

TRUE ADVANCED PURGE



MODEL TAP-G3 WITH ADC™

INSTALLATION, COMMISSIONING, AND MAINTENANCE MANUAL

Serial Number _____

Date of Installation _____ Date of Commissioning _____

UNITED Fire Systems

Division of UNITED Fire Protection Corporation

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INDEX

Section	Description	Page
	INDEX	
	List Of Figures	ii
	List Of Tables	iii
	List Of Abbreviations	iii
	Safety Information	iv
	Foreword	vi
	Limited Warranty	vii
1	GENERAL INFORMATION	
1.1	Glossary	1
1.2	Device Purpose	2
1.3	Functional Description	2
1.4	Component Descriptions	
1.4.1	Model TAP-G3 Device	3
1.4.2	Purge Vent Assembly Model PVA-2	4
1.4.3	Sampling Tubing	4
1.4.4	Tubing Connector	5
1.5	Operating Modes	
1.5.1	NORMAL Mode	5
1.5.2	PURGE Mode	5
1.5.3	ACTIVE DRIFT CONTROL™ Mode	6
1.5.4	NITROGEN PURITY SAMPLING Mode	6
1.6	Display Screens	
1.6.1	MAIN Screen	7
1.6.2	FAULTS Screen	8
1.6.3	PASSWORD REQUIRED Screen	9
1.6.4	PASSWORD Screen	10
1.6.5	SETUP START Screen	11
1.6.6	PURGE MODE Screen	12
1.6.7	NITROGEN PURITY Screen	13
1.6.8	LOW PRESSURE Screen	14
1.6.9	ACTIVE DRIFT CONTROL™ Screen	15
2	INSTALLATION	
2.1	Unpacking	17
2.2	Damage or Missing Parts	17
2.3	Model TAP-G3 Device Location	17
2.4	Mechanical Installation	
2.4.1	Fasteners	18
2.4.2	Mounting Holes	18
2.4.3	Mounting	19
2.4.4	Sampling Tubing	19
2.5	Electrical Installation	
2.5.1	Codes	20
2.5.2	Personnel	20
2.5.3	Power Supply Wiring	20
2.5.4	Optional Fault Signaling Contact Connection Wiring	20
2.5.5	Electrical Installation Steps	21
3	COMMISSIONING	
3.1	Before Starting Commissioning Procedure	23
3.2	Preliminary	23

3	COMMISSIONING (continued)	
3.3	Startup	24
3.3.1	Applying 115 VAC Power	24
3.3.2	RUN / STOP Switch To RUN	24
3.3.3	SENSOR HEATER WARMING UP Mode	25
3.3.4	NORMAL Mode	24
3.3.5	ACTIVE DRIFT CONTROL™	25
3.3.6	Applying Gas Pressure To TAP-G3 Device Inlet	27
3.3.7	LOW NITROGEN PURITY Fault	27
3.4	PURGE MODE	27
4. MAINTENANCE		
4.1	Manual Activation of NITROGEN PURITY SENSING	30
4.2	Clearing Faults	30
4.3	115 VAC Power Interruption / Restoration	30
4.3.1	Power Backup	30
4.3.2	Power Restoration	31
4.4	Replacement of PLC Backup Battery	31
4.5	Replacement of Low-Voltage Fuse	33
4.6	Troubleshooting	34
A	APPENDIX – Commissioning Worksheet and Checklist	

LIST OF FIGURES

Figure No.	Description	Page
1	Functional Description and General Arrangement	2
2	Schematic Diagram - Model TAP-G3 Device	3
3	Purge Vent Assembly Model PVA-2	4
4	Sampling Tubing	5
5	Tubing Connector – P/N 33-000006-000	5
6	Layout – MAIN Screen	7
7	Layout – FAULTS Screen	8
8	Layout – PASSWORD REQUIRED Screen	9
9	Layout – PASSWORD Screen	10
10	Layout – SETUP START Screen	11
11	Layout – PURGE MODE Screen	12
12	Layout – NITROGEN PURITY Screen	13
13	Layout – LOW PRESSURE Screen	14
14	Layout – ACTIVE DRIFT CONTROL™ Screen	15
15	Device Interior General Arrangement	16
16	Dimensions and Mounting Details	18
17	Wiring Diagram	22
18	PLC RUN / STOP Switch	24
19	MAIN Screen – SENSOR HEATER WARMING UP	25
20	MAIN Screen – NORMAL Mode	25
21	ACTIVE DRIFT CONTROL™ Screen – Sensor Status: STANDBY	26
22	ACTIVE DRIFT CONTROL™ Screen with Progress Bar	26
23	ACTIVE DRIFT CONTROL™ Screen – Sensor Status: ONLINE	27
24	Device Interior General Arrangement	29
25	Replacement of PLC Backup Battery	31
26	Re-attachment of PLC to Bracket	32

LIST OF TABLES

Table No.	Description	Page
1	Sampling Tubing from UNITED Fire Systems	5
2	Automatic ACTIVE DRIFT CONTROL™ Sequence	6
3	UTC to USA Local Time Conversions	7

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, Gage	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 1.2.2	
ID	Inside Diameter	
MIC	Microbiologically Influenced Corrosion – refer to 1.1.3	
NC	Normally Closed – refer to 2.5.4	
NO	Normally Open – refer to 2.5.4	
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	
TAP	True Advanced Purge™ device	
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™ Model TAP-G3** device. Carefully read, understand, and follow instructions identified by these symbols.



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.



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.



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.



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™ Model TAP-G3** device. This manual must be read thoroughly and completely understood before installation and operation of the **Model TAP-G3** 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 **Model TAP-G3** 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 **Model TAP-G3** device contains nitrogen which quickly disperses in the atmosphere. **DO NOT** directly inhale the output gas from the exhaust mufflers.

The **Model TAP-G3** 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 **Model TAP-G3** 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 is written for those who install, commission, and maintain the **UNITED Fire Systems TRUE ADVANCED PURGE™ Model TAP-G3** device. The manual contains installation, commissioning, and maintenance information for these devices.



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™ Model TAP-G3** 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 **Model TAP-G3** 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 Installation, Commissioning, and Maintenance Manual P/N 33-TG3MAN-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.net



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.net

= 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 (N₂). 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 percent (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 (O₂). 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 13-2016 section 7.2.6.3.2 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.

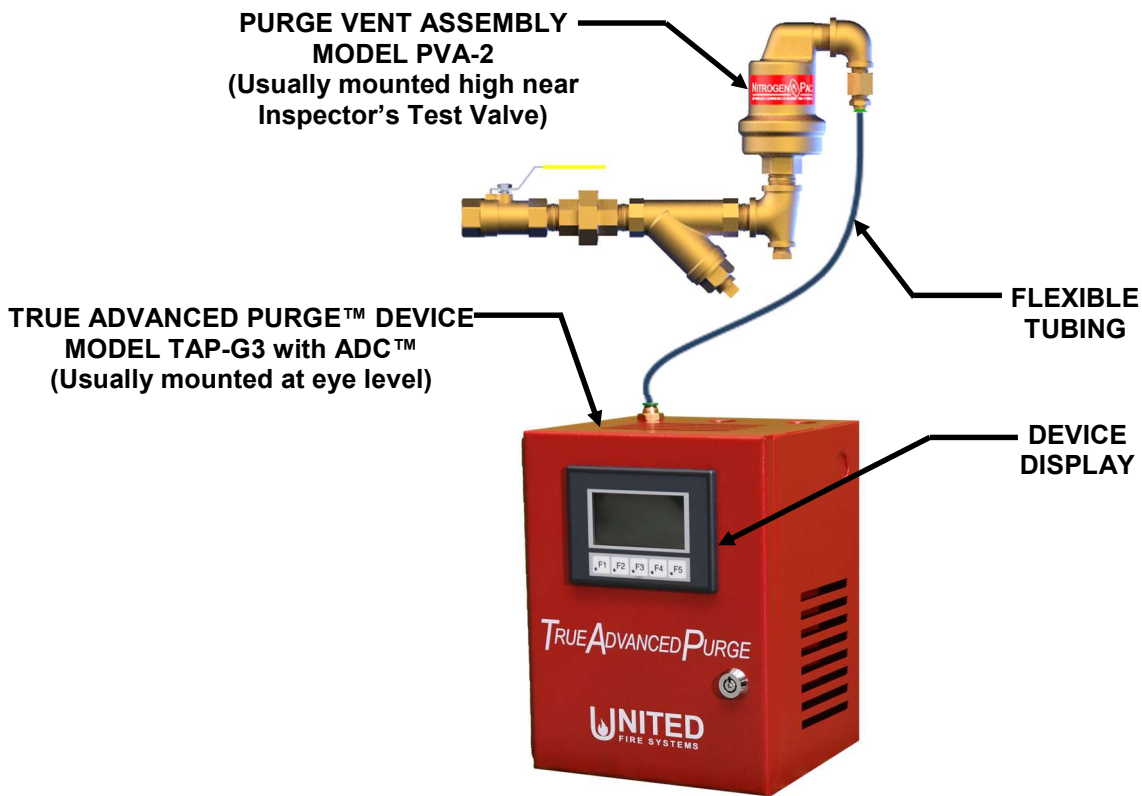
1.2. DEVICE PURPOSE. The **UNITED Fire Systems TRUE ADVANCED PURGE™ Model TAP-G3** with **ADC™** device is designed to automatically purge air from within dry-pipe or preaction fire sprinkler system piping and replace the air with 98% nitrogen from a **NITROGEN-PAC™** sprinkler corrosion inhibiting system. The device also automatically samples, analyzes, and displays the percentage of nitrogen in the pipe.

1.2.1 Advanced Sensor Technology. The **Model TAP-G3** 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 **Model TAP-G3** 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 **Model TAP-G3** device automatically measures the nitrogen purity in the piping. No user involvement or special reference gas is required, and no other similar device available today offers this active method of controlling the accuracy of the displayed nitrogen value.

1.3 FUNCTIONAL DESCRIPTION. Refer to **Figure 1**.

Figure 1
Functional Description and General Arrangement



A. The **Model PVA-2** Purge Vent Assembly is 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.

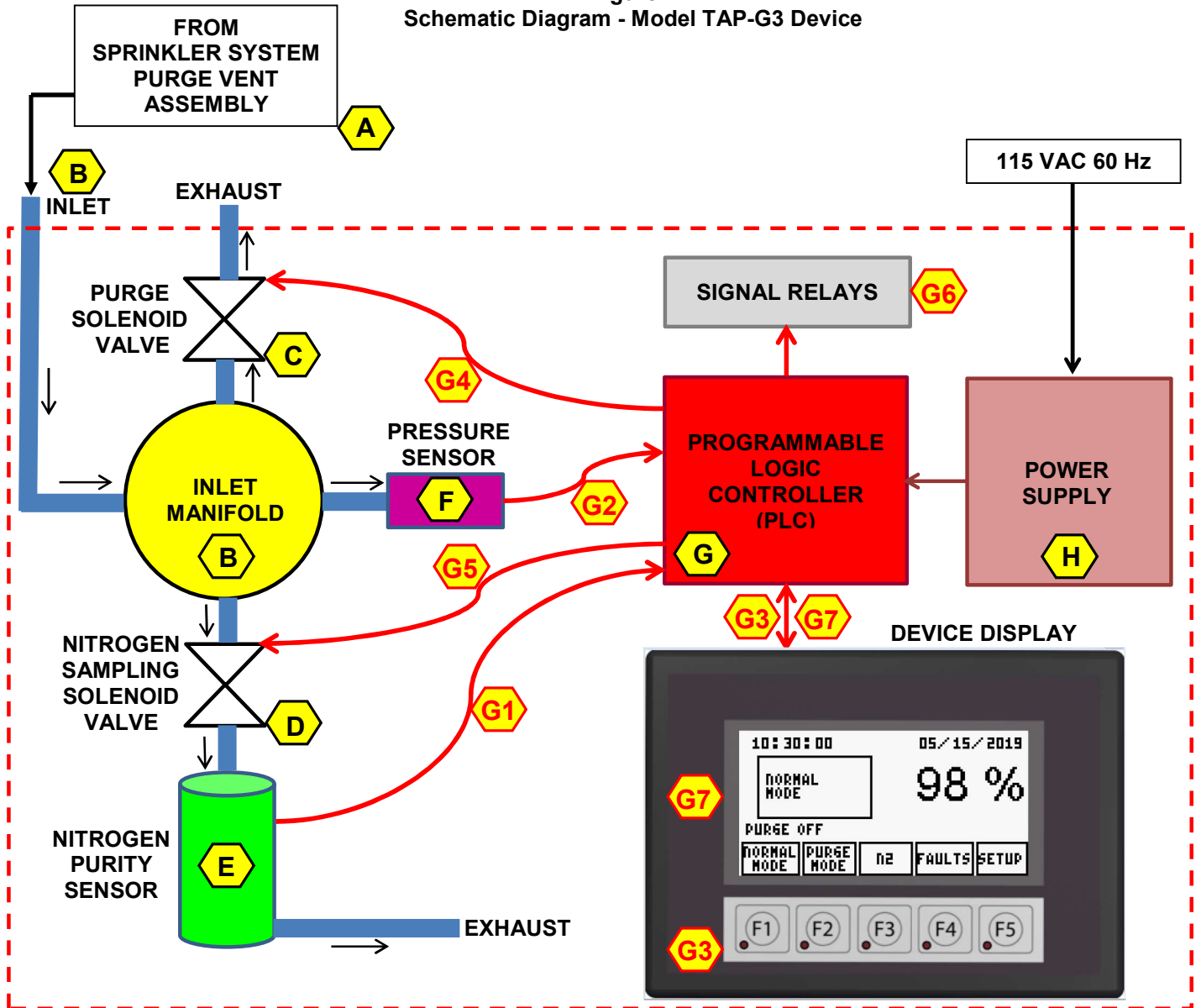
B. Plenum-rated flexible tubing connects the outlet of the **Model PVA-2** to the inlet of the **Model TAP-G3** device. The tubing permits mounting of the **Model TAP-G3** device at any convenient location.

C. The display on the front of the **Model TAP-G3** device allows visual monitoring of the nitrogen concentration in the fire sprinkler piping and the device status. The display also includes five (5) pushbutton switches for device control.

1.4 COMPONENT DESCRIPTIONS.

1.4.1. Model TAP-G3 Device. Refer to Figure 2.

Figure 2
 Schematic Diagram - Model TAP-G3 Device

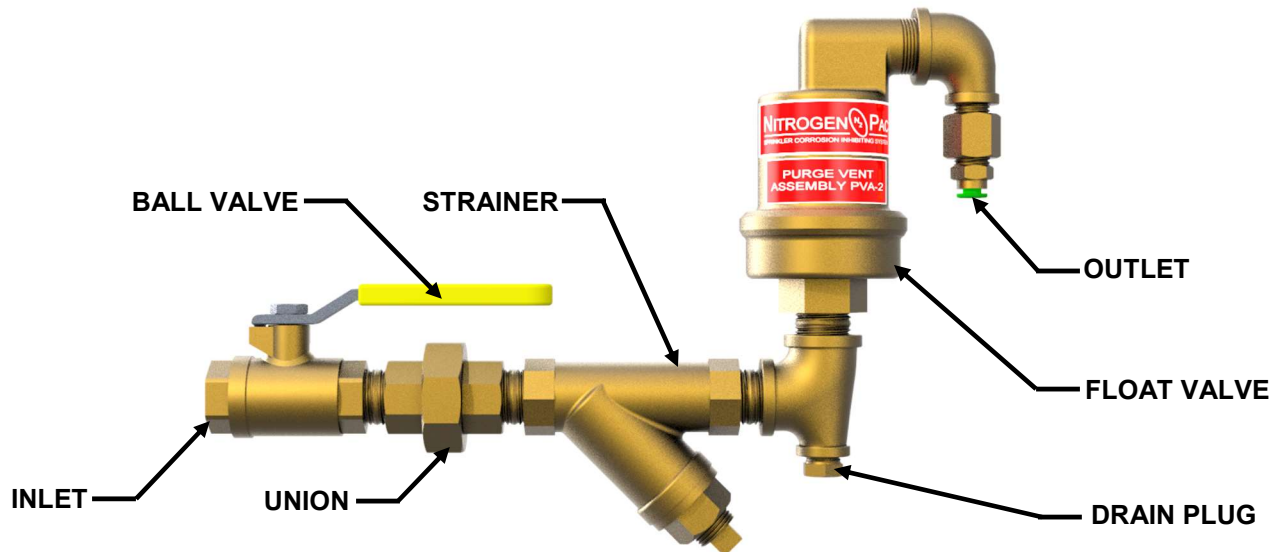


- A. The Purge Vent Assembly (**Model PVA-2**) allows gas pressure from the interior of the sprinkler system piping to travel through flexible tubing to the inlet of the **Model TAP-G3** device.
- B. The gas pressure enters the **INLET** of the **Model TAP-G3** device, and proceeds to the **INLET MANIFOLD**.
- C. The **PURGE SOLENOID VALVE** is opened when the **Model TAP-G3** 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. The **NITROGEN SAMPLING SOLENOID VALVE** is opened when the **Model TAP-G3** device is in **NITROGEN PURITY SAMPLING** mode. This allows a sample of gas from the sprinkler system piping to pass 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 SENSOR** is 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 SENSOR**.
 - G3. The five (5) function buttons on the **DEVICE DISPLAY**.
- The **PROGRAMMABLE LOGIC CONTROLLER (PLC)** provides output to:
- G4. The **PURGE SOLENOID VALVE**.
 - G5. The **NITROGEN SAMPLING SOLENOID VALVE**.
 - G6. The **SIGNAL RELAYS**.
 - G7. The display portion of the **DEVICE DISPLAY**, which shows different screens depending upon selections made with the five (5) function buttons.
- 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.

1.4.2. Purge Vent Assembly Model PVA-2. Refer to **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 in the vicinity of 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. Refer to **Figure 4**. Sampling tubing for connection of the outlet of the **PVA-2** to the inlet of the **Model TAP-G3** 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
33-000003-020	Tubing, 20 foot length	Included With Model TAP-G3 Device
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 leadtime from UNITED Fire Systems

Figure 4
Sampling Tubing



1.4.4 Tubing Connector P/N 33-000006-000. Refer to **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



1.5 OPERATING MODES. For additional information on **NORMAL**, **PURGE**, **ACTIVE DRIFT CONTROL**, and **NITROGEN PURITY SAMPLING** modes, please refer to UFS manual P/N 33-TG3USE-000 – **Model TAP-G3 Device User Guide**.

1.5.1 NORMAL Mode. The **Model TAP-G3** 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.

1.5.2 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 function button F2 on the **MAIN** screen. The **PURGE** mode sequence is:

- (1) The **PURGE** solenoid valve 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 **Model TAP-G3** device enters **NITROGEN PURITY SAMPLING** mode. After the preset sampling duration (factory default 5 minutes), the updated nitrogen purity 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 1.5.2 (2), the **Model TAP-G3** device again opens the **PURGE** solenoid valve per 1.5.2 (1).

- (4) If the displayed nitrogen purity is **LESS** than the preset purge threshold (factory default 98%) for twenty-one (21) consecutive cycles, the **Model TAP-G3** device activates the **NITROGEN PURITY NOT MET** fault (refer to **1.6.2 (1)**) and enters **NORMAL** mode.
- (5) If the displayed nitrogen purity is **EQUAL TO OR GREATER THAN** the preset purge factory threshold (factory default 98%), the **Model TAP-G3** device terminates **PURGE** mode and enters **NORMAL** mode. No fault is indicated.



IMPORTANT

When multiple **Model TAP-G3** devices are associated with a single **NITROGEN-PAC™** system, it is important to have no more than one (1) **Model TAP-G3** device in **PURGE** mode at one time. Having multiple **Model TAP-G3** devices in **PURGE** mode at one time could result in low air signals.

1.5.3 ADC™ - ACTIVE DRIFT CONTROL™ Mode.

(1) **Introduction.** The **Model TAP-G3** 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 **Model TAP-G3** 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 whether the **Model TAP-G3** device is in **NORMAL** or **PURGE** 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 2**. Once per day, the **Model TAP-G3** 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.

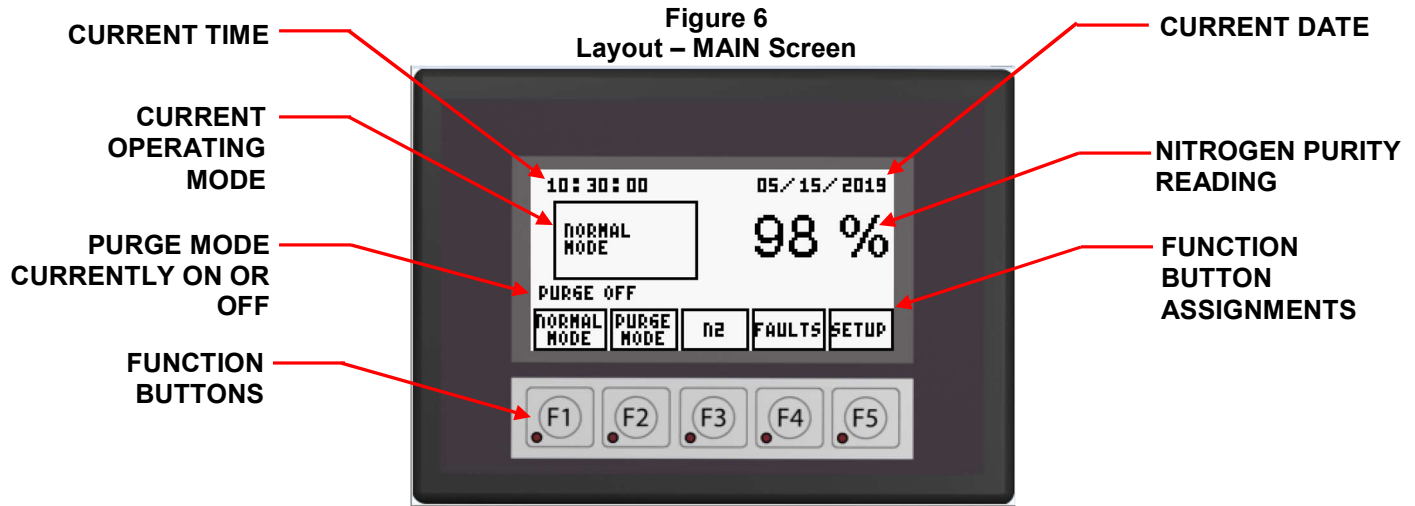
Table 2
Automatic ACTIVE DRIFT CONTROL™ Sequence

START TIME	END TIME	FUNCTION BUTTONS	PURITY DISPLAY	FAULT CONTACTS	SCREEN FLASHING	MODE DISPLAY	DEVICE OPERATION
12:00:00	12:49:59	Disabled	Enabled	Disabled	Disabled	NORMAL or PURGE	Sensor returning to atmospheric purity
12:50:00	12:59:59	Disabled	Disabled	Disabled	Disabled	ACTIVE DRIFT CONTROL™	Drift being evaluated
01:00:00	01:04:59	Disabled	Disabled	Disabled	Disabled	N2 PURITY SAMPLING	Sprinkler system being sampled
01:05:00	01:09:59	Disabled	Enabled	Disabled	Disabled	NORMAL or PURGE	Drift control being enabled
01:10:00		Enabled	Enabled	Enabled	Enabled	NORMAL or PURGE	Device returns to previous mode

1.5.4 NITROGEN PURITY SAMPLING Mode. The **Model TAP-G3** device 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 Function Button **F3**.

1.6 DISPLAY SCREENS.

1.6.1 MAIN Screen. Refer to **Figure 6**. This is the default screen displayed by the **Model TAP-G3** device unless function buttons have been used to change to a different display screen.



(1) **CURRENT TIME** = The **Model TAP-G3** device is factory-set to display Coordinated Universal Time (UTC). Refer to **Table 2** for UTC to USA local time conversions.

Table 3
UTC to USA Local Time Conversions

USA TIME ZONE	STANDARD TIME	DAYLIGHT TIME
EASTERN	UTC MINUS 5 HOURS	UTC MINUS 4 HOURS
CENTRAL	UTC MINUS 6 HOURS	UTC MINUS 5 HOURS
MOUNTAIN	UTC MINUS 7 HOURS	UTC MINUS 6 HOURS
PACIFIC	UTC MINUS 8 HOURS	UTC MINUS 7 HOURS
ALASKA	UTC MINUS 9 HOURS	UTC MINUS 8 HOURS
HAWAII	UTC MINUS 10 HOURS	N / A

(2) **CURRENT DATE** = The current date is displayed in **MM / DD / YYYY** format.

(3) **CURRENT OPERATING MODE** = Indicates the current operating mode. Refer to **1.5** for additional information on the various operating modes.

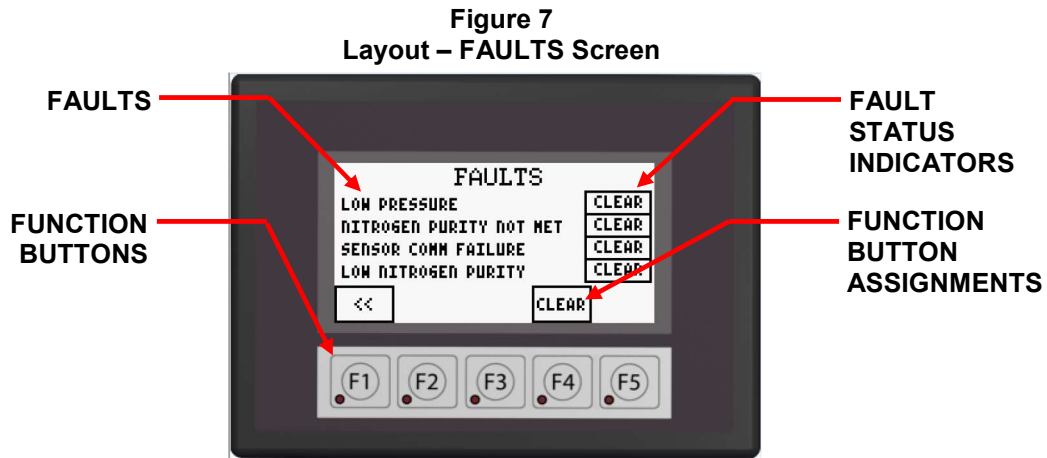
(4) **NITROGEN PURITY READING** = Indicates the nitrogen purity in the sprinkler piping, per the last automatic or manual sampling.

(5) **PURGE MODE CURRENTLY ON OR OFF** = The **Model TAP-G3** device can be in another operating mode while purging. This area of the **MAIN** screen indicates when the device is **PURGE** mode even when another mode is displayed. When **PURGE ON** is displayed here, a countdown timer to the end of that particular purge cycle is displayed to the right of the **PURGE ON** indication.

(6) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	ASSIGNMENT LABEL	REFERENCE	NOTES
MAIN	F1	NORMAL MODE	1.5.1	
	F2	PURGE MODE	1.5.2	
	F3	N2	1.5.4	NITROGEN PURITY SAMPLING mode
	F4	FAULTS	1.6.2	
	F5	SETUP	1.6.3	Displays the PASSWORD REQUIRED screen.

1.6.2 FAULTS Screen. Refer to **Figure 7**. The **FAULTS** screen permits the user to identify which of four (4) faults have been activated.



(1) FAULTS

- **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.
- **NITROGEN PURITY NOT MET** = Occurs when a 21-day purge cycle has ended and the nitrogen purity has not reached the preset value (factory default 98%).
- **SENSOR COMM FAILURE** = Occurs when the programmable logic controller (PLC) loses communication with the electronics associated with the nitrogen purity sensor.
- **LOW NITROGEN PURITY** = Occurs when the nitrogen purity is below the preset value (factory default 96%) after a manual or automatic nitrogen purity reading takes place.

(2) FAULT STATUS INDICATORS

- **CLEAR** = Indicates there is no fault associated with the adjacent description.
- **FAULT** = Indicates there is a fault associated with the adjacent description.
- **FLASHING RED SCREEN** – The screen flashes **RED** whenever a fault is present, unless the **Model TAP-G3** device is in **ACTIVE DRIFT CONTROL** mode.



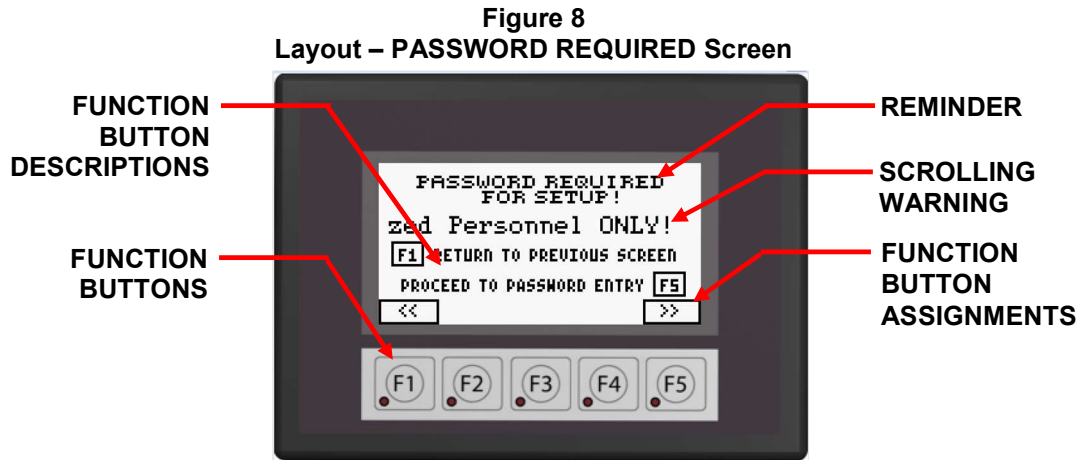
IMPORTANT

Allowing the screen to remain flashing **RED** for extended periods can lead to “burn-in” of the color, turning the screen permanently pink. Resolve faults promptly to avoid this effect

3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	
FAULTS	F1	<< Press F1 to return to MAIN screen.
	F2	Not used.
	F3	Not used.
	F4	CLEAR – Faults latch upon occurrence, making intermittent faults easier to troubleshoot. When all faults have been corrected, press F4 to restore all fault status indicators to CLEAR . This will also shut off the blinking red screen
	F5	Not used.

1.6.3 PASSWORD REQUIRED Screen. Refer to **Figure 8**. This screen reminds the user that a password, only available from **UNITED Fire Systems** under circumstances where variables require change, is needed to proceed to programming screens.



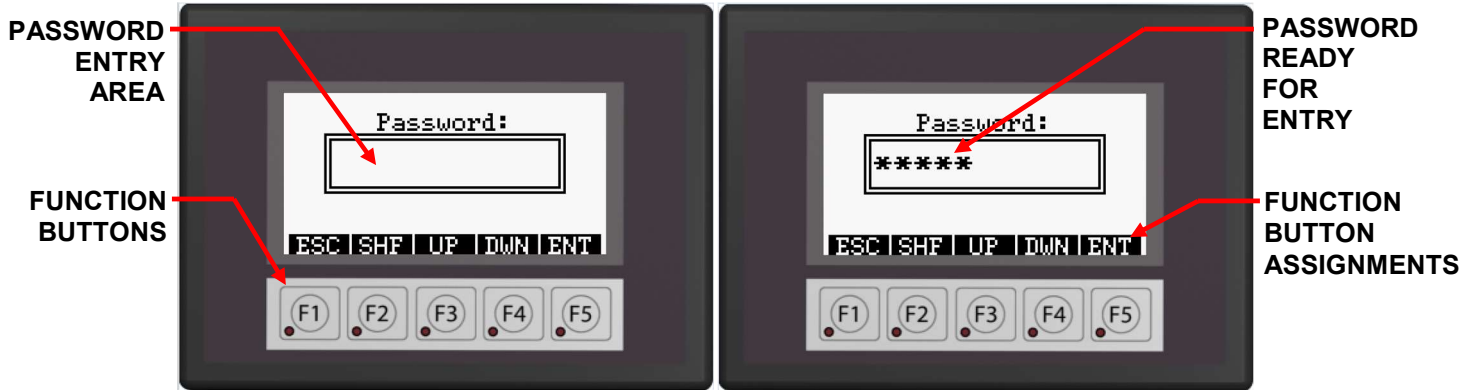
- (1) **REMINDER** = These lines remind the user that a password is required to begin **SETUP** on the various screens to follow. Users without possession of the password are prevented from proceeding beyond this screen. Press **F1** to return to the **MAIN** screen.
- (2) **SCROLLING WARNING** = This warning – **Authorized Personnel ONLY!** – scrolls continuously to alert users that authorization to proceed with **SETUP** is required. Authorized personnel are those in possession of the proper password.

(3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	
SETUP START	F1	<< Press F1 to return to MAIN screen – refer to 1.6.1 . Users not in possession of a valid password MUST operate this function button.
	F2	Not used.
	F3	Not used.
	F4	Not used.
	F5	>> Press F5 to advance to PASSWORD screen – refer to 1.6.4 . Users should operate this button ONLY when in possession of a valid password.

1.6.4 PASSWORD Screen. Refer to **Figure 9**. This screen allows a user in possession of the password to enter that password and proceed to programming screens.

Figure 9
Layout – PASSWORD Screen



(1) **PASSWORD ENTRY AREA** = Password numbers appear in this area while password is being entered.

(2) **PASSWORD READY FOR ENTRY** = When all password numbers have been entered, the **PASSWORD ENTRY AREA** will contain five (5) asterisks, as shown.



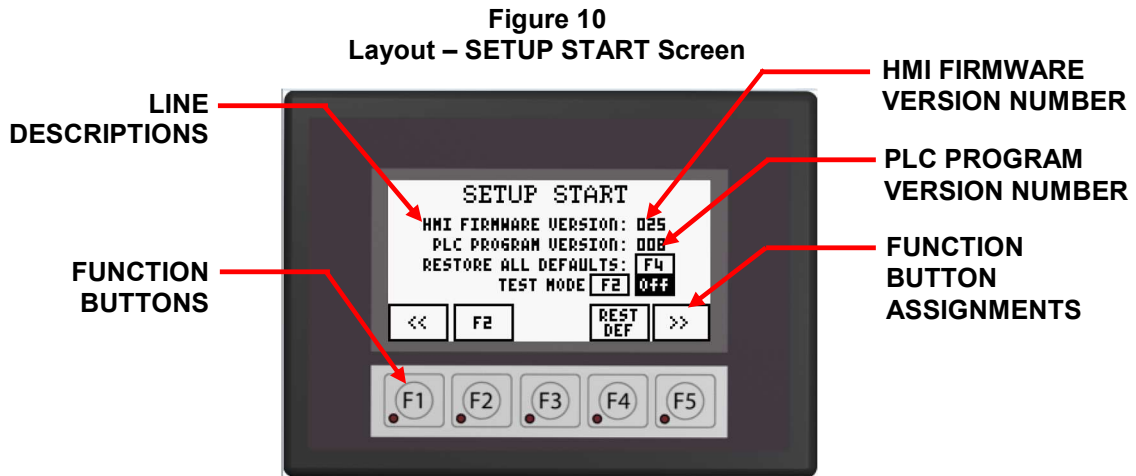
IMPORTANT

The password for the **Model TAP-G3** device is **19564**.
 To avoid inadvertent changes to variable parameters, **DO NOT** provide the password to unauthorized or untrained personnel.
 The Model TAP-G3 device password **CANNOT** be changed!

(3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	
PASSWORD	F1	Labeled ESC for ESCAPE . Press F1 to return to the PASSWORD REQUIRED screen.
	F2	Labeled SHF for SHIFT . Press F2 to move the cursor one space to the right after reaching the correct digit in the previous space.
	F3	Labeled UP . Press F3 to increase the digit appearing in the cursor location by 1. The digits begin with zero. Continued operation of this function button after reaching nine (9) returns the digit to zero.
	F4	Labeled DWN for DOWN . Press F4 to decrease the digit appearing in the cursor location by 1. The digits begin with zero. Operation of this function button when the digit is zero changes the digit to nine (9).
	F5	Labeled ENT for ENTER . Press F5 to enter the password when all digits have been properly entered using function buttons F2 , F3 , and F4 , and proceed to the SETUP START screen.

1.6.5 SETUP START Screen. Refer to **Figure 10**. This screen permits authorized personnel to reference the version numbers of the HMI and PLC, and proceed to additional variable parameter programming screens



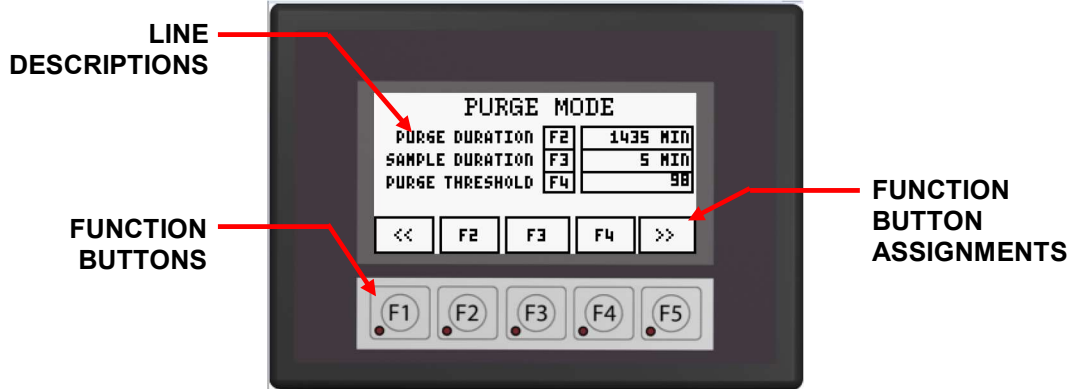
- (1) **HMI FIRMWARE VERSION NUMBER** = Displays the version number of the firmware programmed into the Human / Machine Interface (HMI). If troubleshooting by **UNITED Fire Systems** is required, the commissioning technician may need to supply this number.
- (2) **PLC PROGRAM VERSION NUMBER** = Displays the version number of the program in the Programmable Logic Controller (PLC). If troubleshooting by **UNITED Fire Systems** is required, the commissioning technician may need to supply this number.
- (3) **RESTORE ALL DEFAULTS** = This function restores *all* variable parameters that can be changed by authorized personnel to the factory default values.
- (4) **TEST MODE** = Test mode is **NOT** used at this time. **DO NOT PRESS F2 UNLESS INSTRUCTED TO DO SO BY UNITED Fire Systems!**

(5) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	
SETUP START	F1	<< Press F1 to return to PASSWORD REQUIRED screen – refer to 1.6.3 .
	F2	TEST MODE – Test mode is NOT used at this time. DO NOT PRESS F2 UNLESS INSTRUCTED TO DO SO BY UNITED Fire Systems!
	F3	Not used.
	F4	REST DEF – Press F4 to restore <i>all</i> variables that can be changed by the commissioning technician to the factory default values.
	F5	>> Press F5 to advance to PURGE MODE screen – refer to 1.6.6 .

1.6.6 PURGE MODE Screen. Refer to Figure 11. Refer to 1.5.2 for an explanation of PURGE MODE.

Figure 11
 Layout – PURGE MODE Screen



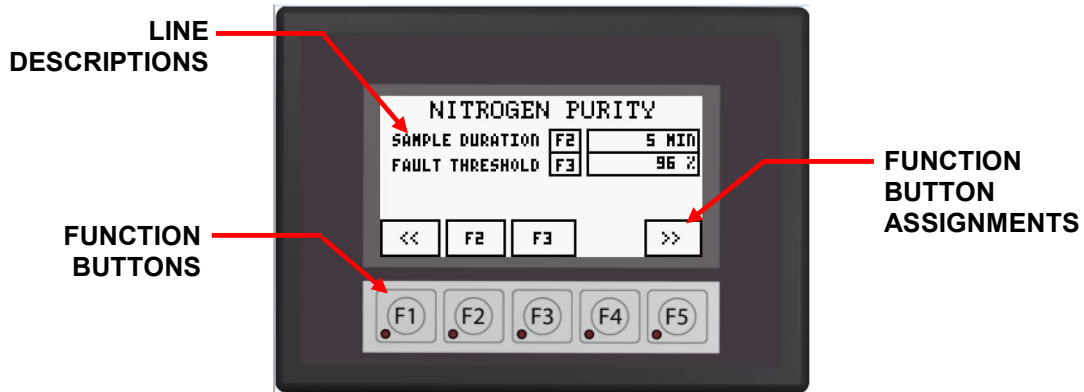
- (1) **PURGE DURATION** = This indicates the preset duration that the **PURGE** solenoid valve is open. The factory default is 1435 minutes, or 23 hours 55 minutes.
- (2) **SAMPLE DURATION** = This indicates the preset duration that the **Model TAP-G3** device will be in **NITROGEN PURITY SAMPLING** mode at the end of the **PURGE MODE** duration. After this duration, the updated nitrogen purity is displayed. The factory default is 5 minutes.
- (3) **PURGE THRESHOLD** = This indicates the threshold N2 purity to be reached by **PURGE MODE**. The factory default is 98%.

(4) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	VARIABLE	FACTORY DEFAULT	
PURGE MODE	F1	<< Press F1 to return to SETUP START screen – refer to 1.6.5.		
	F2	PURGE DURATION	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 .
	F3	SAMPLE DURATION	5 minutes	
	F4	PURGE THRESHOLD	98%	
	F5	>> Press F5 to advance to NITROGEN PURITY screen – refer to 1.6.7.		

1.6.7 NITROGEN PURITY Screen. Refer to **Figure 12**. Refer to **1.5.4** for an explanation of **NITROGEN PURITY SAMPLING** mode.

Figure 12
Layout – NITROGEN PURITY Screen



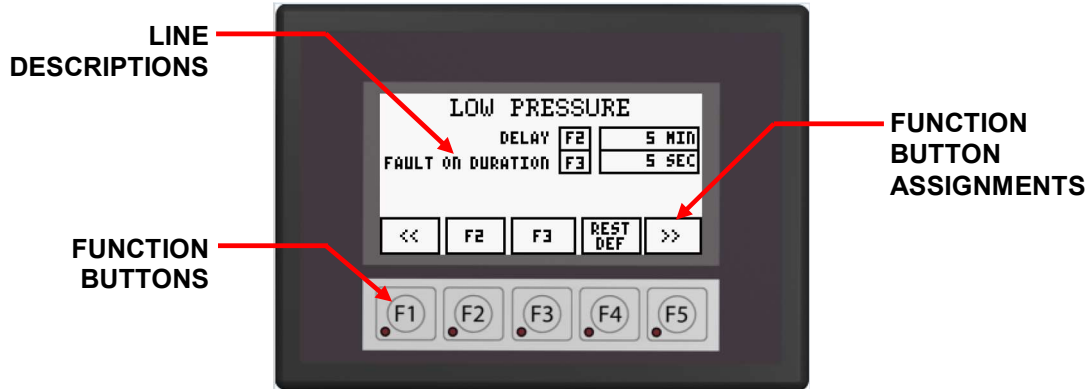
- (1) **SAMPLE DURATION** = This indicates the preset duration that the **Model TAP-G3** device will be in **NITROGEN PURITY SAMPLING** mode once per day, after **ACTIVE DRIFT CONTROL™** takes place. After this duration (factory default 5 minutes), the updated nitrogen purity is displayed. The factory default is 5 minutes
- (2) **FAULT THRESHOLD** = This indicates the threshold N₂ purity below which a **FAULT** will occur in **NORMAL** mode. Although the normal N₂ 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.

(3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	VARIABLE	FACTORY DEFAULT	
NITROGEN PURITY	F1	<< Press F1 to return to PURGE MODE screen – refer to 1.6.6 .		
	F2	SAMPLE DURATION	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 .
	F3	FAULT THRESHOLD	96%	
	F4	Not used.		
	F5	>> Press F5 to advance to LOW PRESSURE screen – refer to 1.6.8 .		

1.6.8 LOW PRESSURE Screen. Refer to **Figure 13**. This screen permits authorized personnel to change two (2) variable parameters associated with the **LOW PRESSURE** fault. Refer to **1.6.2 (1)** for an explanation of the **LOW PRESSURE** fault.

Figure 13
Layout – LOW PRESSURE Screen



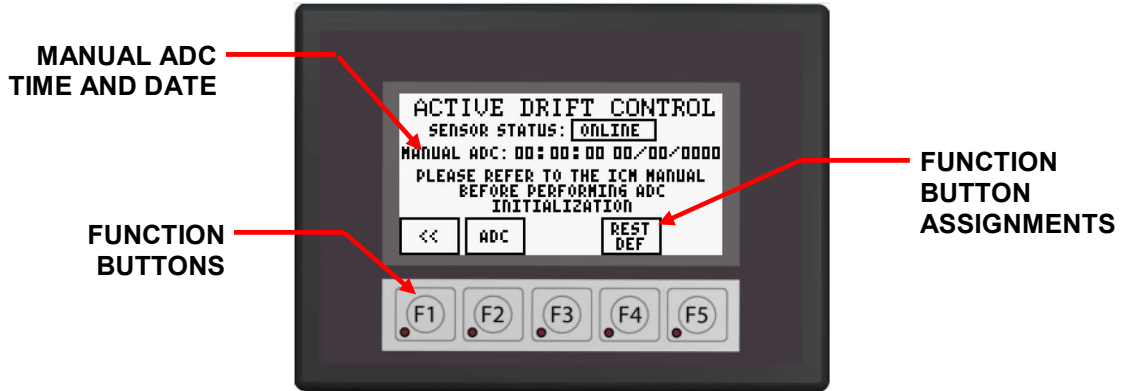
- (1) **DELAY** = This indicates the minimum time that both the purge solenoid valve and the nitrogen sampling solenoid valve must be closed for the PLC to check the status of the pressure switch.
- (2) **FAULT ON DURATION** = This indicates the minimum time that low pressure switch must be at or below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

(3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	VARIABLE	FACTORY DEFAULT	
LOW PRESSURE	F1	<< Press F1 to return to NITROGEN PURITY screen – refer to 1.6.7 .		
	F2	DELAY	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 .
	F3	FAULT ON DURATION	5 seconds	
	F4	REST DEF – Press F4 to restore <i>all</i> variables that can be changed by the commissioning technician to the factory default values.		
	F5	>> Press F5 to advance to ACTIVE DRIFT CONTROL™ screen – refer to 1.6.9 .		

1.6.9 ACTIVE DRIFT CONTROL™ Screen. Refer to **Figure 14**. This screen provides information on the **ADC™ - ACTIVE DRIFT CONTROL™** mode. Refer to **1.5.3** for an explanation of **ADC™ - ACTIVE DRIFT CONTROL™** mode.

**Figure 14 – Layout
 ACTIVE DRIFT CONTROL™ Screen**



(1) **SENSOR STATUS** = This parameter may indicate:

- **STANDBY** (when the automatic **ACTIVE DRIFT CONTROL™** sequence is active between 12:00 AM and 1:10 AM (refer to **1.5.3 (2) Table 2**).
- **ONLINE** (all other times).

(2) **MANUAL ADC** = This parameter indicates the time and date of the last manual activation of **ACTIVE DRIFT CONTROL™** (by pressing function button **F2**).

(3) FUNCTION BUTTONS AND ASSIGNMENTS

SCREEN	FUNCTION BUTTON	
ACTIVE DRIFT CONTROL™	F1	<< Press F1 to return to LOW PRESSURE screen – refer to 1.6.8 .
	F2	ADC™ – Press F2 to manually initialize an ADC cycle.
	F3	Not used.
	F4	REST DEF – Press F4 to restore <i>all</i> variables that can be changed by the commissioning technician to the factory default values.
	F5	Not used.

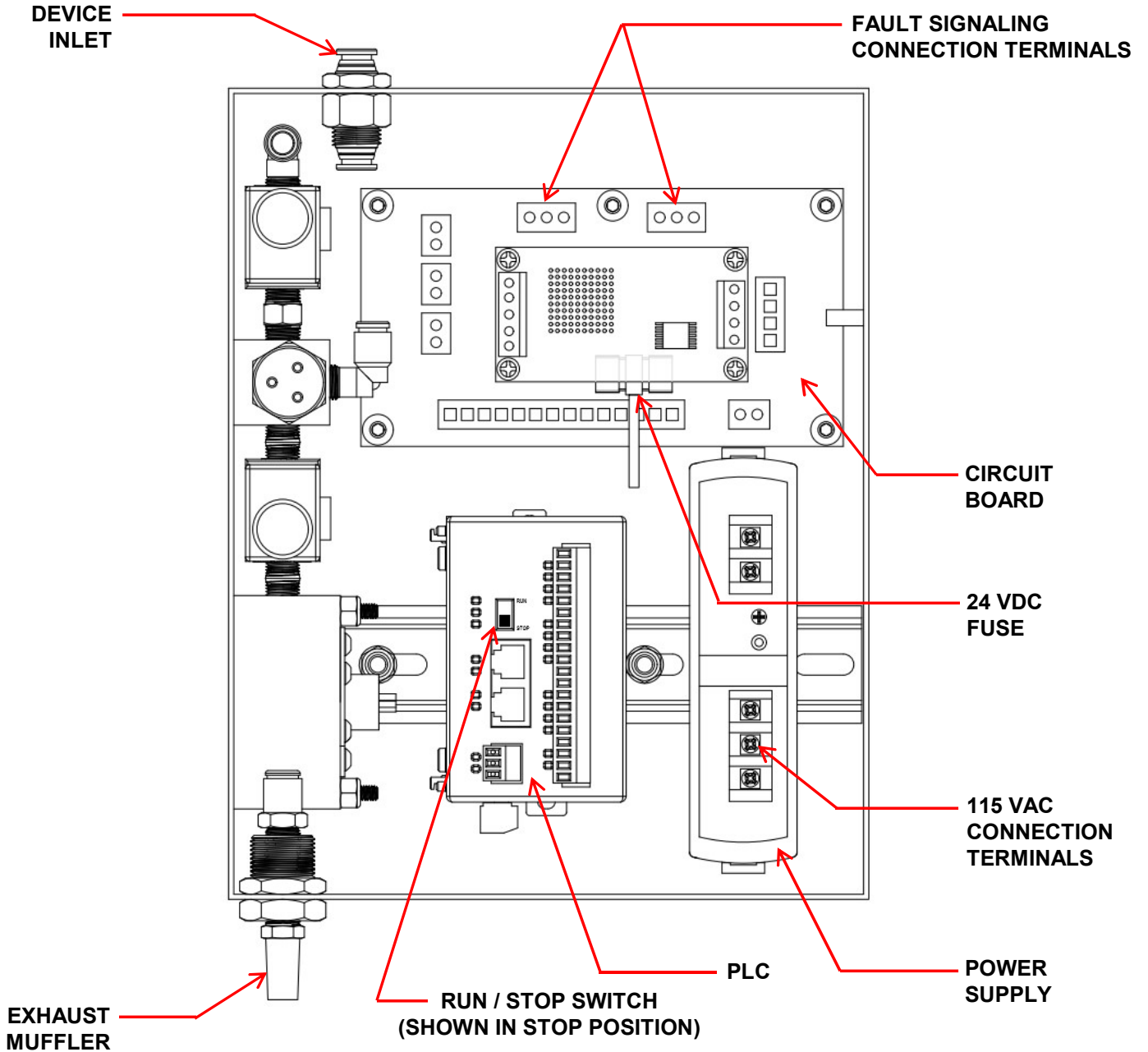
2. INSTALLATION



IMPORTANT

The installation of the **TRUE ADVANCED PURGE™ Model TAP-G3** device **MUST** be in accordance with this manual. Read this manual in its entirety **BEFORE** beginning installation of the **Model TAP-G3** device. Understand and follow all instructions provided in this manual.

Figure 15 – Model TAP-G3 Device Interior
General Arrangement



2.1 Unpacking. Check shipment of the **Model TAP-G3** 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 **Model TAP-G3** device package:

- **Model TAP-G3** device.
- 20 foot length of connection tubing UFS P/N 33-000003-020 (may be packaged in separate cardboard box).
- **Model TAP-G3** User Guide UFS P/N 33-TG3USE-000.
- **Model TAP-G3** Installation, Commissioning, and Maintenance Manual UFS P/N 33-TG3MAN-000.
- **Model TAP-G3** Mounting Template Sheet UFS P/N 33-000004-000.

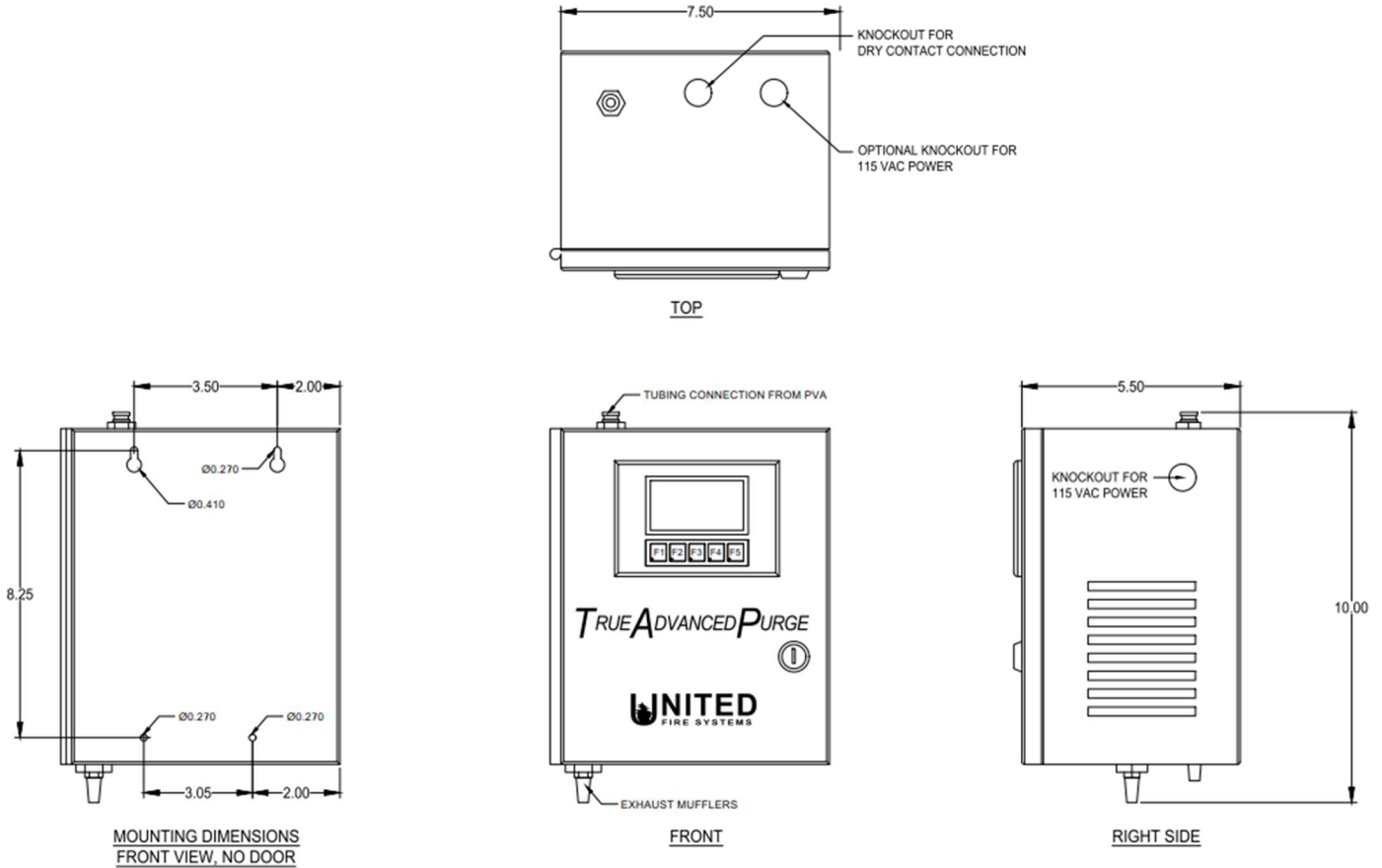
2.2 Damage or Missing Parts. If there is any damage or missing parts, the transportation company's agent should make a notation to the effect on the Bill of Lading. Claims should be settled directly with the transportation company. Verify that all parts were received in the shipment as ordered. Contact the factory immediately if there are any missing parts or discrepancies.

2.3 Model TAP-G3 Device Location. Choose a mounting location for the **Model TAP-G3** device where:

- Indicated on engineering drawings (if available).
- The location is clean, dry, and indoors. The **Model TAP-G3** device is designed for indoor use only.
- The temperature remains between +32°F (0°C) to +122°F (50°C).
- The **Model TAP-G3** device display can 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 assembly (**Model PVA-2**) to the **Model TAP-G3** device is less than 1000 feet maximum.
- A minimum of 3 inches (8 cm) of clearance on all sides of the **Model TAP-G3** device can be maintained.
- The **Model TAP-G3** device front-hinged door can be fully opened.
- The **Model TAP-G3** device weight of approximately 10 lbs. (4.5 kg) can be adequately supported.
- Occasional hissing noise from exhaust mufflers during certain operating modes will not bother operating personnel.

2.4 Mechanical Installation. Refer to **Figure 16** for installation dimensions and mounting details

Figure 16 – Dimensions and Mounting Details



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

2.4.2 Mounting Holes. Follow these steps in order:

- (1) Use the full-size template provided with the **Model TAP-G3** device (UFS P/N **33-000004-000**) to locate mounting holes at the chosen mounting location.
- (2) Use suitable tape to temporarily fasten template to wall. **NOTE:** Proper orientation of template is printed side out with the word “TOP” located at the top.
- (3) Transfer mounting marks to wall using a punch or other device suitable for wall material.
- (4) 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.

2.4.3 Mounting. Follow these steps in order:

- (1) Choose connection entries for AC power raceway and optional alarm signaling connection raceway, and remove knockouts.
- (2) Insert fasteners into mounting holes.
- (3) Attach 1/4 inch hardware into UPPER mounting holes, inserting about half-way.
- (4) Use keyhole-shaped UPPER holes to hang **Model TAP-G3** device onto upper hardware.
- (5) Insert lower hardware.
- (6) Tighten all hardware snugly into fasteners.

2.4.4 Sampling Tubing. Sampling tubing is required from the outlet of the purge vent assembly (**Model PVA-2**) installed on the sprinkler piping to the inlet of the **Model TAP-G3** device. The required tubing is flame-retardant, plenum-rated polyethylene, 1/4" OD, 0.17" ID.

(1) Tubing Lengths.

- Twenty (20) feet of tubing is supplied with the **Model TAP-G3** device.
- UFS P/N **33-000003-050** is a 50-foot length of the same tubing, available separately.
- UFS P/N **33-000003-XXX** (where **-XXX** is any number between **-001** and **-999**) is the part number for ordering a custom-cut length of tubing.

(2) Tubing Connector. UFS P/N **33-000006-000** is a dual-end push-on connector for splicing individual tubing lengths end-to-end.

(3) Tubing Installation.

- 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 **Model TAP-G3** 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 **Model TAP-G3** 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 **Model TAP-G3** device inlet
 - Remove plug from device inlet by holding the green ring on the inlet connector down and pull up on the plug. Discard plug.
 - 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.
- 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.

2.5 Electrical Installation. Refer to **Figure 17** for electrical wiring diagram.



Voltages and currents associated with the Model TAP-G3 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!

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

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

2.5.3 Power Supply Wiring. The **Model TAP-G3** 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 **Model TAP-G3** device. Maximum conductor size for Model TAP-G3 device power terminals is 12 AWG. The device draws approximately 1.1 A at 115 VAC. Attach power conductors to terminals per **Figure 17**. **DO NOT** apply power to **Model TAP-G3** device until ready for commissioning.

2.5.4 Optional Fault Signaling Contact Connection Wiring. Two (2) SPDT volt-free contacts are supplied to permit connecting to a fire detection and / or building management system.

(1) Contact K1. The contact labeled **K1** transfers on any of three (3) faults:

- Low system pressure.
- N₂ purity below set threshold value after 21 day **PURGE** cycle.
- Failure of communication between the nitrogen purity sensor and the PLC.

(2) Contact K2. The contact labeled **K2** transfers if the N₂ purity falls below the set threshold value when the **Model TAP-G3** device is in **NORMAL** mode.

(3) Contact Electrical Ratings.

- Normally Open (NO) contact:
 - DC rating: 5 A maximum @ 30 VDC maximum.
 - AC rating: 10 A maximum @ 277 VAC maximum.
- Normally Closed (NC) contact:
 - DC rating: 3 A maximum @ 30 VDC maximum.
 - AC rating: 10 A maximum @ 277 VAC maximum.

(4) Contact Wiring Combinations

- If one (1) monitoring circuit is to be used:
 - Connect the circuit to contact **K1** to monitor the fault signals described in **2.5.4.1**, or;
 - Connect the circuit to contact **K2** to monitor the fault signal described in **2.5.4.2**, or;
 - Use jumpers to connect the circuit to both contact **K1** and contact **K2** to monitor all signals, without differentiation.
- If two (2) monitoring circuits are to be used, connect one (1) circuit to contact **K1** and one (1) circuit to contact **K2**. This permits separate monitoring of the N₂ purity fault signal from the additional fault signals.

2.5.5 Electrical Installation Steps. Follow these steps in order.



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



CAUTION

To avoid damage to the circuit board assembly inside the **Model TAP-G3** device enclosure, it is recommended that conductors be pulled through raceways BEFORE attaching raceways to **Model TAP-G3** enclosure knockouts.

1. Install raceway for 115 VAC power conductors. Two (2) knockouts are available. Refer to **Figure 16** 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 **Model TAP-G3** enclosure.
3. (Optional) Install raceway for fault signaling connection conductors. Refer to **Figure 16** for information on knockout location.
4. (Optional) Pull conductors through fault signaling connection raceway BEFORE attaching raceway to **Model TAP-G3** enclosure.
5. Attach raceway for 115 VAC power conductors to knockout indicated in **Figure 16**.
6. (Optional) Attach raceway for fault signaling connection conductors to knockout indicated in **Figure 16**.
7. Attach 115 VAC power conductors to power supply as indicated in **Figure 17**.



IMPORTANT

DO NOT apply power to the **Model TAP-G3** device until thoroughly reviewing Section 3 – Commissioning in this manual.

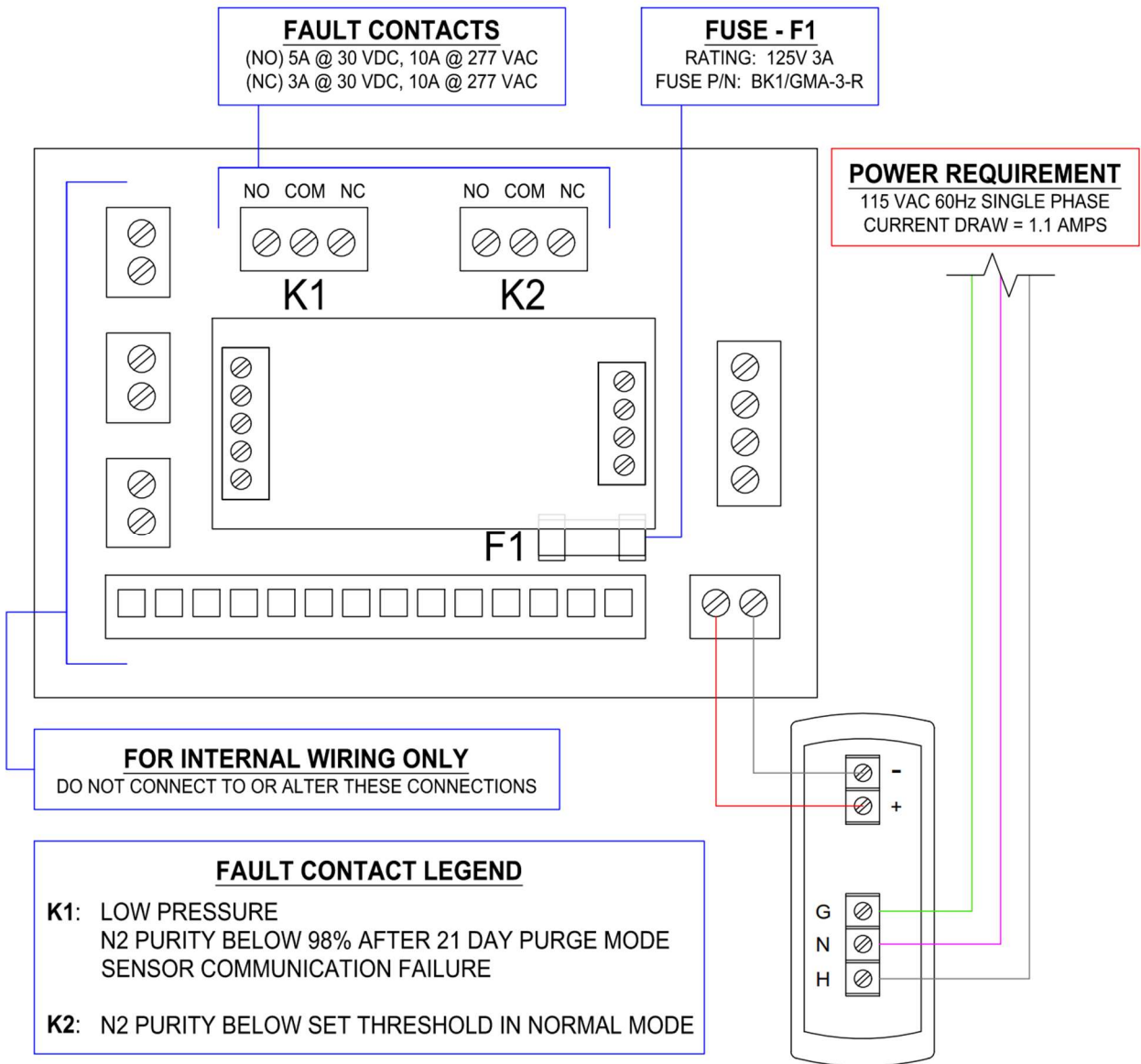


IMPORTANT

Refer to **Figure 15**. The **Model TAP-G3** device is factory-supplied with the **RUN / STOP** switch on the PLC in the **STOP** position. This avoids unwarranted **RED** flashing of the screen if power is applied before commissioning. To avoid “burn-in” from extended **RED** flashing, which can turn the screen permanently pink, **DO NOT** move the **RUN / STOP** switch to **RUN** until just prior to commissioning.

- (Optional) Attach fault signaling connection conductors (and end-of-line device(s), as applicable) to terminal strip(s) indicated in **Figure 17**.

Figure 17
Wiring Diagram



3. 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™ Model TAP-G3** device **MUST** be in accordance with this manual. Read this manual in its entirety **BEFORE** beginning commissioning of the **Model TAP-G3** device. Understand and follow all instructions provided in this manual.

3.1 Before Starting Commissioning Procedure.

3.1.1 The technician performing commissioning should be familiar with all of the information in this manual as well as UFS manual P/N 33-TG3USE-000 – **Model TAP-G3 Device User Guide**.

3.1.2 Refer to **Appendix A**. Use a copy of the Commissioning Worksheet / Checklist during the procedure to record all steps followed.

3.1.3 The device password is required to access screens during the commissioning procedure.



IMPORTANT

The password for the **Model TAP-G3** 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!



CAUTION

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

3.2 Preliminary.

3.2.1 Ensure that 115 VAC power is connected and available. **DO NOT** apply power at this time.



CAUTION

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

3.2.2 If optional connections have been made to the fault signaling contacts, ensure that personnel are aware that signals may be received during commissioning.

3.3 Startup.



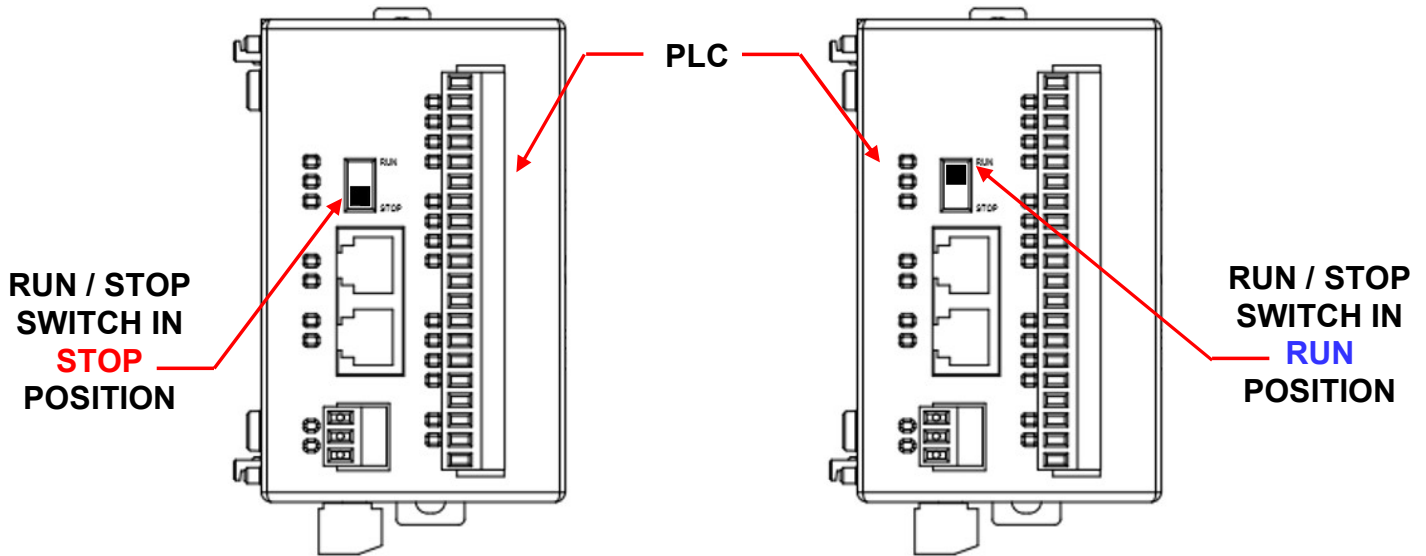
IMPORTANT

The **Model TAP-G3** device is factory-supplied with the **RUN / STOP** switch on the PLC in the **STOP** position. This avoids unwarranted **RED** flashing of the screen if power is applied before commissioning. To avoid “burn-in” from extended **RED** flashing, which can turn the screen permanently pink, **DO NOT** move the **RUN / STOP** switch to **RUN** until just prior to commissioning.

3.3.1 Apply 115 VAC power to the power supply.

3.3.2 Refer to **Figure 18**. Move the **RUN / STOP** switch on the PLC from the **STOP** position to the **RUN** position.

Figure 18 – PLC RUN / STOP Switch

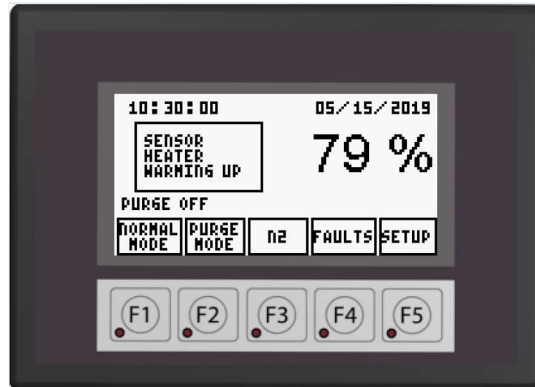


3.3.3 Refer to **Figure 19**. Observe the screen on the device door. The **MAIN** screen should appear, with the **SENSOR HEATER WARMING UP** message appearing in the current operating mode box. This screen will appear for 60 seconds. The screen will be flashing **RED** due to two (2) faults:

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

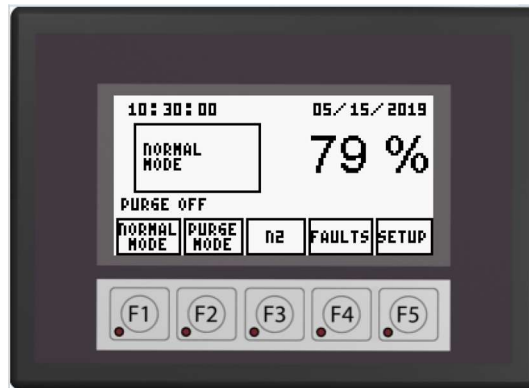
These faults will be cleared later in the commissioning procedure.

**Figure 19 – MAIN Screen
SENSOR HEATER WARMING UP**



3.3.4 Refer to **Figure 20**. After 60 seconds, the screen indicated in **Figure 19** will be replaced with the **MAIN** screen showing **NORMAL** mode.

**Figure 20 MAIN Screen
NORMAL MODE**



3.3.5 Proceed to the **ACTIVE DRIFT CONTROL™** screen.

1. Operate the **SETUP** Function Button **F5** to advance to the **PASSWORD REQUIRED** screen.
2. Refer to 1.6.3. Operate the >> Function Button **F5** to advance to the **PASSWORD** screen.
3. Refer to 1.6.5. Enter password to advance to **SETUP START** screen.



IMPORTANT

The password for the **Model TAP-G3** 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!

- Refer to 1.6.6. Operate the >> Function Button **F5** to advance to the **PURGE MODE** screen.
- Refer to 1.6.9. Operate the >>> Function Button **F5** three times to advance to the **ACTIVE DRIFT CONTROL™** screen. Refer to **Figure 21**. The **ACTIVE DRIFT CONTROL™** screen will appear as shown, with the **SENSOR STATUS** appearing as **STANDBY**.

Figure 21
ACTIVE DRIFT CONTROL™ Screen
Sensor Status: STANDBY



- Operate the **ADC** Function Button **F2** to initialize Manual **ACTIVE DRIFT CONTROL™** (ADC Initialization). Refer to **Figure 22**. A progress bar will appear, with **SENSOR STATUS** becoming blank.

Figure 22
ACTIVE DRIFT CONTROL™ Screen
with Progress Bar



IMPORTANT

DO NOT operate the >> Function Button **F1** while the **ADC INITIALIZATION** progress bar is on the screen.

7. Refer to **Figure 23**. Upon completion of **ADC** Initialization, the progress bar will disappear, and the **SENSOR STATUS** will be **ONLINE**.

Figure 23
ACTIVE DRIFT CONTROL™ Screen
Sensor Status: ONLINE



8. Operate the << Function Button **F1** five (5) times to return to the **MAIN** screen. The **Model TAP-G3** device will be indicating two (2) faults:

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

3.3.6 Applying Gas Pressure To TAP-G3 Device Inlet. If the sprinkler system has been filled with air (initial-fill) or nitrogen, open the ball valve on the **Model PVA-2** purge vent assembly. When pressure at **Model TAP-G3** device reaches 5 PSI, the **LOW PRESSURE** fault may be cleared.

- Operate the **FAULTS** Function Button **F4**.
- The **LOW PRESSURE** and **LOW NITROGEN PURITY** Fault Status Indicators will be indicating **FAULT**.
- Operate the **CLEAR** Function Button **F4**.
- The **LOW PRESSURE** Fault Status Indicator will indicate **CLEAR**.

3.3.7. LOW NITROGEN PURITY Fault. This fault will be cleared by entering **PURGE MODE**. Refer to **3.4**.

3.4 PURGE MODE. Refer to **1.5.2**. 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 open (refer to **1.4.2**), operate the **PURGE MODE** Function Button **F2** on the **MAIN** Screen.



CAUTION

On **NITROGEN-PAC™** systems serving multiple sprinkler risers, selection of **PURGE MODE** on multiple **Model TAP-G3** devices at the same time can lead to inadvertent low air signals and / or inadvertent tripping of sprinkler valves. To prevent this, select **PURGE MODE** on only one (1) **Model TAP-G3** device at a time.



IMPORTANT

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

- **LOW PRESSURE**
- **NITROGEN PURITY NOT MET**
- **SENSOR COMM FAILURE**

Clear faults to permit activation of **PURGE MODE**.

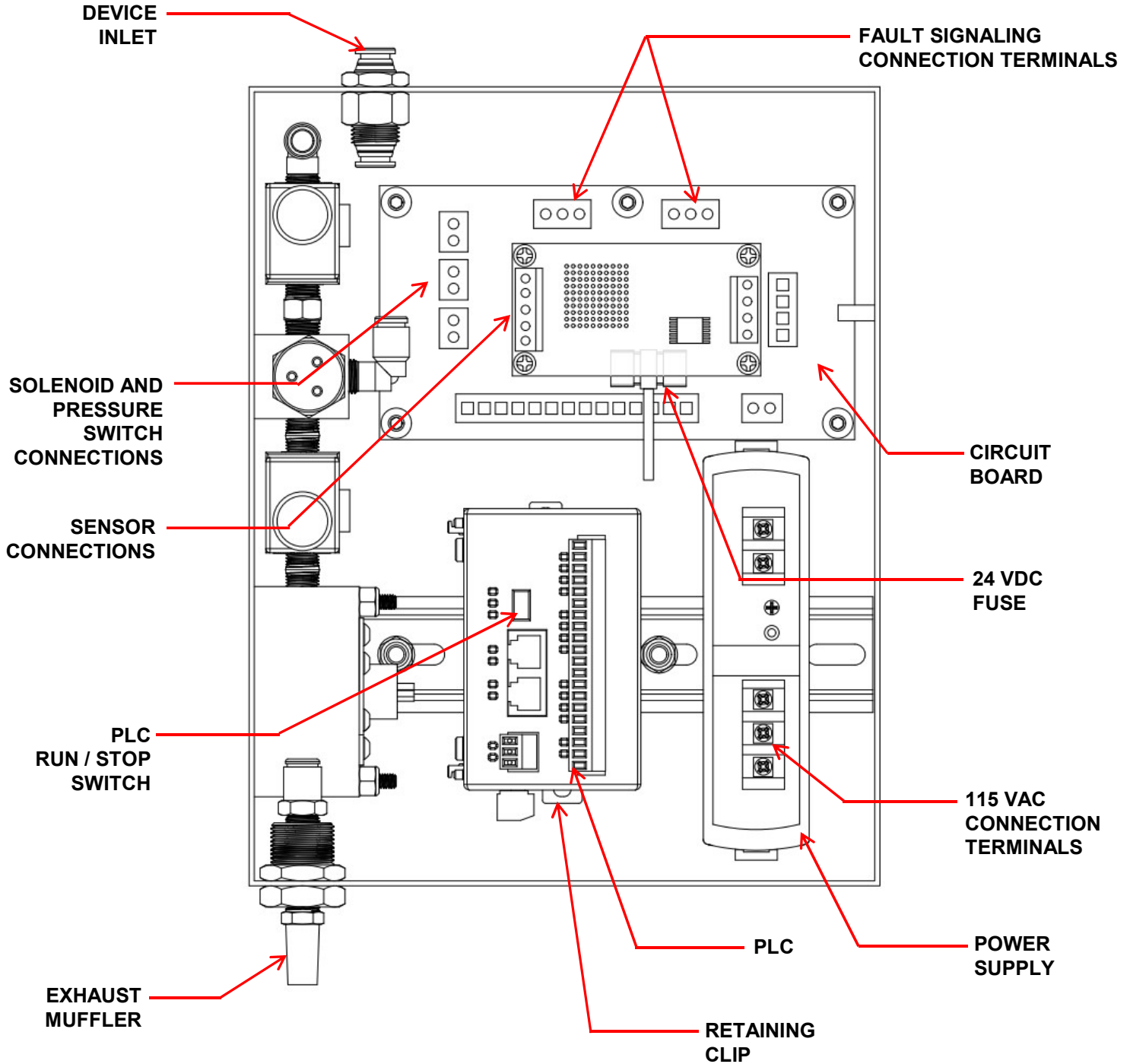
The **LOW NITROGEN PURITY** fault will NOT inhibit activation of **PURGE MODE**.

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 function button F2 on the **MAIN** screen. The **PURGE** mode sequence is:

- (1) The **PURGE** solenoid valve 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 **Model TAP-G3** device enters **NITROGEN PURITY SAMPLING** mode. After the preset sampling duration (factory default 5 minutes), the updated nitrogen purity 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 **Model TAP-G3** device again opens the **PURGE** solenoid valve 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 **Model TAP-G3** device activates the **NITROGEN PURITY NOT MET** fault (refer to **1.6.2 (1)**) and enters **NORMAL** mode.
- (5) If the displayed nitrogen purity is **EQUAL TO OR GREATER THAN** the preset purge factory threshold (factory default 98%), the **Model TAP-G3** device terminates **PURGE** mode and enters **NORMAL** mode. No fault is indicated.

4. MAINTENANCE.

Figure 24 – Model TAP-G3 Device Interior
General Arrangement



4.1 Manual Activation of NITROGEN PURITY SENSING. Automatic **NITROGEN PURITY SENSING** occurs one per day as part of automatic **ACTIVE DRIFT CONTROL™** mode – refer to **1.5.3. NITROGEN PURITY SENSING** may be activated manually at any time by using **N2 Function Button F3** on the **MAIN** screen. This will **NOT** initiate **ACTIVE DRIFT CONTROL™**.

4.2 Clearing Faults.



IMPORTANT

Faults cause the HMI display screen to flash **RED**. If allowed to continue for an extended period, this flashing can cause “burn-in” of the display, turning the background pink. To avoid this phenomenon, clear all faults as promptly as possible.

4.2.1 LOW PRESSURE Fault. This fault occurs when the gas pressure at the 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, operate **CLEAR** Function Button **F4** on the **FAULTS** screen.

4.2.2 NITROGEN PURITY NOT MET Fault. This fault occurs after 21 days of **PURGE MODE** fails to achieve the **PURGE THRESHOLD** nitrogen purity (factory default 98% - refer to **1.6.6**). 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.

After troubleshooting and correcting the cause, operate **CLEAR** Function Button **F4** on the **FAULTS** screen.

4.2.3 SENSOR COMM FAILURE Fault. This fault occurs if the circuit board loses communication with the nitrogen sensor. The sensor connections shown in **Figure 24** can be **CAREFULLY** checked. If these connections are intact, contact **UNITED Fire Systems** for repair information. After troubleshooting and correcting the cause, operate **CLEAR** Function Button **F4** on the **FAULTS** screen.

4.2.4 LOW NITROGEN PURITY Fault. This fault occurs if the nitrogen purity drops below the **FAULT THRESHOLD** nitrogen purity (factory default 96% - refer to **1.6.7**). After troubleshooting and correcting the cause, operate **PURGE** Function Button **F2** on **MAIN** screen. The **LOW NITROGEN PURITY** fault will clear.

4.3 115 VAC Power Interruption / Restoration.

4.3.1 Power Backup. In the event that 115 VAC power to the **Model TAP-G3** power supply is interrupted, data programmed into the PLC within the **Model TAP-G3** 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. The backup battery will maintain the data beyond this period if the power interruption lasts for a longer period.



IMPORTANT

If the period of power interruption lasts for a longer period of time than the capability of the super capacitor and backup battery capacity, the **Model TAP-G3** device programming will be lost. Re-programming by **UNITED Fire Systems** will be necessary.

4.3.2 Power Restoration. The following is the sequence when 115 VAC power is restored to the **Model TAP-G3** 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 **Model TAP-G3** device is operating normally.
- (4) If the **Model TAP-G3** 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 **F2** on the **MAIN** screen.



IMPORTANT

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

- **LOW PRESSURE**
- **NITROGEN PURITY NOT MET**
- **SENSOR COMM FAILURE**

Clear faults to permit activation of **PURGE MODE**.

The **LOW NITROGEN PURITY** fault will NOT inhibit activation of **PURGE MODE**.

4.4 Replacement of PLC Backup Battery. The expected lifespan of the PLC backup battery is three (3) years. To avoid loss of programming, replace this battery at three (3) year intervals.

Figure 25
Replacement of PLC Backup Battery



- (1) Remove 115 VAC power from the **Model TAP-G3** device.
- (2) Have the replacement battery (UFS P/N 33-000015-000) available.
- (3) Refer to **Figure 26**. Use a long, thin screwdriver to **GENTLY** pull down on the retaining clip at the bottom of the PLC.

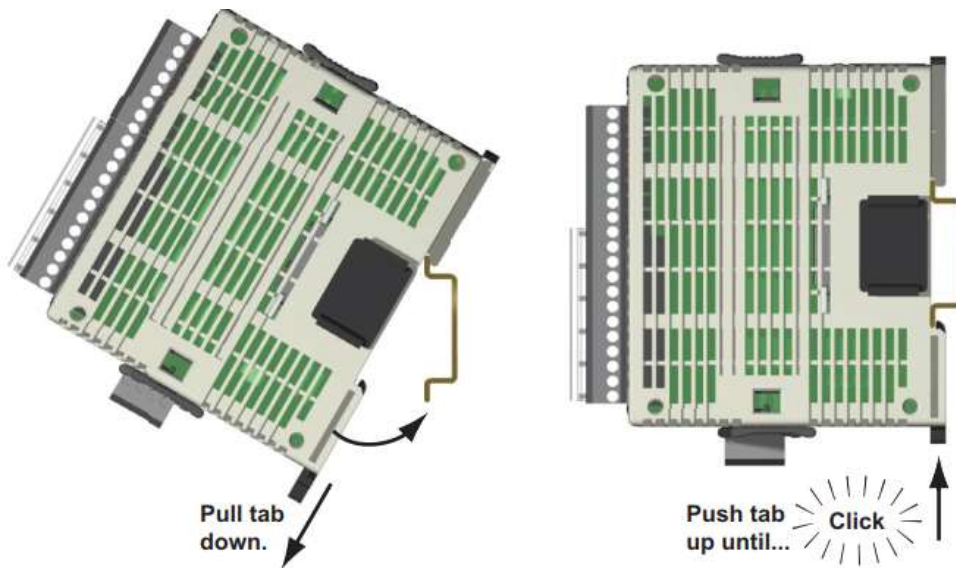


CAUTION

USE EXTREME CARE to NOT disturb any of the connection cables attached to the front and bottom of the PLC!

- (4) Swing the PLC out of the enclosure, bottom edge first.
- (5) Refer to **Figure 25**. Locate the battery holder on the top of the PLC, at the back left corner.
- (6) **GENTLY** lift the battery holder latch up and swing the battery holder open.
- (7) Remove the existing battery by pressing from the minus (-) side.
- (8) Install the new battery into the battery holder, observing the battery polarity per Figure 24.
- (9) Close the battery holder so it latches securely.

Figure 26
Re-attachment of PLC to Bracket



- (10) Refer to **Figure 26** to re-attach PLC to bracket.

4.5 Replacement of Low Voltage Fuse. The output of the **Model TAP-G3** 24 VDC power supply is protected by a 3 A fuse. This fuse is located on the circuit board in the upper left corner of the enclosure. In the event this fuse requires replacement:

- (1) Troubleshoot and correct the problem which led to the overcurrent condition that operated the fuse.
- (2) Ensure that 115 VAC has been removed from the input to the **Model TAP-G3** power supply.
- (3) Have the replacement fuse (UFS P/N 33-000007-103) available.
- (4) Refer to **Figure 24**. Remove 24 VDC fuse by **GENTLY** pulling on wire tie wrapped around fuse.
- (5) Grip replacement fuse by attached wire tie and **GENTLY** insert replacement fuse into fuse holder.
- (6) Re-apply 115 VAC to the input of the power supply.
- (7) Ensure that new fuse does not operate.

4.6. Troubleshooting.

SYMPTOM	INDICATION(S)	PROBLEM	SOLUTION	MANUAL REFERENCE
Device screen not illuminated	Screen blank	115 VAC power not on	Apply 115 VAC power to Model TAP-G3 device	3.3.1
		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	4.5
		Power supply defective	Contact UNITED Fire Systems for repair information	

4.6 Troubleshooting (Continued).

SYMPTOM	INDICATION(S)	PROBLEM	SOLUTION	MANUAL REFERENCE
LOW PRESSURE Fault	Screen flashing RED Fault Status Indicator next to LOW PRESSURE indicates FAULT	Sampling tubing disconnected or cut	Repair sampling tubing	
		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™ Installation, Commissioning, and Maintenance Manual
		FAULT has not been cleared	Operate CLEAR Function Button F4 on FAULTS screen	4.2.1
NITROGEN PURITY NOT MET Fault	Screen flashing RED Fault Status Indicator next to NITROGEN PURITY NOT MET indicates FAULT	NITROGEN-PAC™ system has not provided enough 98% pure nitrogen in 21 days	Repeat PURGE MODE for one (1) more cycle	3.4
		FAULT has not been cleared	Operate CLEAR Function Button F4 on FAULTS screen	4.2.2
SENSOR COMM FAILURE Fault	Screen flashing RED Fault Status Indicator next to SENSOR COMM FAILURE indicates FAULT	Connection between sensor and circuit board loose	Refer to Figure 24 . Check that indicated sensor connections are firmly connected.	Figure 24
		Sensor has failed	Contact UNITED Fire Systems for repair information	
		FAULT has not been cleared	Operate CLEAR Function Button F4 on FAULTS screen	4.2.3

4.6 Troubleshooting (Continued).

SYMPTOM	INDICATION(S)	PROBLEM	SOLUTION	MANUAL REFERENCE
LOW NITROGEN PURITY Fault	Screen flashing RED Fault Status Indicator next to LOW NITROGEN PURITY indicates FAULT	NITROGEN-PAC™ system in bypass mode	Place NITROGEN-PAC™ system in NORMAL mode	Refer to applicable NITROGEN-PAC™ Installation, Commissioning, and Maintenance Manual
		Sprinkler system has not been purged	Open PVA ball valve	1.4.2
			Operate PURGE MODE Function Button F2 on MAIN Screen	3.4
		NITROGEN-PAC™ system is not providing 98% pure nitrogen	Contact UNITED Fire Systems	
		FAULT has not been cleared	Operate CLEAR Function Button F4 on FAULTS screen	4.2.4
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™ Installation, Commissioning, and Maintenance Manual
		Model TAP-G3 device not in PURGE MODE	Operate PURGE MODE Function Button F2 on MAIN Screen	3.4
Remote signals not being received		Remote signaling connections disconnected or improperly made	Repair remote signaling connection wiring	2.5.5 (6) and Figure 24
HMI display background develops a “pink” color		Uncorrected faults for an extended period cause RED flashing and “burn-in” of screen	Screen function is not impaired by color change. Use screen as normal. To avoid problem, clear all faults promptly.	



COMMISSIONING WORKSHEET AND CHECKLIST
 TRUE ADVANCED PURGE MODEL TAP-G3
 UFS-800 REVISION 1.02 – PAGE 1 OF 2



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

MODEL TAP-G3 SERIAL NUMBER	
-----------------------------------	--

PRELIMINARY		
	OK	NOT OK
Is 115 VAC power available, but NOT applied to the Model TAP-G3 device?		
Has sampling tubing been run from the Model PVA-2 and connected to the Model TAP-G3 device?		
Is ball valve on Model PVA-2 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?		
Has the RUN / STOP switch on the PLC been moved from the STOP position to the RUN position?		
Has SENSOR HEATER WARMING UP mode message appeared on MAIN screen?		
After sixty (60) seconds, has NORMAL MODE message appeared on MAIN screen?		
Have function buttons been used to advance to PASSWORD screen?		
Has password been entered on PASSWORD screen?		
Have function buttons been used to advance to ACTIVE DRIFT CONTROL screen?		



**COMMISSIONING WORKSHEET AND CHECKLIST
 TRUE ADVANCED PURGE MODEL TAP-G3
 UFS-800 REVISION 1.02 – PAGE 2 OF 2**



ACTIVE DRIFT CONTROL		
	OK	NOT OK
Does SENSOR STATUS indicate STANDBY ?	<input type="checkbox"/>	<input type="checkbox"/>
Has ADC Function Button F2 been operated, and has progress bar appeared?	<input type="checkbox"/>	<input type="checkbox"/>
Has progress bar disappeared, and does SENSOR STATUS indicate ONLINE ?	<input type="checkbox"/>	<input type="checkbox"/>
Has << Function Button F1 been operates five (5) times to return to MAIN screen?	<input type="checkbox"/>	<input type="checkbox"/>

COMPLETION		
	OK	NOT OK
Is the ball valve on the Model PVA purge vent assembly open?	<input type="checkbox"/>	<input type="checkbox"/>
Has the FAULTS Function Button F2 been operated?	<input type="checkbox"/>	<input type="checkbox"/>
Do the LOW PRESSURE and LOW NITROGEN PURITY Fault Status Indicators indicate FAULT ?	<input type="checkbox"/>	<input type="checkbox"/>
When device inlet pressure increases and CLEAR Function Button F4 is operated, does the LOW PRESSURE Fault Status Indicator indicate CLEAR ?	<input type="checkbox"/>	<input type="checkbox"/>
If the gas at the Model TAP-G3 device is 98% nitrogen, does the LOW NITROGEN PURITY Fault Status Indicator also indicate CLEAR ?	<input type="checkbox"/>	<input type="checkbox"/>
Has the << Function Button F1 been operated to return to the MAIN screen?	<input type="checkbox"/>	<input type="checkbox"/>
If the gas at the Model TAP-G3 device is less than 98% nitrogen, has the PURGE MODE Function Button F2 been operated (at the proper point in the NITROGEN-PAC™ system commissioning sequence)?	<input type="checkbox"/>	<input type="checkbox"/>

FINAL ACCEPTANCE			
Nitrogen purity value indicated on Model TAP-G3 device at the time of final acceptance:			
	PRINT NAME	SIGNATURE	DATE
CUSTOMER			
INSTALLING CONTRACTOR			

(THIS SURFACE INTENTIONALLY LEFT BLANK)



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