or refuse the shipment. Contact the carrier immediately and file a shipping damage claim with the carrier.
2. Check to ensure all components are contained and no visible damage has occurred during shipping.

Check List:

INS-PV  MFG# 1119478

Vent  MFG# 1119478

Optional Transformer (PV) MFG# 5270462

CAUTION

Important: Read all of the safety information in this manual before installing or operating this equipment.

3. Find a location to install the INS-PV that meets these requirements:

Access to front and top for maintenance
Conveniently located near power requirements (24 Volt AC/DC)
Dimensions for INS-PV 7.3" x 6.8" x 7.9" (H x W x D)
Dry, clean, well-ventilated, covered, and away from high voltage power
Ambient temperatures between -4°F (-20°C) and 122°F (50°C)

WARNING

The INS-PV should always be installed in an adequately ventilated room. Nitrogen is nontoxic and largely inert. Rapid release of nitrogen gas into an enclosed space displaces the oxygen and can cause an asphyxiation hazard. Inhalation of nitrogen in excessive concentrations can result in unconsciousness without any warning symptoms.

4. Run a 24 Volt AC/DC wire to installation location for INS-PV.
NOTE: Class 2 Transformers available for 120 V application.
Wire gage must be considered when running power for long distances to the INS-PV. Refer to Figure 3.

Figure 3

MINIMUM AWG	FT.
22	<40
20	<70
18	<100
16	<160
14	<300

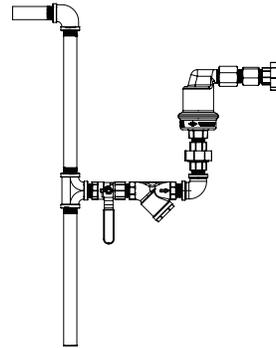
5. For PLINK networking, the INS-PV requires 3 signal lines to allow communication: PL-A, PL-B, and PL-G.
6. The PLINK network requires 3-wire twisted stranded cable. CAT5 cable with the unused wires trimmed is recommended.
 - PL-A is the blue wire
 - PL-B is the white/blue wire
 - PL-G is the orange wire

For more information on networking see pg. 9.

4. Installation of INS-PV

1. Read and understand the instructions provided before proceeding with installation. The INS-PV shall be installed in accordance with local ordinances and the applicable NFPA 13, NFPA 13D, or NFPA 13R standard.
2. The Engineer of Record should select the INS-PV installation location. This is usually located at the end point of the system, be sure that location is accessible and is near 24 Volt AC/DC wiring connection.
3. The unit must be level and arranged in such a manner that water will not become trapped. Trapped water will cause the INS-PV not to purge.
4. Install vent to 1/2" NPT connection off sprinkler system. See Figure 4.

Figure 4

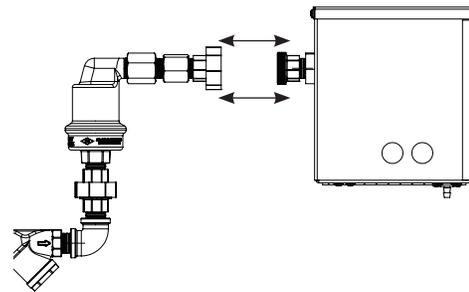


CAUTION

Vent must be installed in level, horizontal position.

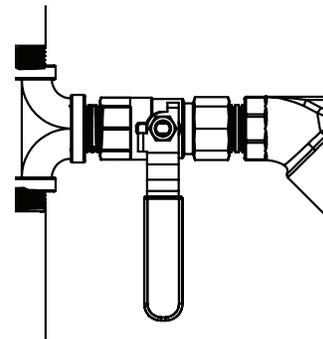
5. Install INS-PV to vent using union and position for easy access. See Figure 5.

Figure 5



6. After installation, close ball valve prior to hydrostatic tests. See Figure 6.

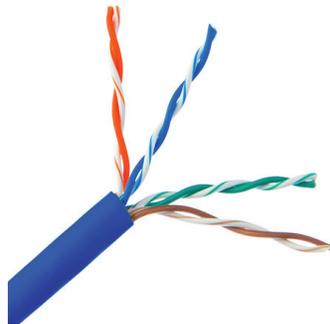
Figure 6



5. Wiring and Networking

1. The PLINK network is Potter’s propriety networking connection. It is a RS-485 network for serial communication between the Nitrogen Generator (INS Series) and its Purge Valves (INS-PV).
2. PLINK requires 3 signal lines to allow communication to and from the Nitrogen Generator and the Purge Valves.
 - PL-A
 - PL-B
 - PL-G
3. The PLINK network shall use stranded, twisted pair wire for PL-A, PL-B, and PL-G. We recommend the unused conductors from the network cable can be pulled back and electrical taped against the outer jacket for possible future use. It is acceptable to use a single twisted pair cable for PL-A and PL-B with the drain wire being used for PL-G. Do not connect any shield to the drain wire.

Figure 6: Recommended unshielded 24 AWG stranded CAT5 equivalent or higher rated network cable



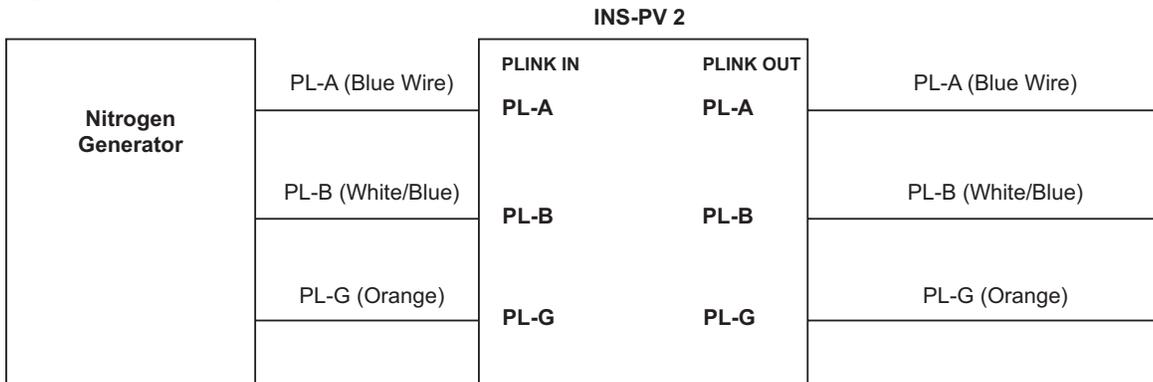
- PL-A is the blue wire
- PL-B is the white/blue wire
- PL-G is the orange wire

NOTICE

The other 5 wires are not needed in this application.

4. Maximum number of INS-PV devices networked to an IntelliGen Series Nitrogen Generator is 26. The maximum wire length for the network when using the recommended wire is 4000 ft. Contact Technical Support for further assistance if a longer wire length is required.
5. The PLINK network works as a Master and Slave network. The INS generator is defined as the Master.

Figure 7: PLINK Wiring Schematic

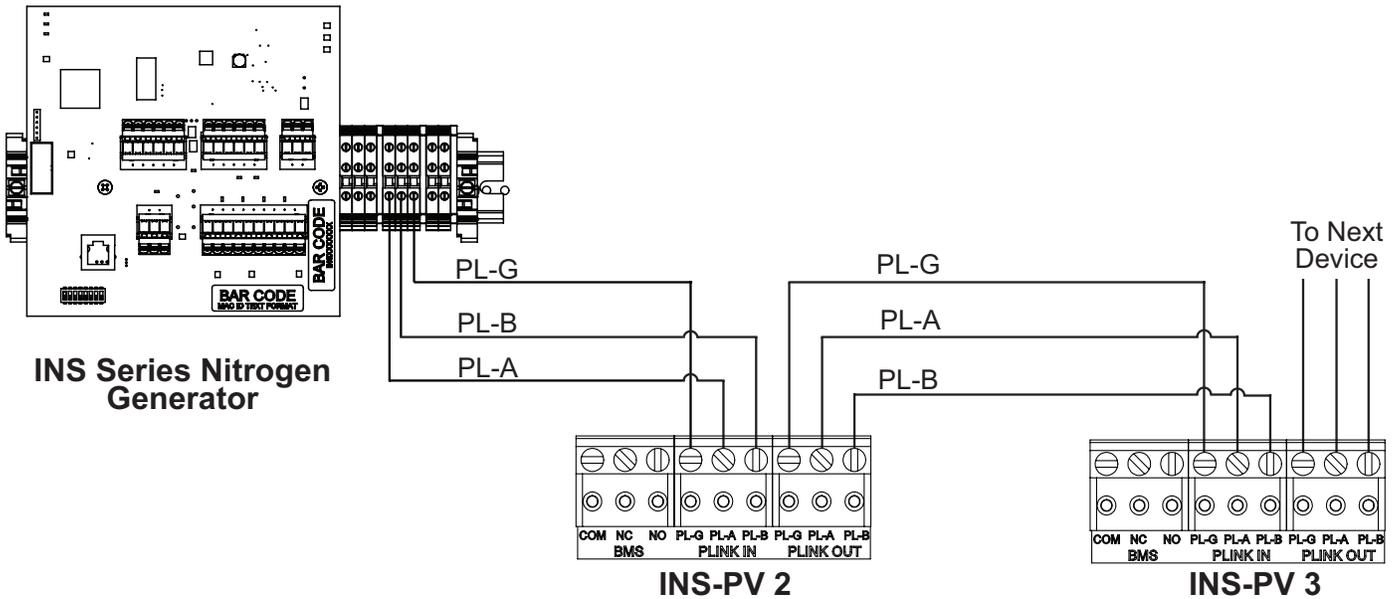


NOTICE

The first INS-PV in the network when connected to the nitrogen generator should be addressed INS-PV-2. The last INS-PV in the network must be addressed as INS-PV-27. If Only ONE INS-PV is networked to the generator it must be addressed as INS-PV-27

6. The INS-PV requires 35 watts of 24V AC power or DC power. See Wiring Diagram in Section 14.

Figure 8: PLINK Wiring Diagram



NOTES:

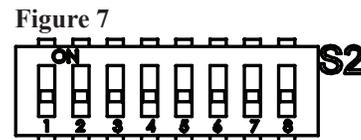
- Wiring from the INS Series Nitrogen Generator to the INS-PVs is low voltage.
- Do not route INS-PV wiring into the high voltage wire ways.
- Do not run INS-PV communication or power wiring parallel to any high voltage wiring or conduit. Keep as much space from high voltage wiring as possible. Only cross high voltage wiring with INS-PV wiring at right angles.
- Do not coil or store excess cable in the INS-PV Cabinet. Doing so may cause communication errors or faulty readings.
- Use the knockouts below the INS IntelliGen Nitrogen Generator control board to exit the nitrogen cabinet. Keep excess wire to a minimum.
- Each INS-PV device comes with a Building Management System (BMS) connection that is a NC or NO contact. This can be wired back to a Building Management System or Fire Panel. If connected to a fire panel it should be wired as a Trouble.

5. Start Up Guide for Non-Networked INS-PV

NOTES:

- All INS-PV units are factory set in Perfect Purge mode. For additional purge configurations, see Programming Guide, starting on page 16.
- Wiring of the INS-PV unit for both Power and BMS notification should be done before starting the purge process. See Wiring Diagram on page 32.

- Before applying power to the INS-PV, open the INS-PV door and observe the DIP switches located on the printed circuit board. On the **S2 Switch**, verify the **DIP switches 4, 5, 6, 7 and 8** are in the **OFF** position, as seen in Figure 7.



- After confirming the DIP switches are configured correctly, close the INS-PV door.
- Apply power to the INS-PV unit. The Power LED indicator should display a solid green LED. If not, the INS-PV is not powered ON. Check wiring of INS-PV unit.
- To start the purging process, **toggle** the **S1** switch into the Start Purge mode.
- Once the purge process has started, the yellow Purge LED indicator will begin blinking.
- The Purge Time display will display the max number of purge days, which is the maximum amount of time the unit is allowed to purge before indicating a trouble.
- The N₂ Level display will remain "--" until the first measurement is taken after 24 hrs.
- The INS-PV is now purging. Confirm that air is escaping out of the Purge Exhaust Port. If air is not escaping, check to ensure ball valve is open and there is no trapped water before the device.
- The INS-PV unit will take a nitrogen level reading every 24 hours. This will be indicated by the N₂ Level display blinking the last reading and subsequently displaying the nitrogen level purity in the sprinkler system.
- When the INS-PV reads greater than 98% N₂ level for multiple consecutive readings, the INS-PV will close the solenoid valves and stop purging.
- After the INS-PV unit has closed the solenoid valves and stopped purging, the unit will continue to take nitrogen purity samples from the fire sprinkler system. This is to ensure that the entire fire sprinkler system has equilibrated to 98% throughout the piping.
- When the INS-PV unit has confirmed that the fire sprinkler system is greater than 98% N₂ level, the purge process will be considered successful and the INS-PV valve will remain closed.
- The yellow Purge LED indicator will turn solid. The Purge Time display will go blank.
- The INS-PV will continue to monitor the nitrogen purity level of the fire sprinkler system. If the N₂ level % drops below 98% for four consecutive readings, the INS-PV will go into trouble, illuminate the red Trouble LED indicator, and blink "Er" "08" Error Code on the Purge Time display. For troubleshooting and Error Code definitions see Troubleshooting Guide on page 26. If the N₂ level % ever increases to 98%, the trouble will clear automatically.

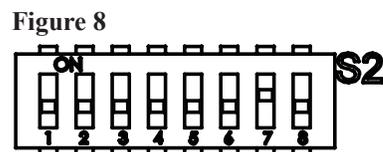
6. Start Up Guide for INS-PVs Networked to an IntelliGen® Series Nitrogen Generators

NOTES:

- All INS-PV units when connected to an IntelliGen® Series Nitrogen Generator maintain their purge mode, all INS-PV DIP switches are factory set to perfect purge mode for 30 days. For additional purge configurations, see Programming Guide starting on page 16.
- Wiring of all the INS-PV units for Power, PLINK networking, and BMS notification should be done before starting the purge process. See Wiring Diagram on page 32.
- When connecting multiple INS-PVs in a networked configuration each INS-PV unit must have a defined address. Each network can handle up to (26) INS-PV units.
- Networked INS-PV units work on a master and slave type addressing system. The nitrogen generator is defined as the Master. All other INS-PV units must be addressed as different units using DIP switches on the printed circuit board. If you have more than one INS-PV on the same address, communication problems will occur.
- The first INS-PV in the network when connected to the nitrogen generator should be addressed INS-PV-2.
- The last INS-PV device in the network must be addressed as INS-PV-27. If only one INS-PV is networked to the generator, it must be addressed as INS-PV-27.
- For additional functionality such as setting date and time, viewing history etc., see page 29.

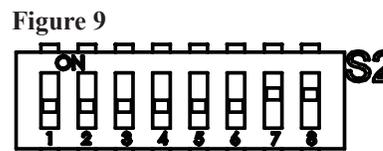
1. Before powering ON any of the INS-PV units, each unit must be assigned a specific unique address.
2. Open the door of the first INS-PV unit in the network. This will be the INS-PV unit networked directly to the nitrogen generator.

3. Before applying power to the INS-PV, open the INS-PV door and observe the DIP switches located on the printed circuit board. On the **S2 switch**, move **DIP switch 7** to the **ON** position, as seen in Figure 8.



4. Record the location of the INS-PV on the DIP switch Address Configuration Table on page 18. After confirming that the DIP switches are configured correctly, close the INS-PV door.
5. Apply power to the INS-PV-2 unit. The Power LED indicator should display a solid green LED. If not, the INS-PV is not powered ON. Check wiring of INS-PV unit.
6. Open the ball valve on the vent. The INS-PV unit is ready for operation. Go to the next INS-PV unit in the network. Open the INS-PV door.

7. Before applying power to the INS-PV, open the INS-PV door and observe the DIP switches located on the printed circuit board. On the **S2 switch**, move **DIP switch 7 and switch 8** to the **ON** position, as seen in Figure 9.



8. Record the location of the INS-PV-3 on the DIP switch Address Configuration Table on page 18. After confirming that the DIP switches are configured correctly, close the INS-PV door.
9. Apply power to the INS-PV unit. The Power LED indicator should display a solid green LED. If not, the INS-PV is not powered ON. Check wiring of INS-PV unit.

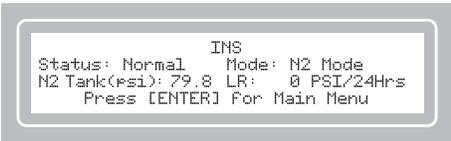
10. Open the ball valve on the vent. The INS-PV unit is ready for operation.
11. Repeat steps 7 to 9, making sure to change each address until all INS-PV units have been uniquely addressed.
12. Record each INS-PV unit, its address and its location on the DIP switch Address Configuration Table on page 18. This will help locate which unit is signaling a trouble in the case of a fault.
13. Double check to ensure that none of the INS-PV units have the same address. This will cause communication errors.

NOTICE

Your last INS-PV unit must be addressed as INS-PV-27

14. Go to the nitrogen generator. The INS generator should display the Title Screen. See Figure 10.

Figure 10



```
INS
Status: Normal      Mode: N2 Mode
N2 Tank(psi): 79.8  LR:  0 PSI/24Hrs
Press [ENTER] For Main Menu
```

15. Press **ENTER** on the IntelliGen® Display keypad.

16. There will be 5 menu options displayed on the Menu Screen: 1) System Status, 2) View History, 3) Maintenance, 4)Purge, and 5) Settings. See Figure 11.

Figure 11



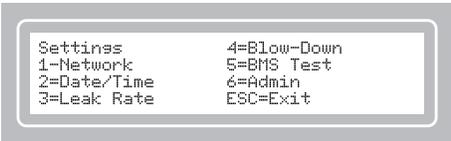
```
Main Menu          4=Purge
1=System Status   5=Settings
2=View History    ESC=Exit
3=Maintenance
```

17. Select **Settings** by either selecting it using the number on the keypad (**5**), or moving the cursor to the number 5 using the directional pad and pressing enter on the keypad.

18. The generator will prompt you with a password. Enter the password **0000**.

19. The INS-RA Menu will display 1) Network, 2) Date/Time, 3) Leak Rate, 4) Blow -down, 5) BMS Test, 6) Admin. See Figure 12.

Figure 12



```
Settings          4=Blow-Down
1=Network         5=BMS Test
2=Date/Time       6=Admin
3=Leak Rate       ESC=Exit
```

20. Select **Network** and press **ENTER**.

21. Select **Learn Network** and press **ENTER**. The INS generator will begin searching for all INS-PV units on the network.

21. The generator will display 1) PLink Found and 2) PLink Removed. See Figure 13.

Figure 13



```
Review Results
1=PLink Found
2=PLink Removed
ESC=Exit
```

22. Select **1) PLink Found** and scroll through the list of new INS-PV units found by moving up and down on the directional pad.

23. Check to ensure all INS-PV units on the DIP switch Address Configuration Table (page 18) match up with all new INS-PV units added to the network.
24. If there is a missing or unfound INS-PV, return to the location of the unfound INS-PV unit and recheck S2 switch DIP switch addresses as well as wiring.
25. Press **1** to accept changes. Press **ENTER** to confirm changes.
26. Generator and INS-PV units will reset. The generator will re-initialize to the Title Menu. Press **ENTER**.
27. Select **4) Purge** and enter pass code **0000**.
28. Select **1) Start Purge**. Press **ENTER**.
29. The generator will then display a screen with the options of 1) All Devices or 2) Specify Device. See Figure 14.

Figure 14



30. To purge all INS-PV units connected to the network, select **All Devices** option and press **ENTER**. To purge individual fire sprinkler systems, select **Specify Device**.
31. When Specify Device is selected, select which INS-PV unit to purge by scrolling through the list of INS-PV units by pressing **up** or **down** on the directional pad.

32. The generator will display a confirm screen. The INS-PV units selected are now purging. See Figure 15.

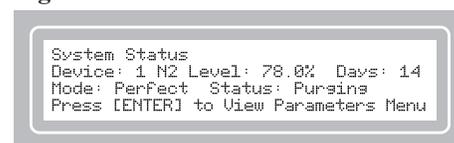
Figure 15



33. Return to the Main Menu by pressing **ESC**.
34. Select option **1) System Status** on the Main Menu. Select option **2) Purge Status**.

35. The System Status should populate: Device, N₂ Level %, Days Remaining, Purge Mode, Purge Status, as seen in Figure 16.

Figure 16



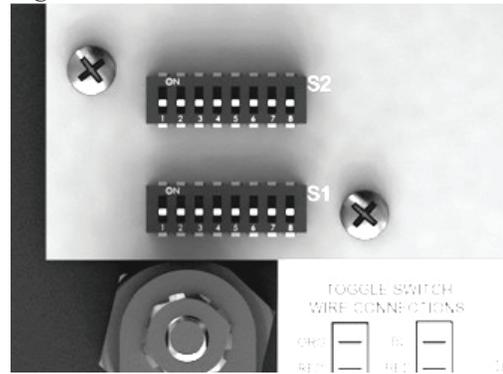
36. N₂ Level % will display the last recorded measurement, or "-" if the INS-PV has not completed its initial measurement.
NOTE: It takes 24 hours for the device to take its first reading.
37. Scroll through the INS-PV units by using the **up** and **down** arrows on the directional pad of INS-RA. All INS-PV units on the network should be displayed in system status.
38. The INS-PV units that were selected to purge will continue purging until their nitrogen sensors read greater than 98% N₂ Level for multiple consecutive readings. Those INS-PVs will then stop purging.
NOTE: Purging times vary depending on system size and configuration. When multiple INS-PV units are networked in Perfect Purge mode, individual systems could reach 98% N₂ Level at different times. This is normal.
39. After the INS-PV unit has stopped purging, the unit will continue to take nitrogen purity samples from the fire sprinkler system. This is to ensure that the entire fire sprinkler system has equilibrated to 98% N₂ Level throughout the piping.

40. When the INS-PV unit has confirmed that the fire sprinkler system is greater than 98% N₂ level, the purge process will be considered successful and the INS-PV valve will remain closed.
41. The IntelliGen® Display will show the purging LED blinking until all devices are complete. It will then turn solid.
42. At the INS-PV, the yellow Purge LED indicator will turn solid and the Purge Time display will go blank. After all INS-PV units have completed the purging process, the systems are now protected.

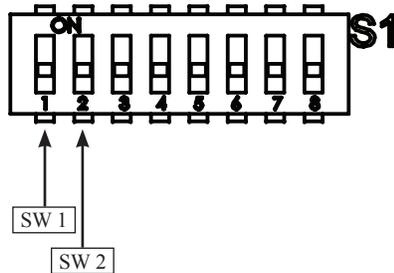
8. Programming Using DIP switches

- DIP switches are located at the bottom left corner of the circuit board when the cabinet is open. See Figure 17.

Figure 17

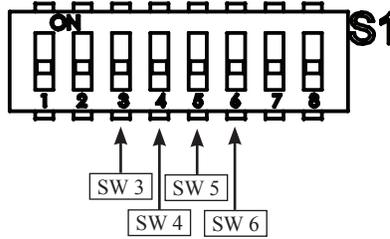


- DIP switches 1 and 2 on the "S1" Switch will control the Mode of the INS-PV.



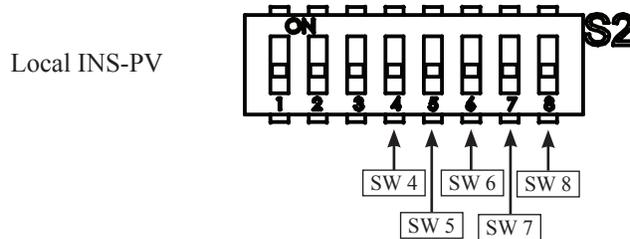
Purge Mode		
<u>SW 1</u>	<u>SW 2</u>	<u>Definition</u>
Off	Off	Perfect Purge Mode
Off	On	IntelliDry Mode
On	Off	Single Shot Mode

3. DIP switches 3,4,5, and 6 on the "S1" Switch will control the way in which the INS-PV behaves within the parameters of the selected mode.

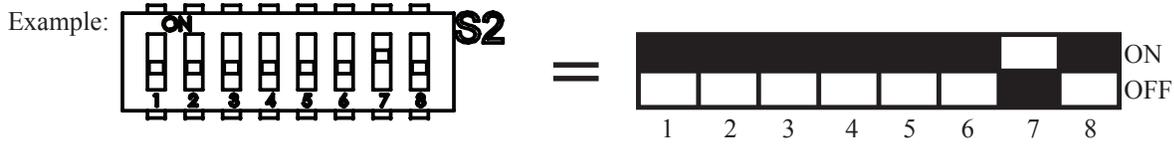


Purge Cycle Settings				
SW 3	SW 4	Perfect Purge	IntelliDry	Single Shot
Off	Off	Purge for 14 days maximum		Purge for 14 days then turn off indefinitely
Off	On	Purge for 21 days maximum		Purge for 21 days then turn off indefinitely
On	Off	Purge for 30 days maximum		Purge for 30 days then turn off indefinitely
On	On	Reserved	Reserved	Reserved
Dryness Level for IntelliDry				
SW 5	SW 6	Perfect Purge	IntelliDry	Single Shot
Off	Off	Unused	Low Dryness	Unused
Off	On	Unused	Medium Dryness	Unused
On	Off	Unused	High Dryness	Unused
On	On	Reserved	Reserved	Reserved

4. For local device, DIP switches 4,5,6,7, and 8 on the "S2" Switch are in the OFF position.



5. DIP switch Address Configuration for Networked INS-PVs.



Name	DIP switch Configuration	Location
INS-PV-1 (Master)*		
INS-PV-2 (Slave)		
INS-PV-3 (Slave)		
INS-PV-4 (Slave)		
INS-PV-5 (Slave)		
INS-PV-6 (Slave)		
INS-PV-7 (Slave)		
INS-PV-8 (Slave)		
INS-PV-9 (Slave)		
INS-PV-10 (Slave)		
INS-PV-11 (Slave)		
INS-PV-12 (Slave)		
INS-PV-13 (Slave)		
INS-PV-14 (Slave)		

Name	DIP switch Configuration	Location
INS-PV-15 (Slave)		
INS-PV-16 (Slave)		
INS-PV-17 (Slave)		
INS-PV-18 (Slave)		
INS-PV-19 (Slave)		
INS-PV-20 (Slave)		
INS-PV-21 (Slave)		
INS-PV-22 (Slave)		
INS-PV-23 (Slave)		
INS-PV-24 (Slave)		
INS-PV-25 (Slave)		
INS-PV-26 (Slave)		
INS-PV-27**		

***NOTE:** Master INS-PV if NOT connected to IntelliGen® Nitrogen Generator. If connected to INS Generator, First INS-PV in series will be INS-PV 2

****NOTE:** Regardless of the number of INS-PV units installed on the sprinkler system, the final unit on the network of INS-PV units must be addressed as number 27. This means that even if there are only two units installed, the second unit must be addressed as INS-PV-27.

9. IntelliGen™ Series Menu Trees

To program the INS-PV using the IntelliGen™ Nitrogen Generator, follow the menu trees below.

Figure 18: Menu Tree 1

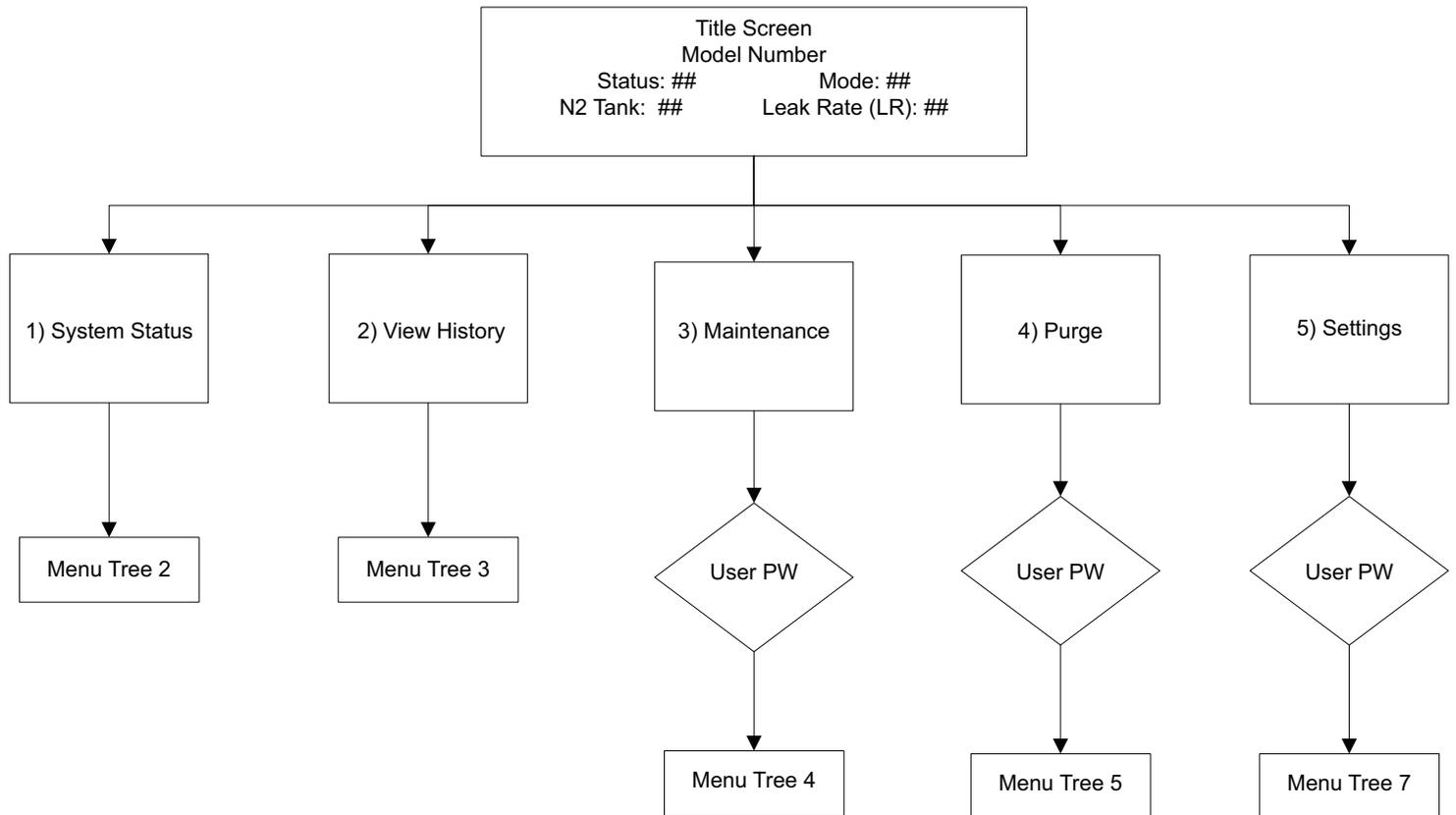


Figure 19: Menu Tree 2

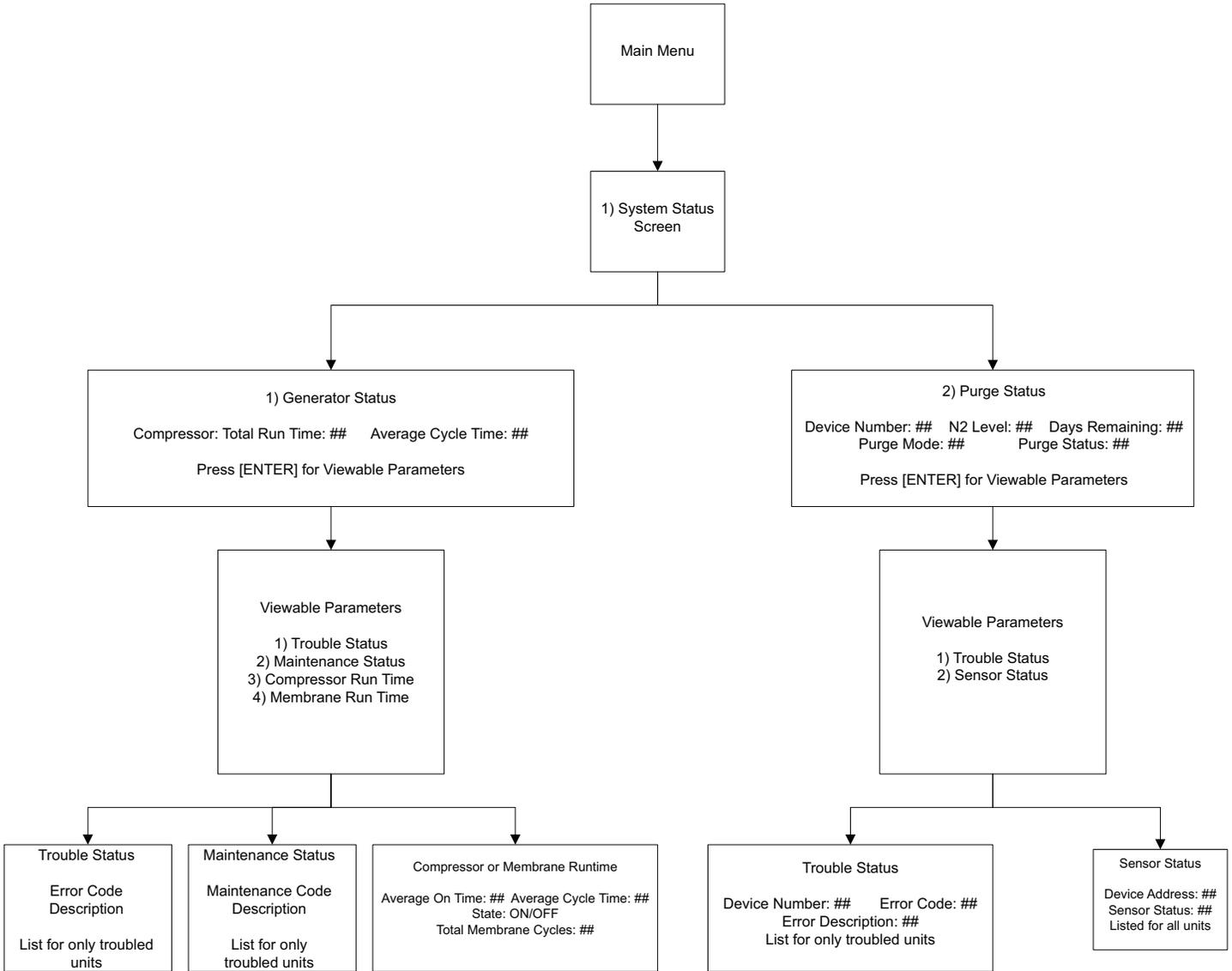


Figure 20: Menu Tree 3

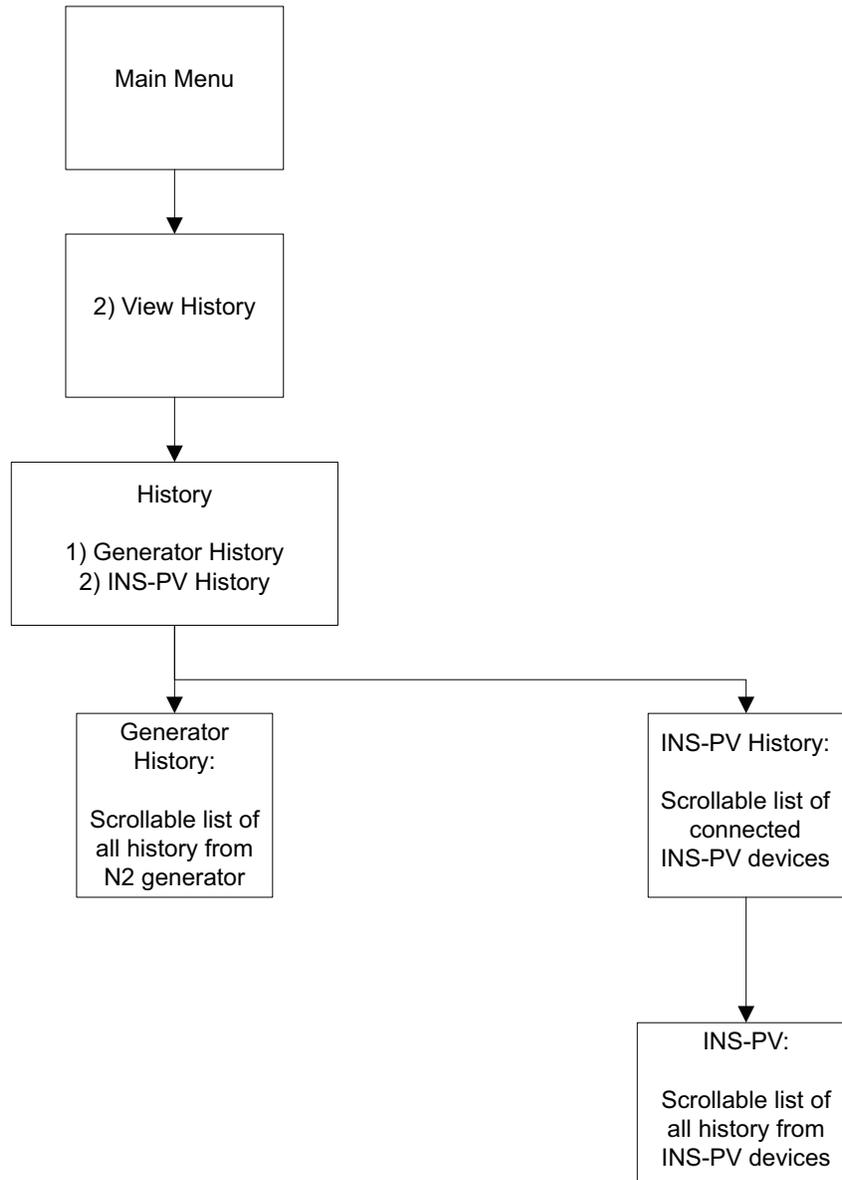


Figure 21: Menu Tree 4

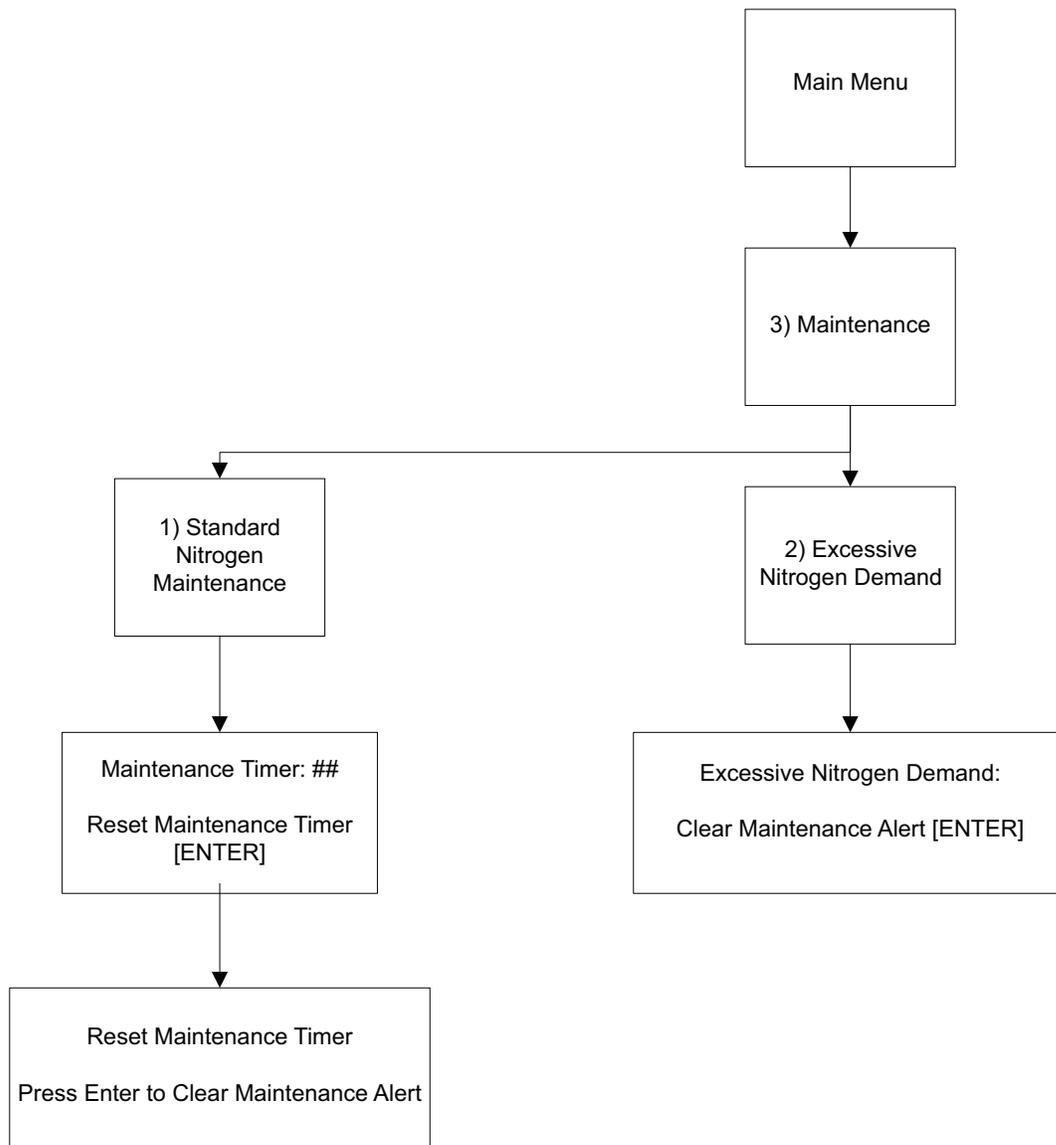


Figure 22: Menu Tree 5

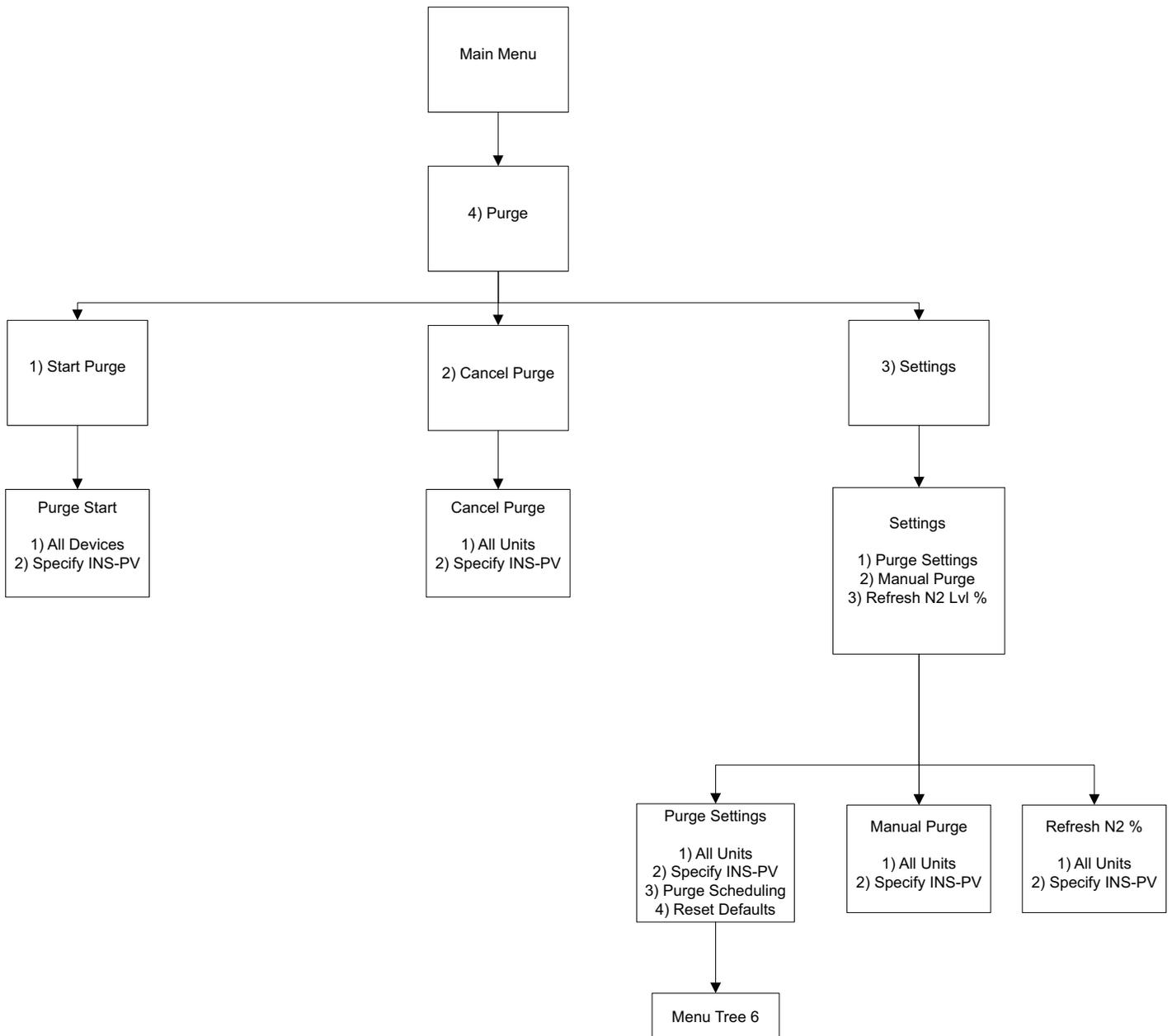


Figure 23: Menu Tree 6

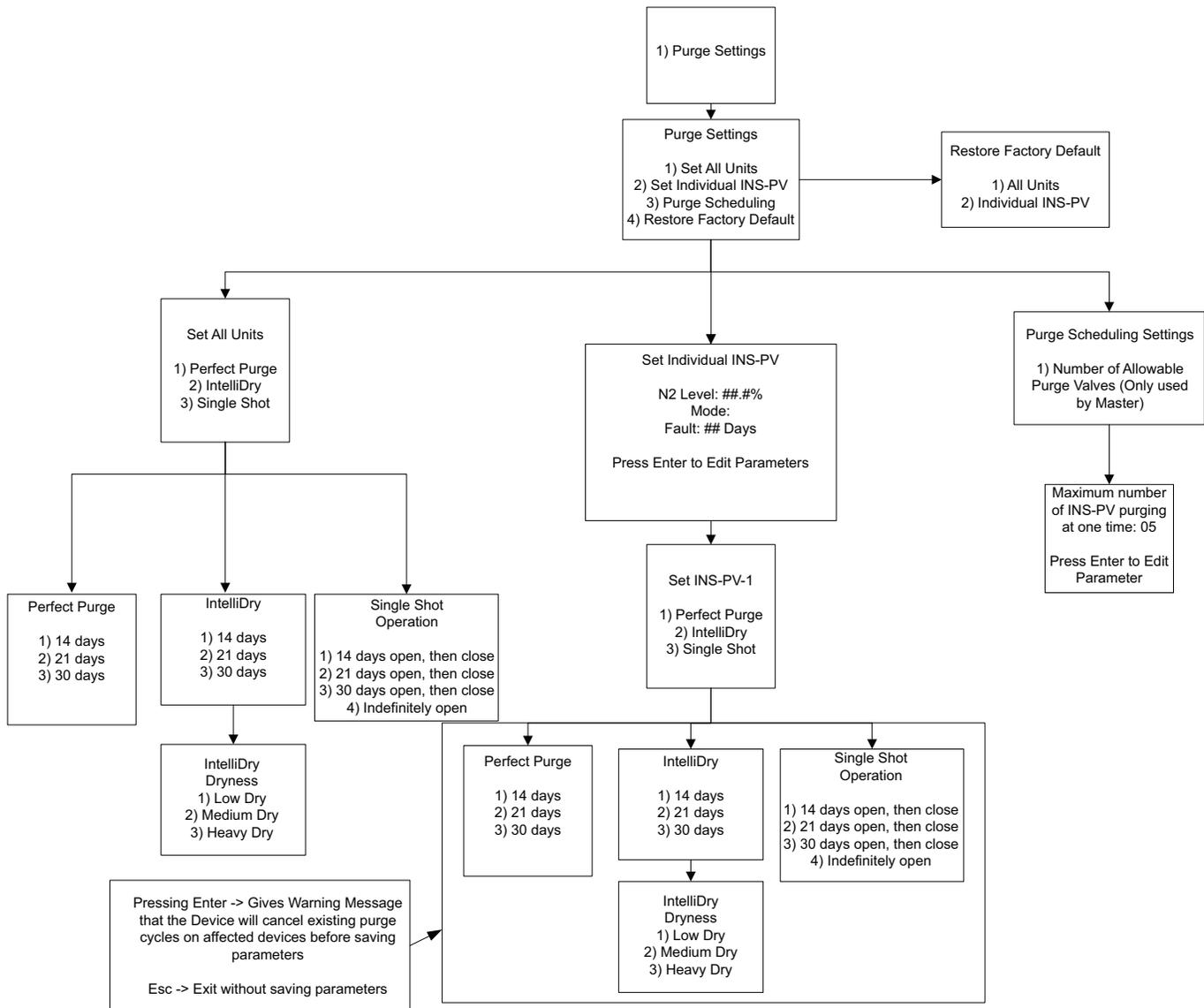
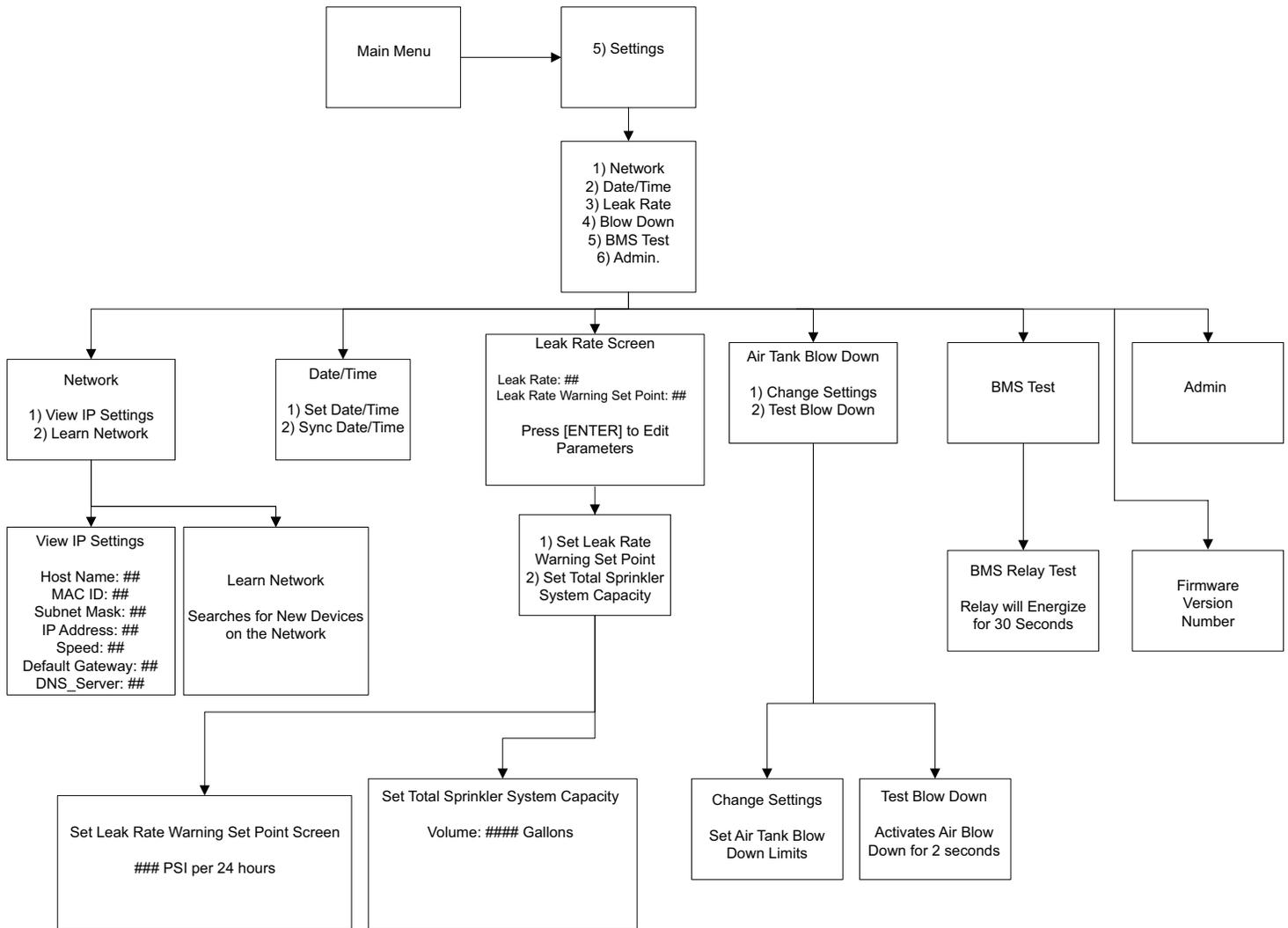
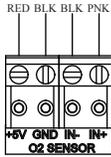
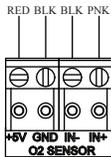


Figure 24: Menu Tree 7



10. Error Codes & Troubleshooting

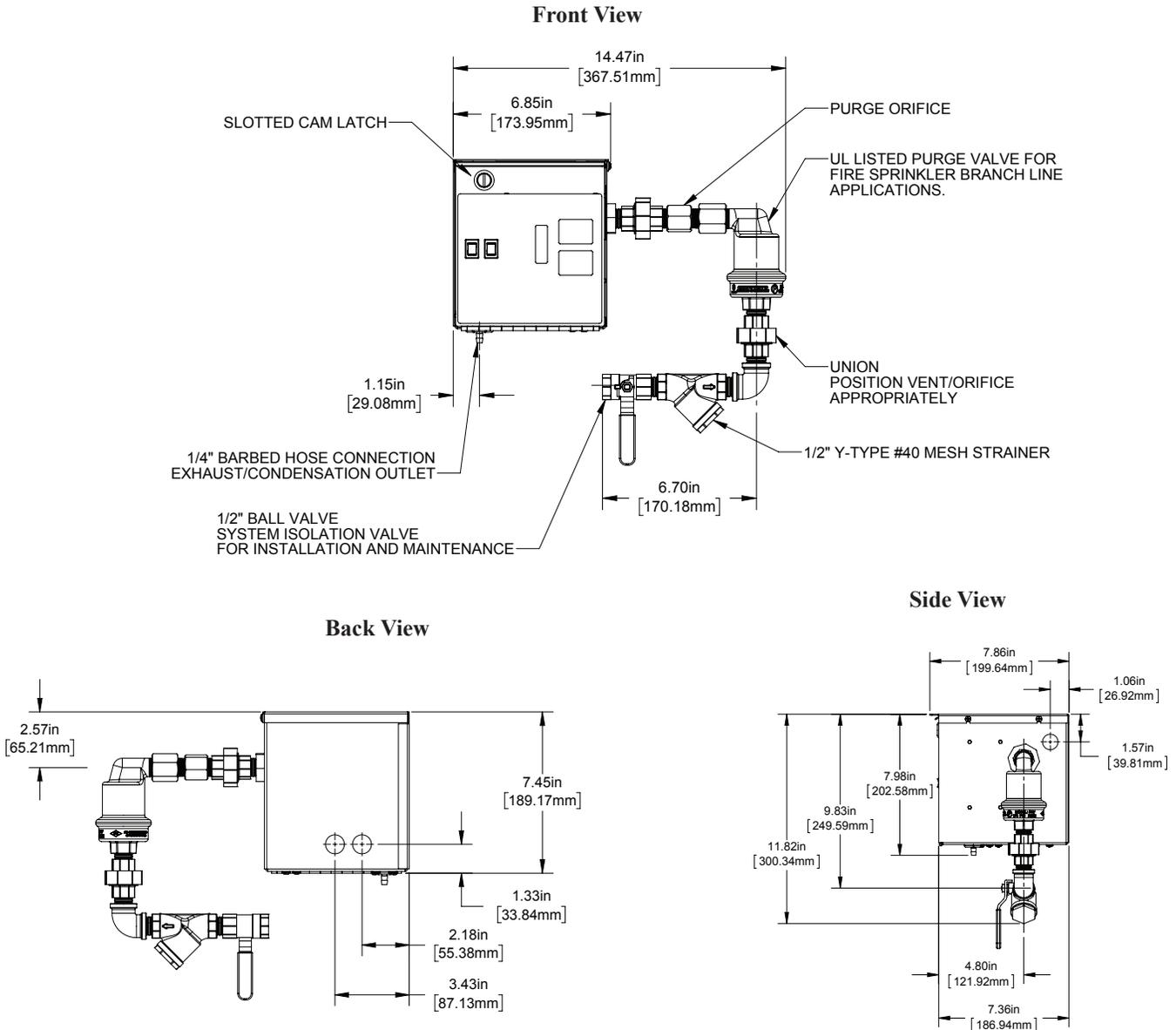
Code	Meaning	Corrective Actions
01	Initial N ₂ Sensor Test Failed	<ol style="list-style-type: none"> If the initial N₂ Sensor Test fails, the unit will continue to retest. Wait for 10 minutes. Press the Start Purge button again to clear the error code. If the Er 1 comes back on the display within ten seconds, check the DIP switch configuration to ensure the elevation setting is correct for your sea level. Check to ensure the sensor cable is plugged in correctly (See Graphic). <div style="text-align: center;">  <p>RED BLK BLK PNK</p> <p>+5V GND IN- IN+ O2 SENSOR</p> </div> Check to ensure the INS-PV is not currently connected to a fire sprinkler system that is already above ambient conditions. Isolate the INS-PV unit using the ball valve. Wait 2 hours and return to press the Start Purge button. Contact Potter technical support if error code returns.
02	Subsequent N ₂ Sensor Test Failed	<ol style="list-style-type: none"> If the N₂ Sensor Test fails, the unit will continue to retest. Check the DIP switch configuration to ensure the elevation setting is correct for your elevation. Check to ensure the sensor cable is plugged in correctly (See Graphic). <div style="text-align: center;">  <p>RED BLK BLK PNK</p> <p>+5V GND IN- IN+ O2 SENSOR</p> </div> Check to ensure the INS-PV is not currently connected to a fire sprinkler system that is already above ambient conditions. Isolate the INS-PV unit using the ball valve. Wait 2 hours and return to see if error code has cleared. Contact Potter technical support if error code remains.
03	Low N ₂ measured upon completion of Single Shot purge cycle	<ol style="list-style-type: none"> Check the N₂ level % at the INS-PV (or INS-RA). If the N₂ level % is below 82%: <ul style="list-style-type: none"> Check to ensure that ball valve is open to the INS-PV unit. If ball valve is closed the INS-PV cannot sense the nitrogen in the system. Open the ball valve and press Refresh N₂ on the INS-PV. Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. <p>Note: The nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.</p> If the N₂ level % is above 90%: <ul style="list-style-type: none"> Check the DIP switch configuration for the sprinkler system. Ensure the correct size sprinkler system setting was selected for unit. See Programming Guide for configuration. The purge process may need to be repeated. Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.
04	Low N ₂ measured after Single Shot purge cycle completed successfully	<p>The INS-PV measured nitrogen level below 98%:</p> <ul style="list-style-type: none"> Check to ensure that ball valve between INS-PV and sprinkler system is open. Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.

Code	Meaning	Corrective Actions
05	Low N ₂ measured upon completion of initial IntelliDry purge cycle	<ol style="list-style-type: none"> 1. Check the N₂ level % at the INS-PV (or INS-RA). 2. If the N₂ level % is below 82%: <ul style="list-style-type: none"> • Check to ensure that ball valve is open to INS-PV unit. If ball valve is closed INS-PV cannot sense the nitrogen in the system. Open ball valve and press Refresh N₂ on the INS-PV. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater. 3. If the N₂ level % is above 90%: <ul style="list-style-type: none"> • Check the DIP switch configuration for the sprinkler system. Ensure the correct size sprinkler system setting was selected for unit. See Programming Guide for configuration. The purge process may need to be repeated. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.
06	Low N ₂ measured after initial IntelliDry purge cycle completed successfully	<p>The INS-PV measured nitrogen level below 98%.</p> <ul style="list-style-type: none"> • Check to ensure that ball valve between INS-PV and sprinkler system is open. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.
07	Low N ₂ measured upon completion of initial Perfect Purge purge cycle	<ol style="list-style-type: none"> 1. Check the N₂ level % at the INS-PV (or INS-RA). 2. If the N₂ level % is below 82%: <ul style="list-style-type: none"> • Check to ensure that ball valve is open to INS-PV unit. If ball valve is closed INS-PV cannot sense the nitrogen in the system. Open ball valve and press Refresh N₂ on the INS-PV. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater. 3. If the N₂ level % is above 90%: <ul style="list-style-type: none"> • Check the DIP switch configuration for the sprinkler system. Ensure the correct size sprinkler system setting was selected for unit. See Programming Guide for configuration. The purge process may need to be repeated. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.
08	Low N ₂ measured after initial Perfect Purge purge cycle completed	<p>The INS-PV measured nitrogen level below 98%.</p> <ul style="list-style-type: none"> • Check to ensure that ball valve between INS-PV and sprinkler system is open. • Ensure the Nitrogen Generator is in Nitrogen Generating Mode. This can be checked by using a portable nitrogen analyzer. The N₂ level % leaving the membrane should be 98% or greater. Note the nitrogen generator needs to be running for accurate nitrogen reading. Call technical support if nitrogen leaving membrane is not 98% or greater.
09	Low N ₂ measured before a purge cycle has been started	<ol style="list-style-type: none"> 1. This error indicates the unit has measured a nitrogen level below 98% while not being in or having completed a successful purge cycle, and the fire sprinkler system is not at 98% Nitrogen. 2. Start a purge process by pressing the “Start Purge” switch on the INS-PV or by using the INS-RA.
10	Device Fault	Check for short circuits on wires connected to connectors E2 and E3 on the Printed Circuit Board.
11	Communication Error	<p>The INS-PV Master is not communicating to one or more of it's slave devices:</p> <ul style="list-style-type: none"> • View "System Status", look for missing INS-PV devices. • Once identified, verify that device has power and the communication lines are connected appropriately.
12	Sensor Ambient Check	Indicates that the INS-PV is in a sensor check mode. This mode is entered by depressing the Manual Purge button for 15 seconds. This mode will display the ambient room N ₂ level % on the display. (Please note that this measurement is not accurate until the sensor has been powered up for at least 5 minutes. Users may need to wait additional time for the N ₂ gas to disperse from the sensor plumbing).

11. INS-PV Technical Specifications and Drawings

INS-PV Specifications	
Power Requirements	24 Volt AC/DC, 1.5 A
Operating Temperature Range	-4°F-122°F (-20°C-50°C) 10%-93% @ 86°F (30°C) non-condensing humidity
Operating Pressure	Maximum air pressure entering INS-PV must not exceed 100 PSI
Maximum INS-PVs (Networked)	26
Maximum Wire Length (Network)	4000 ft. when using unshielded 24 AWG stranded CAT5 equivalent or higher rated network cable. Contact Technical Support if longer wire length is required.
Size (WxHxD)	7.3" x 6.8" x 7.9"
Power and BMS Wire Size	14 AWG - 22 AWG
Compliance	CE MARKED

Figure 25: INS-PV Dimensions



13. Purge Modes, Functions, and Definitions

Purge Modes

IntelliDry – IntelliDry is a selectable Purge Mode for the INS-PV. This mode is used for applications where freezing or ice plugs are a concern. It allows the user to select a level of dryness for the sprinkler system: Low, Medium or High. In this mode, the INS-PV will initially operate in the same manner as the Perfect Purge mode. When the INS-PV has obtained consecutive 98% N₂ level readings for a period of time, the unit will then enter a cyclic purge process to further remove trapped moisture in the fire protection system. In the cyclic purge process, the INS-PV will periodically purge by opening the valve for a set number of days. This set ON time will be displayed on the Purge Time display. When the ON time has expired to 0 days remaining, the INS-PV will close. A new timer will start and be displayed on the Purge Time display, blinking a "D" and then the number of days OFF. When the number of OFF days expires to zero, the INS-PV unit will begin purging again. This continues indefinitely. Note: the yellow Purge LED indicator will blink continuously in this purge mode.

Perfect Purge – Perfect Purge is a selectable Purge Mode for the INS-PV. In this mode, the INS-PV will continuously purge oxygenated air out of the fire sprinkler system until the nitrogen sensor reads 98% N₂, and holds this purity for a defined period. This mode is set by selecting the size of the largest sprinkler system (in gallons) the nitrogen generator is protecting. It is important to note that the unit does not stop purging after the first successful 98% N₂ level reading. The INS-PV must read multiple readings before establishing a successful purge. When the unit has established a successful purge, the yellow Purge LED indicator will stop blinking and remain solid. During the Perfect Purge mode, a preset amount of days will display on the Purge Time display, this is the Fault Timer for the Perfect Purge process. If the unit takes longer than the preset maximum allowable days, the unit will indicate Er 07 error.

Single Shot – Single Shot is a selectable Purge Mode for the INS-PV. In this mode, the INS-PV will continuously purge the oxygenated air out of the fire sprinkler system for a defined number of days. The defined number of days will be displayed on the Purge Time display. When the Purge Time expires to 0, the INS-PV will close and take a N₂ level reading. If the nitrogen sensor reads 98% or greater, the unit will indicate a successful purge, and the yellow Purge LED will remain solid. If the nitrogen sensor reads below 98%, the INS-PV will indicate a trouble condition and the red Trouble LED indicator will go solid. This indicates the fire sprinkler system did not reach 98% in the allotted amount of time.

Functions

Cancel Purge – When the INS-PV is in a purge process, the Cancel Purge switch will cancel the command and close the INS-PV purge valve. The yellow Purge LED indicator will turn off. When the INS-PV unit is networked to a generator, the local Cancel Purge switch will be disabled. In order to cancel the purge process, the Cancel Purge must be selected at the generator.

Learn Network – The Learn Network function is used to detect new INS-PV units connected to the network as well as INS-PV units removed from the network. On initial set up of a network it is necessary to Learn Network to detect INS-PV units added.

Manual Purge – This switch allows the user to manually open the solenoid valves in the INS-PV for a duration of 2 minutes. Once two minutes has expired, the INS-PV unit closes the solenoid valves. This is mainly used for troubleshooting the unit, or getting a secondary reading using a portable nitrogen analyzer. Depressing this button for 15 seconds will place the INS-PV into Sensor Ambient Check.

Purge Scheduling- Purge scheduling is a purge option that allows the user to define how many INS-PV units are allowed to purge (be open) at one time. By using the nitrogen generator the user can select the number of INS-PVs in the network that can be in a purge process. Once the initial INS-PV units have cycled through the purge process, the next maximum allowable INS-PV units remaining begin to operate. This continues until all INS-PV units have completed the purge process. Using this feature it is possible to purge many INS-PV units without overstressing the compressor. It is important to note that the INS-PV units keep their defined purge mode: IntelliDry, Perfect Purge or Single Shot.

Refresh N₂ Level – This switch allows the user to manually take a nitrogen reading of the fire sprinkler system. The N₂ Level Display will start blinking. After 5 minutes, the current N₂ level % will be displayed on the INS-PV unit. If the INS-PV unit is connected to a nitrogen generator, this can also be selected under the Settings Menu – Refresh N₂. The INS-PV gives the user the ability to refresh all INS-PV units or individual INS-PV units.

Start Purge – The Start Purge switch starts the purge process for the INS-PV. The yellow Purge LED indicator on the INS-PV will begin blinking, indicating the purge process has started. It is important to note that when the Start Purge switch is toggled, the INS-PV unit will begin purging based on the selected DIP switch configuration. If the INS-PV is networked to a nitrogen generator, the local Start Purge switch will be disabled. In order to begin the purge process, Start Purge must be activated at the nitrogen generator.

View History – The View History function on the nitrogen generator allows the user to scroll through a list of events for the INS-PV units that are networked together. Such events include, troubles, nitrogen % level readings, purge process starts and cancels as well as other events.

Set Date & Time – The Set Date and Time function should be set up when putting the nitrogen generator into operation. This allows the events seen in View History to have a date stamp available for the user.

Definitions

Error Code – The Error code is the number used to identify the trouble indication. On the INS-PV this will be displayed on the Purge Time display. It will first blink an Er and then display the number. For Error Code number identification see Page 26. If an IntelliGen™ Nitrogen Generator is connected, the Error code will have an identification description as well.

Local Device - A local device is an INS-PV that has an address of 0 and is a stand alone, non-networked device.

Master - The master INS-PV in the IntelliGen™ Nitrogen Generator.

Networked Device - A networked device is any master or slave INS-PV. Addresses 2-27 can be networked devices.

N₂ Level (%) Display – The N₂ Level display indicates the current nitrogen purity in the fire sprinkler system. Every 24 hours, the INS-PV unit takes a nitrogen sample from the fire sprinkler system. When the INS-PV unit takes a sample, the N₂ Level Display will blink indicating the nitrogen sensor is taking a reading. The reading takes 5 minutes. As the system purges, the N₂ level should rise. The target N₂ Level for fire sprinkler systems is 98% or greater.

Power LED – The Power LED indicator is a green LED that indicates if the INS-PV has power. If the green LED indicator is solid green, the unit is powered on. If the LED indicator is off, the unit is not powered.

Purge Exhaust Port – The port at which the supervisory gas in the sprinkler system escapes. This is also the port where a portable nitrogen analyzer can take a reading of the gas leaving the sprinkler system.

Purge LED – The Purge LED indicator displays if the INS-PV unit is not purging, in a purge process, or has successfully completed a purge process. If the LED indicator is not on, the INS-PV unit is not in a purge process. If the LED indicator is blinking, the INS-PV unit is in a purge process. When the LED indicator is solid, the INS-PV unit has successfully completed a purge process.

Purge Mode – The Purge Mode is defined as the way in which the INS-PV operates the purge cycle. There are three defined Purge Modes for the INS-PV: Perfect Purge, IntelliDry and Single Shot.

Purge Process – The active state of the INS-PV unit removing the oxygenated air in the fire sprinkler system and replacing it with high purity nitrogen from the nitrogen generator.

Purge Time (Days Remaining) Display – The Purge Time display indicates the number of days left in the particular purge process of the INS-PV. The Purge Time display counts down, indicating the days left until an action is taken. Based on the different Purge Modes, the Purge Time display can indicate different actions. The Purge Time display also indicates the Error Code, if the trouble LED indicator is blinking. The Purge Time display will blink Er, then the Error Code number. For Error Code number identification, see page 26.

Sensor Status – The Sensor Status is used to indicate the status of the N₂ sensor in the INS-PV.

Slave INS-PV - Slave INS-PVs are Addresses 2-27 and receive commands from the master.

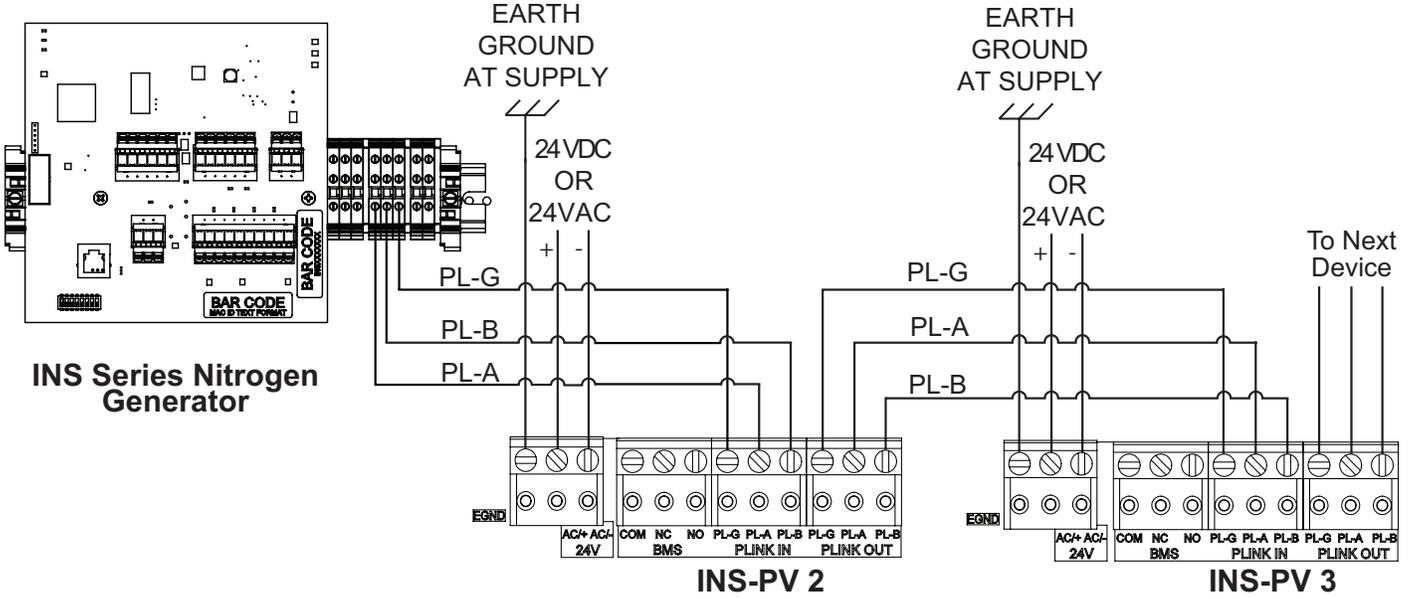
S1 Toggle Switch - The S1 Toggle is located on the front of the INS-PV unit. It allows the users to select Start Purge or “Cancel Purge”.

S2 Toggle Switch - The S2 Toggle is located on the front of the INS-PV unit. It allows the users to select Refresh N₂ Level or Manual Purge.

Trouble LED – The Trouble LED indicator displays if the INS-PV is in a trouble condition. When the trouble LED indicator is not on, the unit is not in a trouble condition. When the red LED indicator is blinking, the INS-PV is in a trouble condition. When the unit is in a trouble condition, the error code will be displayed on the Purge Time Display blinking between Er, and the number indicating the error code. For a list of error codes see Page 26.

Trouble Status – The Trouble Status indicates the trouble code of the INS-PV unit.

14. Wiring Diagram



15. Warranty

GENERAL PROVISIONS & LIMITATIONS

Potter Electric Signal Company, LLC (the "Company") warrants to each original purchaser ("Purchaser") of its new products from the Company or its Authorized Distributor that such products are, at the time of delivery to the Purchaser, made with good materials and workmanship. No warranty is made with respect to:

1. Any product, which has been repaired or altered in such a way, in the Companies judgment, as to affect the product adversely.
2. Any product, which has, in the Companies judgment been subjected to negligence, accident, improper storage, improper installation or application.
3. Any product, which has not been operated or maintained in accordance with the recommendations of the Company.
4. Components or accessories manufactured, warranted and serviced by others.
5. Any reconditioned or prior owned product.

Claims for items described in 4 above should be submitted directly to the manufacturer.

WARRANTY PERIOD

The Company's obligation under this Warranty is limited to repair or, at its option, replacing during normal business hours at the designated facility of the Company, any part that in its judgment proved not to be as warranted within the applicable Warranty Period as follows.

COMPONENTS

All non-consumable components are warranted for 12 months from the date of purchase. Consumable are not covered under warranty. The unit must have been installed by either a factory authorized distributor or agent in accordance with the factory recommendations taking into account all other local site conditions not originally noted to the factory. The unit must be operated and maintained in accordance with the Factory recommendations and original design conditions. Failure to provide such proof of the above may void warranty.

LABOR TRANSPORTATION & INSPECTION

The Company will repair or replace any product or part thereof which in the Companies judgment is proved to be not as warranted. Labor costs are not covered under warranty.

All costs of transportation of product, labor or parts claimed not to be as warranted and, of repaired or replaced parts to or from factory shall be borne by purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by the Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components.

DISCLAIMER

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO THE PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative or employee of the Company which is not contained in this Warranty will be binding upon the company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

PROMPT DISPOSITION

The Company will make a good faith effort for prompt correction or other adjustment with respect to any product, which proves to be defective within the warranty period. Before returning any product, write or call the distributor, agent or authorized company from which the product was purchased, describing defect and giving date and number of original invoice, as well as proof of Factory supplied consumable and proof of scheduled maintenance. Title and risk of loss pass to buyer upon delivery to the common carrier.

PRODUCT SUITABILITY

Many States, Localities and Countries have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Potter attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.