TRUE ADVANCED PURGE

UNITED FIRE SYSTEMS

Multi–TAP™ with ADC™

DESIGN, INSTALLATION, COMMISSIONING, OPERATION, AND MAINTENANCE MANUAL

Serial Number _____

Date of Installation _____**Date of Commissioning** _____

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INDEX

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

The following is an explanation of abbreviations used in this manual.

MEASUREMENT UNITS		
ABBREVIATION	**UNIT**	**PARAMETER BEING MEASURED**
A	Amperes	Electric current
°C	Degrees Celsius	Temperature
°F	Degrees Fahrenheit	Temperature
Hz	Hertz	Frequency (cycles per second)
kg	Kilograms	Weight
lbs.	Pounds	Weight
PSIG	Pounds per Square Inch, Gauge	Pressure (referenced to normal atmospheric pressure)
UTC	Hours, Minutes, Seconds	Coordinated Universal Time
VAC	Volts, Alternating Current	Electrical voltage (electromotive force)
VDC	Volts, Direct Current	Electrical voltage (electromotive force)

OTHER MEASUREMENT TERMS	
ABBREVIATION	**MEANING**
H	Height
L	Length
W	Width

NITROGEN-PAC™ EQUIPMENT	
ABBREVIATION	**MEANING**
AMD	Air Maintenance Device
M	“Modular” (refers to modular **NITROGEN-PAC™** M Series systems)
PVA	Purge Vent Assembly
SC	“Self-Contained” (refers to self-contained **NITROGEN-PAC™** SC Series assemblies)

MISCELLANEOUS TERMS	
ABBREVIATION	**MEANING**
ADC™	**ACTIVE DRIFT CONTROL™** – refer to **5.4.9**
ID	Inside Diameter
MIC	Microbiologically Influenced Corrosion – refer to **1.1.3**
NC	Normally Closed – refer to **3.4.4**
NO	Normally Open – refer to **3.4.4**
NFPA	National Fire Protection Association
N_2	Nitrogen (2 represents two atoms of nitrogen in a naturally-occurring diatomic molecule)
OD	Outside Diameter
O_2	Oxygen (2 represents two atoms of oxygen in a naturally-occurring diatomic molecule)
PLC	Programmable Logic Controller
UL	Underwriters Laboratories
v/v	Volume / Volume (refers to volumetric concentration ratio)

SAFETY INFORMATION

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 **UNITED Fire Systems TRUE ADVANCED PURGE™ Multi-TAP™** device**.** Carefully read, understand, and follow instructions identified by these symbols.

DANGER

The use of the word “DANGER” identifies an immediate hazard with a likelihood of death or serious personal injury if instructions, including recommended precautions, are not followed.

WARNING

The use of the word “WARNING” identifies the presence of hazards or unsafe practices that could result in death, personal injury, or serious property damage if instructions, including recommended precautions, are not followed.

CAUTION

The use of the word “CAUTION” identifies possible hazards or unsafe practices that could result in personal injury or property damage if instructions, including recommended precautions, are not followed.

IMPORTANT

The use of the word “IMPORTANT” identifies special instructions, not related to hazards, that should be followed.

IMPORTANT NOTICES TO INSTALLERS AND USERS

This manual is written for those who are responsible for the installation, commissioning, and maintenance of the **UNITED Fire Systems TRUE ADVANCED PURGE™ Multi-TAP™** device. This manual must be read thoroughly and completely understood before installation and operation of the **Multi-TAP™** device.

WARNING

Do not operate unit if damage occurred during shipping, handling, or use. Contact **UNITED Fire Systems** immediately. Failure to do so could result in death, personal injury, or serious property damage.

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 operation of the **Multi-TAP™** device. Only competent personnel, who have been trained, qualified, and approved by **UNITED Fire Systems** 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.

Nitrogen is not a poisonous gas. However, in a concentrated form, there is a risk of asphyxiation. The exhaust from the **Multi-TAP™** device contains nitrogen which quickly disperses in the atmosphere. **DO NOT** directly inhale the output gas from the exhaust mufflers.

The **Multi-TAP™** device is classified as non-hazardous for transportation purposes and as non-flammable for fire regulations. This equipment is for indoor use only. Do not operate outdoors.

Specific procedures must be followed for maintenance of the **Multi-TAP™** device and the equipment to which the unit is connected. Appropriate labels must be continuously displayed in all areas where personnel might be exposed to a nitrogen atmosphere.

FOREWORD

This manual contains design, installation, commissioning, and maintenance information for **UNITED Fire Systems TRUE ADVANCED PURGE™ Multi-TAP™** device.

IMPORTANT

UNITED Fire Systems assumes no responsibility for the installation, operation, or maintenance of any equipment other than that addressed in this manual. The data contained in this manual is for information purposes only. **UNITED Fire Systems** believes this data to be accurate at the time of publication, but the data is published and presented without any guarantee or warranty whatsoever. **UNITED Fire Systems** disclaims any liability for any use that may be made of the data and information contained in this manual by any and all parties.

IMPORTANT

The **UNITED Fire Systems TRUE ADVANCED PURGE™ Multi-TAP™** device is meant for use with **UNITED Fire Systems NITROGEN-PAC™** sprinkler corrosion inhibiting systems. As such, the device is a vital part of the fire protection of any facility where the unit is installed. Life safety and property protection depends on continuing proper operation of this unit. The owner of the **NITROGEN-PAC™** system equipment is responsible for its condition and continued proper operation. **UNITED Fire Systems** strongly recommends that all owners of **Multi-TAP™** devices and **NITROGEN-PAC™** systems engage the services of qualified, trained fire protection professionals to design, install, commission, and maintain the equipment.

UNITED Fire Systems NITROGEN-PAC™ sprinkler corrosion inhibiting systems are to be installed and maintained by qualified, trained personnel in accordance with:

- This Design, Installation, Commissioning, Operation, and Maintenance Manual P/N 33-MTAPG1-000.
- National Fire Protection Association No. 13, “Standard for the Installation of Sprinkler Systems.”
- National Fire Protection Association No. 25, “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.”
- National Fire Protection Association No. 70, “National Electrical Code®”.

Any questions on the information in this manual should be addressed to:

UNITED Fire Systems
Division of United Fire Protection Corporation
1 Mark Road
Kenilworth, NJ USA 07033
908-688-0300
www.unitedfiresystems.com

LIMITED WARRANTY
TRUE ADVANCED PURGE™

What Does This Warranty Cover?
This Limited Warranty covers all manufacturing defects in material and workmanship by **UNITED Fire Systems** new **TRUE ADVANCED PURGE™** equipment.

How Long Does The Coverage Last?
This Limited Warranty lasts for eighteen (18) calendar months from the date of shipment to the original purchaser.

What Will UNITED Fire Systems Do?
UNITED Fire Systems will repair, replace, or refund the purchase price of, at its option, any defective **TRUE ADVANCED PURGE™** equipment at no charge.

What Does This Warranty Not Cover?
- Equipment that is not supplied by **UNITED Fire Systems** is not covered.
- Equipment that has not been installed, commissioned, operated, and maintained per the instructions in the applicable **UNITED Fire Systems** instruction manual is not covered.
- Equipment that has been repaired, modified, or otherwise tampered with not in accordance with the applicable **UNITED Fire Systems** instruction manual is not covered.
- Any problem that is caused by abuse, misuse, or an act of God (such as a flood) is not covered.
- Transportation and shipping charges to return equipment to **UNITED Fire Systems** or for **UNITED Fire Systems** to return repaired or replacement equipment are not covered.
- Consequential and incidental damages are not covered. Some states do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion may not apply.

What Are The Customer's Responsibilities?
- Ensuring that the **UNITED Fire Systems** equipment is installed, commissioned, operated, and maintained per the instructions in the applicable **UNITED Fire Systems** instruction manual.
- Where applicable, ensuring that checklists supplied by **UNITED Fire Systems** are properly used and completed at the time of installation, commissioning, operation, and maintenance, and such checklists are retained as records of proper completion.
- Noting and recording the serial number(s) of **UNITED Fire Systems** equipment.
- Notifying **UNITED Fire Systems** or a trained distributor of the need for service under this Limited Warranty.

How Is Warranty Service Obtained?
If anything goes wrong with **UNITED Fire Systems** equipment, contact:

UNITED Fire Systems
Division of UNITED Fire Protection Corporation
1 Mark Road
Kenilworth, NJ USA 07033
908-688-0300
www.unitedfiresystems.com

= OR =

Your
Trained
Distributor

Be prepared to supply the serial number(s) of the equipment requiring service, and copies of the installation, commissioning, and maintenance checklists, as applicable.

Is This Limited Warranty Transferable?
If the **TRUE ADVANCED PURGE™** equipment is moved from one to another installation during the time period of Limited Warranty coverage, the **TRUE ADVANCED PURGE™** equipment must be re-commissioned by **UNITED Fire Systems** or a trained distributor to be eligible for continuing coverage. There will be a quoted charge for this re-commissioning.

Is This The Entire Warranty?
This Limited Warranty is the entire warranty given by **UNITED Fire Systems** to the purchaser of new **TRUE ADVANCED PURGE™** equipment. Component warranties supplied by component manufacturers to **UNITED Fire Systems** that are valid for a longer period of time than the **UNITED Fire Systems** Limited Warranty may apply. Contact **UNITED Fire Systems** for more information. There are no other warranties expressed or implied, beyond those required by law.

How Do State and Federal Laws Apply?
This Limited Warranty grants specific legal rights per Federal law. There may also be other rights which vary from state to state.

1. GENERAL INFORMATION

1.1. GLOSSARY. All glossary terms are defined in reference to their use in this manual. Refer to this glossary for definitions of unfamiliar terms encountered when reading and using this manual.

1.1.1. Air. Air is the naturally occurring gas making up Earth's atmosphere. Air consists of a mixture of gases, of which two predominate (refer to the glossary terms Nitrogen and Oxygen).

1.1.2. Dried Compressed Air. Dried compressed air refers to the output of the **NITROGEN-PAC™** refrigerated dryer. This compressed air has been conditioned for entry into the nitrogen generator cabinet.

1.1.3. Microbiologically Influenced Corrosion (MIC). Microbiologically influenced corrosion (also known as MIC) occurs inside steel dry and preaction sprinkler pipes in the presence of certain microbes. This form of corrosion causes thinning of pipe walls, possibly leading to failure under water pressure. Pinhole leaks can occur, leading to water damage. Roughening of the internal pipe surface leads to unpredictable hydraulics, impairing the effectiveness of the sprinkler system. The tubercles formed by the microbes can loosen, clogging sprinkler heads and impairing or preventing the discharge of water onto a fire. MIC microbes can be aerobic, growing in the presence of oxygen, or anaerobic, not needing oxygen but growing in the presence of water. Prevention of MIC results in longer life and better functionality of the sprinkler system. MIC can be inhibited by using nitrogen to displace oxygen and dry out the inside of the pipe.

1.1.4. Nitrogen (N_2). Nitrogen is a naturally occurring diatomic gas present in Earth's atmosphere at a concentration of approximately 78% (v/v). All references to "nitrogen" in this manual are the output from the nitrogen outlet of the Nitrogen-Pac assembly. This outlet delivers gas that is at least 98 % (v/v) nitrogen, at a pressure dew point of approximately -40°F. The pressure dew point of nitrogen is much lower than of compressed air, making nitrogen much more effective at drying out the inside of a sprinkler pipe.

1.1.5. Oxidation Corrosion. Oxidation corrosion (also known as rust) occurs inside steel dry and preaction sprinkler pipes in the presence of oxygen and water. This form of corrosion causes thinning of pipe walls, possibly leading to failure under water pressure. Pinhole leaks can occur, leading to water damage. Roughening of the internal pipe surface leads to unpredictable hydraulics, impairing the effectiveness of the sprinkler system. Loose rust particles can clog sprinkler heads, impairing or preventing the discharge of water onto a fire. Prevention of oxidation corrosion results in longer life and better functionality of the sprinkler system. Oxidation corrosion can be inhibited by using nitrogen to displace oxygen and dry out the inside of the pipe.

1.1.6. Oxygen (O_2). Oxygen is a naturally occurring diatomic gas present in Earth's atmosphere at a concentration of approximately 21% (v/v). Oxygen is discharged from the nitrogen generator cabinet after being separated from dried compressed air by the separator membrane.

1.1.7. Purging. NFPA 13-2022 section 8.2.6.3.2 requires that air pressure be restored in no more than 30 minutes. **NITROGEN-PAC™** systems accomplish this with compressed air, bypassing the nitrogen generation means. After this initial fill, the air must be purged and replaced with 98% nitrogen.

1.2. DEVICE PURPOSE. The **UNITED Fire Systems TRUE ADVANCED PURGE™ Multi-TAP™** device is designed to automatically purge air from within the piping of multiple dry-pipe or preaction fire sprinkler systems, replacing the air with 98% nitrogen from a **NITROGEN-PAC™** sprinkler corrosion inhibiting system. The device also automatically samples, analyzes, and displays the percentage of nitrogen in each zone.

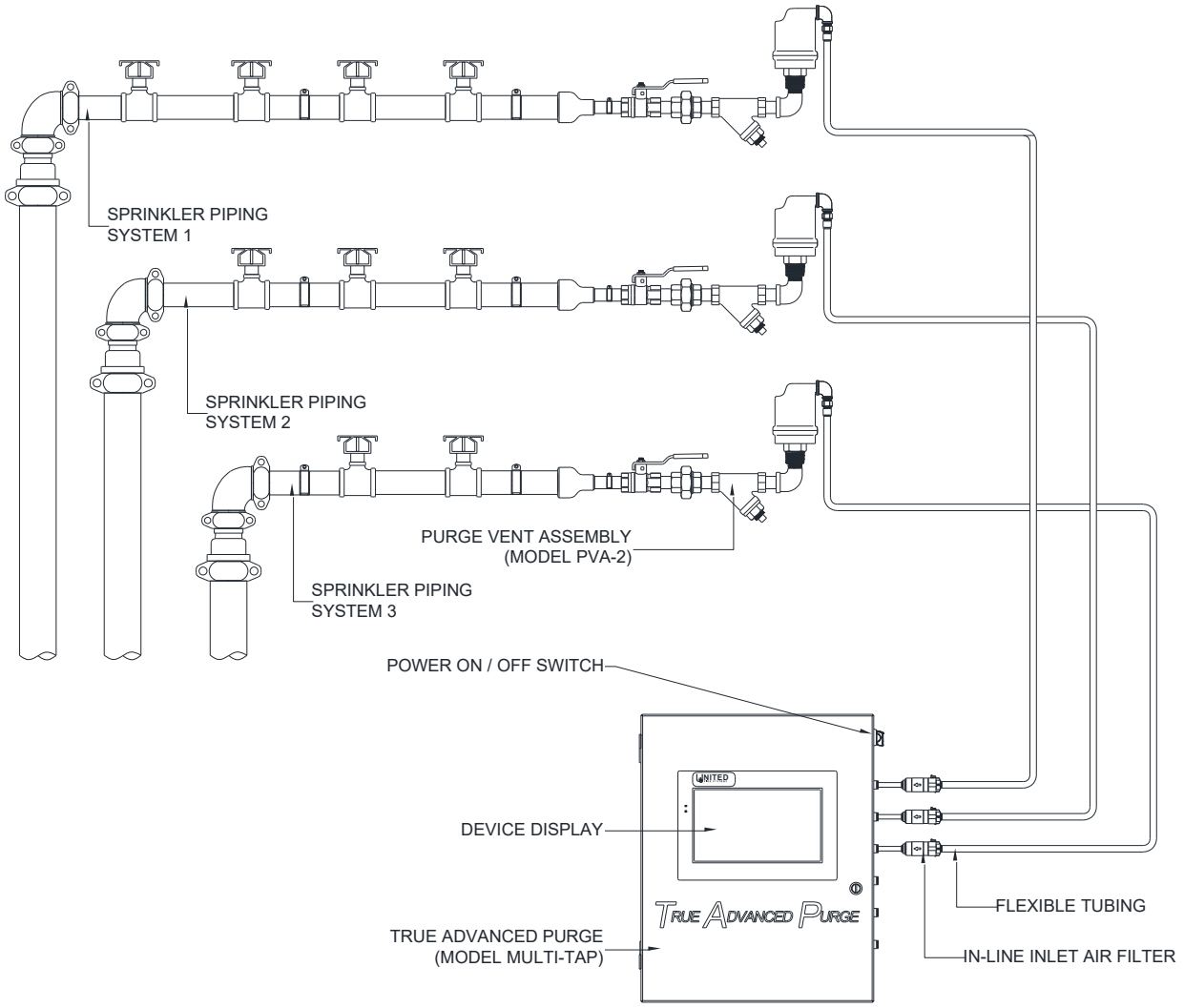
1.2.1. Advanced Sensor Technology. The **Multi-TAP™** device uses the most advanced zirconium dioxide technology available today, overcoming many of the limitations of other sensor types. The result is stable nitrogen purity readings and long sensor life, without the need for manual intervention to adjust or calibrate device readings.

1.2.2. ADC™ - ACTIVE DRIFT CONTROL™. The **Multi-TAP™** device features **ACTIVE DRIFT CONTROL™**, an automatic analysis of sensor drift and application of correlation and gain offsets to maintain device accuracy regardless of sensor status. This analysis and drift control is routinely performed by algorithms built-in to the device control system every time the **Multi-TAP™** device automatically measures the nitrogen purity in the piping. No user involvement or special reference gas is required.

1.2.3. Automatic Purging Sequence. The **Multi-TAP™** device provides an automatic purging sequence for all sprinkler zones connected to the device. Purging occurs one zone at a time, so that the **NITROGEN-PAC™** sprinkler corrosion inhibiting system can supply sufficient nitrogen. The sequence proceeds automatically until all zones have reached the proper nitrogen purity.

1.3. FUNCTIONAL DESCRIPTION. See **Figure 1**.

Figure 1
Functional Description and General Arrangement



(1) **Model PVA-2** Purge Vent Assemblies are connected to the preaction or dry-pipe fire sprinkler piping, usually at the end of a branch line near the Inspector's Test valve. A float valve allows air or nitrogen pressure through, but a float will block the outlet when water fills the pipe.

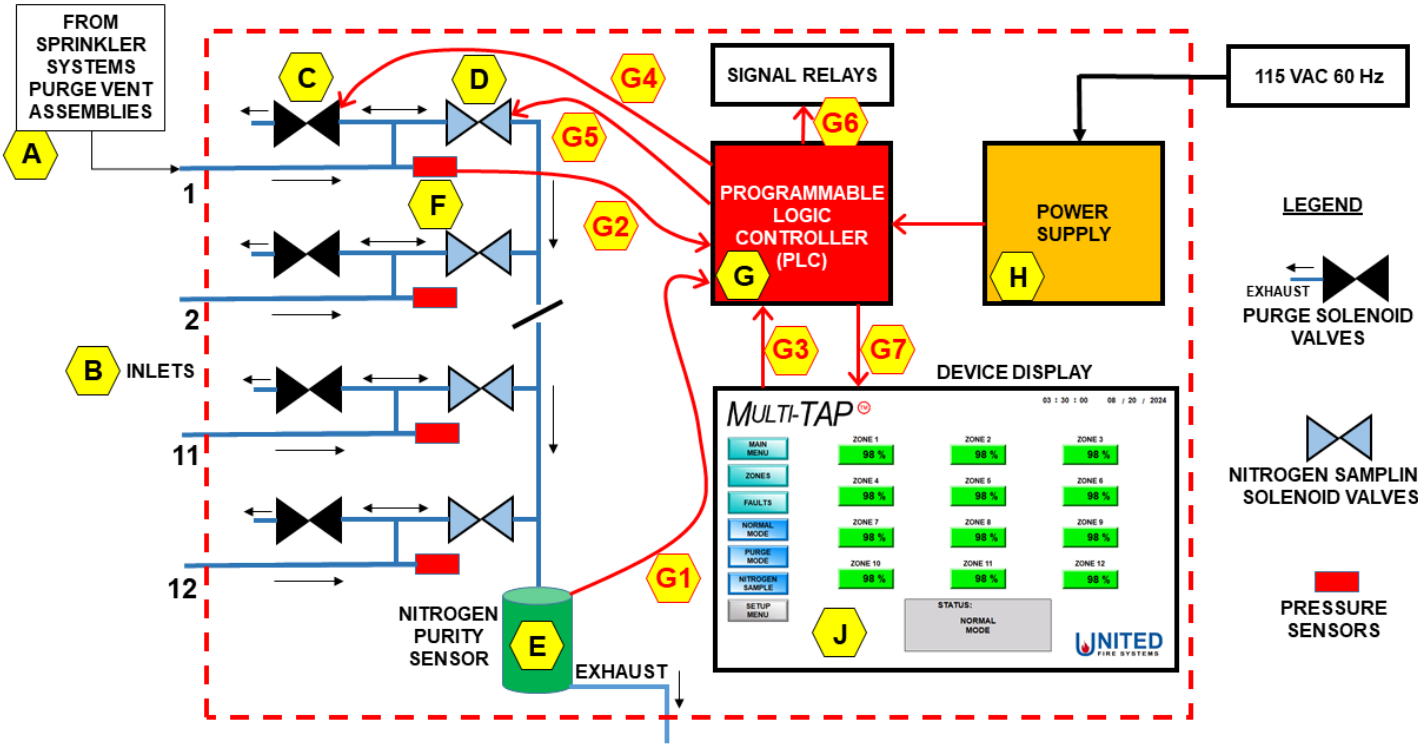
(2) Plenum-rated flexible tubing connects the outlets of the **Model PVA-2** assemblies to the inlets of the **Multi-TAP™** device. The tubing permits mounting of the **Multi-TAP™** device at any convenient location.

(3) The display on the front of the **Multi-TAP™** device allows visual monitoring of the nitrogen concentration in each fire sprinkler pipe, and the device status. The display is a touchscreen for device control.

1.4. COMPONENT DESCRIPTIONS.

1.4.1. Multi-TAP™ Device. See **Figure 2**.

Figure 2
Schematic Diagram – Multi-TAP™ Device



A. Purge Vent Assemblies (**Model PVA-2**) allow gas pressure from the interior of each sprinkler system to travel through flexible tubing to the inlets of the **Multi-TAP™** device.

B. The gas pressure enters the **INLETS** of the **Multi-TAP™** device.

C. Individual **PURGE SOLENOID VALVES** open when the **Multi-TAP™** device is in **PURGE** Mode. Gas is purged from the sprinkler system piping, allowing 98% pure nitrogen from a **NITROGEN-PAC™** system to enter the piping and increase the purity.

D. Individual **NITROGEN SAMPLING SOLENOID VALVES** open when the **Multi-TAP™** device is in **NITROGEN SAMPLE** Mode. This allows a sample of gas from the sprinkler system piping to enter the **NITROGEN PURITY SENSOR** to establish a nitrogen purity reading.

E. The **NITROGEN PURITY SENSOR** analyzes the composition of the gas sample from the sprinkler system, and reports the percentage of nitrogen in the sample.

F. The **PRESSURE SENSORS are** always exposed to the gas pressure from the sprinkler system piping. However, both the **PURGE SOLENOID VALVE** and the **NITROGEN SAMPLING SOLENOID VALVE** must be closed to permit the **PRESSURE SENSOR** to sense a drop in pressure from disconnected or blocked flexible tubing.

G. The **PROGRAMMABLE LOGIC CONTROLLER (PLC)** accepts input data from:

G1. The **NITROGEN PURITY SENSOR**.
G2. The **PRESSURE SENSORS**.
G3. The touchscreen of the **DEVICE DISPLAY**.

The **PROGRAMMABLE LOGIC CONTROLLER (PLC)** provides output to:

G4. The **PURGE SOLENOID VALVES**.
G5. The **NITROGEN SAMPLING SOLENOID VALVES**.
G6. The **SIGNAL RELAYS.**
G7. The display portion of the **DEVICE DISPLAY**, which shows different screens depending upon selections made with the touchscreen.

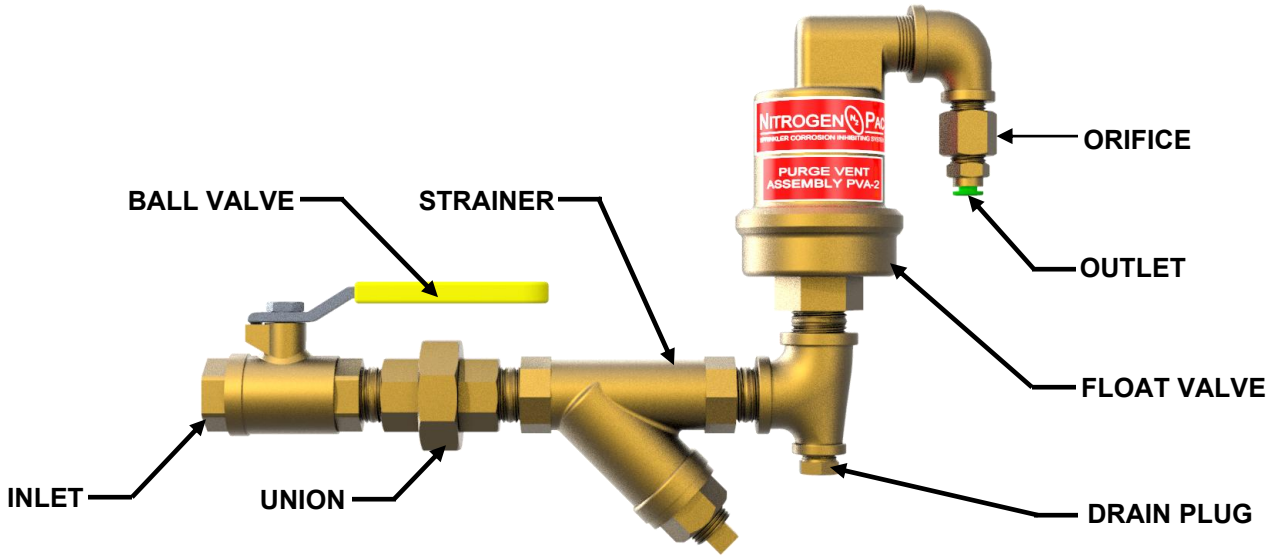
H. The **POWER SUPPLY** accepts 115 VAC 60 Hz input power and converts it into the low voltage required by the device's electrical components.

I. The **DEVICE DISPLAY** has two functions:

- The display shows different screens, depending upon which selection button is used.
- The display is also a touchscreen, allowing selections to be made by touching the applicable button.

1.4.2. Purge Vent Assembly Model PVA-2. See **Figure 3.** This device purges gas from the interior of the sprinkler pipe, allowing the **NITROGEN-PAC™** system to replace air with nitrogen, and also allowing nitrogen to remove liquid water from inside the pipe. This assembly should be connected to the sprinkler piping near the inspector's test connection. A float valve prevents the escape of water when the sprinkler valve opens and the sprinkler piping fills with water. A fixed orifice regulates the amount of gas leaving the pipe. A union facilitates installation and positioning. A strainer helps prevent blockage of the orifice. A drain plug allows occasional removal of accumulated liquid water.

Figure 3
Purge Vent Assembly – Model PVA-2



1.4.3. Sampling Tubing. See **Figure 4.** Sampling tubing for connection of the outlets of the **PVA-2 devices** to the inlets of the **Multi-TAP™** device is plenum-rated flame-retardant polyethylene, 1/4 inch OD, 0.17 inch ID, meeting UL Standard 94V2 for flame retardance and UL Standard 1820 for flame and smoke characteristics as required by NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*. This allows the tubing to be installed above a suspended ceiling in an area being used as an air-handling plenum, with no additional protection required. The tubing is available from **UNITED Fire Systems** per **Table 1.** Each length of tubing is supplied with end caps to prevent debris entry during installation. Remove these caps immediately before connecting tubing.

Table 1 - Sampling Tubing from UNITED Fire Systems		
UFS P/N	**DESCRIPTION**	**NOTES**
33-000003-050	Tubing, 50 foot length	Available From **UNITED Fire Systems** Stock
33-000003-**XXX**	Tubing, custom cut to length (where **-XXX** is any number between **-005** minimum and **-999** maximum)	Verify availability and lead time from **UNITED Fire Systems**

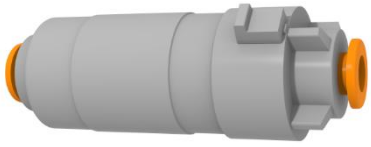
Figure 4
Sampling Tubing

1.4.4. Tubing Connector P/N 33-000006-000. See **Figure 5.** The push-on tubing connector is used to connect the ends of individual tubing lengths together.

Figure 5
Tubing Connector – P/N 33-000006-000

1.4.5. In-Line Inlet Air Filter P/N 30-500002-010. See **Figure 6.** The inlet air filter is used to filter the air from the Purge Vent Assembly at the device inlet using a 10-micron filter.

Figure 6
In-Line Inlet Air Filter – P/N 30-500002-010



2. DESIGN.

2.1. Selection of Multi-TAP™ Device. Refer to **Table 2**.

TABLE 2 – Multi-TAP Devices			
Model No.	**Number of Inlet Ports**	**Intended Minimum Number of Zones**	**Maximum Number of Zones**
TAP-M03	3	2	3
TAP-M06	6	4	6
TAP-M09	9	7	9
TAP-M12	12	10	12

Choose the required model of **Multi-TAP™** device based on the number of individual sprinkler systems (zones) to be protected. If necessary, a **Multi-TAP™** device with more zones than necessary may be chosen if future expansion is planned. In addition, any model of **Multi-TAP™** device may be connected to as few as one (1) zone, allowing future expansion to take place without upgrade or replacement of the device. Refer to **Section 2.5** for examples.

2.2. Selection of Model PVA-2 Purge Vent Assemblies. Choose the quantity of **Model PVA-2** Purge Vent Assemblies equal to the quantity of zones to be connected to the **Multi-TAP™** device.

2.3. Selection of Sampling Tubing and Tubing Connectors. Refer to **Table 3**. Select either 1,000 foot lengths of sampling tubing or custom-cut lengths by **UNITED Fire Systems**. The maximum tubing length between each **Model PVA-2** Purge Vent Assembly and the **Multi-TAP™** device is 1,000 feet. Separate lengths of tubing may be joined together by use of tubing connectors.

TABLE 3 – Sampling Tubing and Tubing Connectors	
UFS P/N	**Description**
33-000003-**XXX**	Sampling Tubing, Factory Custom-Cut Length - **XXX** in P/N refers to custom-cut length in feet. Maximum single length is 999 feet.
33-000006-000	Tubing Connector

2.4. Examples

2.4.1. Example 1.

Zones to be installed NOW:	1
Zones to be installed at future expansion:	2
Model of **Multi-TAP™** Device:	TAP-M03
Number of **Model PVA-2**	1
Maximum quantity of sampling tubing **33-000003-XXX**	1,000 feet
Tubing connectors P/N **33-000006-000**:	As Required
In-Line Inlet Air Filter P/N **30-500002-010**:	1

2.4.2. Example 2.

Zones to be installed NOW:	5
Zones to be installed at future expansion:	Zero
Model of **Multi-TAP™** Device:	TAP-M06
Number of **Model PVA-2**	5
Maximum quantity of sampling tubing **33-000003-XXX**	5,000 feet
Tubing connectors P/N **33-000006-000**:	As Required
In-Line Inlet Air Filter P/N **30-500002-010**:	5

2.4.3. Example 3.

Zones to be installed NOW:	4
Zones to be installed at future expansion:	4
Model of **Multi-TAP™** Device:	TAP-M09
Number of **Model PVA-2**	4
Maximum quantity of sampling tubing **33-000003-XXX**	4,000 feet
Tubing connectors P/N **33-000006-000**:	As Required
In-Line Inlet Air Filter P/N **30-500002-010**:	4

2.4.4. Example 4.

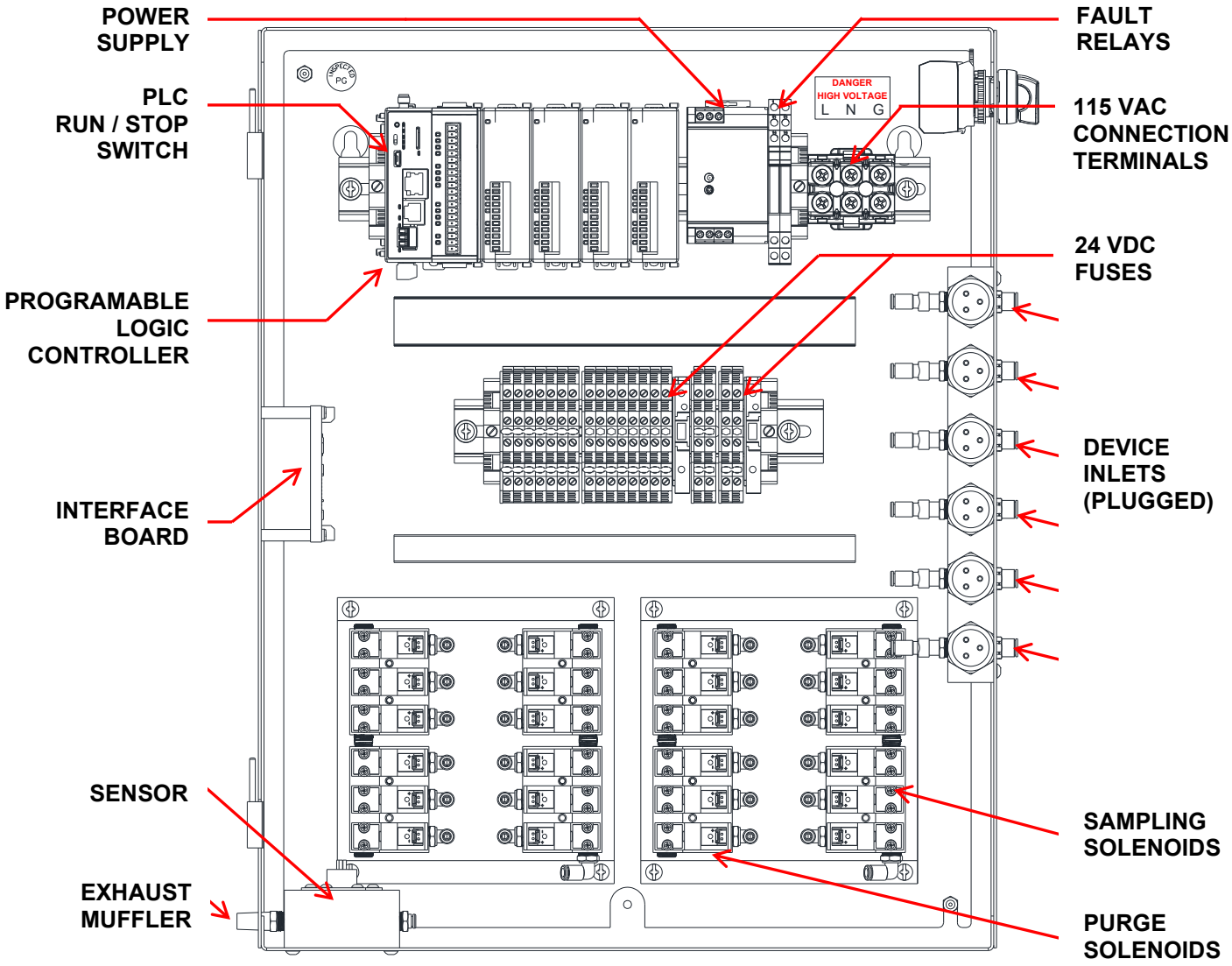
Zones to be installed NOW:	12
Zones to be installed at future expansion:	Zero
Model of **Multi-TAP™** Device:	TAP-M12
Number of **Model PVA-2**	12
Maximum quantity of sampling tubing **33-000003-XXX**	12,000 feet
Tubing connectors P/N **33-000006-000**:	As Required
In-Line Inlet Air Filter P/N **30-500002-010**:	12

3. INSTALLATION

IMPORTANT

The installation of the **TRUE ADVANCED PURGE™ Multi-TAP™** device **MUST** be in accordance with this manual. Read this manual in its entirety **BEFORE** beginning installation of the **Multi-TAP™** device. Understand and follow all instructions provided in this manual.

Figure 7 – Multi-TAP™ Device Interior
General Arrangement



3.1. Unpacking. Check shipment of the **Multi-TAP™** device for damage. If there is any damage or missing parts, the transportation company's agent should make a notation to this effect on the Bill of Lading. Claims should be settled directly with the transportation company. Verify that all components were received as ordered. Contact **UNITED Fire Systems** immediately if there are any missing components or discrepancies.

The following items should be contained in the **Multi-TAP™** device package:

- **Multi-TAP™** device.
- **Multi-TAP™** Design, Installation, Commissioning, Operation, and Maintenance Manual UFS P/N 33-MTAPG1-000.
- **Inlet Filters** for each zone UFS P/N 30-500002-010.

3.2. Multi-TAP™ Device Location. Due consideration must be given to all of the following considerations when locating the **Multi-TAP™** device. Ensure the location is clean, dry, and indoors. The **Multi-TAP™** device is designed for indoor use only.

3.2.1. Temperature. Ensure temperature remains between +32°F (0°C) to +122°F (50°C) at the location of installation.

3.2.2. Engineering Drawings (if available). If a survey was conducted, and engineering drawings prepared, locate all equipment per these drawings.

3.2.3. Proximity. The **Multi-TAP™** device display should be conveniently observed and function switches operated. Typical height from finished floor to the center of the display is 54 to 60 inches (1.3 to 1.5 meters). The length of connection tubing from the sprinkler purge vent assemblies (**Model PVA-2**) to the **Multi-TAP™** device is less than 1000 feet maximum.

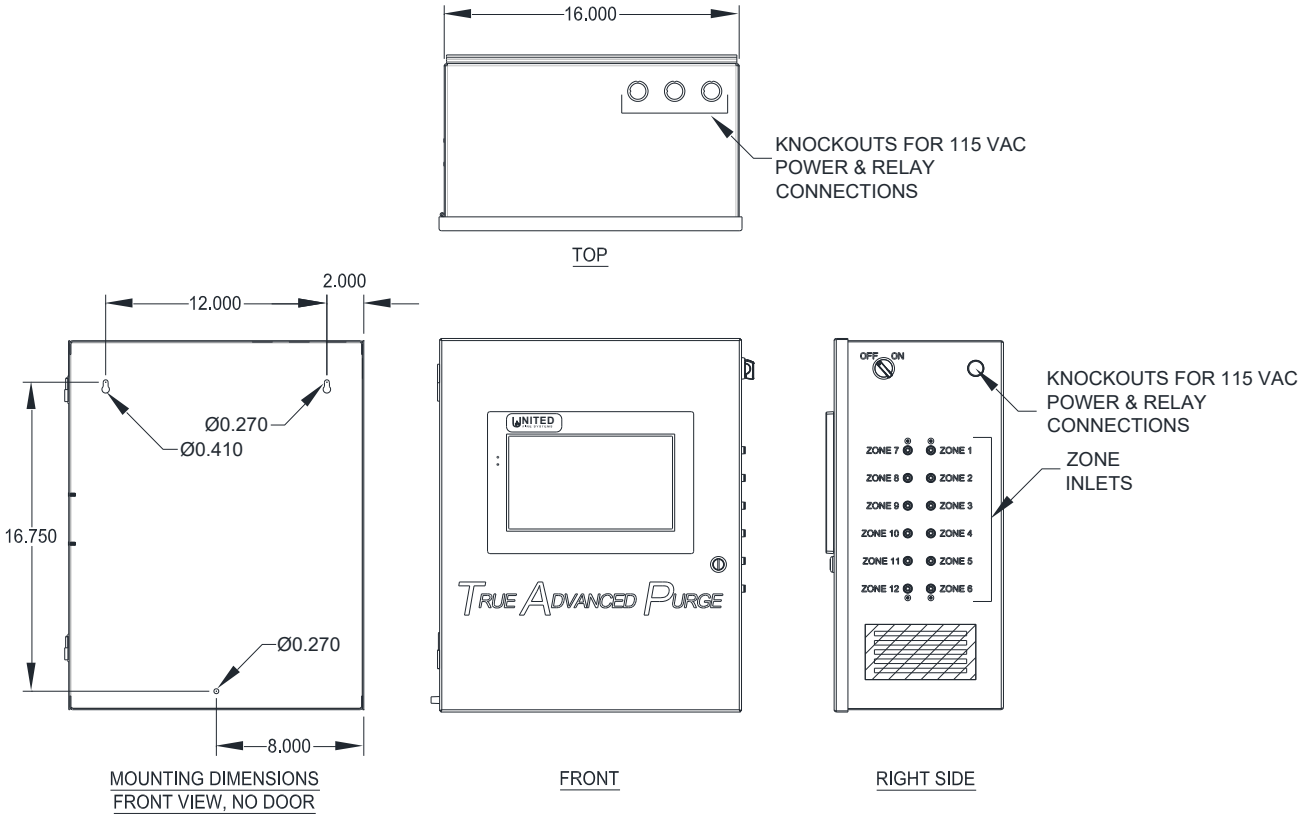
3.2.4. Weight. The **Multi-TAP™** device has a weight of approximately 60 lbs. (27.2 kg). Choose a wall with construction capable of supporting this weight, with a reasonable safety margin. Consult a structural engineer when necessary to verify suitability of location.

3.2.5. Noise. Choose a location where the occasional hissing noise from the exhaust muffler during certain operating modes will not bother operating personnel.

3.2.6. Clearance. A minimum of 3 inches (8 cm) of clearance on all sides of the **Multi-TAP™** device must be maintained. The **Multi-TAP™** device front-hinged door must be able to be fully opened.

3.3. Mechanical Installation. Refer to **Figure 8** for installation dimensions and mounting details.

Figure 8 – Dimensions and Mounting Details
(Dimensions are in inches)



3.3.1. Fasteners. Choose fasteners suitable for wall material at intended mounting location. Indicated hole sizes are intended for use with 1/4 inch hardware.

3.3.2. Mounting Holes. Follow these steps in order:

1. Transfer mounting marks to wall using a punch or other device suitable for wall material.

2. Drill holes in mounting surface at the marked locations with a drill bit appropriate for fastener size and wall material. Drill to depth required by the fastener.

3.3.3. Mounting. Follow these steps in order:

1. Choose connection entry for AC power and remove knockout.

2. Choose knockout for optional relay contact connection entries.

3. Insert fasteners into mounting holes.

4. Attach 1/4 inch hardware into UPPER mounting holes, inserting about half-way.

5. Use keyhole-shaped UPPER holes to hang **Multi-TAP™** device onto upper hardware.

6. Insert lower hardware.

7. Tighten all hardware snug into fasteners.

3.3.4. Tubing Installation.

IMPORTANT

To ensure that tubing connections from the **PVA** valves correspond to proper inlets on the **Multi-TAP™** device, label each tubing run with its corresponding zone.

- Remove end caps from tubing only after completing installation, and just prior to connection.

- The sampling tubing run begins at the purge vent assembly (**Model PVA-2**) installed on the sprinkler piping. Run the tubing from the outlet of the purge vent assembly to the vicinity of the **Multi-TAP™** device. Secure tubing approximately every 3 feet to sprinkler piping or other suitable building structures with cable ties or hangers. Where required, use plenum-rated cable ties to maintain plenum rating. The maximum length of tubing from the purge vent assembly to the **Multi-TAP™** device is 1000 feet (300 meters). In exposed areas, tubing may be run inside raceway or decorative molding if desired.

- Ensure that the tubing ends are cut square, with no burrs.
  - To attach tubing to purge vent assembly outlet, push tubing firmly into the push-in connector until the tubing bottoms. Gently pull on the tubing to ensure the connector has secured the tubing.
  - To attach tubing to splicing connector, push tubing firmly into the push-in connector until the tubing bottoms. Gently pull on the tubing to ensure the connector has secured the tubing.
  - To attach tubing to **Multi-TAP™** device inlets:
    - Remove plugs only from device inlets intended to be used. Remove by holding the green ring on the inlet connector down and pull up on the plug. Discard plug.
    - Install in-line inlet air filters by connecting tubing from purge vent assembly into inlet side of air filter. Push tubing firmly into the push-in connector until the tubing bottoms. Gently pull on the tubing to ensure the connector has secured the tubing.
    - Attach additional tubing approximately 6 inches in length between the air filter outlet and **Multi-TAP™** device inlet as shown in **Figure 1** in **Section 1.3**. Ensure that the tubing corresponds to the appropriate inlet Zone on the **Multi-TAP™** device.

- If necessary to release the tubing from a push-in connector, simultaneously push down on the tubing and the green ring on the connector. While then holding the green ring down, gently pull on the tubing until it is free from the connector.

3.4. Electrical Installation. Refer to **Figure 10** for electrical wiring diagram.

DANGER

RISK OF ELECTROCUTION

Voltages and currents associated with the Multi-TAP™ device are LETHAL. Follow all instructions provided. Work involving electric power MUST be performed ONLY by qualified individuals. All required precautions to prevent contact with live electrical conductors MUST be taken. Failure to comply with these instructions is an immediate hazard with a likelihood of death or serious personal injury!

3.4.1. Codes. All wiring shall be in compliance with the National Electrical Code and all other applicable codes and standards.

3.4.2. Personnel. All wiring shall be performed by a licensed electrician.

3.4.3. Power Supply Wiring. The **Multi-TAP™** device requires 115 VAC 60 Hz single-phase three-wire (HOT, NEUTRAL, GROUND) power. Run these conductors through compliant raceway from the source to the **Multi-TAP™** device. Maximum conductor size for **Multi-TAP™** device power terminals is 12 AWG. The device draws 1.2 A at 115 VAC. Attach power conductors to terminals per **Figure 10**. **DO NOT** apply power to **Multi-TAP™** device until ready for commissioning.

3.4.4. Optional Fault Signaling Relay Connection Wiring. Refer to **Figure 9.** Two (2) interface relays are supplied to permit connecting to a fire detection and / or building management system. Both relays have GREEN LED indicators that illuminate when fault signals are being transmitted.

IMPORTANT

The **Multi-TAP™** device only transmits Relay fault signals while the device is in **NORMAL** Mode. This is to avoid unnecessary fault signals while the device is running Purge or Sample Routines.

(1) Relay 1. The left-hand relay transfers on any of three (3) faults:

- Low system inlet pressure at one or more active zones.
- Failure of communication between the nitrogen purity sensor and the PLC.
- N2 purity below set threshold value after 21 day **PURGE** cycle.

(2) Relay 2. The right-hand relay transfers on one (1) fault:

- N2 purity in any zone falls below the set threshold value.

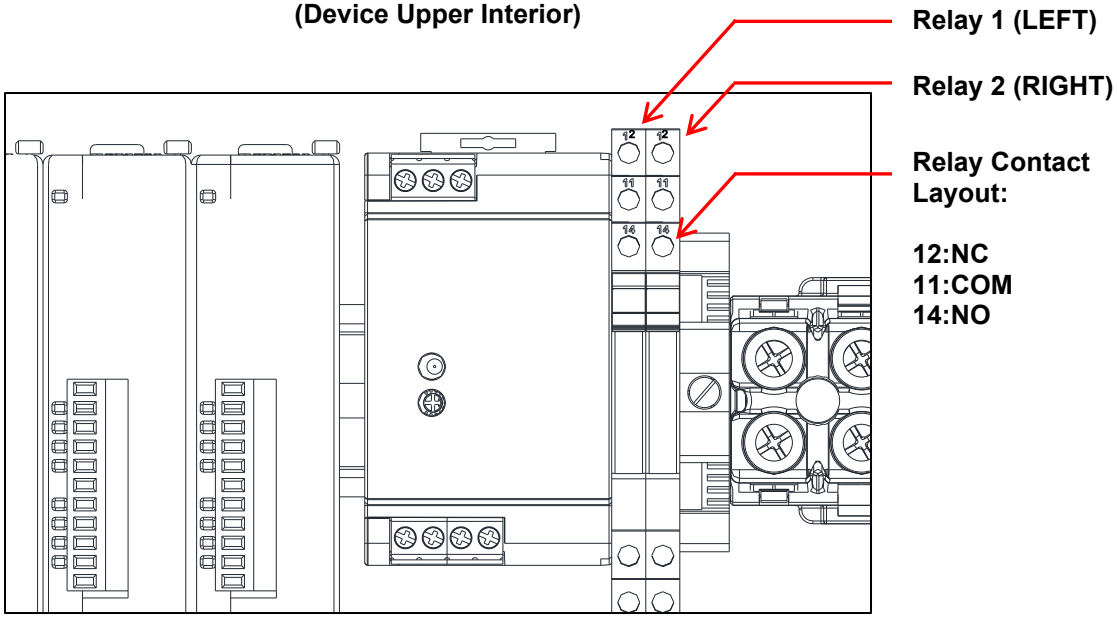
(3) Contact Maximum Ratings

- DC rating: 5A/30VDC, 1500VA
- AC rating: 6A/250VAC, 180W

(4) Contact Wiring Combinations. Relay contacts are **NORMALLY OPEN (NO)** when the device is powered **ON** and in **NORMAL** Mode while no faults are present.

- If one (1) monitoring circuit is to be used:
  - Connect the circuit to contact **Relay 1** to monitor the fault signals described in **3.4.4. (1)**, or;
  - Connect the circuit to contact **Relay 2** to monitor the fault signals described in **3.4.4. (2),** or;
  - Use jumpers to connect the circuit to both **Relay 1** and **Relay 2** to monitor all signals, without differentiation.
- If two (2) monitoring circuits are to be used, connect one (1) circuit to **Relay 1** and one (1) circuit to **Relay 2**. This permits separate monitoring of the **LOW NITROGEN PURITY** Fault signal from the additional fault signals.

Figure 9 – Fault Relays
(Device Upper Interior)



3.4.5. Electrical Installation Steps. Follow these steps in order.

IMPORTANT

DO NOT apply power to the **Multi-TAP™** device until thoroughly reviewing **Section 4 – Commissioning** in this manual.

DANGER

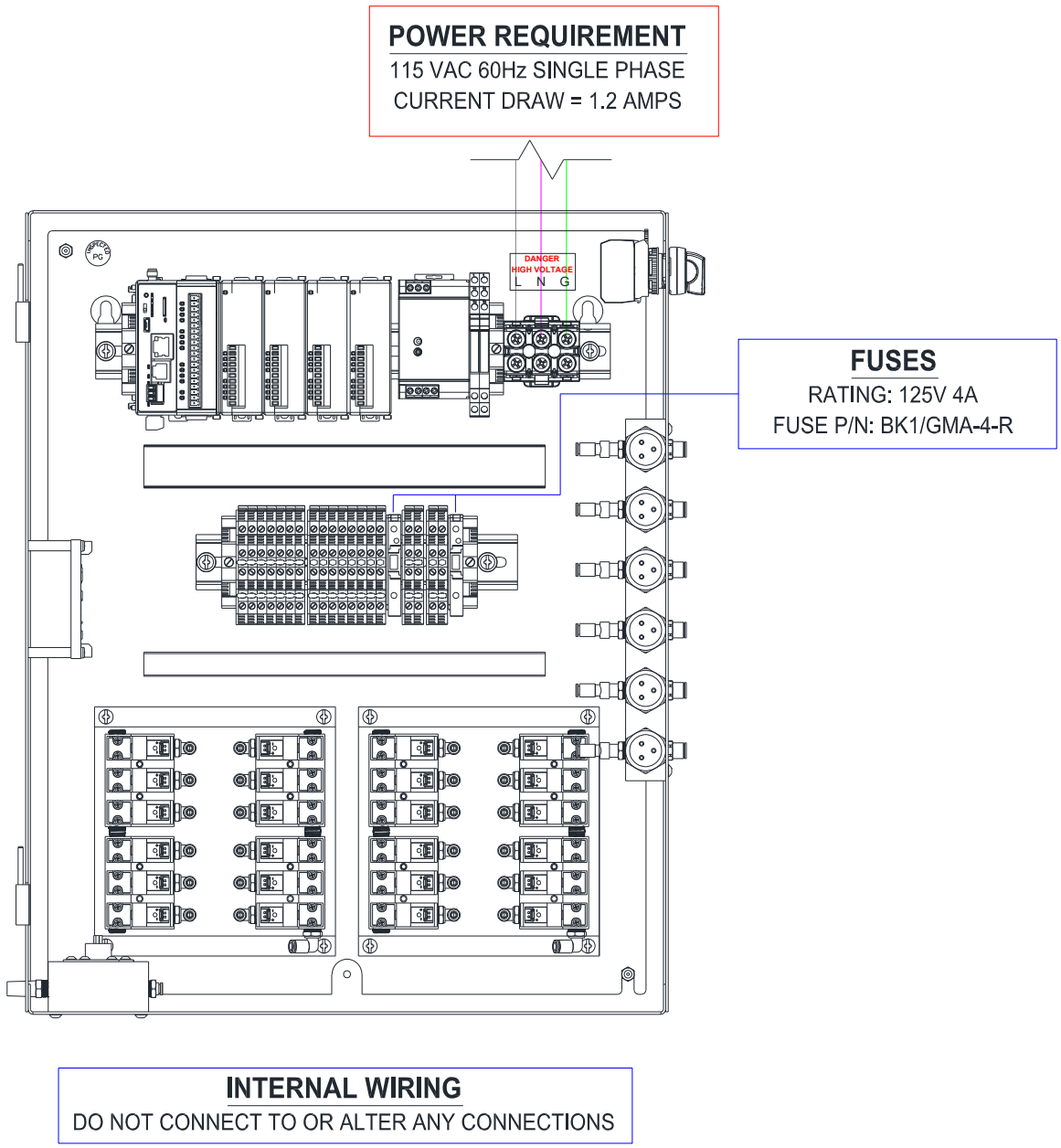
To avoid electric shock, ensure that all electrical conductors are NOT powered before pulling through raceways!

CAUTION

To avoid damage to the PLC and DIN rail assembly inside the **Multi-TAP™** device enclosure, it is recommended that conductors be pulled through raceways BEFORE attaching raceways to **Multi-TAP™** enclosure knockouts.

1. Install raceway for 115 VAC power conductors. Four (4) knockouts are available. Refer to **Figure 8** for information on knockout location. Choose one (1) of the knockouts based on local installation criteria.
2. Pull conductors through 115 VAC power conductor raceway BEFORE attaching raceway to **Multi-TAP™** enclosure.
3. Attach raceway for 115 VAC power conductors to knockout indicated in **Figure 8.**
4. Attach 115 VAC power conductors to power supply as indicated in **Figure 10.**

Figure 10 – General Internal Wiring Diagram



4. COMMISSIONING.

The process of device commissioning is important for achieving satisfactory results. Follow all indicated steps in order.


IMPORTANT

Commissioning of the **TRUE ADVANCED PURGE™ Multi-TAP™** device MUST be in accordance with this manual. Read this manual in its entirety **BEFORE** beginning commissioning of the **Multi-TAP™** device. Understand and follow all instructions provided in this manual.

4.1. Before Starting Commissioning Procedure.

- The technician performing commissioning should be familiar with all of the information in this manual.
- Refer to **Appendix A.** Use a copy of the Commissioning Worksheet / Checklist during the procedure to record all steps followed.


CAUTION

If at any time the screens do not appear as indicated in this procedure, discontinue commissioning and contact **UNITED Fire Systems** for assistance.

4.2. Preliminary.

- Ensure that 115 VAC power is connected and available. **DO NOT** apply power at this time.
- Ensure sampling tubing has been run from the Model PVA-2 devices and connected to the **MULTI-TAP™** device.
- Ensure the ball vales the Model PVA-2 devices are closed
- (Optional) If optional connections have been made to the fault signaling contacts, ensure that appropriate personnel are aware that signals may be received during commissioning.

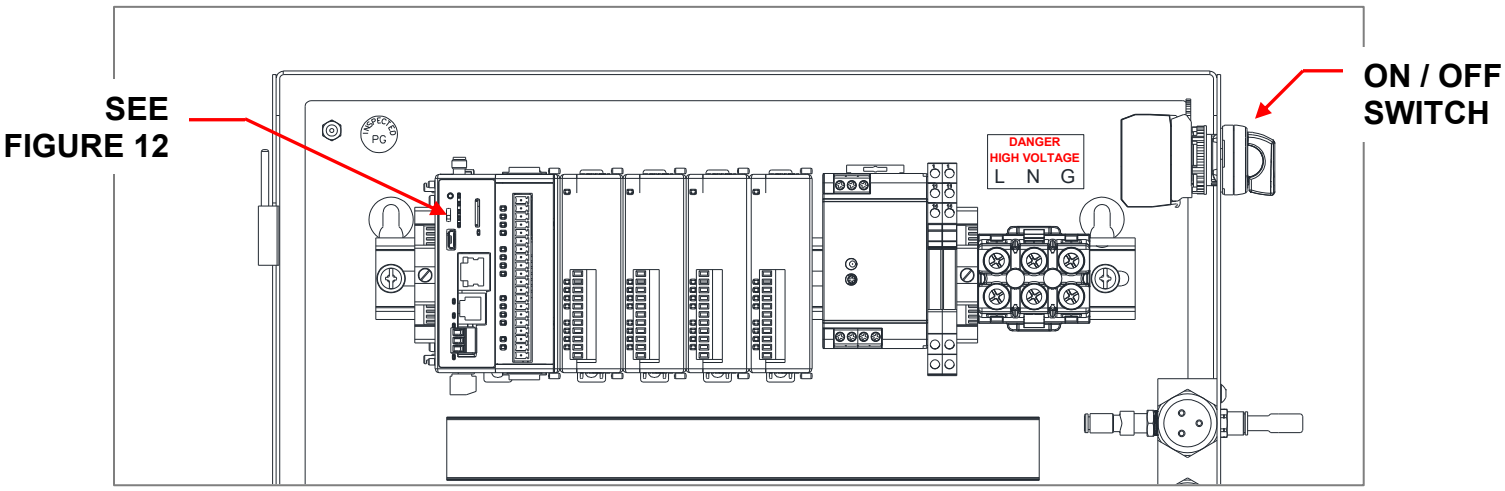

CAUTION

If sprinkler system has been pressurized with air or nitrogen, close ball valve on **Model PVA-2** purge vent assembly to prevent loss of pressure.

4.3. Startup.

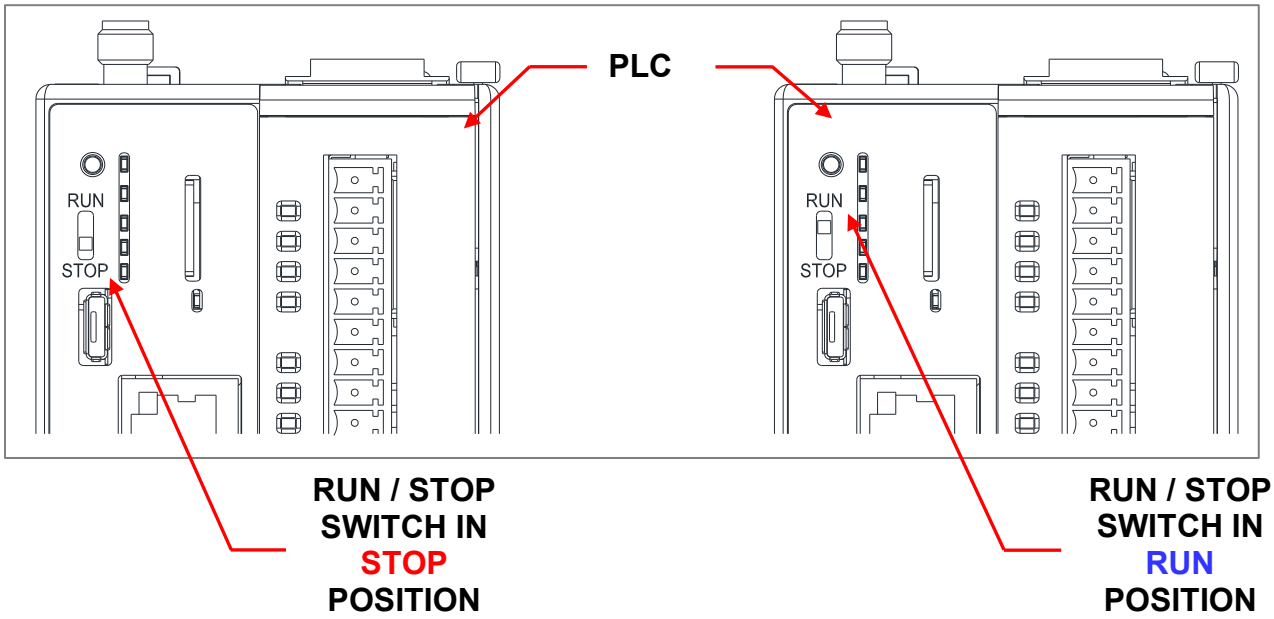
4.3.1. Applying 115 VAC Power. Refer to **Figure 11.** Apply 115 VAC power to the power supply by turning the green power switch on the **Multi-TAP™** device from **OFF** to **ON** position.

Figure 11 – ON / OFF Switch



4.3.2. RUN / STOP Switch. Refer to **Figure 12.** Ensure the **RUN / STOP** switch on the PLC is in the **RUN** position.

Figure 12 – PLC RUN / STOP Switch

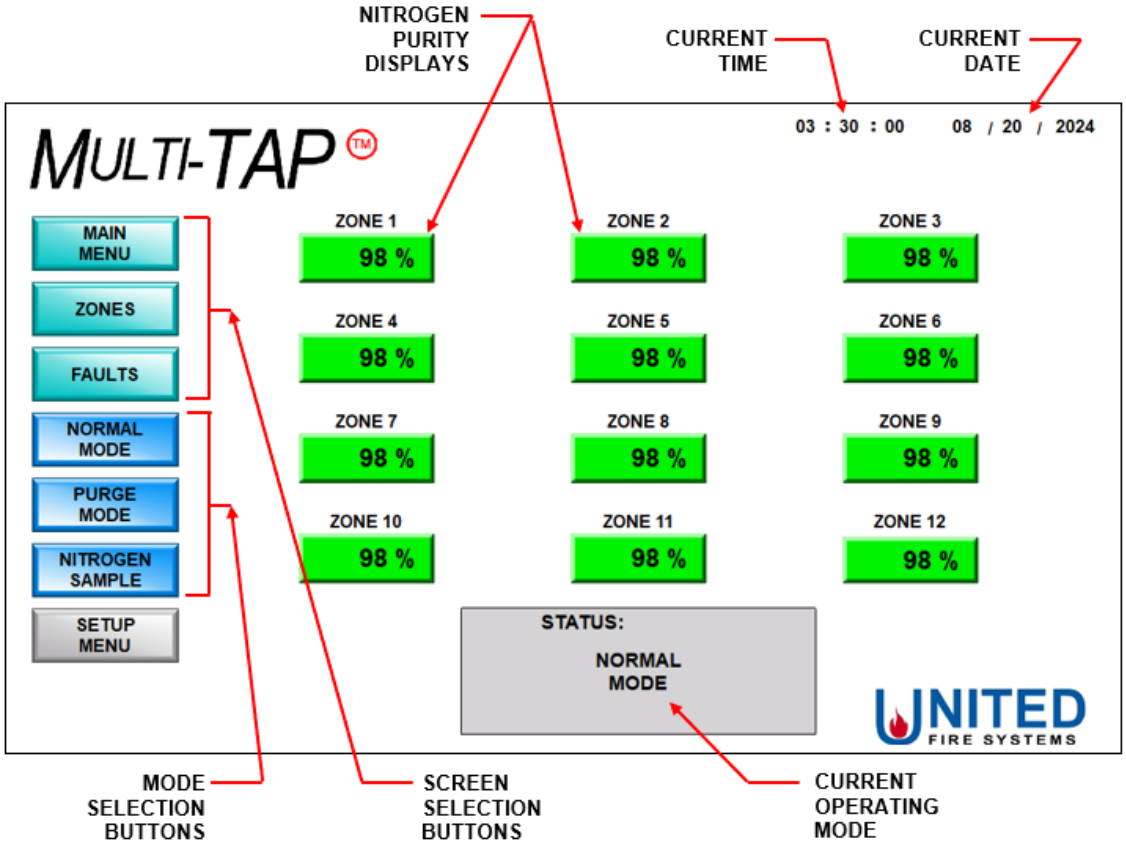


4.4. Initialization. Follow procedure steps in order:

4.4.1. MAIN MENU. Refer to **Figure 13.** The **MAIN MENU** Screen should appear on the screen on the device door. Confirm that the **SENSOR HEATER WARMING UP** message appears in the **CURRENT OPERATING MODE** box when the device powers up. After 60 seconds, the device will enter **NORMAL MODE**. The **FAULTS** Function Button will be flashing **RED** due to two (2) faults:

- **LOW PRESSURE**
- **LOW NITROGEN PURITY**

Figure 13
Layout – MAIN MENU Screen



(1) CURRENT TIME. The **Multi-TAP™** device displays the current time as set in the **SETUP MENU** Screen. The time format is **HH / MM / SS** in 12-hour format.

(2) CURRENT DATE. The **Multi-TAP™** device displays the current date as set in the **SETUP MENU** Screen. The current date is displayed in **MM / DD / YYYY** format.

(3) CURRENT OPERATING MODE. Indicates the current operating mode. Refer to **5.2** for additional information on the various operating modes.

(4) NITROGEN PURITY DISPLAYS. Indicates the nitrogen purity in the sprinkler piping of each zone, per the last automatic or manual sampling.

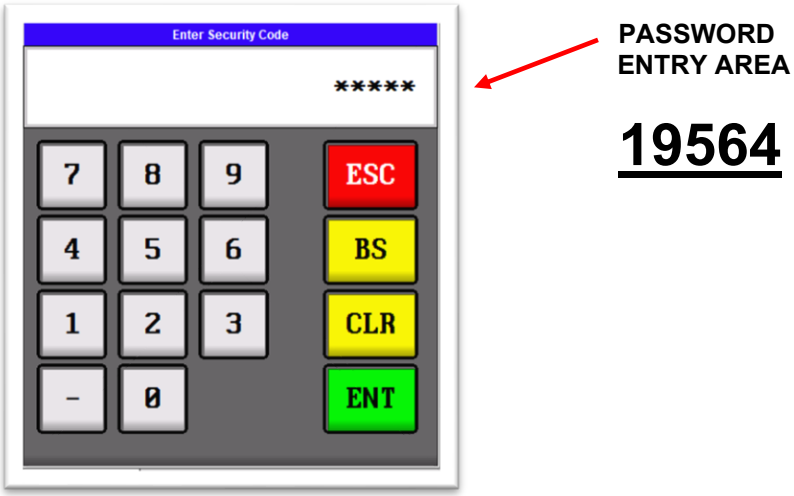
(5) Mode and Screen Selection Buttons

Table 4 – Mode and Screen Selection Buttons				
SCREEN	**BUTTON TYPE**	**BUTTON LABEL**	**REFERENCE**	**NOTES**
MAIN	**SCREEN SELECTION**	**MAIN MENU**	**5.1.1**	**Default Screen**
		ZONES	**5.1.2**	
		FAULTS	**5.1.3**	**Flashes RED when active faults are present.**
	MODE SELECTION	**NORMAL MODE**	**5.2.1**	**Default Mode**
		PURGE MODE	**5.2.2**	**Select Zones (Refer to 5.3.1).**
		NITROGEN SAMPLE	**5.2.4**	**Select Zones (Refer to 5.3.1).**
	SETUP SELECTION	**SETUP MENU**	**5.4**	**Password Required (Refer to 5.3.2).**

4.4.2. ACCESSING THE SETUP MENU. Press the **SETUP MENU** Function Button. The **PASSWORD Screen** will appear. Enter password **19564** to proceed.

IMPORTANT
The password for the **Multi-TAP™** device is **19564**. This password **CANNOT** be changed!
To avoid inadvertent changes to variable parameters, **DO NOT** provide the password to unauthorized or untrained personnel!

Figure 14
Layout – PASSWORD Screen



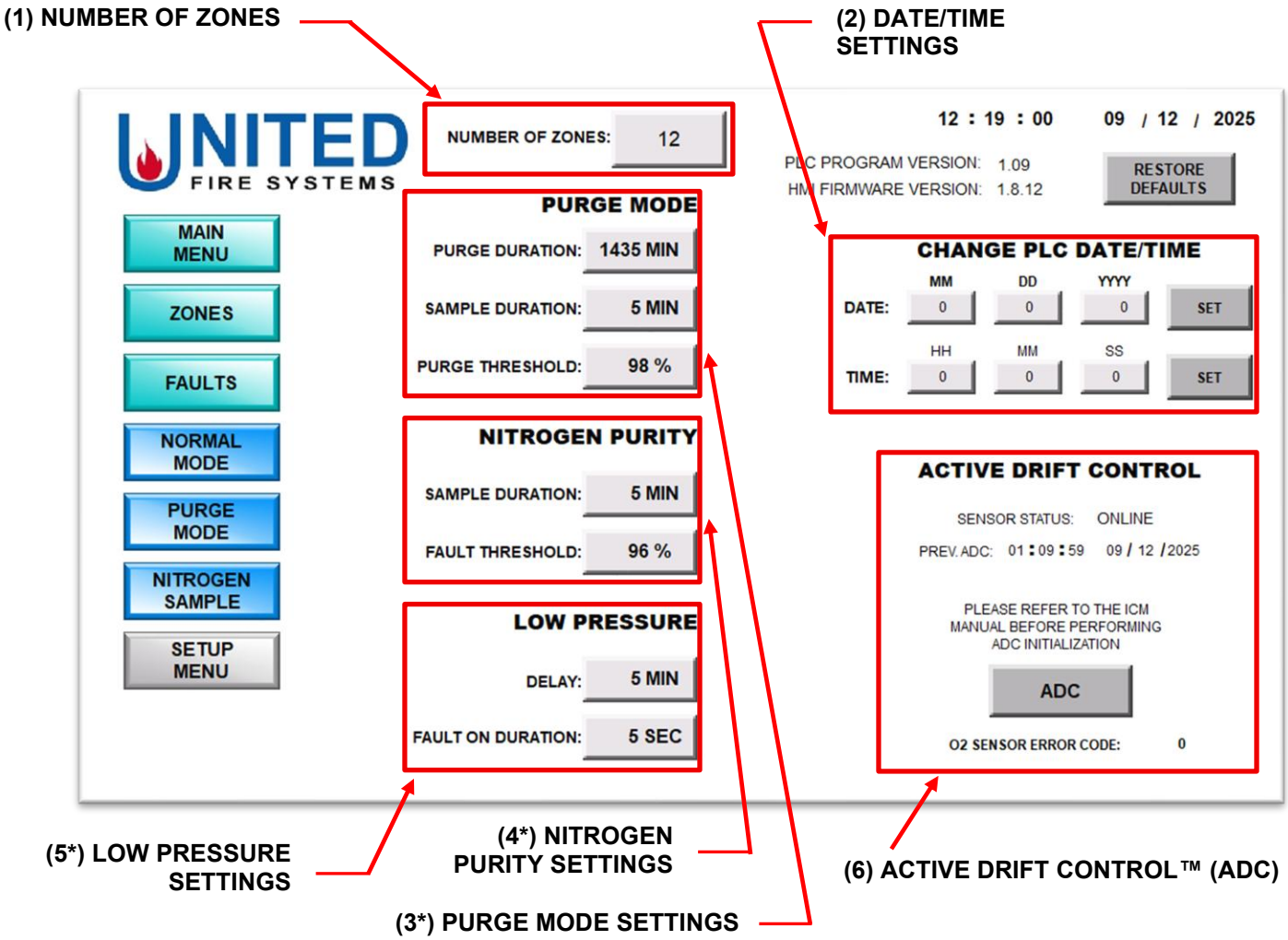
(1) PASSWORD ENTRY AREA. Password numbers appear in this area while password is being entered. When all password numbers have been entered, the **PASSWORD ENTRY AREA** will contain five (5) asterisks, as shown.

(2) PASSWORD SCREEN BUTTONS

- **ESC –** Labeled **ESC** for **ESCAPE**. Press to **EXIT** the **PASSWORD** Screen
- **BS –** Labeled **BS** for **BACK SPACE**. Press to delete the previous entry in **PASSWORD ENTRY AREA.**
- **CLR –** Labeled **CLR** for CLEAR. Press to delete all entries in **PASSWORD ENTRY AREA.**
- **ENT –** Labeled **ENT** for ENTER. Press to enter the password when all digits have been properly entered and proceed to the **SETUP MENU** Screen.

4.4.3. SETUP MENU. Refer to **Figure 15.** The **SETUP MENU Screen** permits authorized personnel to reference the version numbers of the HMI and PLC, and proceed to additional variable parameter programming screens. Follow all instructions and customize settings if necessary.

Figure 15
Layout – SETUP MENU Screen



(1) NUMBER OF ZONES. Press Numeric Value Icon adjacent to **NUMBER OF ZONES**. The **PASSWORD Screen** will appear. Enter password **19564** to proceed. Enter the number of Active Zones connected to the **Multi-TAP™** device.

(2) DATE/TIME SETTINGS. The **Multi-TAP™** device date and time comes pre-set to Eastern Standard Time. Ensure the date and time in the upper right corner of HMI screen is correct for your local time zone. If change is necessary, adjust the date and time by entering the correct values; then press **SET**.

***NOTE FOR (3) (4) & (5):**
The following settings are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**. If you are not instructed to make any changes by **UNITED Fire Systems**, continue to **Step (6).** Otherwise, follow the guidelines set forth and make necessary changes.

(3*) PURGE MODE SETTINGS. This setting allows the user to personalize the operation of the **Multi-TAP™** device.

- **PURGE DURATION.** This indicates the preset duration that the **PURGE** solenoid valve is open. The factory default is 1435 minutes, or 23 hours 55 minutes.
- **SAMPLE DURATION.** This indicates the preset duration that the **Multi-TAP™** device will be in **NITROGEN PURITY SAMPLING** Mode at the end of the **PURGE** Mode duration. After this duration, the updated nitrogen purity is displayed. The factory default is 5 minutes.
- **PURGE THRESHOLD.** This indicates the desired N_2 purity of the system. A **N2 PURITY NOT MET FAULT** will be displayed if this purity threshold is not achieved in one or more zones at the end of a **PURGE** Cycle. The factory default is 98%.

SECTION	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
PURGE MODE	PURGE DURATION	120	1435	1435 minutes	***PURGE DURATION, SAMPLE DURATION,** and **PURGE THRESHOLD** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	SAMPLE DURATION	5	10	5 minutes	
	PURGE THRESHOLD	80	98	98%	

(4*) NITROGEN PURITY SETTINGS. This setting allows the user to personalize the operation of the **Multi-TAP™** device.

- **SAMPLE DURATION.** This indicates the preset duration that the **Model Multi-TAP™** device will be in **NITROGEN PURITY SAMPLING** Mode once per day, after **ACTIVE DRIFT CONTROL™** takes place. After this duration (factory default 5 minutes), the updated nitrogen purity is displayed. The factory default is 5 minutes.
- **FAULT THRESHOLD.** This indicates the threshold N_2 purity below which a **FAULT** will occur in **NORMAL** Mode. Although the normal N_2 purity is 98%, the **FAULT THRESHOLD** factory default is 96%. This factory default should avoid nuisance faults caused by minor fluctuations in environmental parameters, such as temperature, that can temporarily reduce the indicated nitrogen purity.

SCREEN	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
NITROGEN PURITY	SAMPLE DURATION	5	10	5 minutes	***SAMPLE DURATION** and **FAULT THRESHOLD** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	FAULT THRESHOLD	80	98	96%	

(5*) LOW PRESSURE SETTINGS. This setting allows the user to personalize the operation of the **Multi-TAP™** device.

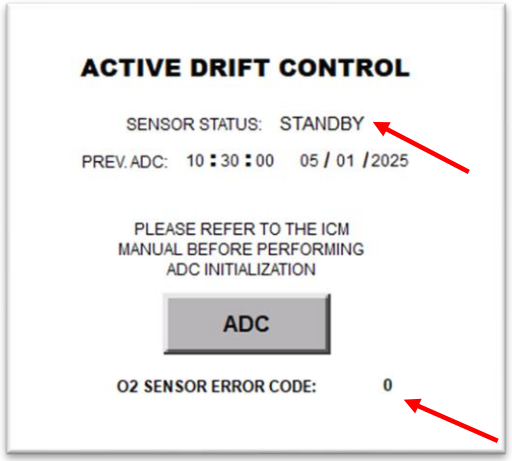
- **DELAY.** This indicates the minimum time that both the purge solenoid valve and the nitrogen sampling solenoid valve must be closed for the PLC to check the status of the pressure switch.
- **FAULT ON DURATION.** This indicates the minimum time that low pressure switch must be at or below 5 PSIG for the **LOW PRESSURE** fault to be recognized.

SECTION	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
LOW PRESSURE	DELAY	1	10	5 minutes	***DELAY** and **FAULT ON DURATION** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	FAULT ON DURATION	0	9999	5 seconds	

(6) ACTIVE DRIFT CONTROL™ (ADC). Refer to **4.4.4.**

4.4.4. ADC™ INITIALIZATION. See **Table 5.** Ensure the sensor status reads **STANDBY** and there are no **O2 SENSOR ERROR CODES** present. Refer to **6.2. Clearing Faults** if error codes other than "0" are present, causing an **O2 SENSOR TIMEOUT Fault.** After correcting errors, continue the commissioning procedure.

Table 5 – ADC Initialization Steps

Figure No.	ACTIVE DRIFT CONTROL™ Screen	Sensor Status	Description
16		STANDBY	Ensure the sensor status reads **STANDBY** and there are no **O2 SENSOR ERROR CODES** present (O2 SENSOR ERROR CODE: 0). IMPORTANT **ADC** cannot be selected if any of the following **FAULTS** are present: • **O2 SENSOR TIMEOUT** Clear faults to permit activation of **ADC**.
17		N/A	Operate the **ADC** Function Button to begin **ADC** INITIALIZATION. An **ADC INITIALIZATION** progress bar will appear, and **SENSOR STATUS** will be blank. IMPORTANT **DO NOT** operate **MAIN MENU** Function Button while the **ADC INITIALIZATION** progress bar is on the screen.
18		ONLINE	Upon completion of **ADC INITIALIZATION**, the progress bar will disappear, and the **SENSOR STATUS** will read **ONLINE.** Press the **MAIN MENU** Function Button to return to the **MAIN MENU.**

4.5. Clearing Faults. Operate the **FAULTS** Function Button to access the **FAULTS** Screen. The **Multi-TAP™** device will be indicating two (2) faults:

- **LOW PRESSURE Fault** – Indicated since no gas pressure is present at the device inlet.
- **LOW PURITY Fault** – Indicated since nitrogen concentration at or above the **FAULT THRESHOLD** is not present at the device inlet.

4.5.1. LOW PRESSURE Fault. If the sprinkler system has been filled with air (initial-fill) or nitrogen, open the ball valves on the **Model PVA-2** purge vent assemblies for all active zones.

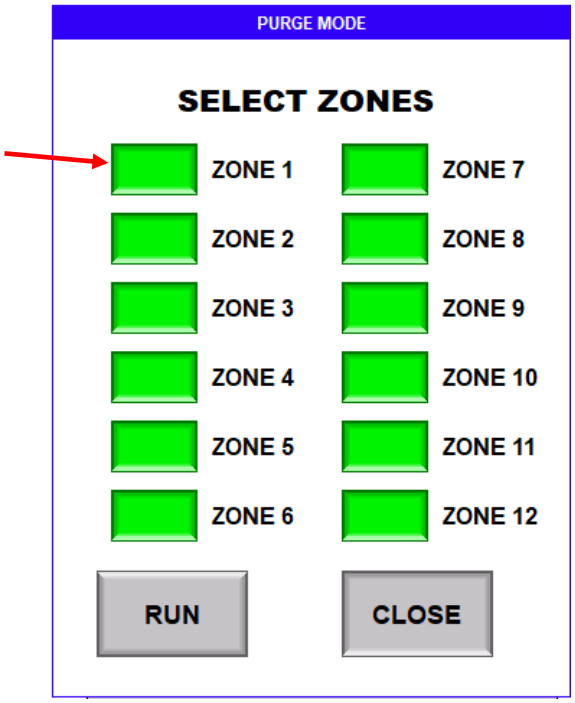
1. On the **FAULTS** Screen, operate the **RESET** Function Button.
2. The **LOW PRESSURE** Fault Status Indicator will clear.

4.5.2. LOW PURITY Fault. This fault will be cleared by entering **PURGE** Mode. Refer to **4.6.**

4.6. Purging. Refer to **5.2.2** for a detailed explanation on the **PURGE** Mode sequence. To reach 98% nitrogen purity in the sprinkler system piping, it is necessary to purge the piping of air. With the **NITROGEN-PAC™** unit generating 98% pure nitrogen and the ball valve on the PVA for all active zones open (Refer to **1.4.2**).

1. Operate the **PURGE MODE** Function Button on the **MAIN** Screen.
2. Follow the instructions in **Table 6** to initiate the **PURGE** sequence.

Table 6 – Purging

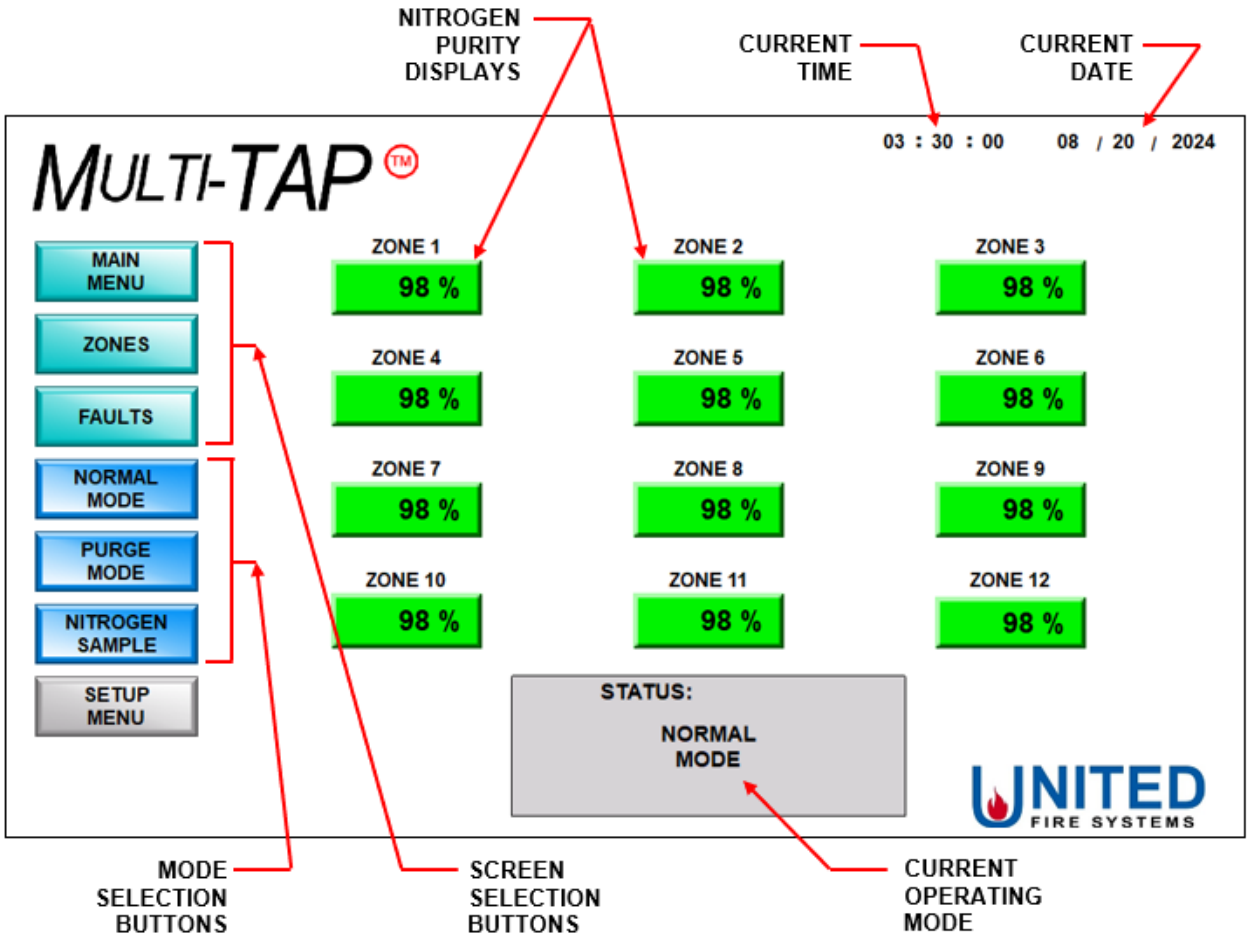
Figure No.	Purging	Description
19		Select all Active Zones so that each box appears green as shown in **Figure 19**. Then, press **RUN** to begin the **PURGE** sequence. IMPORTANT Note that the **Multi-TAP™** device purges only one zone at a time, thereby avoiding low air signals. Therefore, it is acceptable to open more than one (1) PVA valve at a time during the Purging process. IMPORTANT **PURGE MODE** cannot be selected if any of the following **FAULTS** are present: • **LOW PRESSURE** • **O2 SENSOR TIMEOUT** Clear faults to permit activation of **PURGE MODE**. The **LOW NITROGEN PURITY** fault will NOT inhibit activation of **PURGE** Mode.

5. OPERATION

5.1. DISPLAY SCREENS. The **DEVICE DISPLAY** shows different screens, depending upon which touchscreen function button has been operated.

5.1.1. MAIN MENU Screen. See **Figure 20**. This is the default screen displayed by the **Multi-TAP™** device.

Figure 20
Layout – MAIN MENU Screen



(1) CURRENT TIME. The **Multi-TAP™** device displays the current time as set in the **SETUP MENU** Screen. The time format is **HH / MM / SS** in 12-hour format.

(2) CURRENT DATE. The **Multi-TAP™** device displays the current date as set in the **SETUP MENU** Screen. The current date is displayed in **MM / DD / YYYY** format.

(3) CURRENT OPERATING MODE. Indicates the current operating mode. Refer to **5.2** for additional information on the various operating modes.

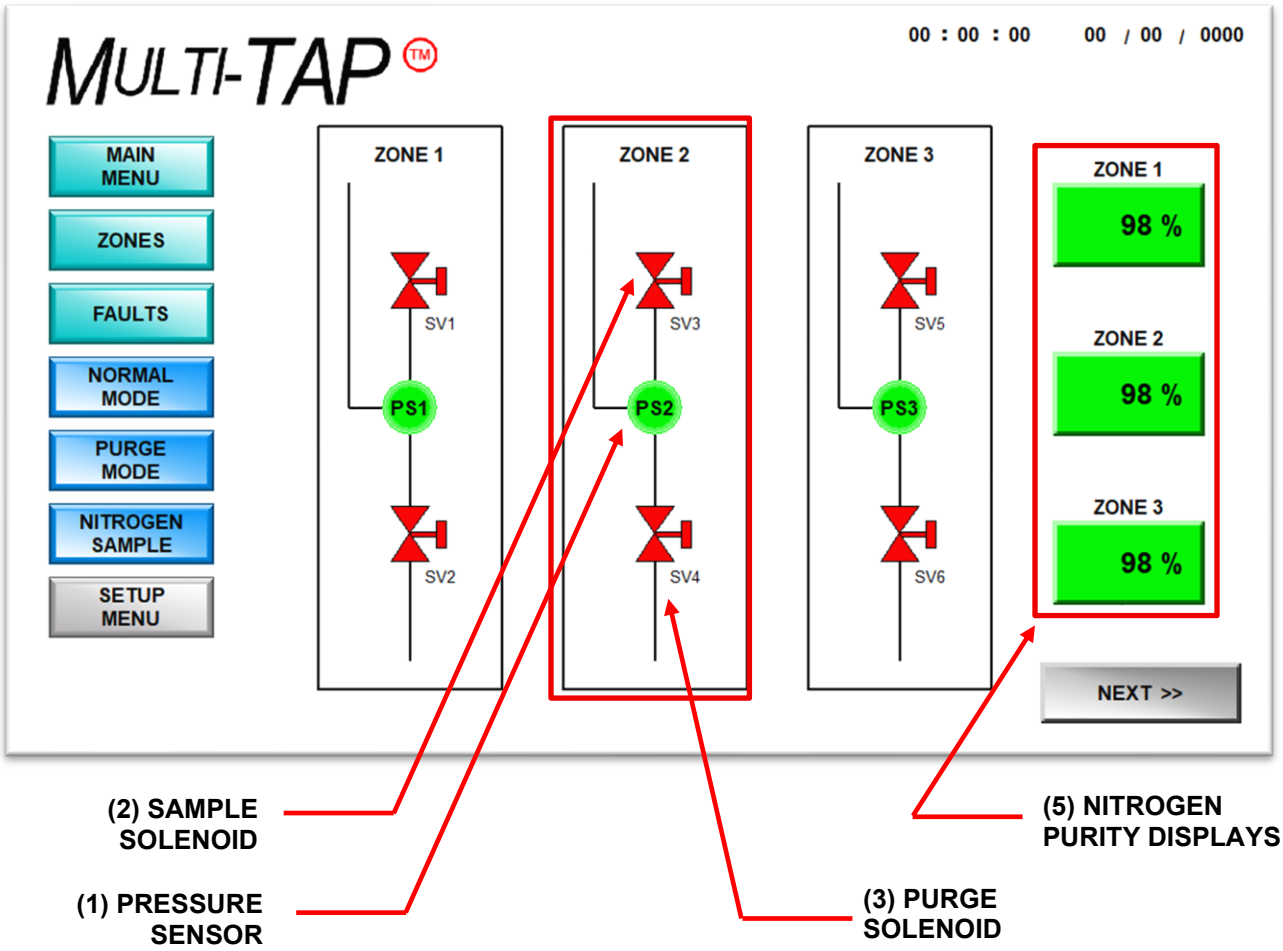
(4) NITROGEN PURITY DISPLAYS. Indicates the nitrogen purity in the sprinkler piping of each zone, per the last automatic or manual sampling.

(5) Mode and Screen Selection Buttons

Table 7 – Mode and Screen Selection Buttons				
SCREEN	**BUTTON TYPE**	**BUTTON LABEL**	**REFERENCE**	**NOTES**
MAIN	**SCREEN SELECTION**	**MAIN MENU**	**5.1.1**	**Default Screen**
		ZONES	**5.1.2**	
		FAULTS	**5.1.3**	**Flashes RED when active faults are present.**
	MODE SELECTION	**NORMAL MODE**	**5.2.1**	**Default Mode**
		PURGE MODE	**5.2.2**	**Select Zones (Refer to 5.3.1).**
		NITROGEN SAMPLE	**5.2.4**	**Select Zones (Refer to 5.3.1).**
	SETUP SELECTION	**SETUP MENU**	**5.4**	**Password Required (Refer to 5.3.2).**

5.1.2. ZONES Screen. Refer to Figure 21. The **ZONES** Screen provides details of the status of each **Multi-TAP™** device zone, as well as the status for the pressure sensors, sample solenoids and purge solenoids in each Zone.

Figure 21
Layout – ZONES Screen



(1) PRESSURE SENSOR – Indicates the status of the Zone Pressure Sensor. **GREEN** indicates adequate pressure, **RED** indicates below threshold (5 PSIG).

Note: For (2) and (3), GREEN indicates **OPEN**, **RED** indicates **CLOSED.**

(2) SAMPLE SOLENOID – Indicates the status of the Sample Solenoid.

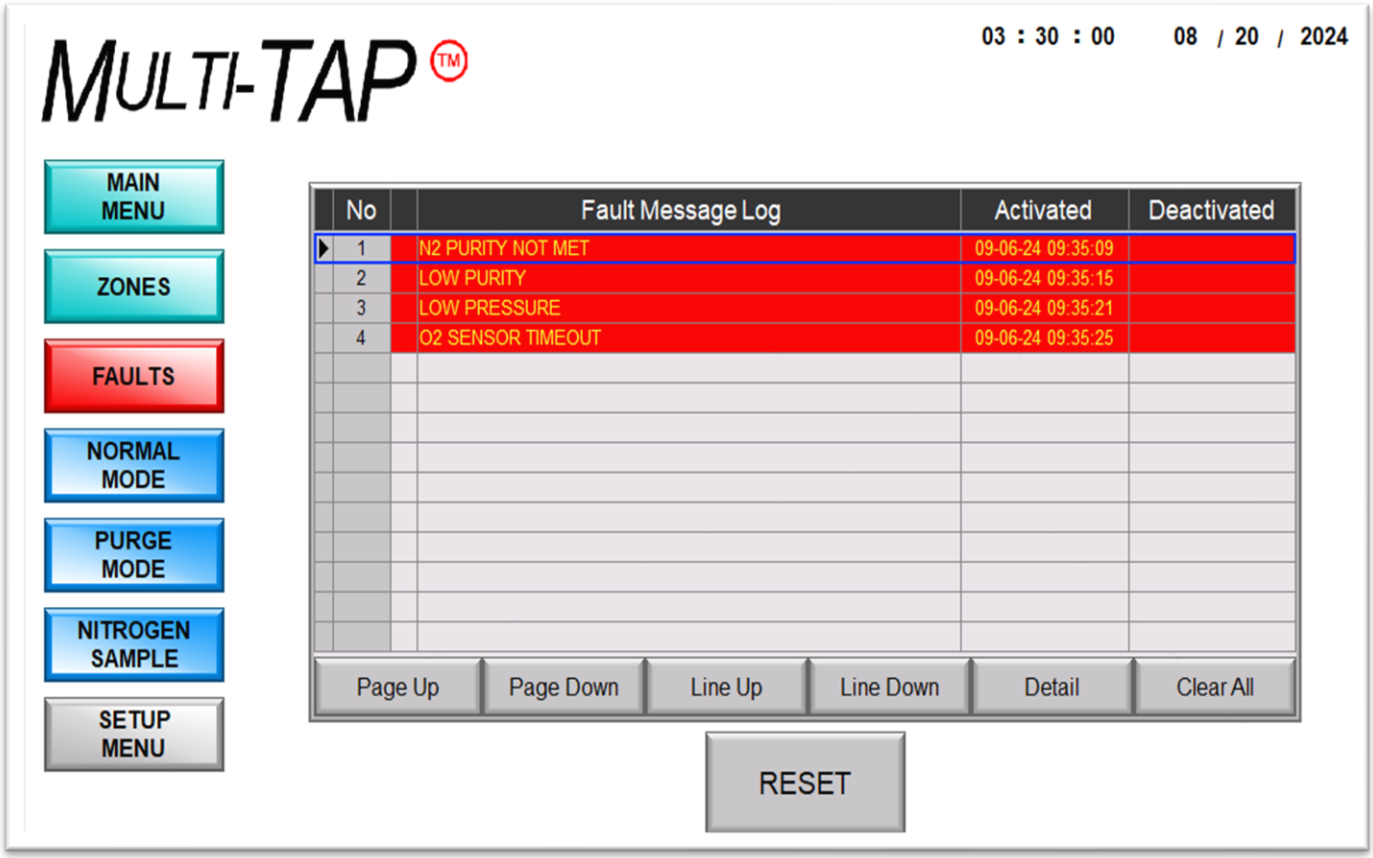
(3) PURGE SOLENOID – Indicates the status of the Purge Solenoid.

(4) ZONE SCREEN BUTTONS:
- **NEXT >> –** Moves the **ZONE SCREEN** to the next set of zones.
- **<< PREV. –** Moves the **ZONE SCREEN** to the previous set of zones.

(5) NITROGEN PURITY DISPLAYS. Indicates the nitrogen purity in the sprinkler piping of each zone per the last automatic or manual sampling.

5.1.3. FAULTS Screen. Refer to **Figure 22**. The **FAULTS** Screen permits the user to identify which of four (4) faults have been activated. Operate the **FAULTS** Screen selection button on the touchscreen to display the **FAULTS** Screen.

Figure 22
Layout – FAULTS Screen



(1) FAULT MESSAGE LOG. The **FAULT MESSAGE LOG** displays all faults present on the **Multi-TAP™** device. When faults are present, the **FAULTS** button flashes **RED**. **LOW PRESSURE** & **O2 SENSOR TIMEOUT** Faults are cleared by correcting the item causing the fault and subsequently operating the **RESET** button. **N2 PURITY NOT MET** & **LOW PURITY** Faults are cleared by correcting the item causing the fault and do not require the **RESET** button to be pressed. Refer to the **6.2 Clearing Faults** for guidelines on correcting faults.

(2) FAULTS

- **N2 PURITY NOT MET =** Occurs when a purge cycle has ended and the nitrogen purity has not reached the preset value in one or more active zone (factory default 98%).
- **LOW PURITY =** Occurs when the nitrogen purity is below the preset value (factory default 96%) after a manual or automatic nitrogen purity reading takes place in one or more active zone.
- **LOW PRESSURE =** Occurs when the pressure sensor is not satisfied during an automatic tubing integrity check. The pressure sensor is set at 5 PSIG, and is not user-adjustable.
- **O2 SENSOR TIMEOUT =** Occurs when the programmable logic controller (PLC) loses communication with the electronics associated with the nitrogen purity sensor.

(3) FAULT MESSAGE LOG COLUMNS

- **Column 1 –** Indicates with a right-facing arrow (►) which line of the log is chosen.
- **Column 2 – No. –** Sequential numbering of each line of the log.
- **Column 3 – Fault Message Log**
- **Column 4 – Activated**
- **Column 5 – Deactivated**

(4) FAULT MESSAGE LOG BUTTONS

- **Page Up –** Moves the **FAULT MESSAGE LOG** to the next page of faults.
- **Page Down –** Moves the **FAULT MESSAGE LOG** to the prior page of faults.
- **Line Up –** Moves the right-facing arrow up to the previous line of the **FAULT LOG.**
- **Line Down –** Moves the right-facing arrow down to the next line of the **FAULT LOG.**
- **Clear All –** Clears all non-active faults from the **FAULT LOG**.

(5) RESET BUTTON – Operating the **RESET** button clears all active faults in the **FAULT LOG** that have been corrected. The faults remain listed in the **FAULT MESSAGE LOG** until the Clear All button is operated.

5.2. Operating Modes. For the following section explains in detail operation of the **Multi-TAP™** device when it is in **NORMAL**, **PURGE**, **ACTIVE DRIFT CONTROL™**, and **NITROGEN PURITY SAMPLING** modes.

5.2.1. NORMAL Mode. The **Multi-TAP™** device will be in **NORMAL** mode most of the time after 98% nitrogen purity is established in the piping. The device defaults to **NORMAL** mode upon power-up, and will automatically enter **ACTIVE DRIFT CONTROL™** and **NITROGEN PURITY SAMPLING** mode at the programmed time each day.

5.2.2. PURGE Mode. PURGE mode purges pressurized air from the sprinkler system piping, allowing the **NITROGEN-PAC™** sprinkler corrosion inhibiting system to replace the air in the sprinkler system piping with 98% nitrogen. **PURGE** mode is manually activated with **PURGE MODE** Function Button on the **MAIN** screen and selecting the desired zones to be purged (**Refer to 5.3.1.). The PURGE** sequence is as follows:

Note: *The **Multi-TAP™** device will proceed one zone at a time in numerical order for the zones selected.*

(1) The **PURGE** solenoid valve in the current zone is opened for the preset purge duration (factory default 1435 minutes, or 23 hours 55 minutes), allowing the **NITROGEN-PAC™** system to gradually raise the nitrogen purity within the sprinkler piping.

(2) At the end of this **PURGE** duration, the **Multi-TAP™** device enters **NITROGEN PURITY SAMPLING** mode. The purge solenoid closes, and the nitrogen sample solenoid opens. After the preset sampling duration (factory default 5 minutes), the sample solenoid closes, and the updated nitrogen purity for the current active zone is displayed.

(3) If the displayed nitrogen purity is **LESS** than the preset purge threshold (factory default 98%), after the **NITROGEN PURITY SAMPLING** mode described in **(2),** the **Multi-TAP™** device again opens the **PURGE** solenoid valve in the same zone per **(1).**

(4) If the displayed nitrogen purity is **LESS** than the preset purge threshold (factory default 98%) for twenty-one (21) consecutive cycles, the **Multi-TAP™** device stores a fault marker into memory which becomes visible at the end of the **PURGE** sequence. The device sets next selected zone as the current zone and continues the **PURGE** sequence starting at **(1).**

(5) If the displayed nitrogen purity is **EQUAL TO OR GREATER THAN** the preset purge factory threshold (factory default 98%), the device sets next selected zone as the current zone and continues the **PURGE** sequence at starting at **(1).**

(6) If there are no more selected zones to be **PURGED**, the **Multi-TAP™** device terminates **PURGE** mode and enters **NORMAL** mode. If any zones failed to meet the minimum purge threshold within 21 cycles per **(4)**, the **FAULTS** Function Button will be flashing **RED**, and a **N2 PURITY NOT MET Fault** will be displayed on the **FAULTS** Screen **(Refer to 5.1.3)**.


IMPORTANT

Note that the **Multi-TAP™** device purges only one zone at a time, thereby avoiding low air signals.

5.2.3 ADC™ - ACTIVE DRIFT CONTROL™ Mode.

(1) Introduction. The **Multi-TAP™** device features **ACTIVE DRIFT CONTROL™**, an automatic analysis of gas sensor drift and application of correlation and gain offsets to maintain device accuracy regardless of sensor status. This analysis and drift control is routinely performed by algorithms built-in to the device control system each time the **Multi-TAP™** device automatically measures the nitrogen purity within the sprinkler piping. No user involvement or special reference gas is required, and no other device available today offers this active method of controlling the accuracy of the displayed nitrogen value. This mode occurs automatically once per day **ONLY IF** the **Multi-TAP™** device is in **NORMAL Mode**. No user intervention is required to initiate **ACTIVE DRIFT CONTROL™**, and user intervention is prevented during this mode's sequence.

(2) Automatic ACTIVE DRIFT CONTROL™ Sequence. Refer to **Table 8.** Once per day, the **Multi-TAP™** device automatically initiates and completes the **ACTIVE DRIFT CONTROL™** sequence.

Note: *All times are as indicated on the* ***CURRENT TIME*** *display on the* ***MAIN*** *screen.*

Table 8 - Automatic ACTIVE DRIFT CONTROL™ Sequence

START TIME	END TIME / DURATION	FUNCTION BUTTONS	PURITY DISPLAYS	FAULT CONTACTS	CURRENT OPERATING MODE	DEVICE OPERATION
12:00:00	12:49:59	**Disabled**	Enabled	**Disabled**	**ACTIVE DRIFT CONTROL**	Sensor returning to atmospheric purity
12:50:00	12:59:59	**Disabled**	**Disabled**	**Disabled**	**ACTIVE DRIFT CONTROL**	Drift being evaluated
01:00:00	5 minutes per Active Zone	**Disabled**	**Disabled**	**Disabled**	**N2 PURITY SAMPLING**	Sprinkler systems being sampled
	5 minutes	**Disabled**	Enabled	**Disabled**	**NORMAL MODE**	Drift control being enabled
See Table 9		Enabled	Enabled	Enabled	**NORMAL MODE**	Device returns to **NORMAL** mode

Table 9 – Return to NORMAL Mode

Number of Active Zones	START TIME	Number of Active Zones	START TIME	Number of Active Zones	START TIME	Number of Active Zones	START TIME
1	01:10:00	**4**	01:25:00	**7**	01:40:00	**10**	01:55:00
2	01:15:00	**5**	01:30:00	**8**	01:45:00	**11**	02:00:00
3	01:20:00	**6**	01:35:00	**9**	01:50:00	**12**	02:05:00

5.2.4. NITROGEN SAMPLE Mode. The **Multi-TAP™** device automatically samples the gas within the sprinkler system once per day to update the **MAIN** Screen's nitrogen purity reading. A manual update of nitrogen purity may be initiated from the **MAIN** Screen using the **NITROGEN SAMPLE Mode** Function Button and selecting the desired zones (**Refer to 5.3.1).**

IMPORTANT

NITROGEN SAMPLE MODE cannot be selected if any of the following **FAULTS** are present:

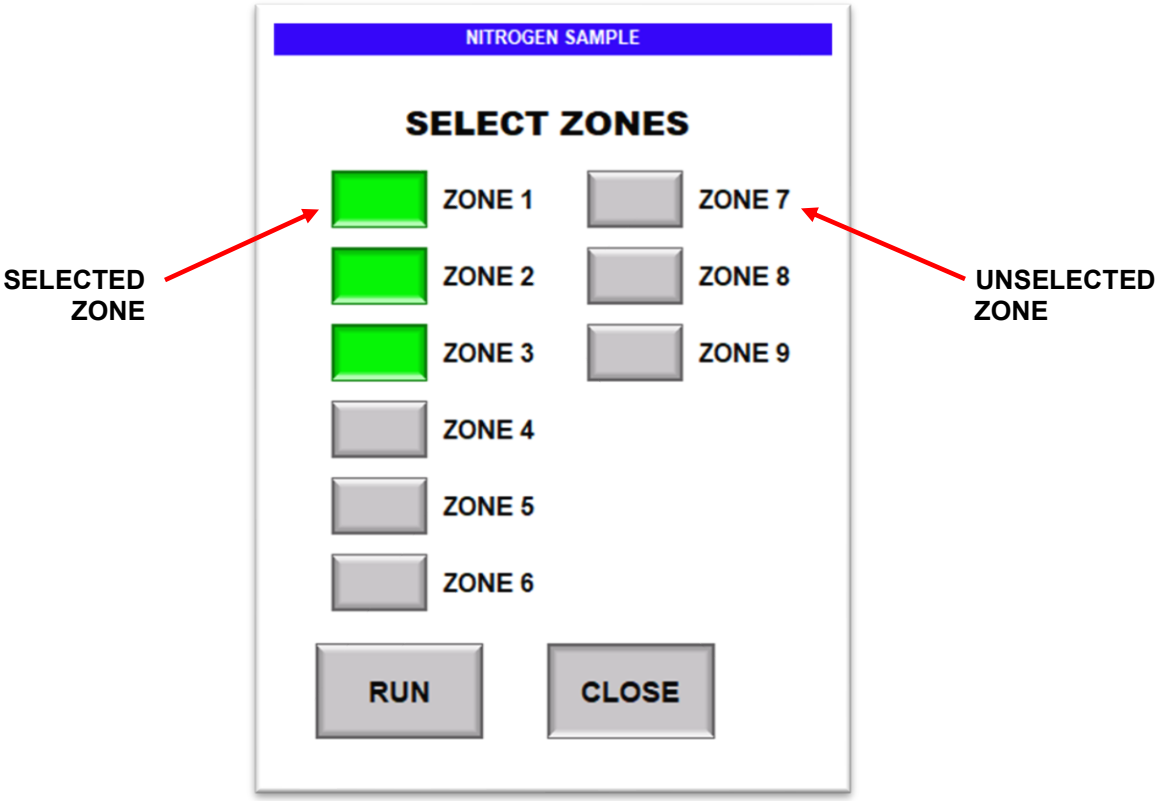
- **O2 SENSOR TIMEOUT**

Clear faults to permit activation of **NITROGEN SAMPLE MODE**.
AVOID frequent activation of **NITROGEN SAMPLE Mode** as it may trigger **O2 SENSOR TIMEOUT.**

5.3. User Input Screens. Depending upon which touchscreen function button has been operated, the device may prompt the user to input variables or make certain selections to proceed.

5.3.1. SELECT ZONES Screen. Refer to **Figure 23**. For use in **PURGE Mode** and **NITROGEN SAMPLE Mode,**

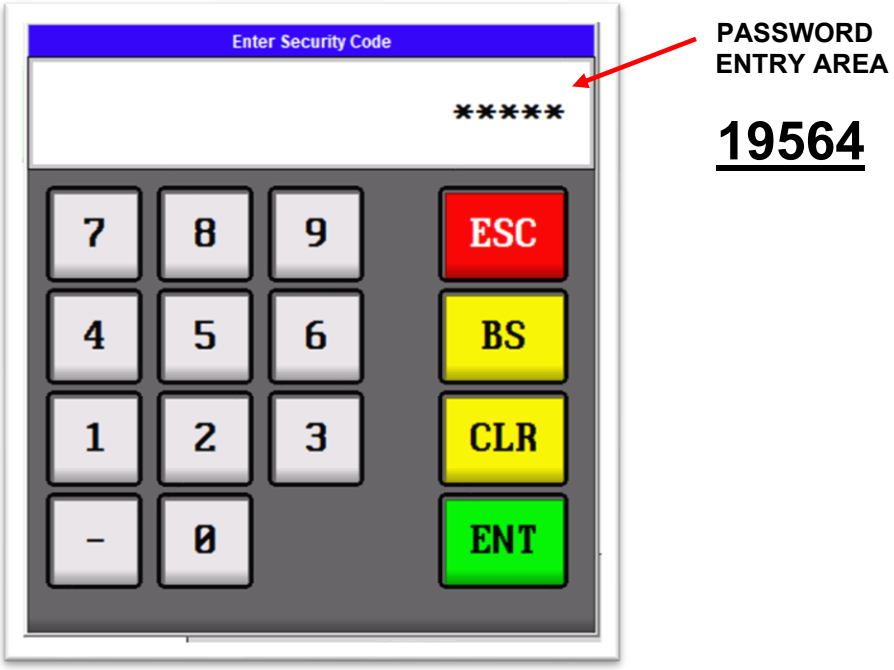
Figure 23
Layout – SELECT ZONES Screen



5.3.2. PASSWORD Screen. Refer to **Figure 24**. This screen allows an authorized user in possession of the password to proceed to programming screens.

IMPORTANT
The password for the **Multi-TAP™** device is **19564**. This password **CANNOT** be changed!
To avoid inadvertent changes to variable parameters, **DO NOT** provide the password to unauthorized or untrained personnel!

Figure 24
Layout – PASSWORD Screen



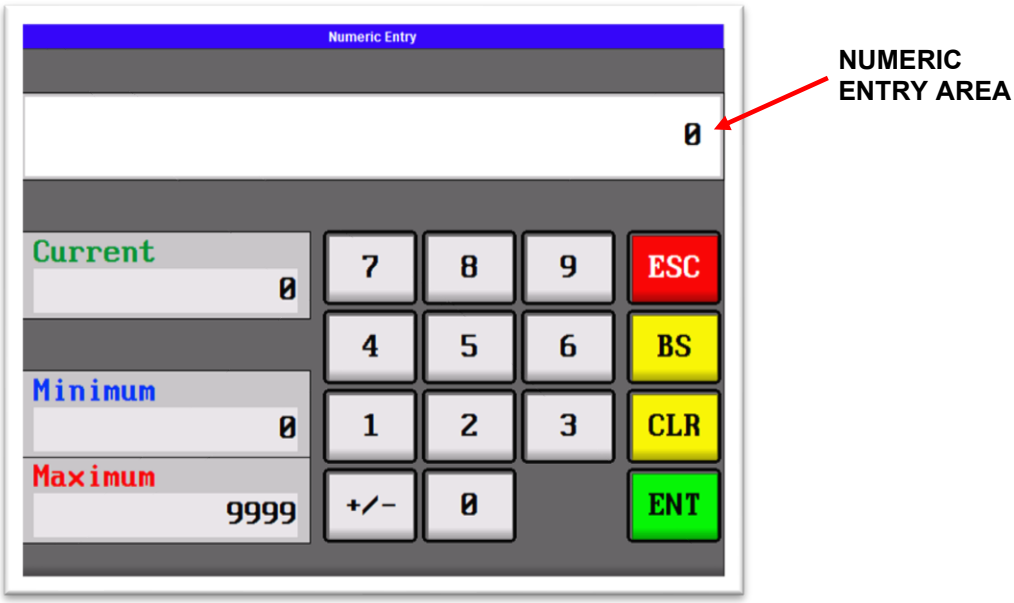
(1) PASSWORD ENTRY AREA. Password numbers appear in this area while password is being entered. When all password numbers have been entered, the **PASSWORD ENTRY AREA** will contain five (5) asterisks, as shown.

(2) PASSWORD SCREEN BUTTONS

- **ESC –** Labeled **ESC** for **ESCAPE**. Press to EXIT THE PASSWORD Screen
- **BS –** Labeled **BS** for **BACK SPACE**. Press to delete the previous entry in **PASSWORD ENTRY AREA.**
- **CLR –** Labeled **CLR** for CLEAR. Press to delete all entries in **PASSWORD ENTRY AREA.**
- **ENT –** Labeled **ENT** for ENTER. Press to enter the password when all digits have been properly entered and proceed to programming screens.

5.3.3. NUMERIC ENTRY Screen. Refer to **Figure 25.** This screen allows a user to customize a variable with a numeric value in certain **NUMERIC ENTRY ICONS** within **SETUP MENU Screen**.

Figure 25
Layout – NUMERIC ENTRTY Screen



(1) NUMERIC ENTRY AREA. Numbers appear here while numeric entry is being entered.

(2) CURRENT. Indicates the current value programmed to the **Multi-TAP™** device.

(3) MINIMUM. The minimum value allowable by the **Multi-TAP™** device. If a value blow minimum is entered, an error will read **"ENTRY TOO LOW".**

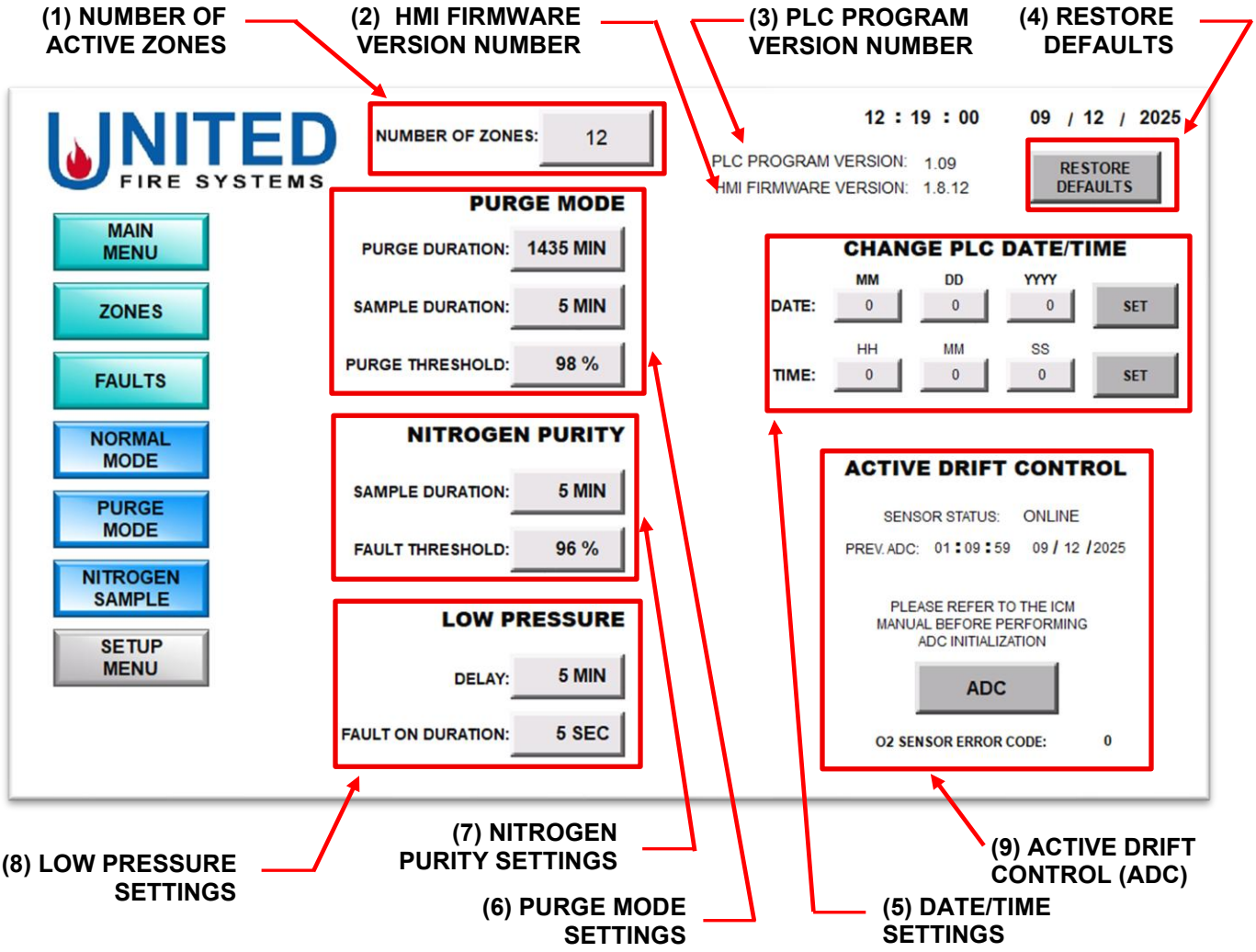
(4) MAXIMUM. The maximum value allowable by the **Multi-TAP™** device. If a value above maximum is entered, an error will read **"ENTRY TOO HIGH".**

(5) NUMERIC ENTRY SCREEN BUTTONS

- **ESC –** Labeled **ESC** for **ESCAPE**. Press to **EXIT** the **NUMERIC ENTRY Screen.**
- **BS –** Labeled **BS** for **BACK SPACE**. Press to delete the previous entry in **NUMERIC ENTRY AREA.**
- **CLR –** Labeled **CLR** for CLEAR. Press to delete all entries in **NUMERIC ENTRY AREA.**
- **ENT –** Labeled **ENT** for ENTER. Press to set the value entered as the new parameter.

5.4. SETUP MENU Screen. Refer to **Figure 26.** This screen permits authorized personnel to reference the version numbers of the HMI and PLC, and proceed to additional variable parameter programming screens

Figure 26
Layout – SETUP MENU Screen



5.4.1. NUMBER OF ACTIVE ZONES. This setting allows the user to enter the number of zones being actively used by the **Multi-TAP™** device. Maximum will be determined based on model of **Multi-TAP™** device. This setting is password protected **(Refer to 5.3.2)**. Press the numeric value icon and enter password to edit the number of active zones.

5.4.2. HMI FIRMWARE VERSION NUMBER. Displays the version number of the firmware programmed into the Human / Machine Interface (HMI). If troubleshooting by **UNITED Fire Systems** is required, the user may need to supply this number.

5.4.3. PLC PROGRAM VERSION NUMBER. Displays the version number of the program in the Programmable Logic Controller (PLC). If troubleshooting by **UNITED Fire Systems** is required, the user may need to supply this number.

5.4.4. RESTORE ALL DEFAULTS. This function restores *all* variable parameters that can be changed by authorized personnel to the factory default values.

5.4.5. DATE / TIME SETTINGS. This function allows the user to set a time and date after changing a set of variable parameters.

5.4.6. PURGE MODE SETTINGS.

- **PURGE DURATION.** This indicates the preset duration that the **PURGE** solenoid valve is open. The factory default is 1435 minutes, or 23 hours 55 minutes.

- **SAMPLE DURATION.** This indicates the preset duration that the **Multi-TAP™** device will be in **NITROGEN PURITY SAMPLING** Mode at the end of the **PURGE** Mode duration. After this duration, the updated nitrogen purity is displayed. The factory default is 5 minutes.

- **PURGE THRESHOLD.** This indicates the desired N_2 purity of the system. A **N2 PURITY NOT MET Fault** will be displayed if this purity threshold is not met at the end of a **PURGE** sequence. The factory default is 98%.

SECTION	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
PURGE MODE	PURGE DURATION	120	1435	1435 minutes	**PURGE DURATION, SAMPLE DURATION,** and **PURGE THRESHOLD** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	SAMPLE DURATION	5	10	5 minutes	
	PURGE THRESHOLD	80	98	98%	

5.4.7. NITROGEN PURITY SETTINGS.

- **SAMPLE DURATION.** This indicates the preset duration that the **Model Multi-TAP™** device will be in **NITROGEN PURITY SAMPLING** Mode once per day, after **ACTIVE DRIFT CONTROL™** takes place. After this duration (factory default 5 minutes), the updated nitrogen purity is displayed. The factory default is 5 minutes.

- **FAULT THRESHOLD.** This indicates the threshold N_2 purity below which a **LOW PURITY Fault** will occur in **NORMAL** Mode. Although the normal N_2 purity is 98%, the **FAULT THRESHOLD** factory default is 96%. This factory default should avoid nuisance faults caused by minor fluctuations in environmental parameters, such as temperature, that can temporarily reduce the indicated nitrogen purity.

SCREEN	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
NITROGEN PURITY	SAMPLE DURATION	5	10	5 minutes	**SAMPLE DURATION** and **FAULT THRESHOLD** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	FAULT THRESHOLD	80	98	96%	

5.4.8. LOW PRESSURE SETTINGS.

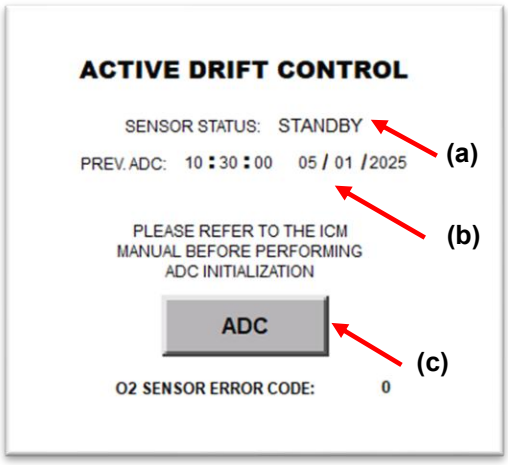
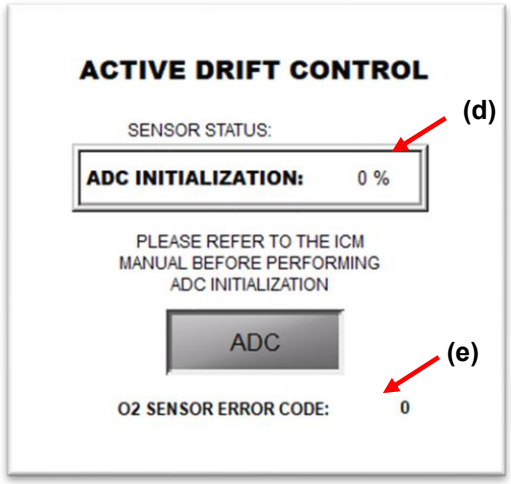
- **DELAY.** This indicates the minimum time that both the purge solenoid valve and the nitrogen sampling solenoid valve must be closed for the PLC to check the status of the pressure switch.

- **FAULT ON DURATION.** This indicates the minimum time that low pressure switch must be at or below 5 PSIG for the **LOW PRESSURE Fault** to be recognized.

SECTION	VARIABLE	MIN	MAX	FACTORY DEFAULT	IMPORTANT
LOW PRESSURE	DELAY	1	10	5 minutes	**DELAY** and **FAULT ON DURATION** are factory-set, and default values should be satisfactory for the overwhelmingly large majority of sprinkler systems. **DO NOT** attempt to alter these values unless instructed to do so by **UNITED Fire Systems**.
	FAULT ON DURATION	0	9999	5 seconds	

5.4.9. ADC™ - ACTIVE DRIFT CONTROL™. Refer to **Table 10.**

Table 10 – SETUP MENU Screen- ACTIVE DRIFT CONTROL

Figure No.	ACTIVE DRIFT CONTROL™ Screen	Variation	Description
27		**ACTIVE DRIFT CONTROL**	**(a) SENSOR STATUS.** This area may indicate: • **STANDBY** (When device is initially powered up and when the automatic **ACTIVE DRIFT CONTROL™** sequence is active between 12:50:00 and 12:59:59 A.M. (Refer to **Table 8** in section **5.2.3.**). • **ONLINE** (all other times). **(b) PREV. ADC.** This indicates the time and date of the last manual activation of **ACTIVE DRIFT CONTROL™** **(c) MANUAL ADC.** This Function Button manually activates **ACTIVE DRIFT CONTROL™**. Refer to **Figure 28.** **IMPORTANT** **ADC** cannot be selected if any of the following **FAULTS** are present: • **O2 SENSOR TIMEOUT** Clear faults to permit activation of **ADC**.
28		**Manual ADC™**	**(d) ADC INITIALIZATION.** Pressing the **ADC** Function Button manually activates **ACTIVE DRIFT CONTROL™**. During this time sensor status will read **STANDBY.** An **ADC INITIALIZATION** progress bar will appear. **ACTIVE DRIFT CONTROL™** should take no longer than 10 minutes to complete. Sensor status will then indicate **ONLINE** **(e) O2 SENSOR ERROR CODE.** "0" indicates normal status. An **O2 SENSOR ERROR CODE** being present will cause an **O2 SENSOR TIMEOUT Fault** on the **FAULTS** Screen. This number may be requested by **UNITED Fire Systems** for repair information.

6. MAINTENANCE.

6.1. Manual Activation of NITROGEN PURITY SENSING. Automatic **NITROGEN PURITY SENSING** occurs one per day as part of automatic **ACTIVE DRIFT CONTROL™** mode – Refer to **5.2.3. NITROGEN PURITY SENSING** may be activated manually at any time by using **NITROGEN SAMPLE** Function Button on the **MAIN** Screen – Refer to **5.2.4**. This will **NOT** initiate **ACTIVE DRIFT CONTROL™**.

6.2. Clearing Faults. Refer to **6.8 Troubleshooting** as necessary.

6.2.1. LOW PRESSURE Fault. This fault occurs when the gas pressure at the **Multi-TAP™** Pressure Sensor drops below 5 PSIG. Typical causes are:

- Disconnected sampling tubing.
- Blocked sampling tubing.
- Failure of **NITROGEN-PAC™** system to supply gas pressure.

After troubleshooting, correcting the cause, and restoring pressure in all Active Zones, operate the **RESET** Function Button on the **FAULTS** screen.

6.2.2. N2 PURITY NOT MET Fault. This fault occurs when **PURGE** Mode fails to achieve the **PURGE THRESHOLD** nitrogen purity (factory default 98% - refer to **5.4.6**). Typical causes are:

- **NITROGEN-PAC™** system not producing nitrogen purity sufficient to achieve **PURGE THRESHOLD**.
- Substantial gas leakage from sprinkler system, such that **NITROGEN-PAC™** system cannot keep up.

This fault will be cleared by entering **PURGE** Mode. Refer to **5.2.2** for a detailed explanation on the **PURGE** Mode sequence. After troubleshooting and correcting the cause, operate **PURGE MODE** Function Button on **MAIN** screen. Select the zones with low purity and press **RUN**. Upon completion of **PURGE MODE** and achieving **PURGE THRESHOLD** nitrogen purity in all selected zones, verify the fault automatically clears on the **FAULTS** screen.

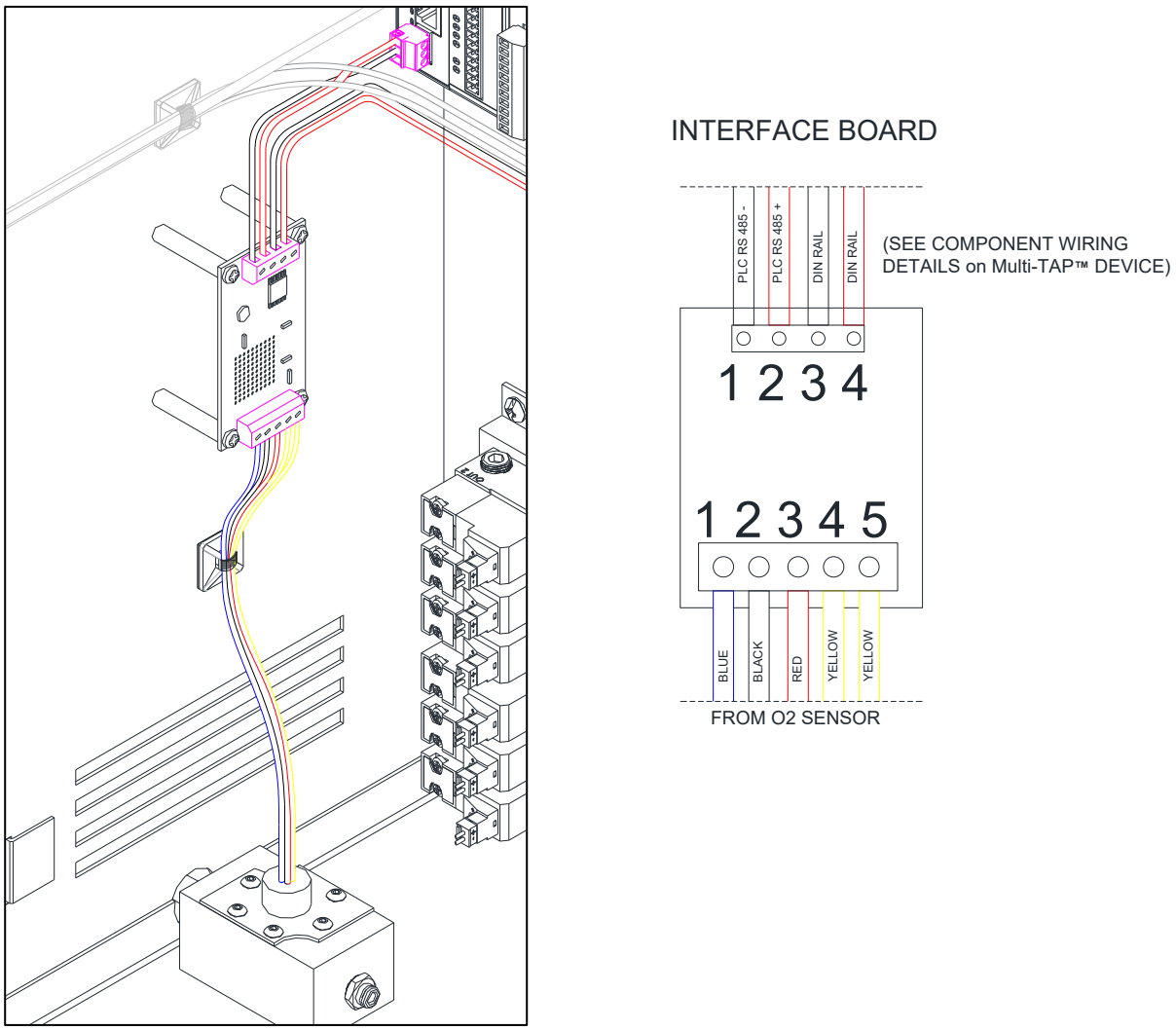
6.2.3. O2 SENSOR TIMEOUT Fault. This fault occurs if the PLC loses communication with the nitrogen sensor. Typical causes are:

- Initiating the O2 sensor by either **SAMPLE MODE** or Manual **ADC** too frequently.
- Loose or disconnected sensor connections.

Operate the **RESET** Function Button on the **FAULTS** screen. If the **O2 SENSOR TIMEOUT Fault** does not successfully clear, repeat attempt after 60 seconds. If still unsuccessful, the sensor connections shown in **Figure 29** can be **CAREFULLY** checked. Refer to the **DEVICE WIRING DETAILS** label sheet located inside the door panel on the **Multi-TAP™** device. Under **COMPONENT WIRING DETAILS**, see termination points for connections between the Interface Board Device Connectors, DIN Rail, and PLC RS 485 connector. After troubleshooting and correcting the cause, operate the **RESET** Function Button on the **FAULTS** screen. If these connections are intact, and attempts to clear the fault are still unsuccessful, contact **UNITED Fire Systems** for repair information.

6.2.4. LOW NITROGEN PURITY Fault. This fault occurs if the nitrogen purity drops below the **FAULT THRESHOLD** nitrogen purity (factory default 96% - refer to **5.4.7**). Refer to **6.8 Troubleshooting**. After troubleshooting and correcting the cause, verify the fault automatically clears on the **FAULTS** screen.

Figure 29
Nitrogen Sensor Connection Points



6.3. 115 VAC Power Interruption / Restoration.

6.3.1. Power Backup. In the event that 115 VAC power to the **Multi-TAP™** power supply is interrupted, data programmed into the PLC within the **Multi-TAP™** device is maintained by a super capacitor and a backup battery. The super capacitor will maintain the data for a minimum of seven (7) days. If the super capacitor is depleted, the backup battery will maintain data.

IMPORTANT

If power interruption lasts for a period of time that exceeds the capabilities of the super capacitor and backup battery to maintain system data, the **Multi-TAP™** device programming may be lost. The device will need to be re-programmed by **UNITED Fire Systems** to restore functionality.

6.3.2. Power Restoration. The following is the sequence when 115 VAC power is restored to the **Multi-TAP™** device.

(1) The **MAIN** screen appears, with the **SENSOR HEATER WARMING UP** message appearing in the current operating mode box for 60 seconds.

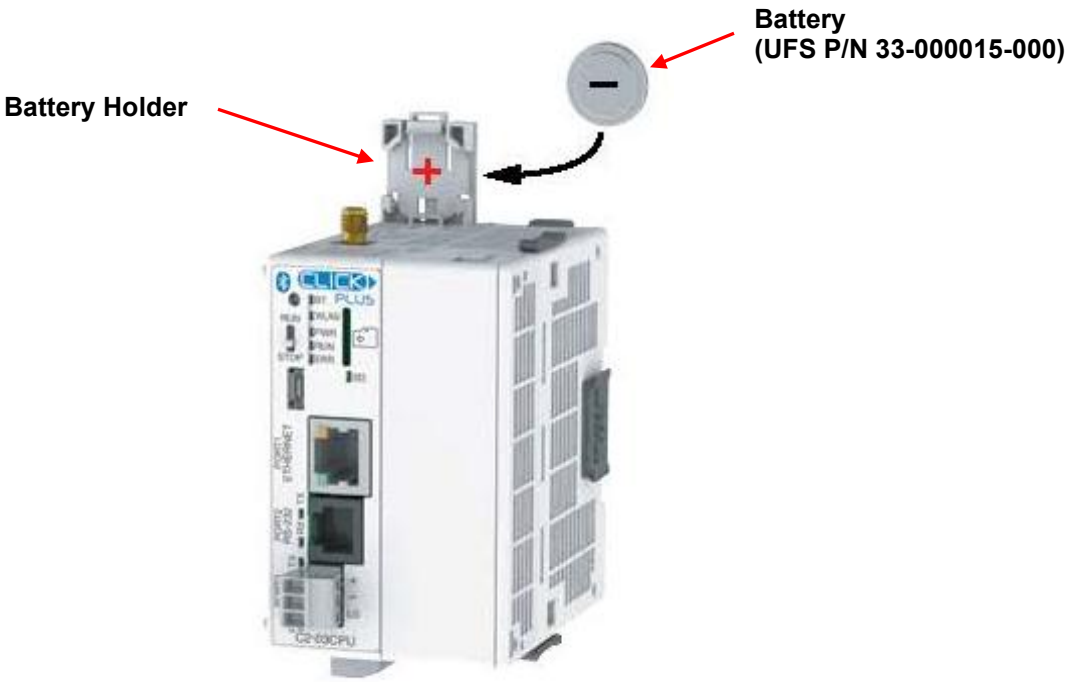
(**2**) The message in the current operating mode box changes to **NORMAL MODE**.

(3) If **NORMAL MODE** is desired at this time, no user intervention is needed. The **Multi-TAP™** device is operating normally.

(4) If the **Multi-TAP™** device was in **PURGE MODE** before the power interruption, this mode will NOT be resumed automatically when power is restored. Manually re-enter **PURGE MODE** by operating the **PURGE MODE** function button on the **MAIN** screen.

6.4. Replacement of PLC Backup Battery. Refer to **Figure 30.** The expected lifespan of the PLC backup battery is three (3) years. To avoid loss of programming, replace this battery every three (3) years.

Figure 30
Replacement of PLC Backup Battery
(Depicted Without Wire Terminals)



(1) Preliminary

- Have the replacement battery (UFS P/N 33-000015-000) available.
- Remove power from the **Multi-TAP™** device.

(2) Use a long, thin flat screwdriver to **GENTLY** pull outward the battery tray at the top left of the PLC.

(3) Remove the existing battery from the battery tray

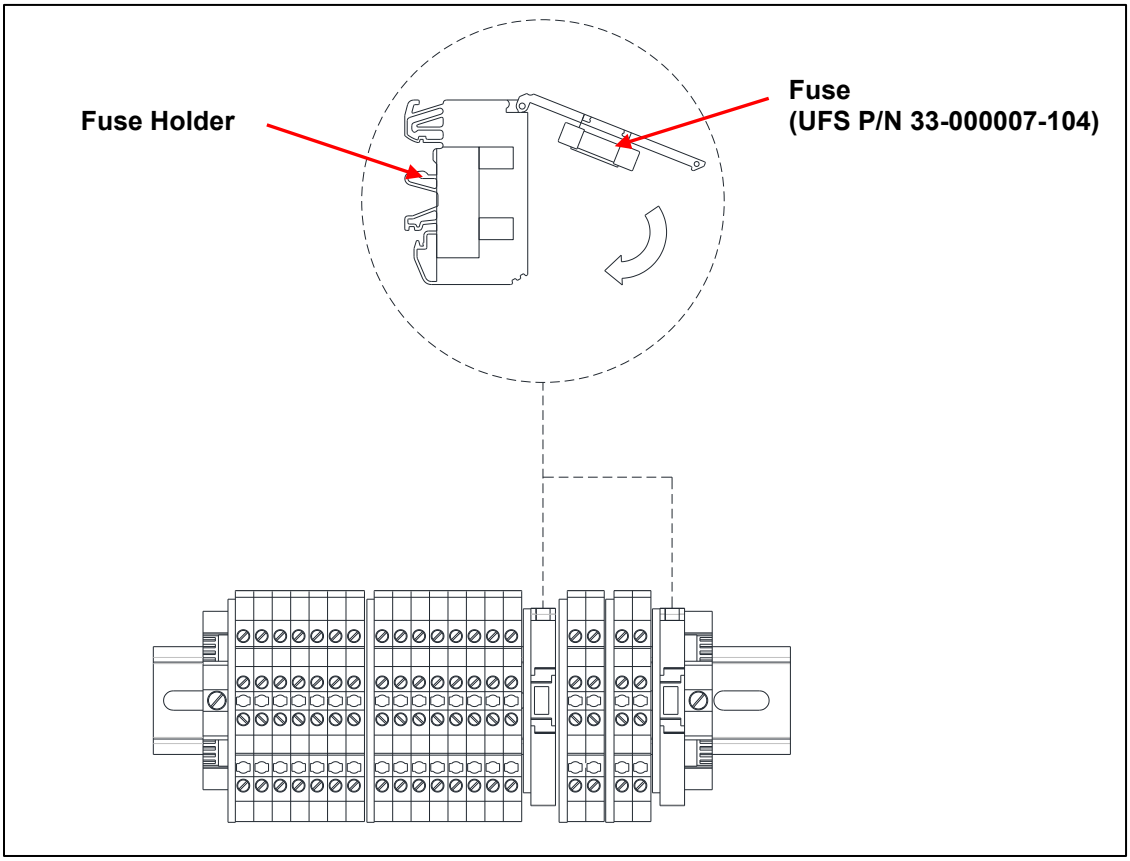
(4) Install the replacement battery (UFS P/N 33-000015-000) into the battery tray, observing the battery polarity per **Figure 30.**

6.5. Replacement of Low Voltage Fuses. Both outputs (CKT1 & CKT2) of the **Multi-TAP™** 24 VDC power supply are each protected by a 4 A fuse. These fuses are located on the din rail in the middle of the enclosure. In the event either fuse requires replacement follow the procedure below:

(1) Preliminary

- Troubleshoot and correct the problem which led to the overcurrent condition that operated the fuses.
- Have the replacement fuses (UFS P/N 33-000007-104) available.
- Remove power from the **Multi-TAP™** device.

Figure 31
Replacement of Multi-TAP™ Fuses



(2) **GENTLY** open fuse holder.

(3) Remove existing 4A fuse from fuse holder.

(4) Install the replacement fuse (UFS P/N 33-000007-104) into the fuse holder.

(5) Close the fuse holder.

(6) Reconnect power, and turn **On** the **Multi-TAP™** device.

(7) Ensure that new fuse does not operate.

6.6. Replacement of In-Line Air Filter Element. Each In-Line Air Filter contains a replaceable 10 micron element. It is recommended that the elements be replaced at least once per year to avoid **LOW PRESSURE Fault** from a clogged filter. To ensure clean airflow to the **Multi-TAP™** device, please replace each element annually. Replace In-Line Air Filter Elements one at a time to avoid mismatching zone tubing.

(1) Have all replacement filter elements (UFS P/N 30-500002-011) available.

(2) Turn **OFF** the **Multi-TAP™** device.

(3) Close all **PVA** valves so that to maintain pressure in sprinkler systems.

(4) NOTE: *A small amount of low-pressure air will be trapped in the tubing lines. When disconnecting element filters in the following steps, it is normal for a small amount of air to escape, and a popping or hissing sound may be heard.*

(5) Refer to **Figure 32**. On the filter housing, identify the lock mechanism. To release the lock, slide the lock mechanism in the direction of the **BLUE** arrow**.**

(6) Rotate the cover in the direction of the **BLACK** arrow.

(7) Pull the cover away from the case in the direction of the **GREEN** arrow.

(8) Remove the existing filter element. Gently remove any remaining dust and debris from within the case.

(9) Examine the O-ring on the cover for damage. If O-ring is damaged, replace the entire filter assembly.

(10) Insert the new filter element into the cover.

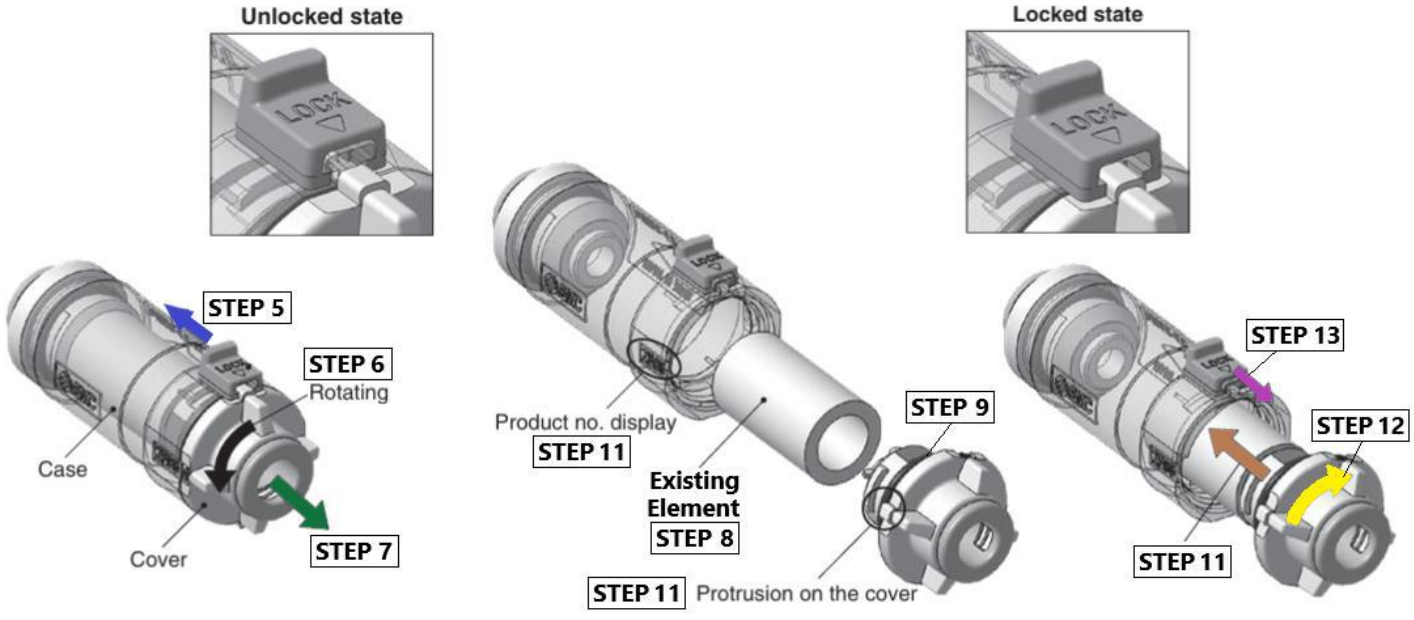
(11) Align the protrusion on the cover with the product no. display on the body, and insert the cover and filter element into the case in the direction of the **BROWN** arrow.

(12) Rotate the cover in the direction of the **YELLOW** arrow until it stops.

(13) Slide the lock mechanism in the direction of the **PURPLE** arrow until it stops. Check that the cover is tightly connected to the case.

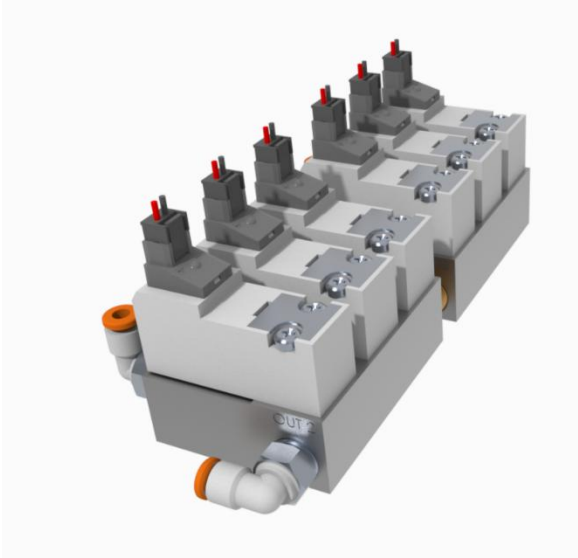
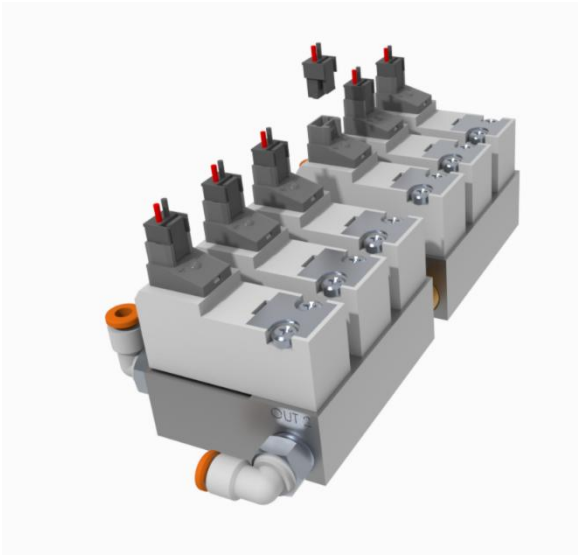
(14) Repeat Steps **(4)** through **(13)** until all element filters have been replaced for each Zone.

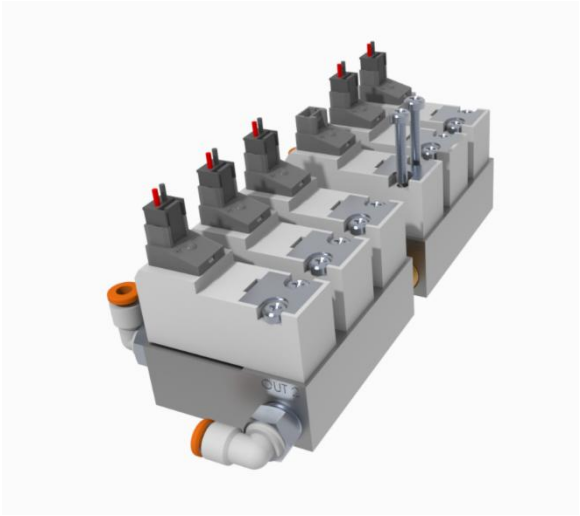
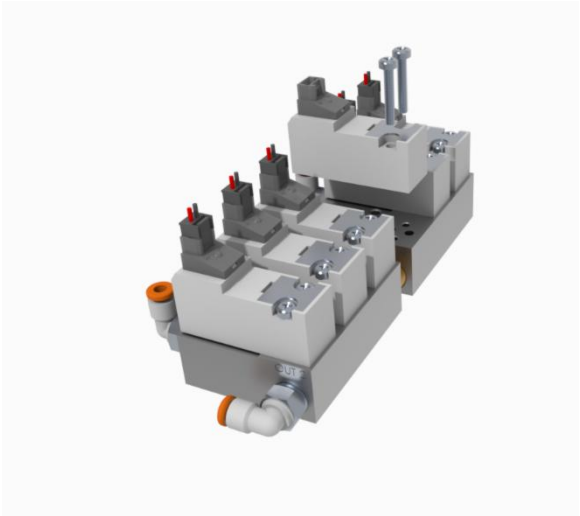
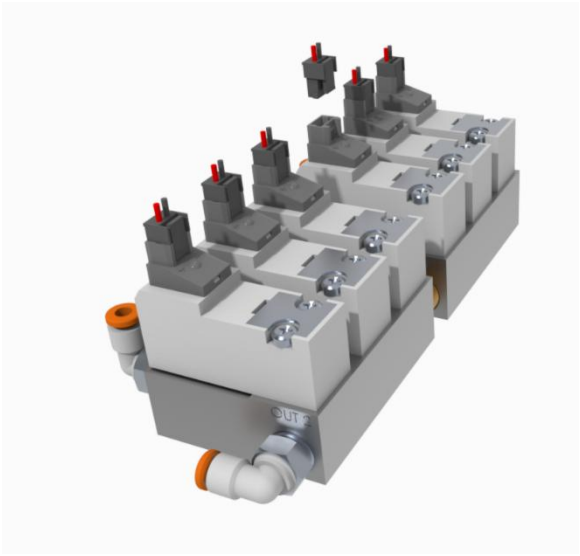
Figure 32
Replacement of In-Line Air Filter Element



6.7. Replacement of Multi-TAP™ Solenoid Valves. If leakage of air at exhaust muffler or purge solenoid valve manifold opening is detected while the device is in **NORMAL** Mode, it may be due to either a purge or sample solenoid valve being stuck open depending on where the leak is detected. In these rare cases, solenoid valve replacement is required to fix the issue. Follow the instruction in **Table 11** to replace the faulty solenoid valve.

Table 11 – Multi-TAP™ Solenoid Valve Replacement

Figure No.	Replacement of Multi-TAP™ Solenoid Valves	STEP
33		**(1)** Preliminary • Identify the failed solenoid valve. • Use compressed air to clean any debris in the surrounding area before proceeding • Have the replacement solenoid valve (UFS P/N 33-000001-004) available. • Remove power from the **Multi-TAP™** device.
34		**(2)** Carefully squeeze the lock tab on the pigtail connector and remove it from the solenoid valve.

35		**(3)** Remove the two (2) Philips head screws from the solenoid valve housing.
36		**(4)** Remove the solenoid valve and the two (2) Philips head screws from the aluminum manifold. Carefully clean the mating surface and ensure the gasket is fully removed before replacing the solenoid valve.
37		**(5)** Install the new solenoid valve. Fasten the two (2) Philips head screws to the aluminum manifold until they are screwdriver tight, and re-attach the pigtail connector.

6.8. Troubleshooting.

SYMPTOM	INDICATION(S)	PROBLEM	SOLUTION	MANUAL REFERENCE
Device screen not illuminated	Screen blank	115 VAC power not on	Apply 115 VAC power to **Multi-TAP™** device	**3.4.5**
		Cable between device screen and PLC not connected	Re-connect cable to PORT1 port on right edge of device screen and / or PORT1 on PLC	
		24 VDC fuse open	Troubleshoot reason for overcurrent; replace fuse	**6.5**
		Power supply defective	Contact **UNITED Fire Systems** for repair information	
LOW PRESSURE Fault	**LOW PRESSURE** indicates **FAULT**	Sampling tubing disconnected or cut	Repair sampling tubing	
		Multi-TAP™ solenoid valve leaking air	Replace solenoid valve	**6.7**
		PVA ball valve not open	Open PVA ball valve	**1.4.2**
		PVA flooded with water	Drain PVA using drain plug	**1.4.2**
		Pressure in sprinkler system is less than 5 PSIG	Place **NITROGEN-PAC™** system valve(s) in **BYPASS** mode, allowing air pressure to increase	
		NITROGEN-PAC™ system is not capable of keeping up with system leakage	Correct leaks in sprinkler system until system can pass NFPA 13 leakage test (no more than 1-1/2 PSIG loss in 24 hours starting at 40 PSIG.	Refer to applicable **NITROGEN-PAC™** Design, Installation, Commissioning, Operation, and Maintenance Manual
		FAULT has not been cleared	Operate the **RESET** Function Button on **FAULTS** screen	**5.1.3**
N2 PURITY NOT MET Fault	**N2 PURITY NOT MET** indicates **FAULT**	**NITROGEN-PAC™** system has not provided enough 98% pure nitrogen in respective zone	Repeat **PURGE MODE** for all Active Zones below purity	**5.2.2**
		Multi-TAP™ Sample solenoid valve stuck open / closed	Replace solenoid valve	**6.7**

6.8 Troubleshooting (Continued).

SYMPTOM	INDICATION(S)	PROBLEM	SOLUTION	MANUAL REFERENCE
O2 SENSOR TIMEOUT Fault	**O2 SENSOR TIMEOUT** indicates **FAULT** and **O2 SENSOR ERROR CODE** Present	**FAULT** has not been cleared	Operate the **RESET** Function Button on **FAULTS** screen	**5.1.3**
		Connection between sensor and PLC loose	Refer to **Figure 29**. Check that indicated sensor connections are firmly connected.	**6.2.3**
		Sensor has failed	Contact **UNITED Fire Systems** for repair information	
LOW NITROGEN PURITY Fault	**LOW NITROGEN PURITY** indicates **FAULT**	**NITROGEN-PAC™** system in bypass mode	Place **NITROGEN-PAC™** system in NORMAL mode	Refer to applicable **NITROGEN-PAC™** Design, Installation, Commissioning, Operation, and Maintenance Manual
		Sprinkler system has not been purged	Open PVA ball valve	**1.4.2**
			Operate **PURGE MODE** Function Button on **MAIN** Screen	**5.2.2**
		NITROGEN-PAC™ system is not providing 98% pure nitrogen	Contact **UNITED Fire Systems**	
		Sprinkler system is known to have 98% pure nitrogen, but has not been sampled	Operate **NITROGEN SAMPLE** Function Button on **MAIN** Screen	**5.2.4**
		Multi-TAP™ Sample solenoid valve stuck open / closed	Replace solenoid valve	**6.7**
Nitrogen purity not increasing	Display remains at 79% indefinitely	**NITROGEN-PAC™** system in bypass mode	Place **NITROGEN-PAC™** system in NORMAL mode	Refer to applicable **NITROGEN-PAC™** Design, Installation, Commissioning, Operation, and Maintenance Manual
		Model Multi-TAP™ device not in **PURGE MODE**	Operate **PURGE MODE** Function Button on **MAIN** Screen	**5.2.2**
Remote signals not being received		Remote signaling relay connections disconnected or improperly made	Repair remote signaling relay connection wiring	**3.4.4**

TRUE ADVANCED PURGE

COMMISSIONING WORKSHEET AND CHECKLIST
TRUE ADVANCED PURGE™ MULTI-TAP™
UFS–810 REVISION 1.00 – PAGE 1 OF 3

UNITED FIRE SYSTEMS

DATE	

LOCATION INFORMATION	
User	
Address 1	
Address 2	
City, State, Zip	
System	

MULTI-TAP SERIAL NUMBER	

PRELIMINARY		
	OK	NOT OK
Is 115 VAC power available, but NOT applied to the **MULTI-TAP™** device?		
Has sampling tubing been run from the Model PVA-2 devices and connected to the **MULTI-TAP™** device?		
Are the ball valves on the Model PVA-2 devices closed?		
(Optional) Have personnel been notified if connections have been made to optional fault signaling contact(s)?		

STARTUP		
	OK	NOT OK
Has 115 VAC power been applied to the power supply by turning the green power switch from **OFF** to **ON**?		
Is the **RUN / STOP** switch on the PLC in the **RUN** position?		
Has **SENSOR HEATER WARMING UP** mode message appeared on **MAIN MENU** screen?		
After sixty (60) seconds, has **NORMAL MODE** message appeared on **MAIN MENU** screen?		
Has **SETUP MENU** Function Button been pressed, and the **PASSWORD** screen appeared?		
Has password been entered on **PASSWORD** screen?		

COMMISSIONING WORKSHEET AND CHECKLIST
TRUE ADVANCED PURGE™ MULTI-TAP™
UFS–810 REVISION 1.00 – PAGE 2 OF 3

CUSTOMIZE SETTINGS		
	OK	NOT OK
Has **NUMBER OF ZONES** Numeric Entry Icon been pressed, and the **PASSWORD** screen appeared?		
Has password been entered on **PASSWORD** screen?		
Has the number of Active Zones been entered?		
Does **DATE / TIME** in upper right corner of HMI screen read the correct **DATE / TIME**?		
If necessary, has **DATE / TIME** been adjusted?		

COMPLETE ONLY IF INSTRUCTED TO DO SO BY UNITED Fire Systems		
	FACTORY DEFAULT	PARAMETER CHANGED TO
Have **PURGE MODE SETTINGS** been adjusted?	1435 MINUTES	
	5 MINUTES	
	98%	
Have **NITROGEN PURITY SETTINGS** been adjusted?	5 MINUTES	
	96%	
Have **LOW PRESSURE SETTINGS** been adjusted?	5 MINUTES	
	5 SECONDS	

ACTIVE DRIFT CONTROL Initialization		
	OK	NOT OK
Does **SENSOR STATUS** indicate **STANDBY** and **02 SENSOR CODE** indicates **0**?		
Has **ADC** Function Button been operated, and has progress bar appeared?		
Has progress bar disappeared, and does **SENSOR STATUS** indicate **ONLINE**?		
Has **MAIN MENU** Function Button been operated to return to **MAIN MENU** screen?		

COMMISSIONING WORKSHEET AND CHECKLIST
TRUE ADVANCED PURGE™ MULTI-TAP™
UFS–810 REVISION 1.00 – PAGE 2 OF 3

COMPLETION		
	OK	NOT OK
Has the **FAULTS** Function Button been operated and the **FAULTS** Screen appeared?		
Do the **LOW PRESSURE** and **LOW PURITY** Fault Status Indicators indicate **FAULT**?		
If the sprinkler system has been filled with air (initial-fill) or nitrogen, have the ball valves on the **Model PVA-2** purge vent assemblies been opened?		
When device inlet pressure increases and **RESET** Function Button is operated, does the **LOW PRESSURE** Fault Status Indicator indicate **CLEAR**?		
Is the **NITROGEN-PAC™** unit generating 98% pure nitrogen?		
Has the **PURGE MODE** Function Button been operated on the **MAIN** Screen? (at the proper point in the **NITROGEN-PAC™** system commissioning sequence)?		
Has the **PURGE MODE** Screen appeared, and have all Active Zones been selected?		
Has the **RUN** Icon been pressed and has the **Multi-TAP™** device begun purging?		

FINAL ACCEPTANCE							
Nitrogen purity value indicated on **MULTI-TAP™** device at the time of final acceptance:							
ZONE 1		**ZONE 4**		**ZONE 7**		**ZONE 10**	
ZONE 2		**ZONE 5**		**ZONE 8**		**ZONE 11**	
ZONE 3		**ZONE 6**		**ZONE 9**		**ZONE 12**	

	PRINT NAME	SIGNATURE	DATE
CUSTOMER			
INSTALLING CONTRACTOR			

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