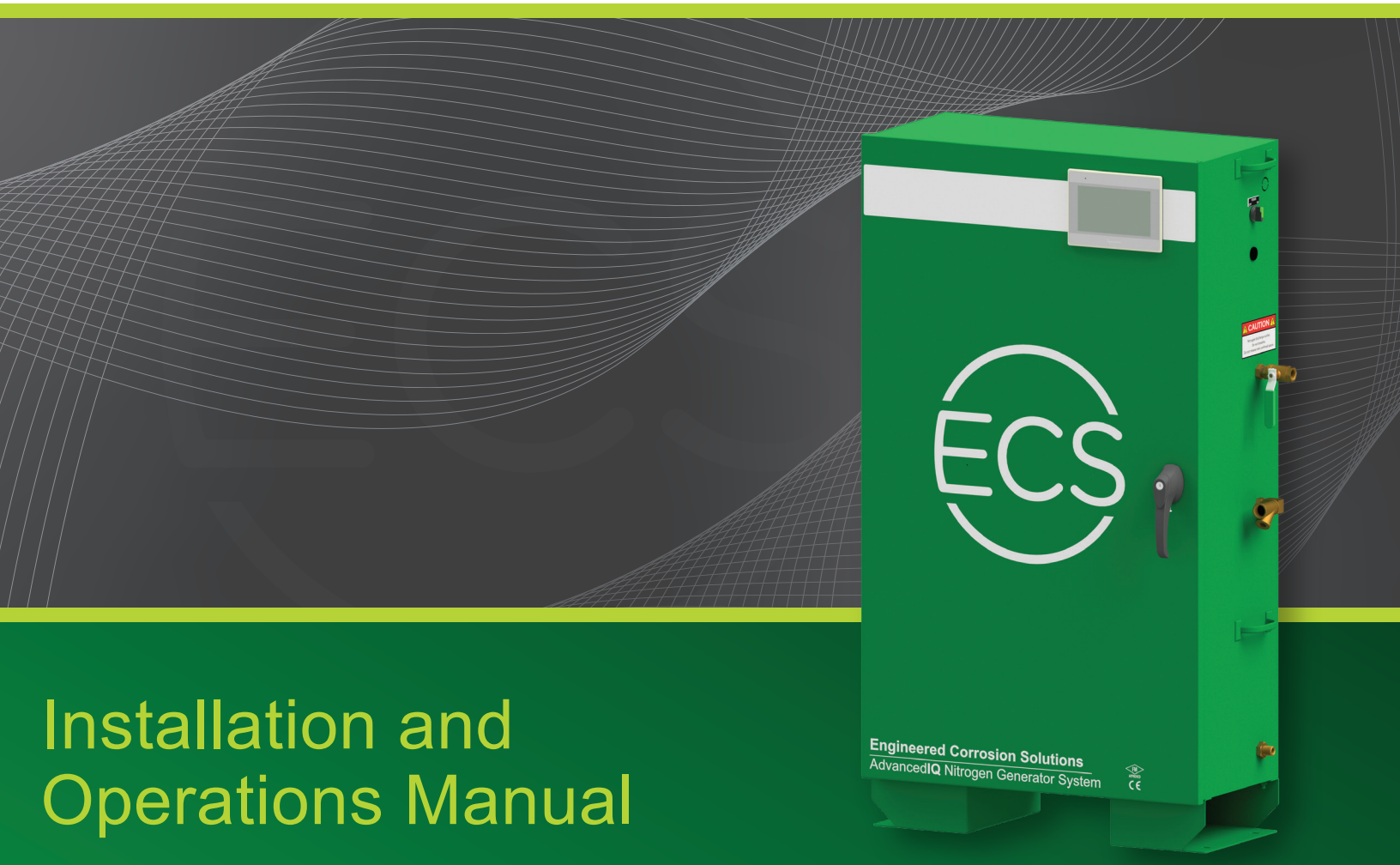
Engineered Corrosion Solutions



Installation and Operations Manual

AdvancedIQ STAND ALONE NITROGEN GENERATOR

AG-6500/11000 | AG-18500/25000

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M-1429

ISO 9001:2015 CERTIFIED COMPANY
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(*continued*)

General

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PRODUCT CERTIFICATIONS

FM
UL
CE
FCC

STANDARDS

FM Standard 1035	Approval Standard for Nitrogen Generators

United States

UL 508A	Open Type Industrial Control Panel
FCC CFR 47, Part 15, Subpart B	Radio Frequency Devices, Unintentional Radiators

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Canada

CAN ICES-003(A) / NMB-003(A)	Standard for Information Technology Equipment
CSA C22-2 No. 14-13	Industrial Control Equipment

British and European Standards

BS EN 55035:2017 + A11:2020	Electromagnetic Compatibility of Multimedia Equipment - Immunity Requirements
BS EN IEC 61000-3-2:2019 / EN 61000-3-3:2013 + A1:2019	Electromagnetic Compatibility (EMC) - Limits
BS EN 55032:2015+A11:2020	Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements

Australia and New Zealand

AS/NZS CISPR 32:2015	Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements

APPLICABILITY

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.

ECS website "Products" page

SAFETY

Safety Guidelines

The manual contains safety information that is important to know and understand. The information is provided for the safety of the installers, operators and users of the nitrogen generation systems, as well as the nitrogen generation equipment.

The Installation and Operations Manual that is supplied with each nitrogen generation system must be read thoroughly and be completely understood prior to installing and operating nitrogen generation system. All appropriate safety standards for the handling of gases as determined by local, state or national laws and regulations are to be always followed.

General Safety Information

IMPORTANT: Read all the safety information in the manual prior to operating the equipment. Use of the equipment in a manner not specified within the manual could impair the protection provided by the nitrogen generation system and could result in an unintended release of pressure which could cause serious injury or damage. Only qualified personnel can perform commissioning, inspection, testing and maintenance of the nitrogen generation equipment.

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

Ensure the nitrogen generation equipment is depressurized and electrically isolated, before performing any maintenance or troubleshooting instructions specified in this manual.

The warnings covered in this manual are the most known potential hazards, but cannot be all-inclusive. If the user employs an operating procedure, item of equipment, or method of working that is not specifically recommended by Engineered Corrosion Solutions, LLC, the user must ensure that the equipment will not be damaged or become hazardous to any person or property.

Cautions and Warnings

CAUTION: Do not install the Nitrogen Generator or Air Compressor Package in an area where ammonia, sulfur dioxide, hydrogen sulfide, mercaptans, chlorides, chlorine, oxides of nitrogen, acid fumes, solvent vent vapors, and ozone vapors or similar contaminates exist. The equipment can be damaged by ammonia and other vapors shortening membrane life.

WARNING: Do not operate the Nitrogen Generation System if damaged during shipment, handling or use. Damage could result in injury or property damage.

WARNING: Operation of the nitrogen membrane above the rated design pressure could be hazardous. Do not connect the nitrogen generation equipment to compressed air sources that can exceed the maximum rated pressure without installing pressure controls and safety relief devices in the compressed air supply line.

WARNING: Specific procedures must be developed for maintenance and servicing of the equipment where the nitrogen membrane is located. Appropriate labels must be continuously displayed in all areas where personnel might be exposed to a nitrogen atmosphere under normal and abnormal conditions.

WARNING: Nitrogen is nontoxic and largely inert. Rapid release of nitrogen gas into an enclosed space displaces oxygen and can cause an asphyxiation hazard.

Maintenance and Troubleshooting Warnings

1. Nitrogen Generator includes 100-240 VAC, 50-60 Hz voltage inside cabinet. Exercise caution and do not touch any wiring connections when power is applied to the unit.
2. Nitrogen Generator has hot surfaces inside cabinet when nitrogen generator is operating and after nitrogen generator has turned off. Exercise caution when working on nitrogen generator while operating and after nitrogen generator has shut off. (***Wear Hand Protection where needed.***)

Lifting and Troubleshooting Instructions

Nitrogen Generators weigh more than 100 lbs (45 kg). When lifting and/or carrying a nitrogen generator, proper lifting and/or carrying techniques must be considered.

1. Keep a wide base of support. Feet should be shoulder-width apart with one knee slightly in front of the other.
2. Squat down bending at hips and knees. If needed, one knee on the floor and other knee in front, bent at a right angle.
3. Keep good posture. Look straight ahead with back straight, chest out, and shoulders back.
4. Slowly lift by straightening your hips and knees (not your back). Keep your back straight, and don't twist as you lift.
5. Hold the load as close to body as possible.
6. Use feet to change direction. Small steps.
7. Lead with hips as changing direction. Keep shoulders in line with hips as you move.
8. Set load down carefully, squatting with the knees and hips only.

AIR COMPRESSOR

WARNING: To ensure safety and reliability from your air compressor, follow all manufacturer recommendations.

ECS has paired Quincy COMP-series compressors with ECS Advanced**IQ** Stand Alone Nitrogen Generators as follows:

- ECS AG-6500 – Quincy COMP-QY5-1; Quincy COMP-QY5-2
- ECS AG-11000/18500 – Quincy COMP-QY7.5-1; Quincy COMP-QY7.5-2
- ECS AG-25000 – Quincy COMP-QY10-1; Quincy COMP-QY10-2

All air compressor information in this manual is based on these Quincy reciprocating air compressors (US models). Refer to the Quincy installation, operation, and maintenance manual for complete details.

When another manufacturer's air compressor is used, see the manufacturer's installation, operation, and maintenance manual.

All air compressors connected to a nitrogen generator must include an auto-drain on the air receiver tank to remove water and oil condensate, which must not enter the nitrogen generator. If an auto-drain is not included in the air compressor package, install an auto-drain on the air receiver tank.

SYSTEM and PRODUCT INFORMATION

Dry Pipe Nitrogen Inerting (DPNI) technology was developed by Engineered Corrosion Solutions, LLC (ECS) and is used to control oxygen corrosion in dry pipe and/or preaction fire sprinkler systems. DPNI is executed by employing a "fill and purge" differential pressure cycle (breathing) within the sprinkler pipe network. The "fill and purge" pressure cycle consists of venting the system pressure by 3 to 5 psi (0.2 to 0.3 bar), followed by replacing the vented pressure back into the system. This breathing process uses a rich nitrogen gas stream, typically 98% or greater, for a specific length of time (typically 14 days or less), until a rich nitrogen atmosphere exists within the sprinkler pipe network. By changing the atmosphere inside the pipe network to 98% or higher nitrogen content, the available oxygen content is reduced to a level that will not allow appreciable corrosion of the fire sprinkler pipe. With the level of oxygen corrosion reduced to near zero the effective life of the fire sprinkler system is greatly extended.

Dry Pipe Nitrogen Inerting Equipment

The ECS AdvancedIQ Stand Alone Nitrogen Generator coupled with a third-party air compressor facilitates Dry Pipe Nitrogen Inerting (DPNI) for controlling oxygen corrosion in dry pipe and preaction fire sprinkler systems. The nitrogen generator can be used in cold storage/freezer to provide added benefit of ice plug mitigation. The user interface display screen allows for easy operation and complete control of the nitrogen generator. Access to various nitrogen generator operation, maintenance, diagnostics, and stored historical data is easily obtained through the user interface and remotely by way of Form C dry contacts, Modbus (optional), and ECS' GreenSight web application (optional). The nitrogen generator includes an electronically controlled air bypass function to enable maintenance or "fast fill" for the NFPA 13 30-minute fill requirement. The Nitrogen Generator facilitates "fill and purge" breathing in the fire sprinkler system and has been paired with a Standard Vent (PAV-D), SMART Vent (PSV-D/DE), or Advanced**IQ** Vent (PAV-DQ) installed on the fire sprinkler riser. The nitrogen generator with the ECS-patented "fill and purge" breathing technology includes the following features:

- Removal of corrosive oxygen from the entire sprinkler system in 14 days or less
- All equipment is installed in the sprinkler riser room for easier installation and servicing

- No refrigerated dryers or nitrogen storage tanks required
- Interactive LCD touchscreen display for system setup, operation, monitoring, and maintenance
- Electronically controlled air bypass
- Bypass alarm indication with sleep mode
- Programmable audible alarm
- Four Form C dry contact output signals to allow for system monitoring: Nitrogen Generator Running, Bypass Alarm Monitoring, Nitrogen Generator Power Monitoring, and Common Trouble Monitoring (Short Cycle Advisory, Excessive Runtime Alarm, Low Air Alarm, Bypass Mode Active, Filter Change Required)
- Modbus communication protocol for additional system monitoring (contact ECS Sales for technical details and pricing)
- Optional remote monitoring and email alerts with ECS' GreenSight web application (for more information, see page 64)
- Programmable automatic drain function
- USB flash drive for exporting system-generated event logs and data logs

Oxygen Removal Vent. To completely remove the oxygen in a dry pipe and preaction fire sprinkler system, it is necessary to install a vent on the main riser of each fire sprinkler system. Vents allow for a system to breathe, which requires a 3 to 5 psig (0.2 to 0.3 bar) pressure range to facilitate removal of oxygen gas from the system. Supervisory nitrogen gas is supplied to the system until the air maintenance device reaches high-end pressure. The vent slowly releases the gas mixture inside the sprinkler system through the restricted orifice until the system reaches low-end pressure at which point supervisory nitrogen is supplied to the system again. This process is repeated numerous times until the atmosphere inside the piping network reaches at least 98% nitrogen. The vent is crucial for expedient mixing of the gas and elimination of oxygen inside the system within the specified timeframe.

ECS offers three DPNI vents: The PSV-D/(DE) SMART Vent, the PAV-D Standard Vent, and the PAV-DQ Vent.

- The PSV-D/(DE) SMART Vent is an automated vent that when activated will automatically vent for the necessary amount of time to achieve the desired inert inner pipe atmosphere, and automatically close when the process is completed. This process is initiated by pressing the **Vent** button on the vent's control panel.
- The PAV-D Standard Vent requires an operator to open the vent's isolation valve when venting is desired, and after a specified time (typically 14 days or less) when the breathing process is completed, the isolation valve on the vent must be manually closed.
- The PAV-DQ Vent in conjunction with Advanced**IQ** Vent Controller (AVC) is an automated vent that when activated will open and vent for the necessary amount of time to achieve the desired inert inner pipe atmosphere, and close automatically when the process is completed.

The oxygen removal vents with the ECS-patented "fill and purge" breathing technology include the following features:

- Removal of corrosive oxygen from the entire sprinkler system in 14 days or less
- All equipment is installed in the sprinkler riser room for easier installation and servicing
- No support hanger required
- Backpressure regulator preventing system depressurization from vent
- In-line filter to protect restricted venting orifice from contamination

Recommended Monitoring Equipment

The In-Line Corrosion Detector (ILD) is designed to provide an early warning of corrosion activity within the fire sprinkler system. The ILD features a double wall construction that incorporates a thin milled section of pipe [0.035" (8.9 mm)] surrounded by a full-thickness piece of pipe to detect and alert to the presence of corrosion activity. If corrosion occurs the milled section of the ILD will fail prior to the failure of any other section of the pipe wall. When the milled section fails it allows the system to pressurize the chamber outside the milled section of pipe which activates the attached pressure switch on the ILD. The pressure switch can be remotely monitored through a building monitoring system, or locally through the Detector Remote Test Station.

The ILD is placed at strategic locations within the fire sprinkler piping network where corrosion has the highest potential of occurring.

- Wet Systems: Locate the ILD in a high point of the sprinkler system, typically at the air/water interface in a branch line, where air will be trapped as the system is filled with water.
- Dry Systems: Locate the ILD in a horizontal portion of the supply main piping where trapped water will accumulate.

The handheld gas analyzer (PHGA-1) allows for quick, convenient reading of nitrogen gas purity levels. The gas analyzer can be connected to any of the sample ports on the ECS equipment such as the nitrogen generator or a vent. Additional sampling ports can be ordered and placed at any point on the systems where gas purity monitoring is desired.

The AdvancedIQ Vent Controller (AVC) provides automatic oxygen venting, monitoring of nitrogen/oxygen concentration levels and monitoring of the sprinkler system pressure within each dry pipe/preaction fire sprinkler system. As a fire sprinkler system is filled with a continuous supply of nitrogen gas from the nitrogen generator system, the vent, installed on the sprinkler system riser, allows oxygen rich gas to be vented from the fire sprinkler system.

The AVC samples the discharge gas from each vent connected to the controller. Over a 14-day period, the vent will dilute the oxygen concentration in the entire fire sprinkler system to less than 2% oxygen. The gas flows out of the restricted orifice on the vent through pressure-rated tubing to provide slow, controlled flow to the Advanced**IQ** Controller. Once the desired system gas composition is reached, the controller will automatically close and stop the venting process thereby preventing continuous venting. The AVC is equipped with a programmable logic controller (PLC) and an LCD display to control the venting process and continuously monitor the nitrogen purity levels in the sprinkler systems.

The Advanced**IQ** Vent Controller, in conjunction with oxygen removal vents along with the ECS-patented "fill and purge" breathing technology, includes the following features:

- All equipment is installed in the sprinkler riser room for easier installation and servicing
- Individual pressure & purity monitoring for up to six sprinkler systems
- Datalogging & historical trends for each sprinkler system
- Leak rate checks for each sprinkler system
- Optional internet connectivity and remote monitoring capability
- Removeable datalog (flash drive)
- Form-C dry contact supervisory

TECHNICAL SPECIFICATIONS

Nitrogen Generators

Dimensions: AG-6500/11000	24.5"(622mm) W x 52.5"(1,334mm) H x 8.5"(216mm) D
Dimensions: AG-18500/AG-25000	28.5"(724mm) W x 52.5"(1,334mm) H x 13.5"(343mm) D
Weight: AG-6500/11000	152 lbs (69 kg)
Weight: AG-18500/AG-25000	250 lbs (113 kg)
Location	Dry Indoor Use
Altitude	Up to 6,560 ft (2,000m)
Temperature Range	40°F - 105°F (5°C - 40°C)
Pollution Degree	Type 1
Power Requirement	100-240 VAC, 50-60 Hz, 1 ph
Power Consumption	1 Amp
Overvoltage Category	II
AG-6500: Nitrogen Gas Output (COMP-5)	2.8 SCFM/170 SCFH (80.2 L/min)
AG-6500: Largest Single Zone Capacity @ 40 psig (2.8 bar)	2,050 gallons (7,755 Liters)
AG-6500 Largest Single Zone Capacity @ 20 psig (1.4 bar)	4,100 gallons (15,510 Liters)
AG-6500: Largest Cumulative System Capacity	6,500 gallons (24,600 Liters)
AG-11000: Nitrogen Gas Output (COMP-7.5)	4.0 SCFM/240 SCFH (113.3 L/min)
AG-11000: Largest Single Zone Capacity @ 40 psig (2.8 bar)	2,250 gallons (8,520 Liters)
AG-11000: Largest Single Zone Capacity @ 20 psig (1.4 bar)	4,500 gallons (17,040 Liters)
AG-11000: Largest Cumulative System Capacity	11,000 gallons (41,640 Liters)
AG-18500: Nitrogen Gas Output (COMP-7.5)	7.1 SCFM/425 SCFH (200.6 L/min)
AG-18500: Largest Single Zone Capacity @ 40 psig (2.8 bar)	2,250 gallons (8,520 Liters)
AG-18500: Largest Single Zone Capacity @ 20 psig (1.4 bar)	4,500 gallons (17,040 Liters)
AG-18500: Largest Cumulative System Capacity	18,500 gallons (70,035 Liters)
AG-25000: Nitrogen Gas Output (COMP-10)	10.5 SCFM/630 SCFH (297.3 L/min)
AG-25000: Largest Single Zone Capacity @ 40 psig (2.8 bar)	2,900 gallons (10,980 Liters)
AG-25000: Largest Single Zone Capacity @ 20 psig (1.4 bar)	5,800 gallons (21,960 Liters)
AG-25000: Largest Cumulative System Capacity	25,000 gallons (94,635 Liters)
Air Inlet Connection	½" NPT Female
Nitrogen/Air Bypass Output Connection	½" NPT Female
Drain Connection	¼" NPT Female
Filter Replacement Part Number	FKSA-FS

Note: All largest system capacities are based on FM Global testing during the approval process.

Nitrogen Quality

N_2 Purity at Discharge: 98% (maximum of 2.0% oxygen)
N_2 Pressure at Discharge: Min: 15 psig (1 bar); Max: feed air pressure minus 15 psig (1 bar)
N_2 Water Dew Point: Less than -70°F (-57°C) @ 98% Purity

Air Compressors

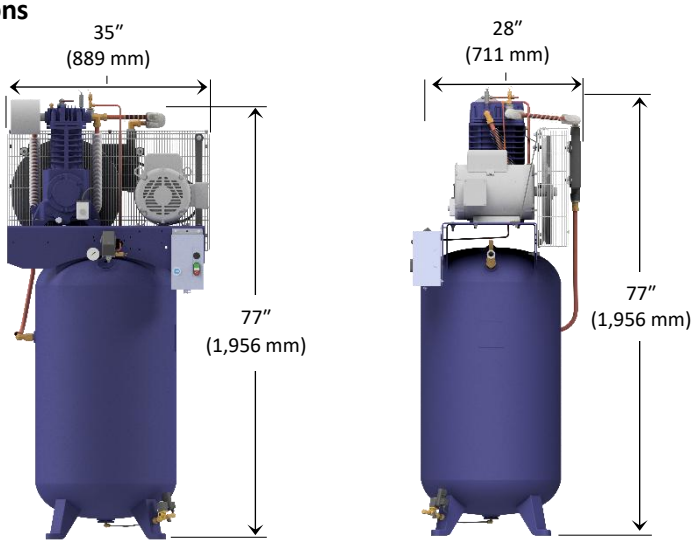
COMP-QY5-1 Dimensions (Simplex/Vertical)	35"(889mm) (L) x 28"(711mm) (W) x 77"(1,956mm) (H)
COMP-QY5-2 Dimensions (Duplex/Horizontal)	79"(2,007mm) (L) x 34"(864mm) (W) x 54"(1,372mm) (H)
COMP-QY7.5-1 Dimensions (Simplex/Vertical)	35"(889mm) (L) x 28"(711mm) (W) x 77"(1,956mm) (H)
COMP-QY7.5-2 Dimensions (Duplex/Horizontal)	79"(2,007mm) (L) x 34"(864mm) (W) x 54"(1,372mm) (H)
COMP-QY10-1 Dimensions (Simplex/Vertical)	49"(1,245mm) (L) x 34"(864mm) (W) x 78"(1,981mm) (H)
COMP-QY10-2 Dimensions (Duplex/Horizontal)	76"(1,930mm) (L) x 56"(1,422mm) (W) x 64"(1,626mm) (D)
COMP-QY5-1 Weight (Simplex/Vertical)	680 lbs (308kg)
COMP-QY5-2 Weight (Duplex/Horizontal)	994 lbs (451kg)
COMP-QY7.5-1 Weight (Simplex/Vertical)	720 lbs (327kg)
COMP-QY7.5-2 Weight (Duplex/Horizontal)	1,058 lbs (480kg)
COMP-QY10-1 Weight (Simplex/Vertical)	900 lbs (408kg)
COMP-QY10-2 Weight (Duplex/Horizontal)	1,693 lbs (768kg)
COMP-QY5-1 Power Source	460VAC, 60Hz, 3 ph: 6.6 Amps / 200 VAC, 60Hz, 3 ph 15.2 Amps (3.1kW)
COMP-QY5-2 Power Source, Two (2) Supplies	460VAC, 60Hz, 3 ph: 13.2 Amps / 200 VAC, 60Hz, 3 ph 30.4 Amps (6.2kW)
COMP-QY7.5-1 Power Source	460VAC, 60Hz, 3 ph: 11 Amps / 200 VAC, 60Hz, 3 ph 23.3 Amps (5.1kW)
COMP-QY7.5-2 Power Source, Two (2) Supplies	460VAC, 60Hz, 3 ph: 22 Amps / 200VAC, 60Hz, 3 ph 46.6 Amps (10.2kW)
COMP-QY10-1 Power Source	460VAC, 60Hz, 3 ph: 12.5 Amps / 200VAC, 60Hz, 3 ph 29.5 Amps (5.9kW)
COMP-QY10-2 Power Source, Two (2) Supplies	460VAC, 60Hz, 3 ph: 25 Amps / 200VAC, 60Hz, 3 ph 59 Amps (11.8kW)
COMP-QY5-1 Air Compressor Output	17.4 SCFM/1,044 SCFH (493 L/min)
COMP-QY5-2 Air Compressor Output	34.8 SCFM/2,088 SCFH (986 L/min)
COMP-QY7.5-1 Air Compressor Output	23.6 SCFM/1,416 SCFH (668 L/min)
COMP-QY7.5-2 Air Compressor Output	47.2 SCFM/2,832 SCFH (1,336 L/min)
COMP-QY10-1 Air Compressor Output	36 SCFM/2,160 SCFH (1,019 L/min)
COMP-QY10-2 Air Compressor Output	72 SCFM/4,320 SCFH (2,038 L/min)
Air Tank Output Connection	1" NPT Female
Auto-Drain Connection	¼" NPT Female
Auto-Drain Power Source	120VAC, 60Hz, 1 ph (200-240VAC, 50HZ, 1 ph): Connect to unswitched Power Source
Temperature Range	40°F - 105°F (5°C - 40°C)

Nitrogen Generator Dimensions

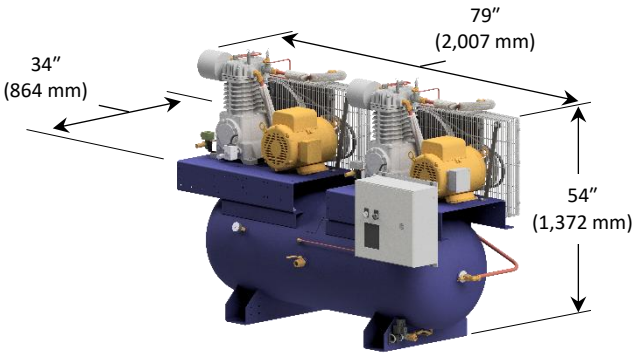
AG-6500 and AG-11000

AG-18500 and AG-25000

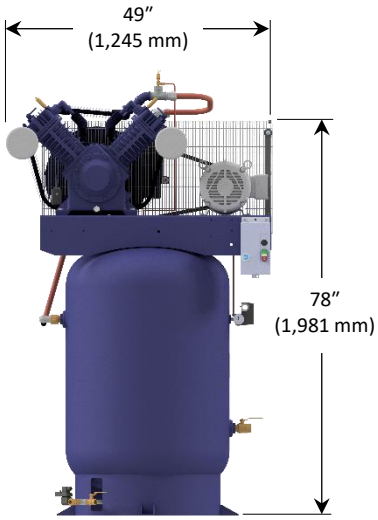
Air Compressor Dimensions



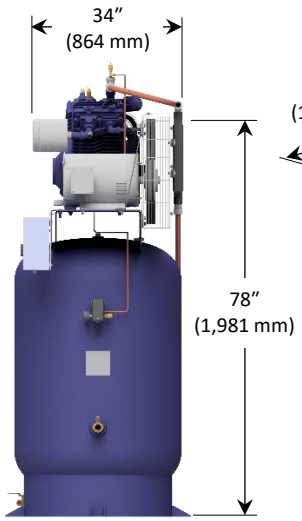
COMP-QY5-1 and COMP-QY7.5-1 Simplex Air Compressor

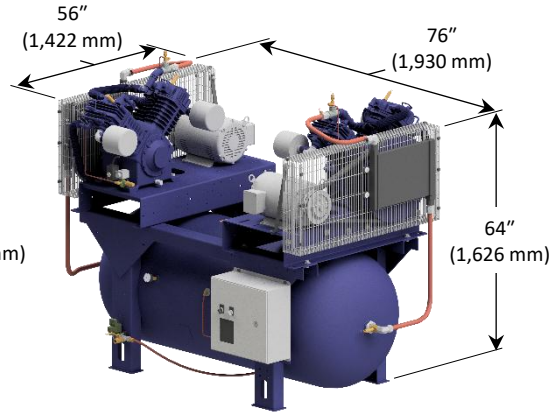


COMP-QY5-2 and COMP-QY7.5-2 Duplex Air Compressor



COMP-QY10-1 Simplex Air Compressor





COMP-QY10-2 Duplex Air Compressor

OPERATIONAL INFORMATION

System Operating Pressures

When multiple dry pipe and preaction fire sprinkler systems are connected to one nitrogen generator, the **fire sprinkler systems must operate at the same supervisory gas pressure**. Fire sprinkler systems operating at different pressures will have an adverse effect on the nitrogen inerting process, as well as cause damage to the nitrogen generation equipment resulting in premature failure.

In applications where multiple dry pipe and preaction fire sprinkler systems are connected to one nitrogen generator and there is more than one supervisory gas pressure, an ECS Nitrogen Interface Controller (NIC-1) must be included in the project.

System Operating Pressure Adjustments

The nitrogen generator operating pressure settings in conjunction with the pressure setting of the fire sprinkler system's air maintenance device(s) are established and set during the commissioning process.

1. The operating pressure settings of the fire sprinkler air maintenance device(s) or the nitrogen generator must not be readjusted after the system has been commissioned.
2. Any adjustments to the operating pressure settings of the fire sprinkler air maintenance device(s) or the nitrogen generator will have an adverse effect on the nitrogen inerting process and could damage the nitrogen generation equipment.
3. **Any changes to the fire sprinkler air maintenance device(s) or nitrogen generator operating pressure settings must be authorized by and performed under the direction of ECS.**

Sprinkler System Gauge Accuracy

The accuracy of the gauges used in fire sprinkler systems can affect the operating pressure of the fire sprinkler system as well as determining the required 3 to 5 psig (0.2 to 0.3 bar) pressure range needed to properly remove the oxygen from a fire sprinkler system. NFPA 25 indicates that gauges more than ±3% must be replaced or recalibrated. FM Global allows the gauges used in fire sprinkler systems to be accurate within ±2% over the center third of its scale and ±3% over the remaining two thirds of its scale. This can become paramount when operating a low-pressure valve sprinkler system with an operating pressure of 15 to 20 psig (1 to 1.4 bar).

Example: NFPA 25: A 200 psi (14 bar) gauge with ±3% accuracy equates to ±6 psi (0.4 bar) variance in the actual pressure reading of the gauge. Therefore, a sprinkler system indicating a 40 psig (2.8 bar) operating pressure can be operating between 34 psig (2.3 bar) and 46 psig (3.2 bar).

FM Global: A 200 psi (14 bar) gauge with ±2% accuracy in the center third of the gauge equates to ±4 psi (0.3 bar) variance in the actual pressure reading of the gauge; and ±3% accuracy in the upper and lower third of the gauge equates to ±6 psi (0.4 bar) variance in the actual pressure reading of the gauge.

1. A 200 psi (14 bar) gauge on a sprinkler system indicating a 100 psig (6.9 bar) (center third of the gauge) operating pressure can actually be operating between 96 psig (6.6 bar) and 104 psig (7.2 bar).
2. A 200 psi (14 bar) gauge on a sprinkler system indicating a 20 psig (1.4 bar) (lower third of the gauge) operating pressure can actually be operating between 14 psig (0.9 bar) and 26 psig (1.8 bar).

A sprinkler system using a low-pressure valve with a 200 psi (14 bar) gauge indicating a 15 psig (1 bar) operating pressure can actually be operating between 9 psig (0.6 bar) and 21 psig (1.4 bar); which could be close to the low-air alarm/trip pressure of the sprinkler system.

To ensure proper operation of the sprinkler system and the nitrogen generator, calibrate the sprinkler system operating pressure to the turn-on and turn-off pressure of the nitrogen generator using the “Air Maintenance Device Pressure Adjustment Procedure” on page 67.

The procedure aligns the sprinkler system operating pressure to the turn-on pressure of the nitrogen generator, reducing the potential of the nitrogen generator turn-on pressure to be set near the low-air alarm/trip pressure of the sprinkler system.

Sprinkler System Air Maintenance Device

Dry pipe and preaction fire sprinkler systems are to be configured to use a single air maintenance device (AMD) for each dry pipe or preaction fire sprinkler system in accordance with NFPA 13.

1. Applications where multiple fire sprinkler systems are served with a single AMD have been known to cause nitrogen generators to short cycle due to the air restriction that the AMD imposes on the nitrogen supply line. Short cycling of the nitrogen generator can cause damage to the system components and may affect the manufacturer’s warranty.

AMD operation is directly affected by the inlet pressure to the AMD. To ensure the AMD operates properly with the nitrogen generator, use the “Air Maintenance Device Pressure Adjustment Procedure” on page 67.

Fire Sprinkler System Leak Rates

The leak rate of a dry pipe or preaction fire sprinkler system will have a direct effect on the nitrogen generator run frequency or on/off cycles. The maximum allowable leak rate in a fire sprinkler system as defined by NFPA-13 is 1.5 psig (0.1 bar) within a 24-hour period. The design specifications of the nitrogen generator are based on 6.0 psig (0.4 bar) leak rate within a 24-hour period. Sprinkler systems with a leak rate more than 6.0 psig (0.4 bar) within a 24-hour period will cause the nitrogen generator run frequency to increase resulting in greater wear on system components. Sprinkler systems with a leak rate greater than 6.0 psig (0.4 bar) within a 24-hour period must be repaired.

Nitrogen Generator Runtime and Run Frequency

The nitrogen generators are designed to supply 5 psi (0.3 bar) of nitrogen into the total volume (gallons) of the sprinkler system(s) connected to the nitrogen generator in less than 3 hours.

1. The nitrogen generator may typically run between 0.25 to 3.5 hours per cycle with a run frequency of approximately one to five cycles per day in the nitrogen inerting (venting) mode.
2. The nitrogen generator should typically run between 0.25 to 3.5 hours per cycle with a run frequency of approximately one to three cycles per day in the supervisory gas (not venting) mode.

NOTES: All sprinkler systems are different. Performance of the nitrogen generator will vary based on number of systems, individual and total system volume, leak rate, generator model, and operating pressure.

A smaller breathing range (i.e. generator turn-on pressure is 3 psi (0.2 bar) below system operating pressure), higher leak rates, or smaller sprinkler system volumes may increase the frequency of cycles or affect the runtime of the nitrogen generator.

If nitrogen generator runtime is consistently less than 0.25 hours per cycle, more than 3.5 hours per cycle, or you experience runtime or short-cycle alarms, contact ECS.

If the nitrogen generator cycles more than seven times per day, or you experience runtime or short-cycle alarms, contact ECS.

Startup, Commissioning, and Operational Procedures

INSTALLATION

Overview

Following is an overview of the steps required to install the nitrogen generation system. The remainder of this section includes details for each step. To prepare, read the entire "Installation" section before you get started.

1. Mount the nitrogen generator cabinet in the appropriate location.
2. Mount the air compressor in the appropriate location.
3. Connect the power source to the nitrogen generator cabinet.
4. Connect the power source to the air compressor.
5. Plumb the air supply line between the air compressor and the nitrogen generator.
6. Plumb the nitrogen/air supply line to the dry pipe and/or preaction sprinkler risers being served.
7. Plumb the condensate drain line to floor drain or building exterior.
8. Connect air compressor running monitoring contacts to nitrogen generator (Recommended).
9. Connect to the nitrogen generator output signals (Form C dry contacts). Or, wire for optional Modbus communication.
10. Connect the nitrogen generator to the internet for remote monitoring by way of ECS' GreenSight web application (optional). (See "GreenSight" on page 64 for details.)

Wire Gauge Chart

1. Ensure an appropriately rated disconnect switch and circuit breaker [minimum 15 Amps and a Short-Circuit Current Rating (SCCR) of 5 kVA] are installed in a suitable and accessible location in accordance with the applicable national and/or local codes (i.e., NFPA 70).
2. The circuit breaker and disconnect are to be easily identifiable as associated with the equipment.
3. Ensure the ground wire is properly connected to the ground terminal(s) of the equipment using appropriately sized ground wire.

Wire Gauge Chart							
Size	**Amperage**			**Diameter**		**Resistance**	
(AWG)	60°C (140°F)	75°C (167°F)	90°C (194°F)	(Inches)	(mm)	(Ohms/1,000 ft)	(Ohms/km)
18				0.0403	1.024	6.385	20.95
16				0.0508	1.291	4.016	13.17
14	15	15	15	0.0641	1.628	2.525	8.282
12	20	20	20	0.0808	2.053	1.588	5.211
10	30	30	30	0.1019	2.588	0.9989	3.277

Step 1: Mount the Nitrogen Generator Cabinet

The nitrogen generator is designed to be mounted directly to the floor and /or the wall at the appropriate location. Several factors should be considered in choosing the proper mounting location for the nitrogen generator:

1. Access to the power source (dedicated circuit is highly recommended)
2. Access to building monitoring connections and optional internet connection (where applicable)
3. Access to sprinkler risers being supplied from nitrogen generator
4. Access to drain for the condensate discharge line
5. Clearance for service and ventilation
6. Cleanliness of the environment and air intake

The cabinet includes pre-punched holes in the feet for floor mounting using standard anchors.

NOTES:

1. The generator cabinets do not include holes in the back panel for wall support.
2. The generator cabinet must be firmly anchored to a flat/level surface.
3. When additional wall supporting of the generator cabinet is used, ensure the cabinet is firmly anchored to a wall, the wall is structurally sound, and capable of supporting the generator cabinet.

Step 2: Mount the Air Compressor

For air compressor installation, take note of the below and follow the compressor manufacturer's installation, operation, and maintenance manual—always follow specific instructions for your exact make and model.

WARNING: To ensure safety and reliability from your air compressor, follow all manufacturer recommendations.

NOTE: The operating environment shall not exceed the maximum temperature specified by the air compressor manufacturer.

NOTE: The air compressor must include an auto-drain on the air receiver tank to remove water and oil condensate, which must not enter the nitrogen generator. If auto-drain is not included in the air compressor package, install an auto-drain on the air receiver tank.

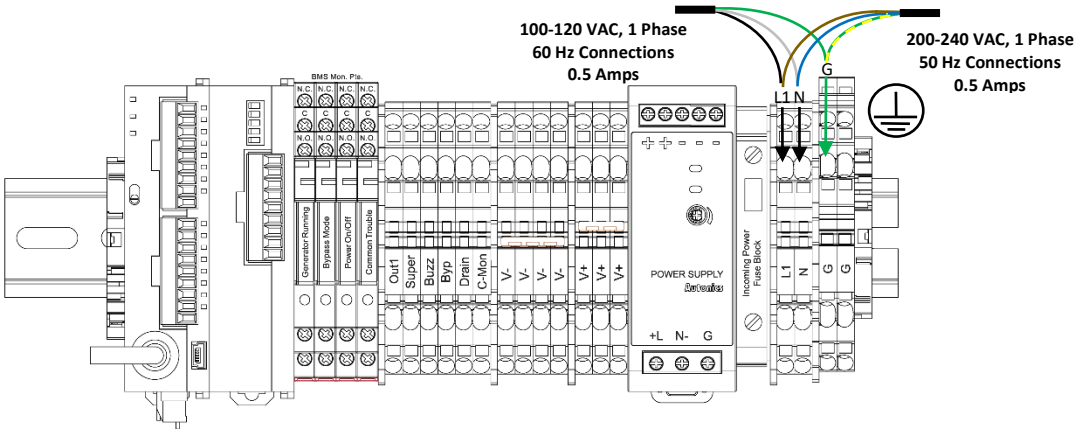
NOTE: Follow all applicable national and/or local codes.

1. Choose a location for the air compressor in the fire sprinkler riser room. The air compressor:
   - Must be mounted on a flat and level concrete surface.
   - Must be installed in an adequately ventilated space.
   - Must have adequate clearance for servicing and ventilation.
   - Must be close to a drain, or plan to use an evaporative collection chamber.
   - Must be within close proximity to the nitrogen generator.
2. Mount the air compressor directly to a concrete floor or concrete pad (see the compressor manufacturer's installation instructions).
3. Install a properly rated and sized braided flexible hose (not supplied) in-line and directly to the isolation valve on the air supply outlet of the air receiver tank.

Step 3: Connect the Nitrogen Generator Power Source

It is highly recommended that a dedicated power source is provided for the Nitrogen Generator to prevent interaction with other equipment. The incoming power source line is connected to the terminal blocks inside the nitrogen generator cabinet. The terminal connections are labeled L1, N, and G.

Nitrogen generator power source: 100-240 VAC, 50-60 Hz, 1 phase (dedicated circuit is highly recommended).



NOTE: Ensure an appropriately rated disconnect switch and circuit breaker [minimum 15 Amps and a Short-Circuit Current Rating (SCCR) of 5 kVA] are installed in a suitable and accessible location in accordance with the applicable national and/or local codes (i.e., NFPA 70).

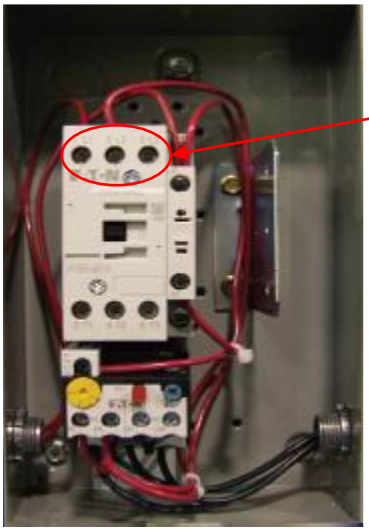
Step 4: Connect the Air Compressor Power Source

Follow the compressor manufacturer's installation, operation, and maintenance manual. A dedicated power source is recommended. Provide a means of power disconnect adjacent to the air compressor in accordance with manufacturer's published instructions and in accordance with the applicable national and/or local codes (i.e., NFPA 70). The incoming power source line(s) is/are connected to the terminal block inside the NEMA 4 power box on the air compressor.

NOTES:

1. Simplex and Duplex Air Compressors require one incoming power source.
2. Confirm the available power source is compatible with the wiring configuration of the air compressor. Contact ECS if there is a discrepancy.
3. Ensure the air compressor pump(s) is/are operating in the correct direction. Hold a piece of paper to the opening of the heat exchanger housing. The paper will be pulled towards the heat exchanger housing when the pump direction is correct.

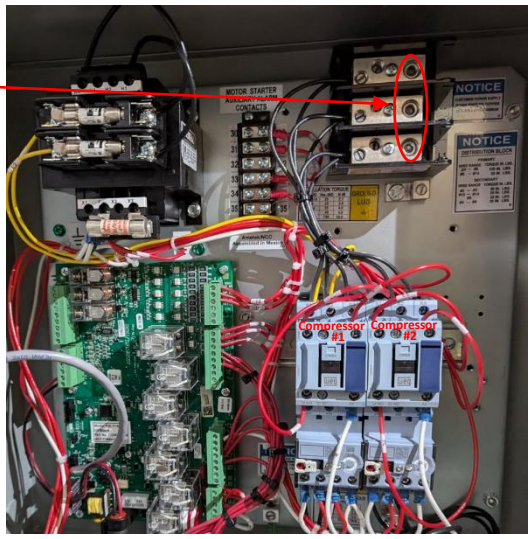
The auto-drain power source: 100-120 VAC, 60 Hz, 1 phase (200-240 VAC, 50 Hz, 1 phase) unswitched power source, can be connected to same power source as the nitrogen generator.



200 or 460 VAC, 60 Hz, 3 Phase Connections
Labeled L1, L2, L3

Simplex Air Compressor	200 VAC	460 VAC
COMP-QY5-1	15.2 Amps	6.6 Amps
COMP-QY7.5-1	23.3 Amps	11 Amps
COMP-QY10-1	29.5 Amps	12.5 Amps

NOTE: Amperage must be doubled for Duplex



Simplex Air Compressor **Duplex Air Compressor**

NOTES: Air compressor information is based on Quincy air compressors (U.S. models). When a different air compressor is used, refer to air compressor manufacturer's installation instructions.

Ensure an appropriately rated disconnect switch and circuit breaker [minimum 15 Amps and a Short-Circuit Current Rating (SCCR) of 5 kA] are installed in a suitable and accessible location in accordance with the applicable national and/or local codes (i.e., NFPA 70).

Duplex Air Compressor Operation

Duplex Air Compressors are configured for lead/lag operation. One compressor pump operates as the primary pump (lead) while the second pump operates as the secondary pump (lag). The secondary pump energizes when the primary pump is unable to maintain air pressure. Duplex air compressors include a transfer switch which transitions the primary pump responsibility to the alternate pump at each start up cycle of the air compressor.

Step 5: Plumb the Air Supply Line to the Nitrogen Generator

Use a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines.

NOTE: All parts of the piping should fit so as not to create any stress between the piping and system components.

NOTE: Except for the flexible hose, the piping between the compressor receiver tank and the nitrogen generator shall be secured (for example, anchored to a wall).

1. Install the Y-strainer on the nitrogen generator air inlet. (A Y-strainer shipped with the nitrogen generator.)
2. Install piping from the air inlet of the nitrogen generator to the braided flexible hose (not supplied) on the compressor air receiver tank.

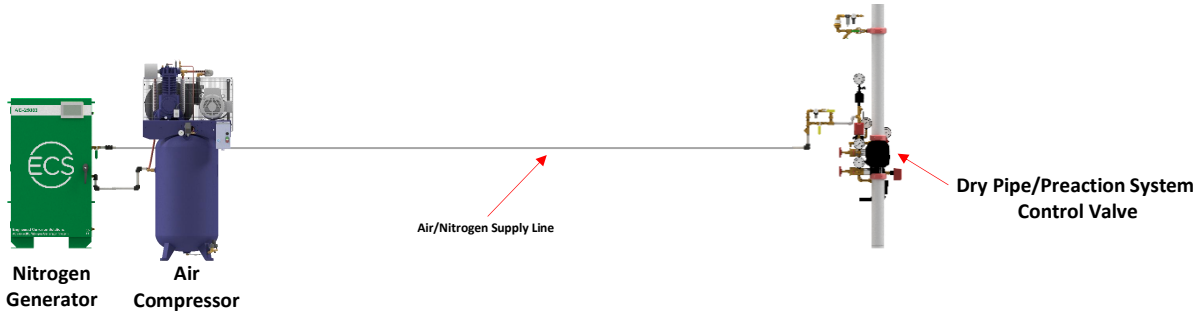
Step 6: Plumb the Nitrogen/Air Supply Line

NOTE: Isolation ball valve is shipped with the nitrogen generator. Install the isolation ball valve on the nitrogen outlet connection directly to the nitrogen generator.

Dry Pipe/Preaction Systems with No Additional Air Compressor

The nitrogen/air discharge plumbing from the nitrogen generator must be connected directly to the dry pipe or preaction valve trim using a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines. The size of the nitrogen/air supply line must be based on both the length of pipe between the nitrogen generator and fire sprinkler systems and the total volume of fire sprinkler systems being supplied.

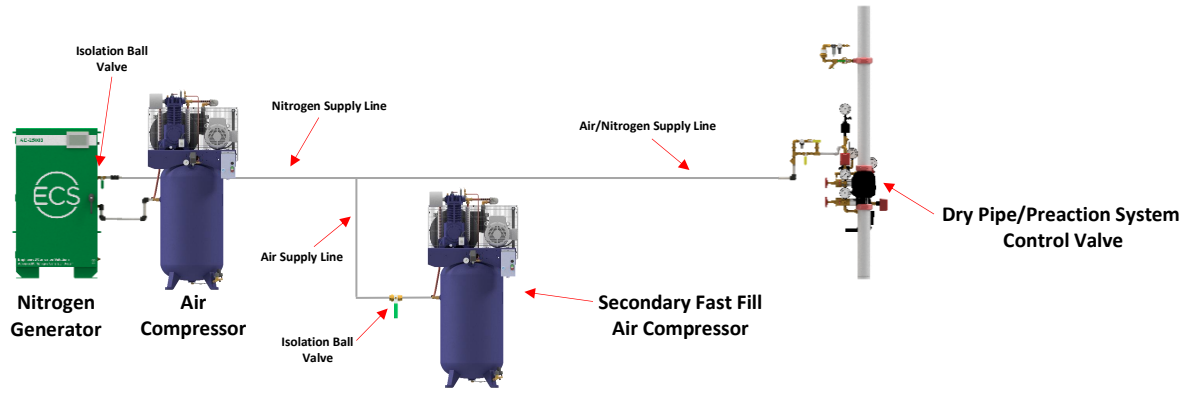
NOTE: The nitrogen generator requires an in-line Air Maintenance Device (AMD) that is equipped with an on-board field adjustable pressure regulator for each sprinkler system being served.



Dry Pipe/Preaction Systems with Separate Air Compressor

A separate air compressor can be used to meet the NFPA 13 30-minute fill requirement or as a back up to the nitrogen generator. In this application, the nitrogen/air discharge plumbing from the nitrogen generator and the separate air compressor are connected to the dry pipe or preaction valve trim with isolation valves in each supply line using a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines. The size of the nitrogen/air supply line must be based on both the length of pipe between the nitrogen generator and fire sprinkler systems and the total volume of fire sprinkler systems being supplied.

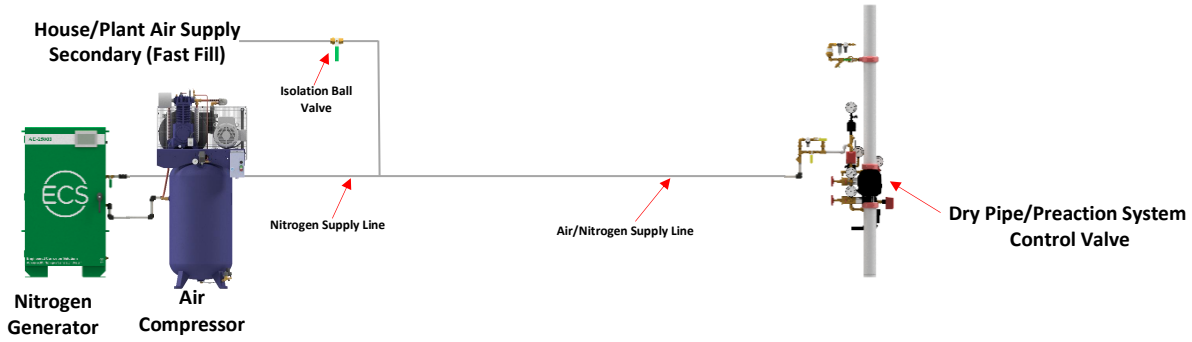
NOTE: The nitrogen generator requires an in-line Air Maintenance Device (AMD) that is equipped with an on-board field adjustable pressure regulator for each sprinkler system being served.



Dry Pipe/Preaction Systems with House/Plant Air Supply

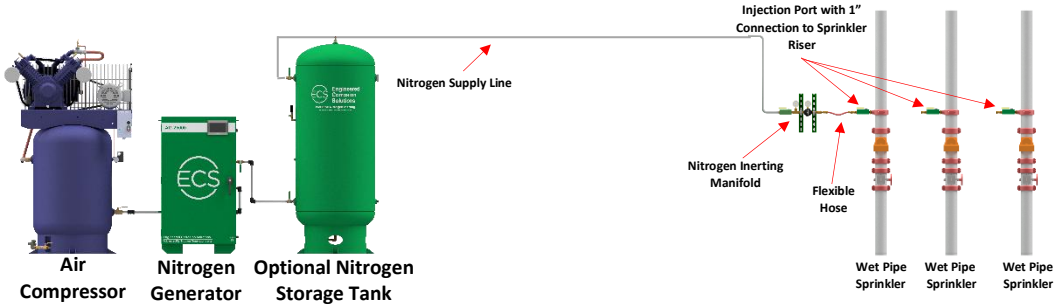
A separate house/plant air supply can be used to meet the NFPA 13 30-minute fill requirement or as a back up to the nitrogen generator. In this application, the nitrogen/air discharge plumbing from the Nitrogen Generator and the separate house/plant air supply are connected to the dry pipe or preaction valve trim with isolation valves in each supply line using a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines. The size of the nitrogen/air supply line must be based on both the length of pipe between the nitrogen generator and fire sprinkler systems and the total volume of fire sprinkler systems being supplied.

NOTE: The nitrogen generator requires an in-line Air Maintenance Device (AMD) that is equipped with an on-board field adjustable pressure regulator for each sprinkler system being served.



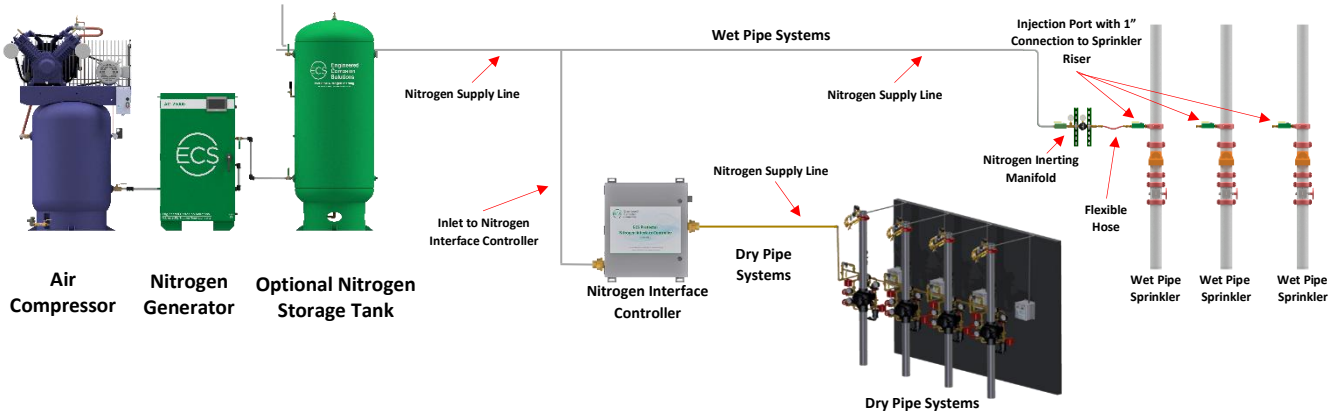
Wet Pipe Systems

The nitrogen discharge plumbing from the nitrogen generator and *optional* nitrogen storage tank must be connected directly to the Nitrogen Inerting Manifold using a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines. The size of the nitrogen/air supply line must be based on both the length of pipe between the nitrogen generator and fire sprinkler systems and the total volume of fire sprinkler systems being supplied.



Combination Wet Pipe and Dry Pipe/Preaction Systems

The nitrogen discharge plumbing from the Nitrogen Generator and *Optional* Nitrogen Storage Tank must be connected directly to the inlet of the Nitrogen Interface Controller and Nitrogen Inerting Manifold using a minimum ½" (12.7 mm) black steel, galvanized steel, or copper lines. Nitrogen Generator and Nitrogen Storage Tank provide nitrogen for wet pipe systems and Nitrogen Interface Controller provides nitrogen dry pipe/preaction systems. The size of the nitrogen/air supply line must be based on both the length of pipe between the nitrogen generator and fire sprinkler systems and the total volume of fire sprinkler systems being supplied.



Step 7: Plumb the Condensate Drain Line

The Nitrogen Generator will occasionally discharge a small amount of condensate water from the coalescing filters inside the cabinet. It is recommended that the ¼" drain connection be plumbed to a floor drain or building exterior. When plumbing to a drain is not feasible, an evaporative collection chamber can be used.

The Nitrogen Generator includes an automatic draining function of the condensate water from the coalescing filters inside the cabinet. The autodrain function is programmed from the factory to momentarily drain upon initial start of a nitrogen generation cycle, momentarily drain upon each hour of runtime of a nitrogen generation cycle, and momentarily drain at the completion of a nitrogen generation cycle. (If adjustments are needed to the Autodrain function, see "Autodrain Settings Screen" on page 56.)

The air compressor will discharge a small amount of condensate water periodically from the air receiver tank auto-drain. The condensate water discharge time and frequency are based on the settings of the auto-drain. The auto-drain requires 120 VAC, 60 Hz, 1 phase (200-240 VAC, 50 Hz, 1 phase) unswitched power source and can be connected to the same power source as the nitrogen generator. Ensure the auto-drain is connected and the power source is active.

Recommend: Set the discharge frequency (OFF Time) to twenty minutes and the discharge time (ON Time) to ten seconds. If excessive water and oil condensate accumulates in the nitrogen generator filter assembly, the discharge frequency time may need to be decreased and/or the discharge time may need to be increased. Adjust as necessary.

It is recommended that the ¼" drain connection be plumbed to a floor drain or building exterior. When plumbing to a drain is not feasible an evaporative collection chamber can be used.

Step 8: Connect the Air Compressor Running Monitor Contacts

The nitrogen generator and air compressor are designed to run for up to two hours at a time when filling all the systems with 3 to 5 psig (0.2 to 0.3 bar) of high-purity nitrogen. To ensure the air compressor does not operate more than the anticipated run-time of the nitrogen generator and air compressor, the air compressor running can be monitored through the nitrogen generator when the air compressor is equipped with monitoring contacts. All wiring must be in accordance with manufacturers' published instructions and in accordance with the applicable national and/or local codes (i.e., NFPA 70).

Connections:

1. Connect one of the Air Compressor Monitoring Contact Terminals to V+ Terminal in the Nitrogen Generator.

2. Connect one of the Air Compressor Monitoring Contact Terminals to C-Mon Terminal in the Nitrogen Generator.

NOTES: Air compressor information is based on Quincy air compressors (U.S. models). When a different air compressor is used, refer to air compressor manufacturers installation instructions.

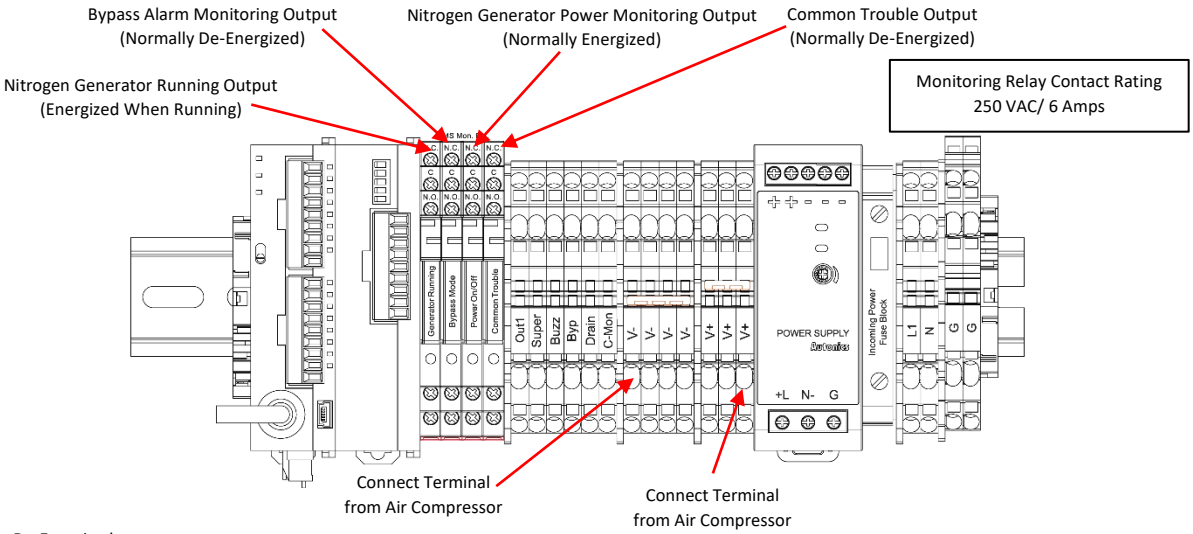
Step 9: Connect to the nitrogen generator Form C dry contacts or wire for Modbus communication

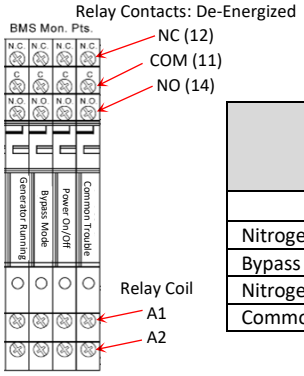
Connect (Building Alarm System or Building Management System) to the four nitrogen generator Form C dry contacts for the following output signals: Nitrogen Generator Running, Bypass Alarm Monitoring, Nitrogen Generator Power Monitoring, and Common Trouble Monitoring.

The Common Trouble Monitoring signal turns on for any of the following:

- *Short Cycle Advisory:* Generator runs short intervals multiple times within a 24-hour period
- *Excessive Runtime Alarm:* Generator runs continuously for more than 3 1/2 hours
- *Low Air Alarm:* Loss in nitrogen supply line pressure
- *Bypass Mode Active:* Generator is in the Bypass (air only) Mode
- *Filter Change Required:* Coalescing filters in the generator need to be replaced

Alternatively, wire for optional Modbus communication to enable more extensive monitoring. Contact ECS Sales for technical details and pricing information.





Description	Normally Open Contact Connections (Building Alarm System)			Normally Closed Contact Connections (Building Management System)		
	Relay	LED	Connections	Relay	LED	Connections
Nitrogen Generator Running Output (Running)	Energized	On	11 & 14	Energized	On	11 & 12
Bypass Alarm Monitoring Output	De-Energized	Off	11 & 14	De-Energized	Off	11 & 12
Nitrogen Generator Power Monitoring Output	Energized	On	11 & 12	Energized	On	11 & 14
Common Trouble Monitoring Output	De-Energized	Off	11 & 14	De-Energized	Off	11 & 12

Step 10: Connect the nitrogen generator to the internet (optional).

If you will be using ECS' GreenSight web application for remote monitoring and email alerts (see page 64 for details), connect an ethernet cable from your LAN to the LAN 1 ethernet port inside the nitrogen generator cabinet on the bottom of the display module. ***Note:*** While there are two ethernet ports on the display module, you must use LAN 1 for GreenSight.

Display Module (bottom view)

COMMISSIONING

Only qualified personnel should commission the new equipment into service once it is installed. **Once the nitrogen generator has been configured, there should be no reason to adjust them.**

Safety Warning

Prior to any system commissioning on the nitrogen generator, ensure that the nitrogen generator is isolated from all system risers. Failure to do so can result in system damage and/or personal injury.

Commissioning Video

Commissioning videos to assist with the commissioning process of this equipment is available. Access to the commissioning video can be obtained through the QR code on the back page of this document or by contacting ECS.

Pre-Commissioning Information

Prior to setting the cut-in (turn-on) and cut-out (turn-off) pressures of the nitrogen generator, identify the following sprinkler system pressures:

1. Sprinkler system operating pressure/Air Maintenance Device (AMD) pressure.

   NOTE: When the nitrogen generator is connected to multiple dry pipe and preaction systems, the **fire sprinkler systems must operate at the same supervisory gas pressure**.

2. Sprinkler system low air alarm pressure.

Once the sprinkler system pressures have been identified, determine the cut-in and cut-out pressures of the nitrogen generator.

1. **Important:** The nitrogen generator cut-in pressure is to be 3 to 5 psig (0.2 to 0.3 bar) **below** the sprinkler system operating/AMD pressure.
2. **Important**: The nitrogen generator cut-in pressure needs to be 3 to 5 psig (0.2 to 0.3 bar) **above** the sprinkler system low air alarm pressure.
3. The nitrogen generator cut-out pressure is preset from the factory at 100 psig (6.9 bar) which should be adequate for most applications. Should a higher cut-out pressure be needed, adjust the cut-out pressure using the cut-out pressure adjustment procedure.

Low Pressure Valves

When connecting a nitrogen generator to a low-pressure valve, additional considerations need to be evaluated. Due to the inherent operating pressures [i.e., 20 psi (1.4 bar) or below], the operational tolerances are tighter which reduces the pressure range for the “fill and purge” pressure cycling to operate. Low pressure valves typically operate within two pressure ranges:

1. Minimum and maximum pressure range [i.e., 13 psi (0.9 bar) minimum and 18 psi (1.2 bar) maximum].
2. Minimum and maximum pressure range based on the maximum incoming water pressure.

The nitrogen generator cut-in (turn-on) pressure must be a minimum of 3 psi (0.2 bar) **below** the sprinkler system operating pressure for the “fill and purge” breathing cycle to operate properly. The nitrogen generator cut-in (turn-on) pressure must not be below the minimum allowable pressure as defined by the sprinkler valve manufacturer.

1. Adjust the nitrogen generator cut-in (turn-on) pressure to the minimum allowable pressure as defined by the sprinkler valve manufacturer.
2. Verify the nitrogen generator cut-in pressure is a minimum of 3 psi (0.2 bar) **above** the low air alarm pressure.

3. Adjust the sprinkler system operating pressure [air maintenance device (AMD) pressure] to 3 psi (0.2 bar) **above** nitrogen generator cut-in pressure.

This configuration of the nitrogen generator cut-in pressure and the sprinkler system operating pressure allows the "fill and purge" breathing process to operate properly while maintaining the minimum sprinkler system operating pressure without adversely affecting the sprinkler system water delivery time.

Nitrogen Generator Commissioning

The nitrogen generator commissioning is accomplished through the user interface display screen. The user interface provides the access for setup, monitoring, and control functions of the nitrogen generator. See "User Interface Information" on page 54.

1. The user interface Home screen includes a banner that requires the nitrogen generator to be commissioned prior to operation. To commission, press the commissioning note banner.
2. Check the nitrogen generator's nitrogen production and nitrogen purity (see "Nitrogen Purity and Flow Rate Procedures" on page 65).
    a. Isolate the nitrogen generator from the sprinkler system(s).
    b. Verify nitrogen generator is in the Nitrogen Production Mode.
    c. Open the flow meter ball valve to initiate nitrogen production.
    d. Allow the nitrogen generator to operate in the nitrogen production mode for approximately five minutes to allow the nitrogen generator to obtain optimum operating temperature.

        NOTE: Air compressor must remain running continuously during the nitrogen generation cycle. If the air compressor cycles during the nitrogen generation cycle or an excessive amount of air is being exhausted from the excess air regulator muffler, the excess air regulator in the nitrogen generator may require adjustment. (See "Nitrogen Generator Excess Air Adjustment Procedure" on page 65.)

    e. Check nitrogen production and nitrogen purity.

        IMPORTANT NOTE: Nitrogen purity and nitrogen production rate are inversely proportional in the nitrogen generator. **As the nitrogen purity increases (above 98%) the nitrogen production rate decreases (lower SCFH) and as the nitrogen purity decreases (below 98%) the nitrogen production rate increases (higher SCFH).** Lower nitrogen

        production rates will increase system fill times resulting in longer run times of the nitrogen generator.

        I. In Dry Pipe and Preaction System applications the nitrogen purity should be 98%.

        II. In Wet Pipe Nitrogen Inerting (WPNI) applications the nitrogen purity should be 98.5%

        III. Connect the Handheld Gas Analyzer to the quick connect gas sampling port in the nitrogen generator to verify the nitrogen purity.

            NOTE: Prior to connecting the Handheld Gas Analyzer to the nitrogen generator, calibrate the Handheld Gas Analyzer using the calibration procedures. (See the "Nitrogen Purity Level Check Procedure" on page 65.)

IV. The nitrogen purity was verified to be producing 98% nitrogen purity prior to equipment shipment from ECS. Should the purity not be as defined above, contact ECS prior to making changes to the nitrogen purity.
   1) If the nitrogen purity is above the desired purity, decrease the nitrogen purity by turning the Nitrogen Flow Control Valve counterclockwise in ⅛ turn increments. (See "Generator Configuration Diagrams" on page 77.)
   2) If the nitrogen purity is below the desired purity, increase the nitrogen purity by turning the Nitrogen Flow Control Valve clockwise in ⅛ turn increments. (See "Generator Configuration Diagrams" on page 77.)

Nitrogen Generator Flow Rates

Nitrogen Generator	Production Rate – SCFH (L/min)	
	Bypass Mode	Nitrogen Generation Mode
AG-6500 Stand Alone w/ Quincy COMP-QY5 Air Compressor	1,044 (492.7)	170 (80.2)
AG-11000 Stand Alone w/ Quincy COMP-QY7.5 Air Compressor	1,416 (668.3)	240 (113.3)
AG-18500 Stand Alone w/ Quincy COMP-QY7.5 Air Compressor	1,416 (668.3)	425 (200.6)
AG-25000 Stand Alone w/ Quincy COMP-QY10 Air Compressor	2,160 (1,019.5)	630 (297.3)

NOTES: Production rates are nominal rates based on 70°F (21°C) operating temperature at sea level. Changes in ambient temperatures, humidity levels, elevations, air compressor performance and coalescing filter performance can affect the production rate.

If production flow rate is lower than flow rates in the production chart, check pressure regulator of the excess bleed off assembly.

If production flow rate identified and documented varies more than 10% of the flow rates in the production chart, contact ECS.

f. Close the nitrogen production flow meter isolation ball valve, allow the pressure to increase to the nitrogen generator's cut-out (turn-off) pressure and the nitrogen generator to shut off.
g. Once nitrogen generator has shut off, monitor the pressure on the display to ensure the pressure indicated remains constant and does not decrease.
   I. If pressure decreases, a leak within the nitrogen cabinet or in the nitrogen supply line exists, leak check all piping and fittings within the nitrogen generator and repair leaks as necessary. (See "Leak Checking" on page 71.)

3. Enter the nitrogen production and nitrogen purity in the appropriate user interface screen.
4. Check and adjust the time and date, as needed.

   NOTE: The Time Zone (in minutes) is only active when nitrogen generator is connected to the internet.

5. Enter sprinkler system operating pressure.
   a. Set the Sprinkler System Operating Pressure.
      i. Set **PSI**/**Bar** button to the appropriate position, if needed (Factory set for PSI).
         1) Press the display.
      ii. Enter the sprinkler system operating pressure.
         1) Press the pressure display, which displays a keypad.
         2) Enter the appropriate pressure, then press keypad **Enter** key.

6. Commissioning Process: Choose Express (Recommended), Custom, or Unsure?
    a. **Express** (Recommended)
        i. Set the nitrogen generator Cut-In (Turn-On) Pressure.
            1) Press the pressure display, which displays a keypad.
            2) Enter the appropriate pressure, then press keypad **Enter** key.
        ii. Set the sprinkler system Low Air Alarm Pressure.
            1) Press the pressure display, which displays a keypad.
            2) Enter the appropriate pressure, then press keypad **Enter** key.
            3) Turn **On** Low Air Alarm Pressure.
        iii. Enter the installation location information into the appropriate user interface screen (recommended but not required).
            1) Press the appropriate display, which displays a keyboard.
            2) Enter the appropriate information, then press keypad **Enter** key.
        iv. Enter the Owner Contact information (recommended but not required).
            1) Press the appropriate display, which displays a keyboard.
            2) Enter the appropriate information, then press keypad **Enter** key.
        v. Press the **Finish** Button.
    b. **Custom**
        i. Choose: Dry/Preaction, Wet System, or Wet and Dry
        ii. **Dry/Preaction**
            1) Set the nitrogen generator Cut-In (Turn-On) Pressure
                a) Press the pressure display, which displays a keypad.
                b) Enter the appropriate pressure, then press keypad **Enter** key.
            2) Set the nitrogen generator Cut-Out (Turn-Off) Pressure.
                a) Press the pressure display, which displays a keypad.
                b) Enter the appropriate pressure, then press keypad **Enter** key.
            3) Set the sprinkler system Low Air Alarm Pressure.
                a) Press the pressure display, which displays a keypad.
                b) Enter the appropriate pressure, then press keypad **Enter** key.
                c) Turn **On** Low Air Alarm Pressure.
            4) Enter the installation location information into the appropriate user interface screen (recommended but not required).
                a) Press the appropriate display, which displays a keyboard.
                b) Enter the appropriate information, then press keypad **Enter** key.
            5) Enter the Owner Contact information (recommended but not required).
                a) Press the appropriate display, which displays a keyboard.
                b) Enter the appropriate information, then press keypad **Enter** key.
            6) Press the **Finish** Button.
        iii. **Wet System**
            1) Wet Pipe Nitrogen Inerting (WPNI) Setup, Nitrogen Generator Cut-In Pressure is lock at 100 psi and Nitrogen Generator Cut-Out Pressure is lock at 120 psi.
            2) Set PSI/Bar button to the appropriate position, if needed (Factory set for PSI).
                a) Press the display.
            3) Enter the installation location information into the appropriate user interface screen (recommended but not required).
                a) Press the appropriate display, which displays a keyboard.
                b) Enter the appropriate information, then press keypad **Enter** key.

4) Enter the Owner Contact information (recommended but not required).
    a) Press the appropriate display, which displays a keyboard.
    b) Enter the appropriate information, then press keypad **Enter** key.
5) Press the **Finish** Button.

iv. **Wet & Dry**
1) The nitrogen generator is configured for Wet Pipe Nitrogen Inerting (WPNI) Setup for the wet pipe systems and a Nitrogen Interface Controller (NIC-1) is used and configured for the dry pipe/preaction systems.
2) Nitrogen Generator Cut-In Pressure is lock at 100 psi and Nitrogen Generator Cut-Out Pressure is lock at 120 psi.
3) Set PSI/Bar button to the appropriate position, if needed (Factory set for PSI).
    a) Press the display.
4) Enter the installation location information into the appropriate user interface screen (recommended but not required).
    a) Press the appropriate display, which displays a keyboard.
    b) Enter the appropriate information, then press keypad **Enter** key.
5) Enter the Owner Contact information (recommended but not required).
    a) Press the appropriate display, which displays a keyboard.
    b) Enter the appropriate information, then press keypad **Enter** key.
6) Press the **Finish** Button.

v. **Unsure?**
1) The user interface displays a message that recommends using the Express Commissioning Process.
2) Press the **Okay** button which returns to the Commissioning Process screen.
3) Choose the express process and press the **Express** button.

Oxygen Removal Vent Setup and Pressure Regulator Adjustment Instructions

Once the nitrogen generator has been commissioned, the oxygen removal vents can be commissioned.

1. Install the appropriate restricted venting orifice in the oxygen removal vent by removing the vent muffler downstream of the backpressure regulator, installing the restricted venting orifice and re-installing the vent muffler.
    a. The restricted venting orifice size is determined by the sprinkler system capacity (gallons).
    b. Consult with ECS to ensure the appropriate restricted venting orifice is installed in the appropriate oxygen removal vent.
2. Based on the nitrogen generator turn-on pressure and the sprinkler system low alarm pressure, adjust the pressure setting for the back pressure regulator.
    a. Choose a pressure setting for the backpressure regulator that is the same as or **above** the low air alarm pressure and **below** the turn-on pressure of the nitrogen generator.

    NOTE: This process can only be performed when sprinkler system is at normal operating pressure.

    b. PAV-D/DQ Standard Vents:
        i. Open the isolation ball valve to allow the vent to pressurize.
        ii. Close the isolation ball valve and allow the vent to depressurize through the restricted venting orifice to pressure setting.
        iii. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.

iv. Make adjustment to pressure setting using the knob so that the regulator stops depressurizing at the desired pressure.
v. Open the isolation ball valve to pressurize the vent and close the isolation ball valve again to check pressure setting. Repeat process until desired pressure setting is achieved.
vi. Push knob back into regulator until it clicks into place.
vii. Once the nitrogen generator system has been commissioned, open the isolation ball valve on the vent assembly. The Standard Vent is now open and actively venting oxygen from the fire sprinkler system.
viii. The isolation ball valve should remain open for approximately 14 days or until the system nitrogen concentration reaches 98% or greater.

NOTE: Use a Handheld Gas Analyzer to verify the gas concentration inside the fire sprinkler system.

ix. At the conclusion of the 14-day DPNI process, close the isolation ball valve.

NOTE: Failure to close the isolation ball valve after 14 days or once fire sprinkler system nitrogen concentration reaches 98% will result in additional oxygen corrosion damage to the system and unnecessary run time of the air compressor and nitrogen generator.

x. If the sprinkler system actuates or another event introduces oxygen to the sprinkler system, the isolation ball valve must be opened again for a period of 14 days to vent oxygen from the system.

c. SMART Vents:
i. Verify the timer settings inside the electric control box. The settings should be as follows:
1) Mode set to **E**
2) Scale set to **20, 30, 40, 50, 60**
3) Range set to **10h**
4) Timer knob set to **35**
5) If needed, a small flathead screwdriver can be used to adjust the timer settings.

NOTE: The green power switch on the electric control box must be in the **On** position and the **Vent** button pressed with both the green power switch and the **Vent** button illuminated to adjust the vent pressure regulator.

ii. Open the isolation ball valve to allow the vent to pressurize.
iii. Close the isolation ball valve and allow the vent to depressurize through the restricted venting orifice to pressure setting.

iv. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.
v. Make adjustment to pressure setting using the knob so that the regulator stops depressurizing at the desired pressure.
vi. Open the isolation ball valve to pressurize the vent and close the isolation ball valve again to check pressure setting. Repeat process until desired pressure setting is achieved.
vii. Push knob back into regulator until it clicks into place.

viii. Once the nitrogen generator system has been commissioned, open the isolation ball valve on the vent assembly, turn the green power switch on the electric control box to the **On** position and push the **Vent** button. The button should now be illuminated.
ix. The SMART Vent is now open and actively venting oxygen from the fire sprinkler system. It will remain open for approximately 14 days.
x. At the conclusion of the 14 day DPNI process, the **Vent** button will extinguish, and the vent will automatically close.
xi. If the sprinkler system actuates or another event introduces oxygen to the sprinkler system press the **Vent** button to automatically restart the oxygen venting cycle.

Sprinkler System Air Maintenance Device Pressure

The proper operation of the nitrogen generator and the dry pipe nitrogen inerting (DPNI) process is dependent on the sprinkler system's air maintenance device (AMD) pressure setting. Sprinkler system AMD pressure settings less than 3 psig (0.2 bar) above the nitrogen generator cut-in (turn-on) pressure or greater than 5 psig (0.3 bar) above the nitrogen generator cut-in pressure will have an adverse effect on the nitrogen generator.

Verify the AMD pressure setting using the "Air Maintenance Device Pressure Adjustment Procedure" on page 67.

Nitrogen Generator and Sprinkler System Air Gauge Comparison

The nitrogen generator utilizes an electronic pressure transducer to digitally monitor the supply line pressure whereas the sprinkler system utilizes an analog gauge to monitor the sprinkler system pressure. There can be variances between the nitrogen generator digital display and the sprinkler system analog gauges. This can have an adverse effect om the cut-in (turn-on) pressure of the nitrogen generator.

NOTE: ALL pressures are measured from the Sprinkler System Air Gauge, unless otherwise indicated.

Nitrogen Cut-In Pressure Check

1. Reduce sprinkler system pressure to the nitrogen generator cut-in pressure.
    a. If nitrogen generator automatically turns on, the nitrogen generator and sprinkler system air gauge are aligned.
    b. If nitrogen generator does not automatically turn on, the nitrogen generator and sprinkler system air gauge are NOT in alignment.
2. Verify pressure indicated on the nitrogen generator display.

    Example: Nitrogen generator display indicates 16 psig (1.1 bar) and the sprinkler system air gauge indicates 15 psig (1 bar), 1 psig (0.1 bar) difference between nitrogen generator display and sprinkler system air gauge.

3. Change the nitrogen generator cut-in pressure to align with pressure indicated on the nitrogen generator display.

    Example: Change cut-in pressure from 15 psig (1 bar) to 16 psig (1.1 bar).

4. The nitrogen generator and sprinkler system air gauge are in alignment.
5. Repeat process to confirm nitrogen generator is automatically turning on when the sprinkler system air gauge is at the appropriate sprinkler system pressure.

Nitrogen Generator Cut-Out (Turn-Off) Pressure Check

1. Verify or lower the sprinkler system pressure is below the sprinkler system operating pressure.
2. Manually turn on nitrogen generator (open then close the flow meter isolation valve) and allow sprinkler system to refill and generator shut off.
    a. If sprinkler system pressure has returned to the sprinkler system operating pressure, the cut-out function is operating properly.
    b. If sprinkler system pressure is not returned to the sprinkler system operating pressure, use the "Air Maintenance Device Pressure Adjustment Procedure" on page 67.
3. Repeat process to confirm nitrogen generator is automatically turning off as well the sprinkler system air gauge is at the desired operating pressure.

STARTUP PROCEDURE

To start up the generator or to put back in service, follow these steps:

NOTE: For component locations, see "Generator Configuration Diagrams" on page 77.

1. Verify that the air compressor is functioning properly.
2. Verify that the automatic drain on the compressor is functioning properly.
3. Verify the air maintenance devices (AMDs) have been set to the system operating or "high end" breathing pressure.
    a. Ensure AMD is calibrated to operate with nitrogen generator pressures using the "Air Maintenance Device Pressure Adjustment Procedure" on page 67.
4. **Important:** Verify the nitrogen generator turn-on pressure is 3 to 5 psig (0.2 to 0.3 bar) **below** the AMD set pressure/sprinkler system supervisory gas operating pressure.
5. **Important:** Verify the nitrogen generator turn-on pressure is 3 to 5 psig (0.2 to 0.3 bar) **above** the sprinkler system low air alarm set pressure.
6. Verify the nitrogen generator is in the Nitrogen Generation mode (Bypass NOT Enabled).

    NOTE: The only time the nitrogen generator should be in the **Bypass Enable** mode is for the NFPA 13 30-minute system fill time requirement.

7. Turn the cabinet power switch **On** (if not already on).
8. Open the regulated valve of all appropriate AMDs and confirm the fast fill valves of all appropriate AMDs are closed.
9. The nitrogen generator is ready to protect the fire sprinkler system(s)

    NOTE: Once the nitrogen generator is operational and if the nitrogen generator experiences short cycling issues, the short cycling is typically a result of an erratically operating air maintenance device. (See "Nitrogen Generator Short Cycling Prevention Procedure" on page 67.)

System Filling Procedure: Ambient Temperatures

The sprinkler system(s) is (are) filled using the air from the air compressor connected to the nitrogen generator to meet the NFPA 13 30-minute fill requirement.

1. Press the **Enable Bypass** button on the **Home** screen to enable the Bypass function in the nitrogen generator. Bypass indication will appear.
2. Open the fast fill valve and close the regulated valve of the appropriate air maintenance device (AMD) necessary to fill the sprinkler system(s).
3. Close the fast fill and regulated AMD valves on any system not being filled.
4. Air compressor will start running.
5. Once the sprinkler system(s) obtains the desired pressure:
   a. Press the **Disable Bypass** button on the **Home** screen to disable the Bypass function and enable the nitrogen mode function in the nitrogen generator. The Bypass Alarm indication will be extinguished.
   b. Close the appropriate AMD fast fill valve and open the AMD regulated valve.
   c. Open AMD regulated valves that were previously closed on any systems not being filled.
6. Initiate the 14-day nitrogen inerting process (see “Nitrogen Inerting Process” on page 33).
7. Once the nitrogen inerting process is completed, the nitrogen generator will continue to automatically operate when any of the associated sprinkler systems require nitrogen.

System Filling Procedure: Cold Storage Applications

The sprinkler system(s) is (are) filled using nitrogen from the nitrogen generator to meet the NFPA 13 fill requirement (DO NOT USE AIR).

NOTE: If temperature of refrigerated spaces maintained below 5°F (-15°C) the pressure is allowed to be restored in 60 minutes, as permitted by NFPA 13.

1. Do Not Enable the Bypass function.
2. Isolate nitrogen generator from sprinkler systems and open flow meter isolation valve.
3. Increase the nitrogen generator production rate (decrease nitrogen purity to 90-92%) by turning flow control (needle) valve counterclockwise.
4. Open isolation valve to sprinkler systems and close flow meter isolation valve.
5. Open the fast fill valve and close the regulated valve of the appropriate air maintenance device (AMD) necessary to fill the sprinkler system(s).
6. Close the fast fill and regulated AMD valves on any system not being filled.
7. Once the sprinkler system(s) obtains the desired pressure:
   a. Isolate nitrogen generator from sprinkler systems and open flow meter isolation valve.
   b. Decrease the nitrogen generator production rate (increase nitrogen purity to 98%) by turning flow control (needle) valve clockwise.
   c. Close the appropriate AMD fast fill valve and open the AMD regulated valve.
   d. Open AMD regulated valves that were previously closed on any systems not being filled.
8. Initiate the 14-day nitrogen inerting process (see “Nitrogen Inerting Process” on page 33).
9. Once the nitrogen inerting process is completed, the nitrogen generator will continue to automatically operate when any of the associated sprinkler systems require nitrogen.

Nitrogen Inerting Process

1. Standard Vents
    a. Open the ball valve on the Standard Vent to initiate the 14-day nitrogen inerting process.
    b. Close the ball valve on the Standard Vent at the completion of the 14-day nitrogen inerting process.
2. SMART Vents
    a. Press the **Vent** button on the SMART Vent Controller which energizes the solenoid on the SMART Vent to initiate the 14-day nitrogen inerting process.
    b. At the completion of the 14-day nitrogen inerting process the SMART Vent Controller will automatically close the vent by de-energizing the solenoid.
3. Advanced**IQ** Vents
    a. Press the **Vent System** button on the Advanced**IQ** Vent Controller which initiates the 14-day nitrogen inerting process.
    b. At the completion of the 14-day nitrogen inerting process or when the nitrogen purity has obtained 98%, the Advanced**IQ** Vent Controller will automatically cease the nitrogen inerting process.

NORMAL OPERATION

Once in service, the nitrogen generator requires no additional intervention to function properly. Generator settings should not be altered without consulting ECS and the unit should not be powered down for any reason other than maintenance. To take the generator out of service for maintenance, follow these steps:

1. Close the air maintenance device (AMD) regulated and fast fill valve on the appropriate fire sprinkler system.
2. Power off generator cabinet.
3. Depressurize the nitrogen generator cabinet and/or air compressor before performing any work on either the nitrogen generator or the air compressor.

FIRE SPRINKLER SYSTEM MAINTENANCE PROCEDURE

In the event the fire sprinkler system requires maintenance or repair, the following procedure ensures the nitrogen inerting process will continue to function properly.

1. Close the air maintenance device (AMD) regulated and fast fill valve on the appropriate fire sprinkler system.
2. Depressurize the fire sprinkler system.
3. Complete the maintenance or repair work on the fire sprinkler system.
4. Open the appropriate fire sprinkler system AMD to pressurize the appropriate fire sprinkler system (see the appropriate “System Filling Procedure” on page 32).
5. Refill the sprinkler system with air in compliance with the NFPA 13 30-minute fill requirement.
6. Initiate the nitrogen inerting process.

COMMISSIONING CHECKLIST

Fire Sprinkler System: General

Verify and document the quantity of fire sprinkler systems connected to the nitrogen generator:

Qty. _____

Verify and document the capacity of each fire sprinkler system connected to the nitrogen generator (gallons or sq. ft.):

Sys. #1 _____	Sys. #9 _____	Sys. #17 _____
Sys. #2 _____	Sys. #10 _____	Sys. #18 _____
Sys. #3 _____	Sys. #11 _____	Sys. #19 _____
Sys. #4 _____	Sys. #12 _____	Sys. #20 _____
Sys. #5 _____	Sys. #13 _____	Sys. #21 _____
Sys. #6 _____	Sys. #14 _____	Sys. #22 _____
Sys. #7 _____	Sys. #15_____	Sys. #23 _____
Sys. #8 _____	Sys. #16_____	Sys. #24 _____

Verify and document the make and model of air maintenance device(s): _____

Verify and document the pressure settings of the air maintenance device(s): _____

Verify and document the Systems(s) High Air Alarm Pressure: _____

Verify and document the Systems(s) Low Air Alarm Pressure: _____

Verify and document the Systems(s) Trip Pressure: _____

Verify and document the make and model of accelerator: _____

Air Compressor: Existing

Verify and document the location of the air compressor: _____

Verify and document the manufacturer of the air compressor: _____

Verify and document the model number of the air compressor: _____

Verify and document the serial number of the air compressor: _____

Verify and document the air compressor on/off pressure settings: _____

Verify and document if an air compressor exists and whether the existing air compressor(s) to remain: ☐ Yes ☐ No

If existing Yes: ☐ Primary ☐ Backup ☐ Meet NFPA 13 30-Minute Fill Requirement

Verify and document whether the fire sprinkler system(s) are supplied by house air: ☐ Yes ☐ No

If Yes, what pressure: _____

Air Compressor: New

Verify and document the location of the air compressor: _____

Verify and document the manufacturer of the air compressor: _____

Verify and document the model number of the air compressor: _____

Verify and document the serial number of the air compressor: _____

Verify and document the air compressor on/off pressure settings: _____

Verify and document the air compressor power source voltage: _____

Verify and document whether the air compressor(s) is/are installed correctly: ☐ Yes ☐ No

If No, explain: _____

Verify and document whether the air compressor(s) is/are wired correctly: ☐ Yes ☐ No

If No, explain: _____

Verify and document whether the air compressor(s) rotation is correct: ☐ Yes ☐ No

NOTE: If rotation is incorrect on 3-phase motor, reverse any two of the three incoming power wires to reverse the rotation

Verify and document if air compressor receiver tank auto-drain(s) is/are powered: ☐ Yes ☐ No

Verify and document the auto-drain(s) is configured for on time of ten seconds and off time frequency is 20 minutes (maximum): ☐ Yes ☐ No

Verify and document whether the auto-drain is/are plumbed to a drain: ☐ Yes ☐ No

Nitrogen Generator Equipment

Verify and document the location of the nitrogen generator(s): _____

Verify and document the quantity of the nitrogen generator(s): _____

Verify and document the model number of the nitrogen generator(s): _____

Verify and document the serial number of the nitrogen generator(s): _____

Verify and document whether the nitrogen generator(s) is/are installed correctly: ☐ Yes ☐ No

If No, explain: _____

Verify and document whether the nitrogen generator(s) is/are wired correctly: ☐ Yes ☐ No

If No, explain: _____

Programming of Nitrogen Generator's Pressure Settings

Turn On/Off Power Switch to the **On** position.

Verify and document the cut-in or turn-on pressure of the nitrogen generator is **3 to 5 psig (0.2 to 0.3 bar) <u>below</u>** operating pressure of the fire sprinkler system's air maintenance device(s): ☐ Yes ☐ No

If No, change the cut-in or turn-on pressure of the nitrogen generator to be **3 to 5 psig (0.2 to 0.3 bar) <u>below</u>** operating pressure of the fire sprinkler systems' air maintenance device(s) using the "Nitrogen Generator Pressure Adjustment Procedure" on page 71.

Verify and document the cut-in or turn-on pressure of the nitrogen generator is **<u>above</u> the low air alarm** pressure of the fire sprinkler system(s): ☐ Yes ☐ No

Verify and document the cut-in or turn-on pressure of the nitrogen generator: _____

Verify and document the cut-out or turn-off pressure of the nitrogen generator is above operating pressure of the fire sprinkler system's air maintenance device(s): ☐ Yes ☐ No

If No, change the cut-out or turn-off pressure of the nitrogen generator to be above operating pressure of the fire sprinkler systems' air maintenance device(s) and below 85 psig (5.9 bar) using the "Nitrogen Generator Pressure Adjustment Procedure" on page 71.

Verify and document the cut-out or turn-off pressure of the nitrogen generator: _____

Verify and document that the **Enable Bypass** button on the **Home** screen is displayed: ☐ Yes ☐ No

Verify and document the nitrogen back pressure regulator is set to 80 psig (5.5 bar): ☐ Yes ☐ No

Change if needed. Document regulator setting: _____

Open the isolation ball valve to the internal flow meter.

Connect the handheld gas analyzer (PHGA-1) to the gas sampling port of the nitrogen generator.

Allow the nitrogen generator to operate in nitrogen production mode for approximately five minutes to ensure proper operating temperature of the nitrogen generator prior to adjusting nitrogen purity or measuring nitrogen production rate.

NOTE: The nitrogen generator will obtain optimum operating temperature faster if the nitrogen generator cabinet door is closed.

Adjust to Flow Control Valve in the nitrogen generator to obtain a nitrogen output purity level of 98%.

NOTE: Nitrogen purity and nitrogen production rate are inversely proportional in the nitrogen generator. As nitrogen purity increases, production decreases. Increase nitrogen purity by turning Flow Control Valve clockwise and decrease nitrogen purity by turning Flow Control Valve counterclockwise.

Verify and document the nitrogen output purity concentration: _____

Verify and document the nitrogen production rate as indicated on the flow meter: _____

Compare documented nitrogen output purity concentration and nitrogen production rate levels with the Shop Test Report provided in the nitrogen generator.

1. Readjust nitrogen output purity level using Flow Control Valve, as necessary, to obtain nitrogen output purity levels and nitrogen production rate comparable to the Shop Test Report, if discrepancies are significant.
2. If you are unable to obtain comparable nitrogen output purity levels and nitrogen production rate, contact ECS.

Close the isolation ball valve to the internal flow meter.

Disconnect the handheld gas analyzer (PHGA-1) from the gas sampling port of the nitrogen generator.

Leak check all plumbing throughout the nitrogen generator, include the air supply from the air compressor and the nitrogen supply to the fire sprinkler systems, repair any leaks found.

Verify and document that no leaks exist in the nitrogen generator, air compressor supply line and fire sprinkler supply line: ☐ Yes ☐ No

Oxygen Removal Vents: PAV-D/DQ and PSV-D/DE

Verify and document the appropriate orifices for each vent are available: ☐ Yes ☐ No

NOTE: Ensure the appropriate orifice is installed in the appropriate vent for each fire sprinkler system. The restricted venting orifice size is determined by the sprinkler system capacity (gallons). The restricted venting orifice ensures the oxygen removal process is completed in all fire sprinkler systems within the same approximate timeframe and within typically 14 days.

PAV-D/DQ Standard Vent

Verify and document the model and serial number of each oxygen removal vent installed: ☐ Yes ☐ No

Determine the pressure setting of the backpressure regulator of oxygen removal vent.

1. The back pressure regulator setting must be **below** the cut-in or turn-on pressure of the nitrogen generator and the same as or **above** the low air alarm pressure of the fire sprinkler system.

Verify and document the appropriate orifice in the oxygen removal vent: ☐ Yes ☐ No

Install the appropriate orifice in the oxygen removal vent.

Adjust the backpressure regulator setting on the oxygen removal vent:

1. Open and close the isolation ball valve on the oxygen removal vent to determine the pressure setting of the backpressure regulator.
2. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.
3. Repeat process until desired pressure setting is achieved.

   NOTE: This process can only be performed when sprinkler system is at normal operating pressure.

4. Once the desired pressure has been obtained on the back pressure regulator, push the knob on the regulator until it clicks into place.

Verify and document the backpressure regulator set point: _____

Verify and document isolation ball valve left in open position: ☐ Yes ☐ No

PSV-D/DE SMART Vent

Verify and document model and serial number of each oxygen removal vent installed: ☐ Yes ☐ No

Verify and document serial number of each oxygen removal vent control box installed: ☐ Yes ☐ No

Verify and document that the control box is properly installed: ☐ Yes ☐ No

If No, explain: _____

Verify and document wiring between the control box and the vent is properly installed: ☐ Yes ☐ No

If No, explain: _____

Verify the control box timer is programmed properly:

1. Mode is set to **E** ☐ Yes ☐ No
2. Scale is set to **20, 30, 40, 50, 60** ☐ Yes ☐ No
3. Range is set to **10h** ☐ Yes ☐ No
4. Dial is set to **35** ☐ Yes ☐ No

Turn on the control box. Verify and document control box is operating properly: ☐ Yes ☐ No

If No, explain: _____

Determine the pressure setting of the back pressure regulator of oxygen removal vent.

1. The back pressure regulator setting must be **below** the cut-in or turn-on pressure of the nitrogen generator and the same as or **above** the low air alarm pressure of the fire sprinkler system.

Verify and document the appropriate orifice in the oxygen removal vent: ☐ Yes ☐ No

Install the appropriate orifice in the oxygen removal vent.

Adjust the back pressure regulator setting on the oxygen removal vent:

1. Turn on the power switch to the control box and press the **Vent** button.
2. Open and close the isolation ball valve on the oxygen removal vent to determine the pressure setting of the back pressure regulator.
3. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.
4. Repeat process until desired pressure setting is achieved.

   NOTE: This process can only be performed when sprinkler system is at normal operating pressure.

5. Once the desired pressure has been obtained on the back pressure regulator, push the knob on the regulator until it clicks into place.

Verify and document the back pressure regulator set point: _____

Verify and document isolation ball valve left in open position: ☐ Yes ☐ No

Sequence of Operation

Once in service, the nitrogen generator requires no additional intervention to function properly. Nitrogen generator settings should not be altered without consulting ECS and the unit should not be powered down or bypassed for any reason other than a service or maintenance procedure as detailed in the "Maintenance" section. The nitrogen generator operates in two modes: Nitrogen Inerting Mode and Supervisory Gas Mode.

Nitrogen Inerting Mode

The application of supervisory nitrogen gas to a dry pipe or preaction fire sprinkler system using the Dry Pipe Nitrogen Inerting (DPNI) protocol which is fundamentally different than the traditional application of compressed air as a supervisory gas. Because the DPNI protocol uses a process called "fill and purge breathing" it requires small [3 to 5 psig (0.2 to 0.3 bar)] supervisory pressure fluctuations in the fire sprinkler system(s) to remove oxygen before it can cause corrosion.

NOTE: The gas pressure in the sprinkler system will fluctuate between the desired set pressure and the turn-on pressure of the nitrogen generator.

1. The nitrogen generator and compressor will cycle on to increase the pressure in all fire sprinkler systems connected to the nitrogen generator.
2. Once the high-end pressure of the breathing cycle is reached the air compressor and nitrogen generator will turn off and the fire sprinkler system(s) are allowed to depressurize gradually through the oxygen removal vent(s).
3. Once the low-end pressure of the breathing cycle is reached, the air compressor and nitrogen generator automatically turn on to repeat the process.
4. The high-end/turn-off pressure is determined by the pressure setting of the fire sprinkler system(s) air maintenance device (AMD) and the low-end/turn-on pressure is determined by the nitrogen generator's integral pressure transducer.
5. The air compressor and nitrogen generator are simultaneously cycling the pressure in all fire sprinkler system(s) by 3 to 5 psig (0.2 to 0.3 bar) during each cycle. This will result in longer run times of the air compressor and nitrogen generator than a traditional air compressor configured to supply supervisory gas.
6. The DPNI "fill and purge breathing" protocol described above is performed for a 14-day period.
7. Once the 14-day inerting period is complete and the ball valve on the Standard Vent is closed, the SMART Vent is automatically closed, or the Advanced**IQ** Vent is automatically closed; and the run frequency of the air compressor and nitrogen generator is reduced.

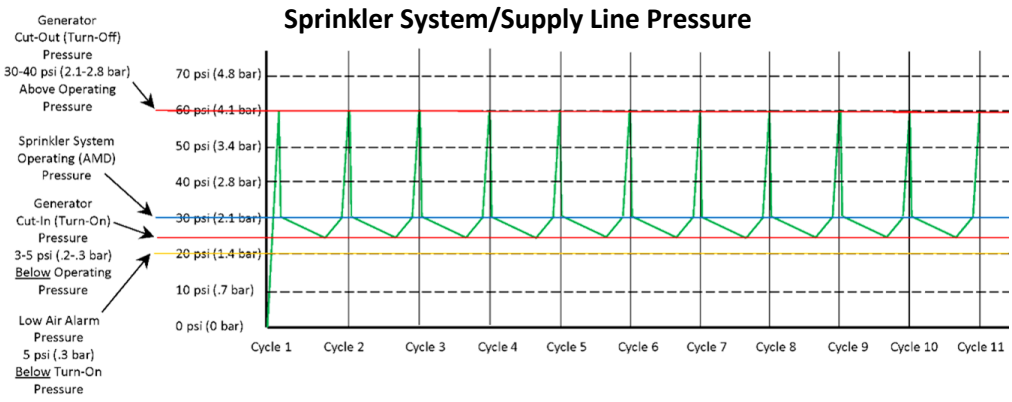
It is important to remember that closing the vents will not affect the runtime of the air compressor and nitrogen generator. It will only affect the frequency that the air compressor and nitrogen generator will run. The nitrogen generator and air compressor are designed to run for up to two hours when filling all the systems with 3 to 5 psig (0.2 to 0.3 bar) of high purity nitrogen.

If air compressor and nitrogen generator runtimes are greater than four hours, contact ECS immediately.

NOTES: Higher than anticipated runtime hours or cycles may lead to increased wear to the nitrogen generator.

Anticipated annual runtime of nitrogen generator is 950 to 1,000 hours at 450 to 500 cycles.

ECS Nitrogen Generator Pressure Cycling for Dry Pipe and Preaction Fire Sprinkler Systems

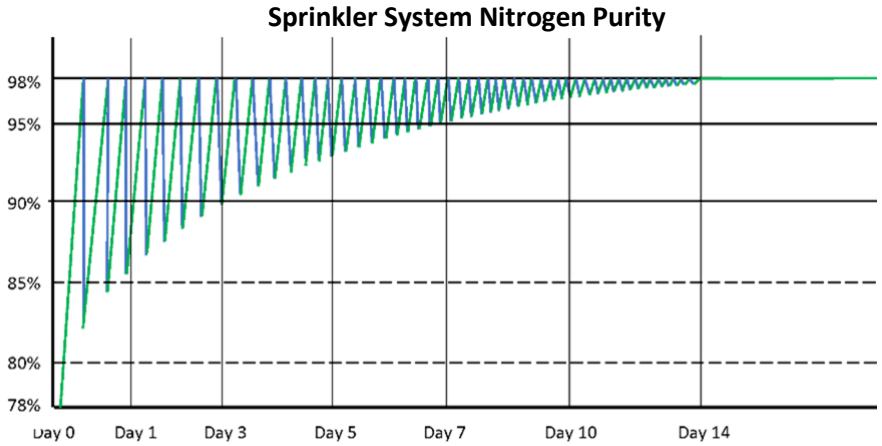


OPERATING PRESSURE NOTES:

1. The nitrogen generator produces nitrogen increasing the pressure in the nitrogen supply line which increases the pressure in the fire sprinkler system.
2. When the pressure in the fire sprinkler system reaches the pressure setting of the AMD, the AMD closes (no longer needing supervisory gas).
3. The nitrogen generator continues to produce nitrogen increasing the pressure in the nitrogen supply line until the cut-out pressure is reached and the nitrogen generator shuts off.
4. When the pressure in the fire sprinkler system decreases (inerting process or normal operation) below the pressure of the AMD, the AMD opens (needing supervisory gas).
5. The pressure in the nitrogen supply line equalizes with the pressure in the fire sprinkler system.
6. When the pressure in the nitrogen supply line and the fire sprinkler system decreases to the cut-in pressure of the nitrogen generator, the nitrogen generator turns on.
7. The nitrogen generator produces nitrogen increasing the pressure in the nitrogen supply line and the fire sprinkler system, repeating the nitrogen filling cycle.
8. The nitrogen inerting "fill & purge" process requires a 3 to 5 psig (0.2 to 0.3 bar) range between the cut-in pressure of the nitrogen generator and the pressure of the AMD to nitrogen inert the fire sprinkler system within 14 days.

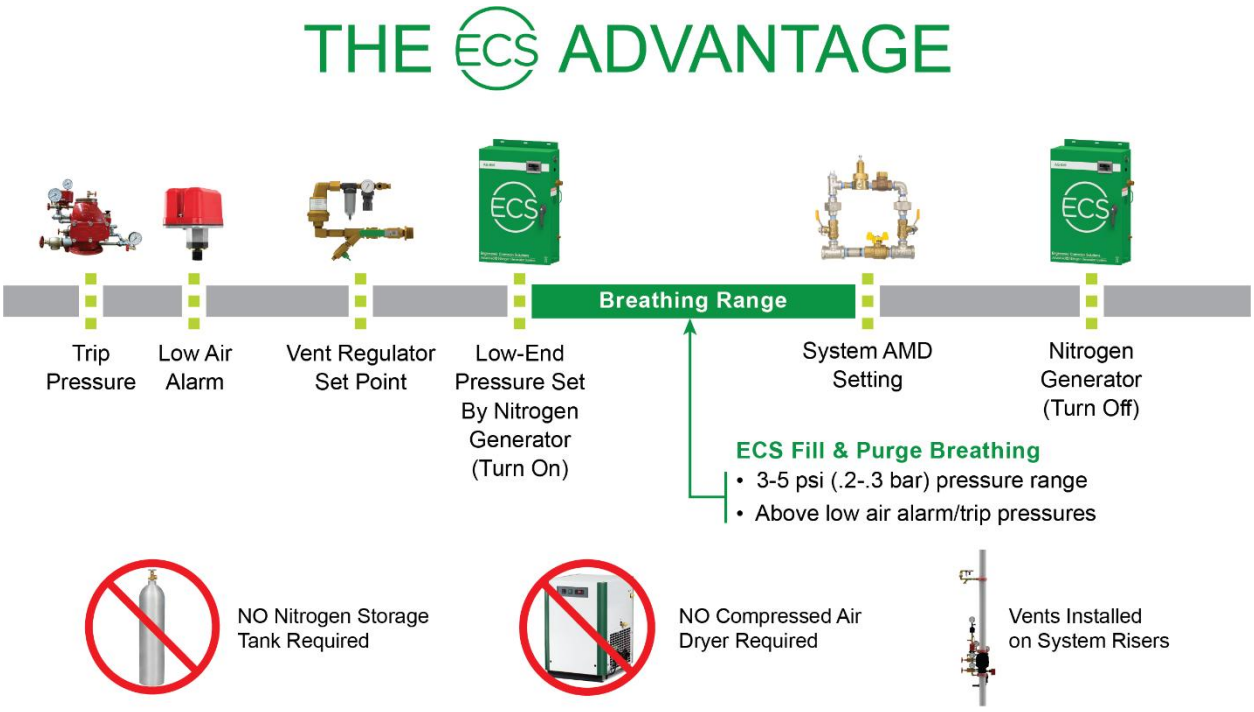
GRAPH NOTE:

The pressures reflected in the graph are representative of the operating pressures in a typical dry pipe or preaction fire sprinkler system. Actual operating pressures may vary.



NITROGEN PURITY NOTES:

1. The nitrogen generator produces 98% nitrogen increasing the nitrogen purity in the fire sprinkler system.
2. Nitrogen mixes (homogenizes) with the gas (air) in the sprinkler system and the nitrogen generator turns off.
3. The sprinkler system gas mixture (less than 98% nitrogen purity) is vented from the vent.
4. The process is repeated until the nitrogen purity throughout the sprinkler system reaches 98% nitrogen purity.
5. The vent is closed, and nitrogen inerting process is complete.
6. The nitrogen generator automatically transitions to supervisory gas mode supplying nitrogen for pressure maintenance.



Supervisory Gas Mode

Once the DPNI "fill and purge breathing" protocol is complete the nitrogen generator will automatically operate in the Supervisory Gas Mode. Whenever a fire sprinkler system needs supervisory gas the nitrogen generator and compressor will automatically operate.

1. The vents no longer operate to depressurize the systems.
2. When the sprinkler systems reach low-end pressure, the nitrogen generator and compressor will automatically turn on to increase the pressure in all fire sprinkler systems connected to the nitrogen generator.
3. Once the high-end pressure of the breathing cycle is reached, the air compressor and nitrogen generator will automatically turn off.
4. It is important to remember that closing the vents will not affect the *runtime* of the air compressor and nitrogen generator; it will only affect the *frequency* of the runtime of the air compressor and nitrogen generator. The nitrogen generator and air compressor are designed to run for up to two hours at a time when filling all the systems with 3 to 5 psig (0.2 to 0.3 bar) of high purity nitrogen.

If air compressor and nitrogen generator runtimes are greater than four hours, contact ECS immediately.

Restart of the Nitrogen Inerting Process

Whenever the fire sprinkler system(s) are serviced and refilled with air, the DPNI protocol using the "fill and purge breathing" process must be reinitialized.

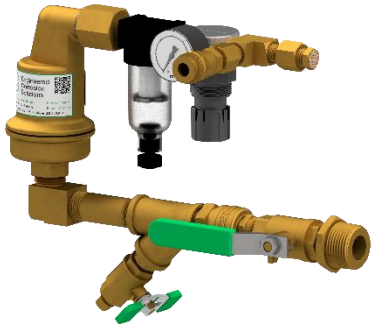
1. Standard Vent:
    a. Open the vent isolation ball valve to begin the venting process.
    b. The isolation ball valve on the vent(s) will need to be closed after 14 days to stop the Nitrogen Inerting Mode and begin the Supervisory Gas Mode.
2. SMART Vent:
    a. Press the **Vent** button on the SMART Vent control box which energizes the solenoid on the SMART Vent to begin the venting process.
    b. The SMART Vent(s) will automatically close at the end of the 14-day inerting period and the nitrogen generator and compressor will automatically transition from the Nitrogen Inerting Mode to the Supervisory Gas Mode.
3. Advanced**IQ** Vent
    a. Press the **Vent System** button on the Advanced**IQ** Vent controller which initializes the venting process.
    b. The Advanced**IQ** Vent(s) will automatically close at the end of the 14-day inerting period and the nitrogen generator and compressor will automatically transition from the Nitrogen Inerting Mode to the Supervisory Gas Mode.

System Power Loss

In the event of a system power loss, all programmed information in the nitrogen generator is stored in the nitrogen generator and the nitrogen generator will automatically restart once system power is restored.

1. Where Standard Vents are installed, the system will automatically return to Nitrogen Inerting Mode or Supervisory Gas Mode, depending on which mode the nitrogen generator was in when the power loss occurred.
    a. If Standard Vent ball valve is open (Nitrogen Inerting Mode), then the ball valve needs to be manually closed upon completion of the 14-day DPNI process. The air compressor and nitrogen generator will automatically transition to the Gas Supervisory Mode.
2. Where SMART vents are installed, the system will automatically return to the Supervisory Gas Mode. When the system power loss is during the 14-day DPNI process, the DPNI process will need to be reinitialized.
    a. Press the **Vent** button on the SMART vent control box which energizes the solenoid on the SMART vent.
    b. The nitrogen generator and compressor will automatically cycle on operating in the nitrogen inerting mode.
    c. Upon completion of the 14-day DPNI process, the vents automatically close and the air compressor and nitrogen generator will automatically transition to the Gas Supervisory Mode.
3. Where Advanced**IQ** vents are installed, the Advanced**IQ** Vent Controller will automatically return to the sequence prior to the loss of power.

OXYGEN REMOVAL VENT: STANDARD VENT PAV-D/DQ



For use under U.S. Patents
8,720,591, 9,144,700, 9,186,533 and 9,610466 B2

Specifications

Stock Number:	PAV-D/DQ
Service Pressure:	Up to 175 PSIG (12 Bar)
System Connection:	1" NPT Male
Temperature Range:	40°F to 120°F (4.5°C to 49°C)
Dimensions:	13.5" (W) X 7.5" (H) X 4.25" (D) (343mm (W) X 191mm (H) X 108mm (D))

Support Hanger Not Required

General Description

The PAV-D/DQ Standard Vent provides oxygen venting in dry pipe and preaction fire sprinkler systems. As a fire sprinkler system is filled with a continuous supply of nitrogen gas from the nitrogen generator system, the PAV-D/DQ allows oxygen rich gas to be vented from the fire sprinkler system. Over a short period of time the vent will almost completely remove oxygen from the fire sprinkler system (less than 2% oxygen). The vent is equipped with a levered float valve that prevents water from passing through the restricted venting orifice when water enters the fire sprinkler system. The in-line filter protects the restricted venting orifice from contaminants from the sprinkler system. A backpressure regulator is included to prevent total system depressurization from the vent assembly during the venting process. The restricted venting orifice allows oxygen to be vented from the fire sprinkler system at a controlled rate to achieve a minimum of 98% nitrogen concentration. A special push fitting is provided to receive 5/32" tubing when the vent is used with the SMART Gas Analyzer or the Advanced**IQ** Vent Controller.

Installation Instructions

1. The vent is equipped with a ball valve to be connected to the fire sprinkler riser. The contractor must install a 1" outlet (welded or mechanical) to connect the vent assembly to the sprinkler system on the system side of the main control valve. The ball valve must remain in the closed position until the nitrogen generator system has been commissioned.

   NOTE: The vent assembly does not require a support hanger.

2. Install the vent assembly in a level position. Recommended mounting height is 5' to 10' (2 to 3m) above the finished floor, but a minimum of 2' (0.6m) above the dry pipe or preaction control valve.

   NOTE: Piping to the vent assembly cannot be installed in a configuration that would trap water and prevent drainage to the sprinkler system; a water trap impedes the ability of the vent assembly to vent oxygen from the fire sprinkler system.

3. Inspection of the vent assembly after installation and hydrostatic testing of the fire sprinkler system. Inspection should be performed periodically thereafter in accordance with the applicable national codes, NFPA codes and standards, and/or the authority having jurisdiction.

NOTE: Inspection must include the condition of the in-line filter and checking for blockage in the Y-strainer and the restricted venting orifice.

Operating Instructions

1. Verify the vent assembly has been equipped with a restricted venting orifice downstream of the backpressure regulator.

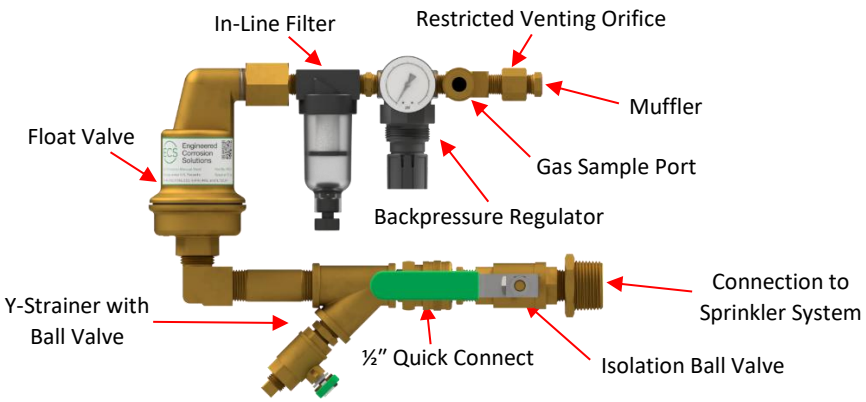
   NOTE: If the vent assembly is not equipped with a restricted venting orifice, one will be provided by ECS during system commissioning. The restricted venting orifice must be installed before proceeding with the steps below.

2. Determine the low air alarm pressure and the turn-on pressure of the nitrogen generator.
3. Choose a pressure setting for the backpressure regulator that is the same as or above the low air alarm pressure but below the turn-on pressure of the nitrogen generator.

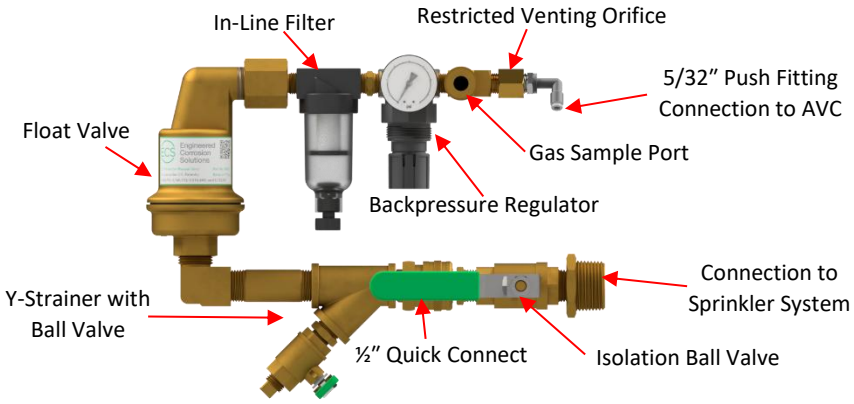
   NOTE: This process can only be performed when sprinkler system is at normal operating pressure.

4. Open the isolation ball valve to allow the vent to pressurize.
5. Close the ball valve and allow the vent to depressurize through restricted venting orifice to pressure setting.
6. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.
7. Make adjustment to pressure setting using the knob so that the regulator stops depressurizing at the desired pressure.
8. Open the isolation ball valve to pressurize the vent and close the isolation ball valve again to check pressure setting. Repeat process until desired pressure setting is achieved.
9. Push knob back into regulator until it clicks into place.
10. Once the nitrogen generator system has been commissioned, open the isolation ball valve on the vent assembly.
11. Standard Vent Operation:
    a. The vent is now open and actively venting oxygen from the fire sprinkler system. It should remain open for approximately 14 days or less, until the system nitrogen concentration reaches 98% or greater.
    b. Close the isolation ball valve. Failure to close the isolation ball valve after 14 days or less, once fire sprinkler system nitrogen concentration reaches 98% will result in additional oxygen corrosion damage to the system and unnecessary run time of the air compressor and nitrogen generator.
    c. Use a Handheld Gas Analyzer to verify the gas concentration inside the fire sprinkler system.
12. The Advanced**IQ** Vent is now open and actively purging oxygen from the fire sprinkler system. It will remain open for approximately 14 days. The Advanced**IQ** Controller will automatically stop the venting process.
13. If the sprinkler system actuates or another event introduces oxygen to the sprinkler system the isolation ball valve must be opened again for a period of 14 days to vent oxygen from the system.

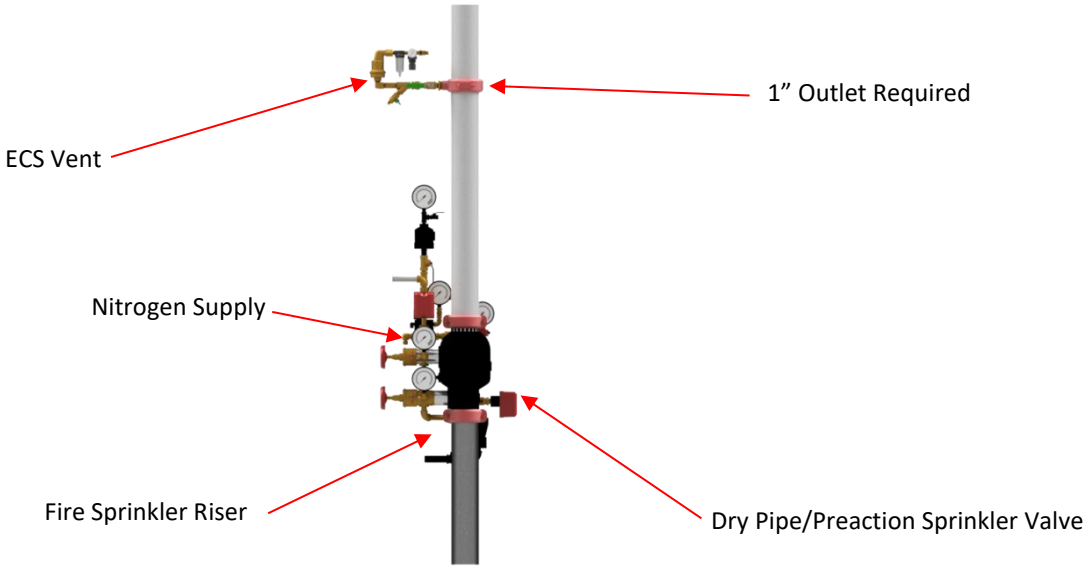
PAV-D Vent Assembly



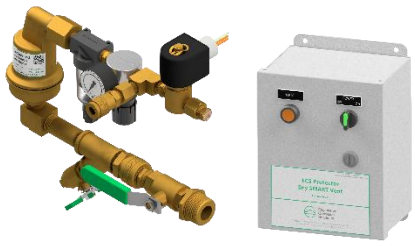
PAV-DQ Vent Assembly



Vent Installation Schematic



OXYGEN REMOVAL VENT: SMART VENT PSV-D/DE



For use under U.S. Patents
8,720,591, 9,144,700, 9,186,533 and 9,610,466

Specifications

Stock Number:	PSV-D (PSV-DE)
Service Pressure:	Up to 175 PSIG (12 Bar)
System Connection:	1" NPT Male
Temperature Range:	40°F to 120°F (4.5°C to 49°C)
Dimensions:	
Vent Assembly:	13.5" (W) X 7.5" (H) X 4.25" (D) (343mm (W) X 191mm (H) X 108mm (D))
Control Box:	8" (W) X 10" (H) X 6" (D) (203mm (W) X 254mm (H) X 152mm (D))

Support Hanger Not Required

General Description

The PSV-D/DE SMART Vent provides oxygen venting in dry pipe and preaction fire sprinkler systems. As a fire sprinkler system is filled with a continuous supply of nitrogen gas from the nitrogen generator system, the PSV-D/DE allows oxygen rich gas to be vented from the fire sprinkler system. Over a short period of time the vent will almost completely remove oxygen from the fire sprinkler system (less than 2% oxygen). The vent is equipped with a levered float valve that prevents water from passing through the restricted venting orifice when water enters the fire sprinkler system. The in-line filter protects the restricted venting orifice from contaminants from the sprinkler system. A backpressure regulator is included to prevent total system depressurization from the vent assembly during the venting process. The restricted venting orifice allows oxygen to be vented from the fire sprinkler system at a controlled rate to achieve a minimum of 98% nitrogen concentration.

The SMART Vent is equipped with an electronic solenoid valve that must be wired to the electric control box (conductors not included). The control box will automatically close the vent once the desired nitrogen concentration has been reached. The control box is equipped with an on/off switch and a vent button to provide a means to restart the venting process should oxygen be reintroduced into the fire sprinkler system.

Installation Instructions

1. The SMART Vent includes two separate components. The first component is the vent assembly equipped with a ball valve to be connected to the fire sprinkler riser. The contractor must install a 1" outlet (welded or mechanical) to connect the vent assembly to the sprinkler system on the system side of the main control valve. The isolation ball valve must remain in the closed position until the nitrogen generator system has been commissioned.

   NOTE: The vent assembly does not require a support hanger.

2. Install the vent assembly in a level position. Recommended mounting height is 5' to 10' (2 to 3m) above the finished floor, but a minimum of 2' (0.6m) above the dry pipe or preaction control valve.

   NOTE: Piping to the vent assembly cannot be installed in a configuration that would trap water and prevent drainage to the sprinkler system; a water trap impedes the ability of the vent assembly to vent oxygen from the fire sprinkler system.

3. The second component of the SMART Vent is the electric control box. The control box must be installed on a wall or vertical surface adjacent to the vent assembly installation location.
4. Provide conductors from 115-120 VAC, 60 Hz (220-240 VAC, 50 Hz) power source to designated terminals in the electric control box in accordance with the applicable national and/or local codes (i.e., NFPA 70). The control box draws less than 2 amps. Contractor must drill hole in the control box to provide access for the 115-120 VAC, 60 Hz (220-240 VAC, 50 Hz) power source conductors.
5. Provide conductors to connect the 115-120 VAC, 60 Hz (24 VDC) coil leads of the electronic solenoid valve on the vent assembly to the designated terminals in the electric control box in accordance with applicable national and/or local codes (i.e., NFPA 70). Contractor must drill hole on side or top of the control box to provide access.
6. The green power switch on the electric control box must remain in the OFF position until the nitrogen generator has been commissioned.
7. Inspection of the vent assembly should be performed after installation and hydrostatic testing of the fire sprinkler system. The inspection should be performed periodically thereafter in accordance with the applicable national codes, NFPA codes and standards, and/or the authority having jurisdiction.

   NOTE: Inspection must include verifying the condition of the in-line filter and checking for blockage in the Y-Strainer and the restricted venting orifice.

Operating Instructions

1. Verify the vent assembly has been equipped with a restricted venting orifice downstream of the backpressure regulator.

   NOTE: If the vent assembly is not equipped with a restricted venting orifice, one will be provided by ECS during system commissioning. The restricted venting orifice must be installed before proceeding with the steps below.

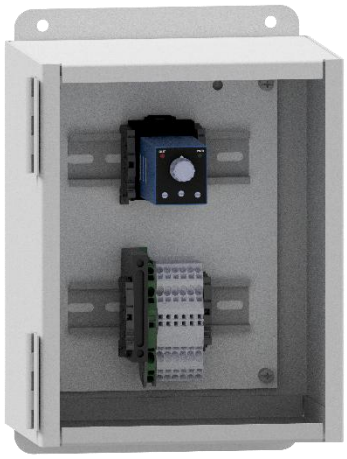
2. Determine the low air alarm pressure and turn-on pressure of the nitrogen generator.
3. Choose a pressure setting for the backpressure regulator that is the same as or above the low air alarm pressure but below the turn-on pressure of the nitrogen generator.

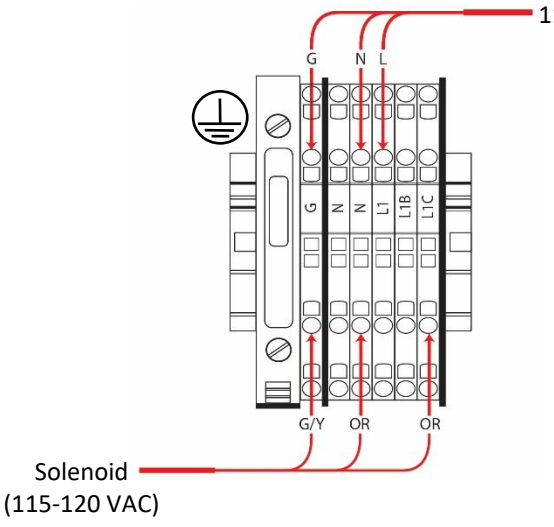
   NOTE: This process can only be performed when the solenoid on the vent is energized (power on and **Vent** button pressed), and sprinkler system is at normal operating pressure.

4. Open the isolation ball valve to allow the vent to pressurize.
5. Close the isolation ball valve and allow the vent to depressurize through restricted venting orifice to pressure setting.
6. Pull the knob out from the regulator to adjust pressure setting. Turn the knob clockwise to raise the pressure, counterclockwise to lower the pressure.
7. Make adjustment to pressure setting using the knob so that the regulator stops depressurizing at the desired pressure.
8. Open the isolation ball valve to pressurize the vent and close the isolation ball valve again to check pressure setting. Repeat process until desired pressure setting is achieved.
9. Push knob back into regulator until it clicks into place.
10. Verify the timer settings inside the electric control box. The settings should be as follows: mode set to **E**, scale set to **20, 30, 40, 50, 60**, range set to **10h**, and timer knob set to **35**. If needed, a small flathead screwdriver can be used to make the timer setting adjustments.
11. Once the nitrogen generator system has been commissioned, open the isolation ball valve on the vent assembly, turn the green power switch on the electric control box to the **On** position and push the **Vent** button. The button should now be illuminated.

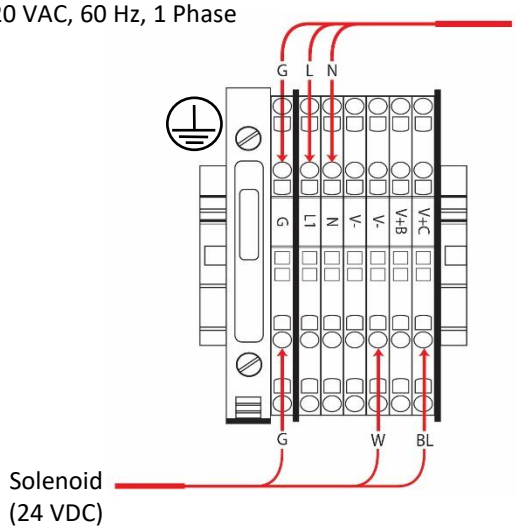
12. The SMART Vent is now open and actively purging oxygen from the fire sprinkler system. It will remain open for approximately 14 days. The **Vent** button will turn off when the vent is closed.
13. If the sprinkler system actuates or another event introduces oxygen to the sprinkler system press the **Vent** button to restart the purging cycle.

SMART Vent Control Box



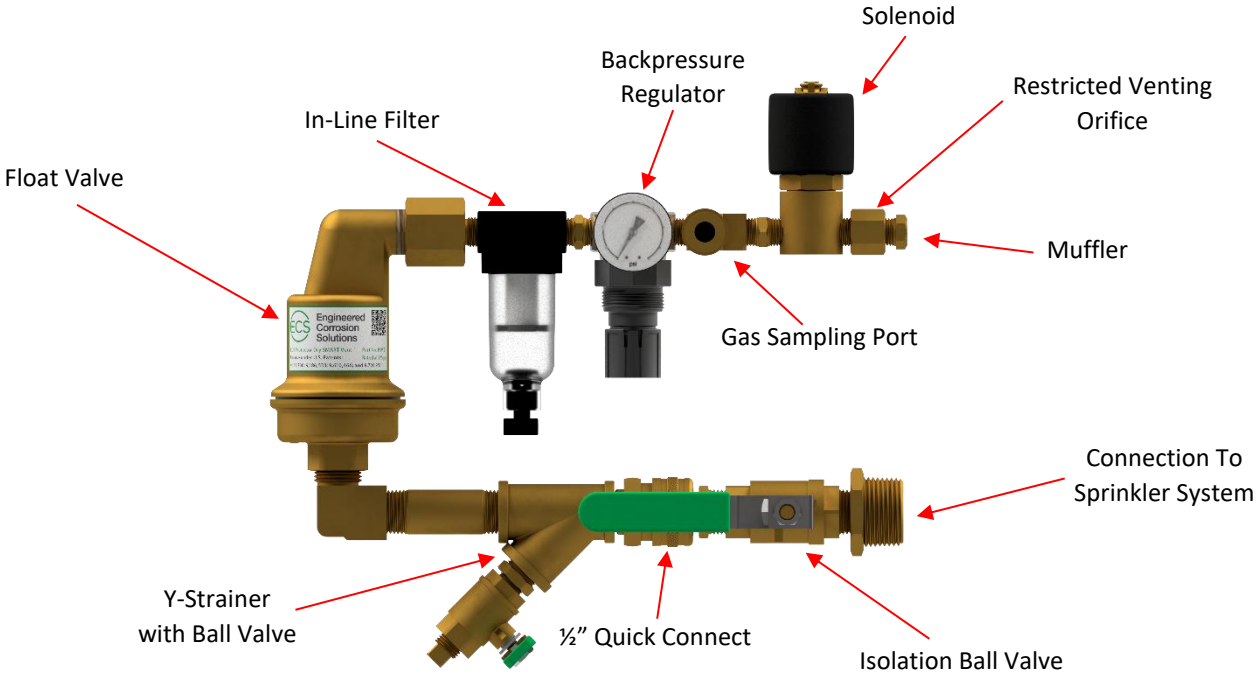


PSV-D Wiring Diagram

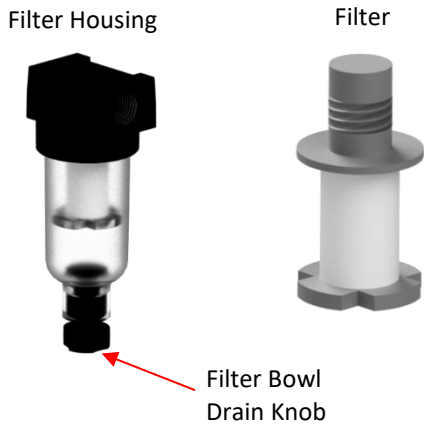


PSV-DE Wiring Diagram

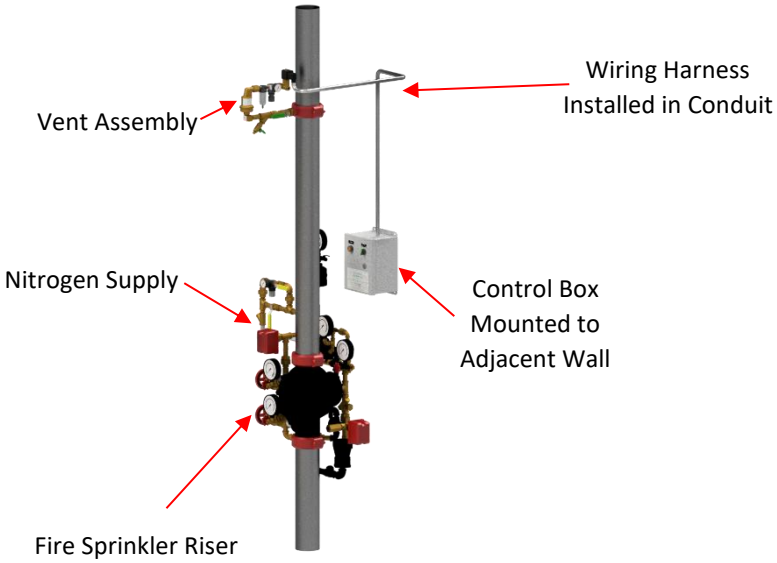
SMART Vent Assembly



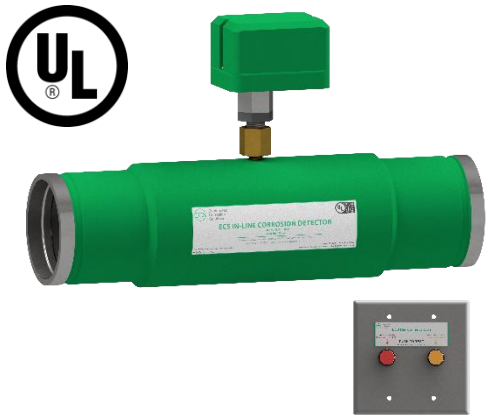
In-Line Filter Assembly



SMART Vent Installation Schematic



MONITORING: IN-LINE CORROSION DETECTOR (ILD-X)



U.S PAT. No. 9,095736 and 9,839,802

Specifications

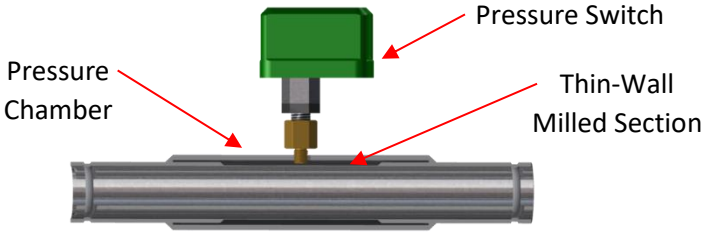
Stock Number:	ILD-X
Service Pressure:	175 psi
Temp. Rating:	-40°F to 120°F (-40°C to 49°C)
Elec. Connection:	dry contact
Pipe Size:	1.25" - 6"
Pipe Schedule:	Sch. 10 or Sch. 40
Pipe Material:	Black Steel or Galvanized

How to Order ILD-__ __ _____

Size	Pipe Material	Pipe Schedule
1.25" - 6"	G - Galvanized B - Black Steel	10 - Schedule 10 40 - Schedule 40

General Description

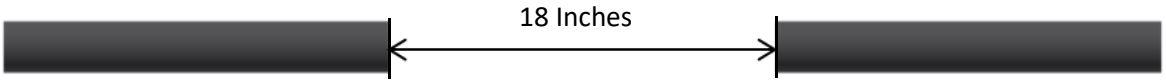
The In-Line Corrosion Detector is designed to provide an early warning indication of internal corrosion activity in water-based fire sprinkler systems. The corrosion detector is designed to be installed where corrosion is most likely to occur: the air/water interface. A cross-section of the corrosion detector shows the two key attributes that allow for early detection of corrosion: an externally milled section of the pipe that creates a thin-wall section and a pressure chamber created by an external sleeve welded over the pipe. The thin-wall section of the corrosion detector will fail before other system piping to provide an early warning indication. The In-Line Corrosion Detector is equipped with a pressure switch to monitor the pressure chamber. The In-Line Corrosion Detector can be remotely monitored through a building monitoring system, or locally through the Detector Remote Test Station.



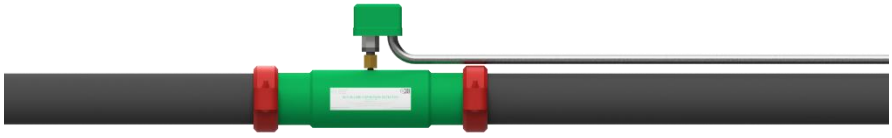
Installation Instructions

The In-Line Corrosion Detector is manufactured as a spool of piping with roll grooved ends for easy insertion into the fire sprinkler piping using standard mechanical couplings (supplied by others). All models of the In-Line Corrosion Detectors are 18 inches (457 mm) in length. The variety of pipe schedules and metal types are listed in the table under ordering information.

1. Contact an ECS Engineer to determine the location within the sprinkler system where corrosion is likely to occur. In wet pipe systems locate on a high point at the air/water interface; in dry pipe and preaction systems locate on a horizontal portion of the mains in an area with trapped water.
2. At the chosen location in the fire sprinkler piping remove an 18-inch (457 mm) pipe section from the fire sprinkler system.



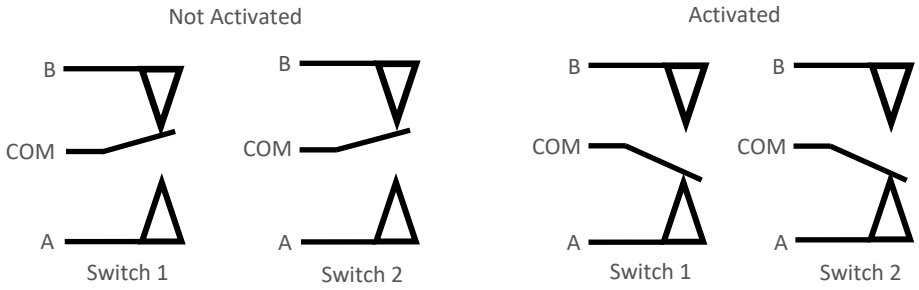
3. Roll groove the remaining ends of the fire sprinkler system piping to receive a standard mechanical coupling.
4. Install the In-Line Corrosion Detector matching pipe material, diameter and schedule into the section space that has been created with the removal of the 18-inch (457 mm) pipe section. Orient the In-Line Corrosion Detector so that the pressure switch is accessible for maintenance. Tighten the mechanical couplings as per the manufacturer's specifications.
5. **(Optional)** Connect the wiring from the monitoring system to the pressure switch (dry contact) in accordance with the manufacturer's wiring instructions. Activation of the In-Line Corrosion Detector should be identified as a supervisory signal.



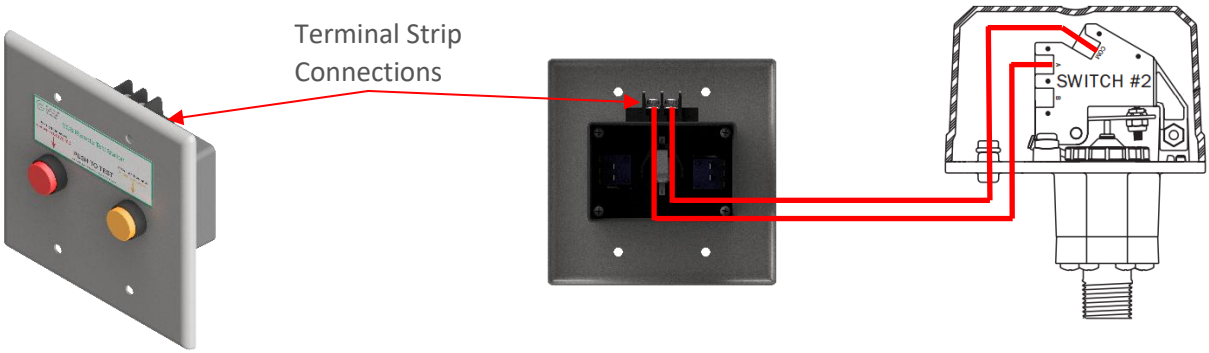
Detector Remote Test Station Installation Instructions

1. The Detector Remote Test Station mounts in an accessible location near the In-Line Corrosion Detector.
    a. Mounts to American (U.S.) version 4" square x 2⅛" minimum deep electrical box with a 2-gang device cover.
2. Recommended mounting height 72" (1.8m) AFF.
3. Connect 2-conductor, in accordance with applicable national and/or local codes (i.e., NFPA 70), between the In-Line Detector and the Remote Test Station (Recommended 18 AWG cable).
4. Provide any required raceway or mechanical protection.
5. Connect the terminals of the Remote Station to the common (COM) and normally open (A) of the pressure switch.

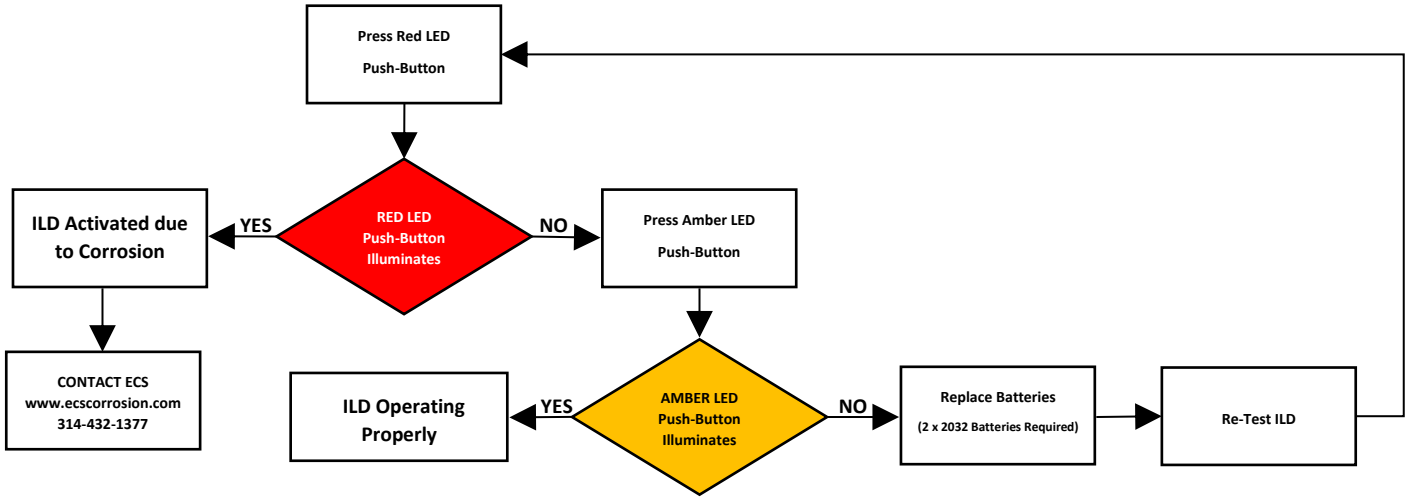
Model EPS10-2 Pressure Switch Electrical Connections



ECS Detector Remote Test Station



Detector Remote Test Station Operation Flowchart



Response to Detector Activation

Activation of the pressure switch indicates that the thin wall section of the corrosion detector has failed and the pressure chamber is exposed to system pressure. Contact ECS for instructions regarding replacement and testing of the failed In-Line Corrosion Detector.

Battery Test and Replacement

1. Press Amber LED Push Button. If Amber LED does not illuminate, battery replacement is required.
2. Remove Remote Test Station from electrical mounting box, remove four back cover screws, remove two 2032 batteries from battery holder.
3. Replace Battery with two Energizer Part No. CR2032 Only*, re-install battery holder in backbox, reinstall back cover with four screws and reinstall Remote Test Station in electrical mounting box.
   * Use of Another Battery May Present A Risk of Fire or Explosion.

CAUTION: Battery May Explode if Mistreated. Do Not Recharge, Disassemble or Dispose of In Fire.

These cells are intended for use at ordinary temperatures where anticipated high temperature excursions are not expected to exceed 212°F (100°C).

Maintenance

Safety Warning

Only qualified personnel can perform inspection, testing and maintenance of the nitrogen generation equipment. Prior to any system maintenance on the nitrogen generation system, ensure that the nitrogen generator is isolated from the compressed air supply and all system risers. Ensure that the nitrogen generation system and the associated piping that is to be manipulated is completely depressurized prior to performing any maintenance. Failure to do so can result in system damage and/or personal injury.

Maintenance and Troubleshooting Warnings

1. Nitrogen Generator includes 100-240 VAC, 50-60 Hz voltage inside cabinet. Exercise caution and do not touch any wiring connections when power is applied to the unit.
2. Nitrogen Generator has hot surfaces inside cabinet when nitrogen generator is operating and after nitrogen generator has turned off. Exercise caution when working on nitrogen generator while operating and after nitrogen generator has shut off. **(*Wear Hand Protection where needed.)***

ROUTINE CHECKS

Below are periodic maintenance checks for the Advanced**IQ** Nitrogen Generation System. For the air compressor, follow all manufacturer's recommendations. See the air compressor manufacturer installation, operation, and maintenance manual.

Check	Occurrence
Verify all valves are clean, free of corrosion, and operate properly	Quarterly
Verify compressor is turning on/off at low/high pressure	Quarterly
Verify correct nitrogen purity level out of cabinet sampling port	Quarterly
Verify pressure gauges are in working order	Quarterly
Verify there are no noticeable leaks on unit	Quarterly
Check coalescing filters	Semi-annually
Check for loose connections in cabinet and control box	Semi-annually
Check air receiver tank auto-drain strainer: *Clean as necessary*	Annually
Replace coalescing filters	Annually
Verify Oxygen Removal Vent In-Line Filter and Y-Strainer are clean	Annually
Verify no air or water leaks in Oxygen Removal Vent	Annually

USER INTERFACE INFORMATION

Use the nitrogen generator user interface to setup, monitor, and control the nitrogen generator.

Home Screen

The Home screen displays nitrogen supply line pressure, nitrogen generator cut-in and cut-out pressures, nitrogen generator status, nitrogen generator running hours and cycles. The Home screen also provides access to the **Main Menu** and the **Enable Bypass** function.

Any current alarm conditions are displayed across the top of the Home screen. The nitrogen generator has five different alarm conditions:

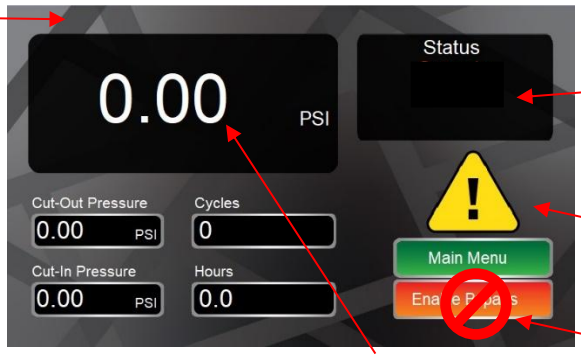
1. *Short Cycle Advisory:* Generator runs short intervals multiple times within 24-hour period.
2. *Excessive Runtime Alarm:* Generator runs continuously for more than 3 1/2 hours.
3. *Low Air Alarm:* Loss in nitrogen supply line pressure
4. *Bypass Mode Active:* Generator is in the Bypass (air only) Mode
5. *Filter Change Required:* Coalescing filters in generator need to be replaced

The Status area displays one of three states:

1. *Running:* The nitrogen generator is running (producing nitrogen).
2. *Standby:* The nitrogen generator is not operating (not producing nitrogen).
3. *Generator Disabled:* The nitrogen generator is out of service.

Alarm Signals in Ribbon
- *Short Cycle Advisory*
- *Excessive Runtime Alarm*
- *Low Air Alarm*
- *Bypass Mode Active*
- *Filter Change Required*

Audible Sounder
- *Excessive Runtime Alarm*
- *Bypass Mode Active*
  (More than 1-Hour)



Status Indicator
- *Running*
- *Standby*
- *Generator Disabled*

Displayed when in **Not Normal Condition**

DO NOT USE
When Nitrogen Generator Configured for WPNI

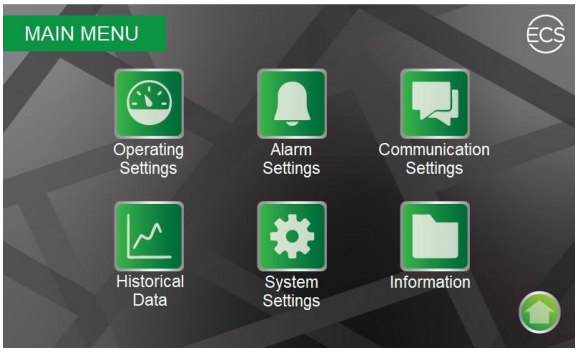
Nitrogen Supply Line Pressure

NOTE: Home Screen
Previous Screen

Main Menu Screen

The Main Menu provides access to the Operation Settings screen, Alarms Settings screen, Communication Settings screen, Historical Data screen, System Settings screen, and Information screen.

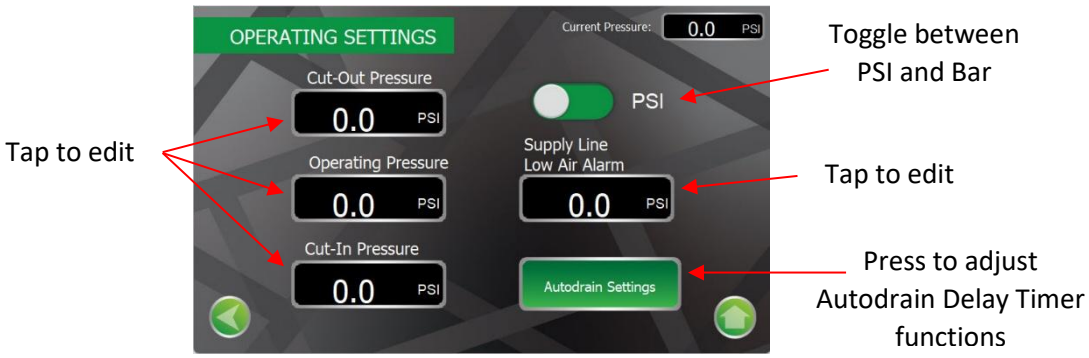
Access: **Home** screen→ **Main Menu** button.



Operating Settings Screen

The Operating Settings screen provides access to configure nitrogen generator to display pressure in **PSI** or **Bar**. The screen allows for setting nitrogen generator cut-in (turn-on) and cut-out (turn-off) pressures, sprinkler system operating pressure, and low air alarm pressures. The Operating Settings screen continuously displays the nitrogen supply line pressure. The Operating Settings screen includes an **Autodrain Settings** button to access the Autodrain Settings sub-screen.

Access: **Home** screen→ **Main Menu** button→ **Operating Settings** button.



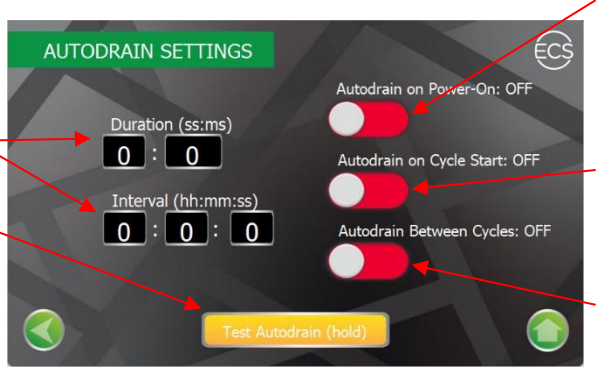
NOTE: If a pressure that is outside of the allowable operating pressures is entered, the user interface will prompt you to enter a valid pressure.

	Cut-Out Pressure		**Cut-In Pressure**	
	With AMD	**Without AMD**		
Maximum	130 psi	System Pressure	10 psi Below System Pressure	Example System Pressure 30 psi Max - Cut-In Pressure 20 psi
Minimum	20 psi Above System Pressure	System Pressure	2 psi Below System Pressure	Example System Pressure 30 psi Min - Cut-In Pressure 28 psi

Autodrain Settings Screen

The Autodrain function is programmed from the factory to momentarily drain (two-second duration) upon initial start of a nitrogen generation cycle, momentarily drain upon each hour (interval) of runtime of a nitrogen generation cycle, and momentarily drain at the completion of a nitrogen generation cycle. The Autodrain Settings screen adjusts the interval and duration of the Autodrain function, as well as the ability to turn on/off specific Autodrain functions.

Access: **Home** screen→ **Main Menu** button→ **Operating Settings** button→ **Autodrain Settings** button.



Toggle button to turn on/off Autodrain upon initial power up of nitrogen generator

Tap to edit

Toggle button to turn on/off Autodrain at the beginning of a nitrogen generation cycle

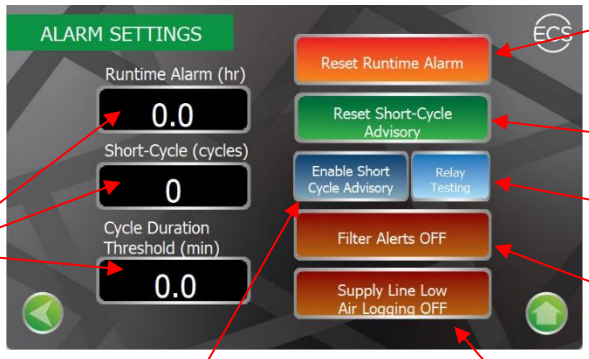
Press and hold to test the Autodrain function

Toggle button to turn on/off Autodrain when nitrogen generator is not generating nitrogen

Alarm Settings Screen

The Alarm Settings screen provides access to alarm settings on the nitrogen generator. Excessive Runtime Alarm (default 3.5 hours), Short-Cycle Alarm (default 15 cycles), Short-Cycle Alarm Time (default 15 minutes). The alarm screen allows access to reset short-cycle alarm signal, reset the runtime alarm signal, turn on/off the Filter Alerts function, turn on/off the Low Air Alarm. The Filter Alerts function signals when filter replacement is needed.

Access: **Home** screen→ **Main Menu** button→ **Alarm Settings** button.



Press to Reset Runtime Alarm Signal

Press to Reset Short-Cycle Advisory Signal

Press to Test Trouble Relay

Tap to edit

Toggle Button to Turn On/Off Filter Alerts

Press to Enable Short Cycle Audible Advisory Signal
(Disabled by default)

Toggle Button to Turn On/Off Supply Line Low Air Alarm Signal

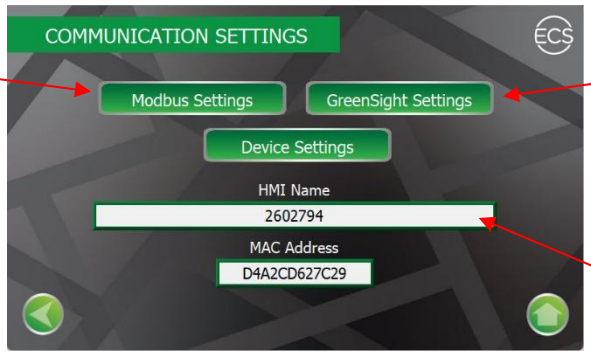
Communications Settings Screen

Use the Communications Settings screen to configure remote monitoring of the nitrogen generator.

NOTE: For system monitoring by way of Modbus communication, contact ECS Sales for technical details and pricing. For remote monitoring and email alerts with ECS' GreenSight web application, see page 64.

Access: **Home** screen→ **Main Menu** button→ **Communication Settings** button.

To use Modbus, contact ECS Sales



Press to open the GreenSight Settings screen to register the nitrogen generator to GreenSight

Defaults to the nitrogen generator serial number. The HMI Name is used for the folder name on the USB flash drive.

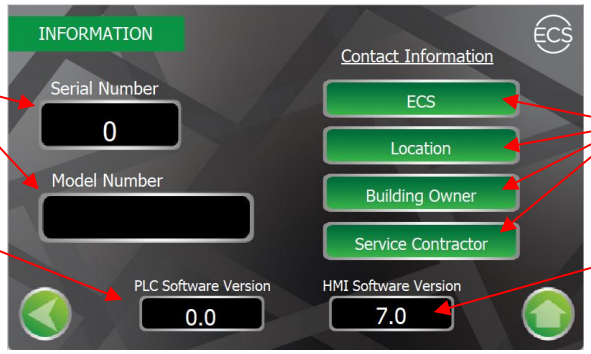
Information Screen

The Information screen displays the nitrogen generator's model number, serial number, PLC and user interface software version numbers. The Information screen provides access for the ECS Contact Information, Site Location Information, Building Owner's Contact Information, and Service Contractor Contact Information.

Access: **Home** screen→ **Main Menu** button→ **Information** button.

Model and Serial Number
Factory installed

PLC Software Version Number
Factory installed



Press for relevant information to appear

To edit the information, touch the display screen for a popup keyboard

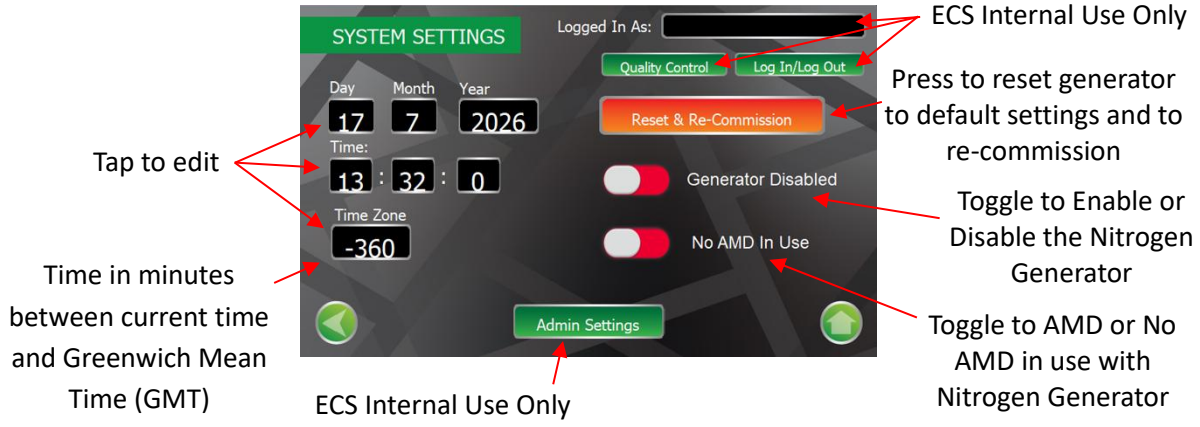
User Interface Software Version Number

System Settings Screen

The System Settings screen provides access to clock and calendar settings, identify whether the nitrogen generator is used with or without Air Maintenance Device (AMD) and selecting whether the nitrogen generator is disabled (Factory setting for shipping and prior to configuration) or enabled position (normal operation).

NOTE: If the nitrogen generator needs to be recommissioned, Reset & Re-Commission button can be pressed which will reset the nitrogen generator to the default settings.

Access: **Home** screen→ **Main Menu** button→ **Information** button.



Historical Datalogs Screen

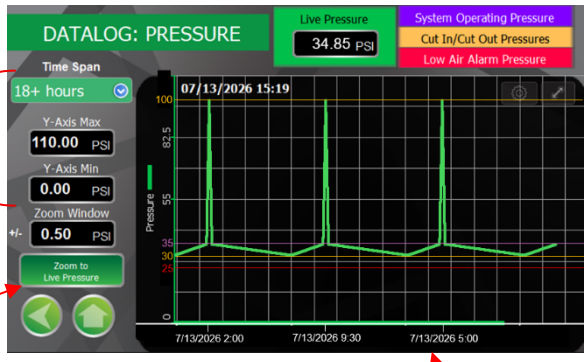
The Historical Datalogs screen provides access to historical data stored in the display module. The buttons on the Historical Datalogs screen are subdivided into two categories: Historical Datalogs and Storage Options. The historical datalogs include Pressures, Alarms, Operations Events, Hours, Maintenance, and Compressor.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button.

Pressures Screen

The Pressure screen graphically displays thirty days of nitrogen supply line pressure. It also allows for real-time pressure monitoring, especially helpful for leak detection.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Pressure** button.



Tap to adjust the X and Y axis

Appears when **Supply Line Low Air** is set to ON in the Alarm Settings screen

Press for real-time leak monitoring

Swipe right to view up to 30 days

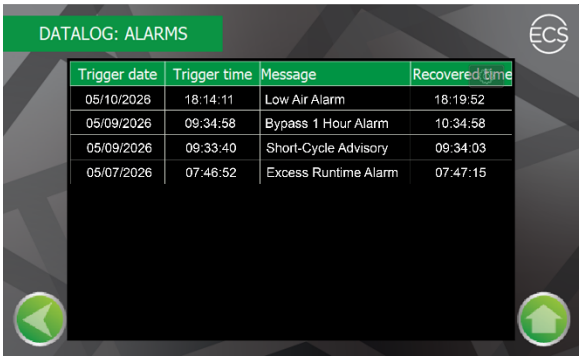
Then, set the Zoom Window to adjust the top and bottom of the Y axis, which in this example would be live pressure plus 0.5 psi (top) and live pressure minus 0.5 psi (bottom)

Swipe right to view up to 30 seconds

Alarms Screen

The Alarms screen displays the following alarms: low air, short cycling, excess run time, and bypass mode.

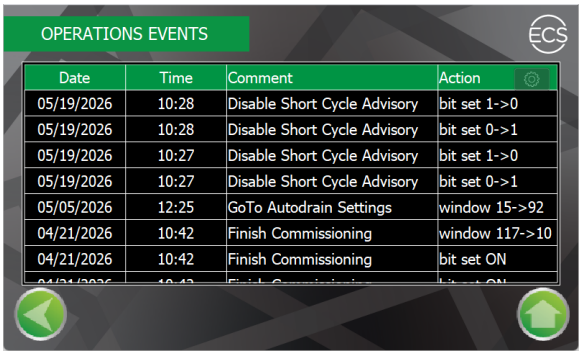
Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Alarms** button.



Operations Events Screen

The Operations Events screen displays any changes to the programmed information stored in the display module.

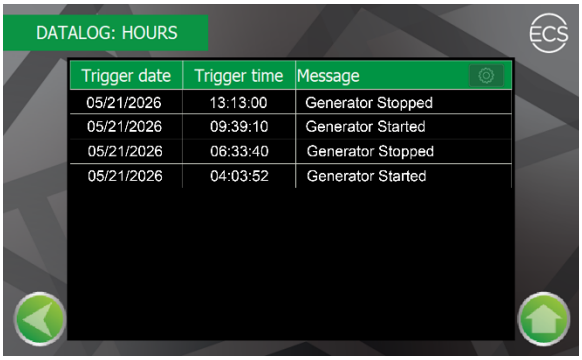
Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Operations Events** button.



Hours Screen

The Hours screen continuously displays when the nitrogen generator starts and stops producing nitrogen.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Hours** button.

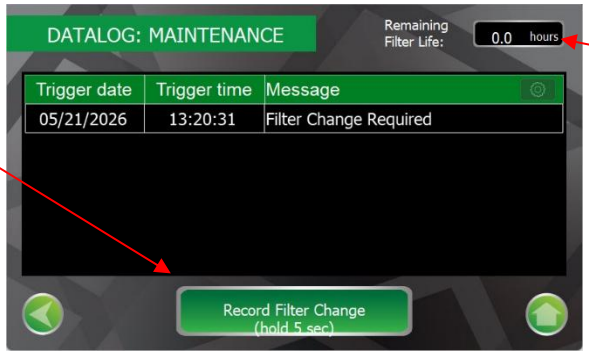


Maintenance Screen

The Maintenance screen continuously tracks and records annual filter changes in the nitrogen generator. After replacing filters, press and hold **Record Filter Change** button for five seconds which records the time and date of the filter change and resets the Filter Alert timer. The Maintenance Screen displays the anticipated remaining life of the filters in hours of use.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Maintenance** button.

Press and hold for five seconds to log a filter change

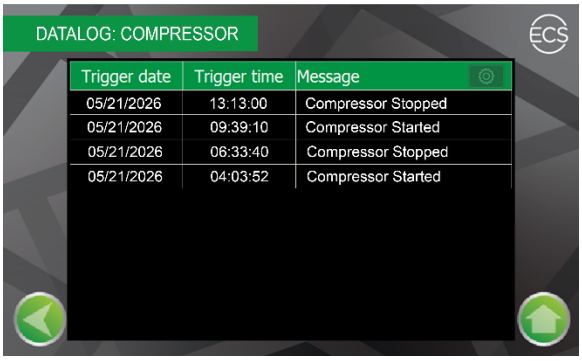


Estimated Remaining Filter Life

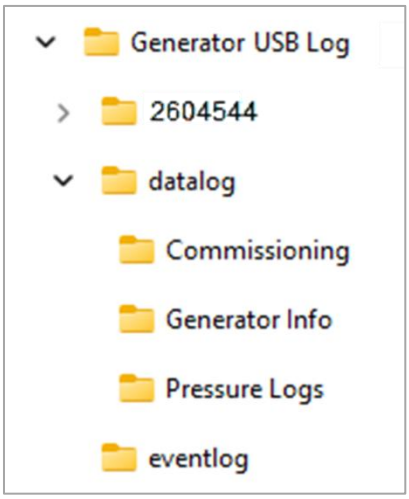
Compressor Screen

The Compressor screen continuously displays when the air compressor started and stopped running.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Compressor** button.



Storage Options Screen



The nitrogen generator retains 180 days of data. Use the Storage Options screen to export that data (event and data logs) to CSV files on the USB flash drive plugged into the display module on the inside of the generator cabinet. Per the bullets below, four different CSV files are available through the Datalog and Eventlog folders at the root of the USB flash drive. (Note that Operation Events are not available in CSV format.) Whenever the Backup & Eject button is pressed, CSV files will be generated and added to the existing set of CSV files in the Datalog and Eventlog folders.

- *Pressure readings* are captured every second and are exported to CSV files specific to the day (e.g., Pressure_2026-05-20.csv).
- *Generator information* is captured every two hours and includes:
    - Unit cycles (refer to the Hours screen)
    - Generator cumulative runtime hours
    - Excess runtime alarm hours setting (refer to the Alarms Setting screen)
    - Short-cycle count (refer to the Alarms screen)
    - Cut-in, cut-out, and operating pressure (refer to the Operating Settings screen)
- *Commissioning information* entered during commissioning is captured when commissioning is finished (refer to “Nitrogen Generator Commissioning” on page 25). Commissioning information includes:
    - Nitrogen flow rate
    - Nitrogen purity
    - Cut-in, cut-out, and operating pressure
    - Low air alarm setting
- *System events* (state changes, alarms, communication status, and storage activity) are logged and exported specific to the day (e.g., EL_20260709.csv for July 9, 2026). Each record includes a Category (for ECS use), date and time the event was triggered, timestamp when the event was acknowledge (assigned automatically), timestamp when the event was no longer active as applicable (Return to Normal Date & Time), and name of the event (Message).

  Device State:
    - Nitrogen generator started
    - Nitrogen generator stopped
    - Compressor started
    - Compressor stopped
    - Generator Powered On
    - Generator Disabled (refer to the System Setting screen)
    - Bypass Mode Active (refer to the Home screen)

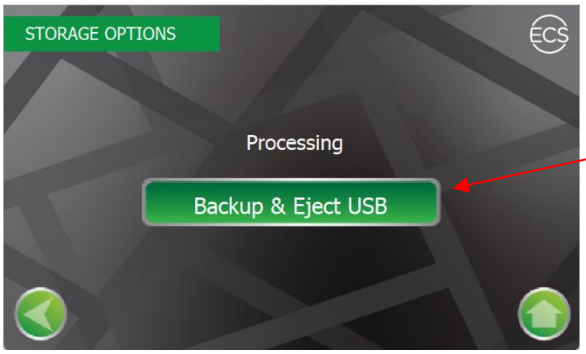
  Alarms:
    - Bypass 1 Hour Alarm
    - Excess Runtime Alarm
    - Short-Cycle Advisory
    - Low Air Alarm
    - Filter Change Required

- Filter Change Alert Reset
- 0V Blip – Pressure Transducer Error
  (for diagnostics; brief 0V fault detected on the pressure transducer signal)
- 5V Blip – Pressure Transducer Error
  (for diagnostics; brief 5V fault detected on the pressure transducer signal)
- 0V Sustain – Pressure Transducer Error (0V fault suggesting a wiring or sensor failure)
- 5V Sustain – Pressure Transducer Error (5V fault suggesting a wiring or sensor failure)

Communication Status and Storage Activity:

- Modbus Activated
- GreenSight Connection Registered
- GreenSight Connection Failed
- USB disk disconnected!
- USB disk insufficient free space!
- Backup complete

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Storage Options** button.

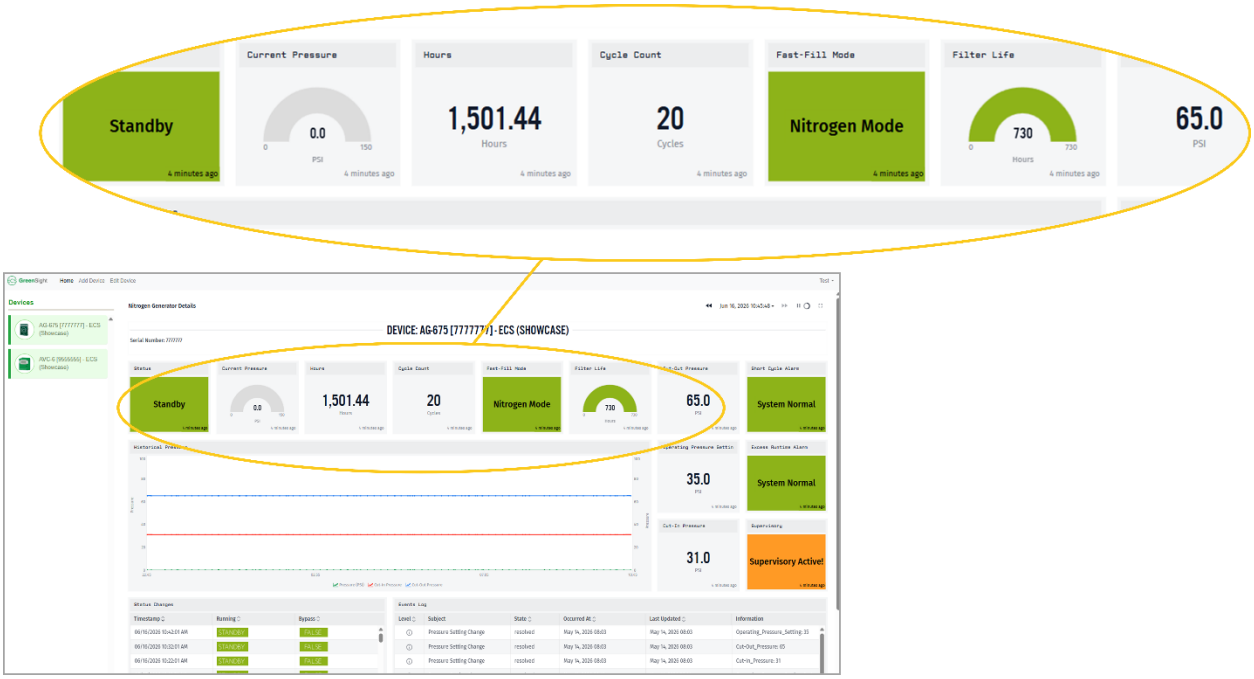


Press to initiate the export function

The export may take a while depending on how much data has been logged.

GreenSight

The ECS GreenSight web application enables remote monitoring of your ECS nitrogen generator and, if applicable, Advanced**IQ** Vent Controller (AVC).



Use the GreenSight Settings screen in the user interface to register the Advance**IQ** Nitrogen Generator with the GreenSight application (see page 57). Then go to GreenSight to first set up your free GreenSight account and, second, using the MAC address of the nitrogen generator registered with GreenSight, associate the generator with your account. The same applies to an AVC.

Note: When setting up your GreenSight account, you will enter an "Organization." Once a device is associated with an account, it cannot be associated with another account of a different organization.

GreenSight provides secure cloud data tracking, 180-day data history, web dashboard access, and alarm visibility with email alerts. (Note that GreenSight does not provide remote control of the nitrogen generation system.) Data sampling occurs every ten minutes and includes the following:

- Pressure data (when using an AVC)
- Device status (running, bypass, standby)
- Alarms (short cycle, excessive runtime, low air, bypass mode, filter change)
- Settings (system operating pressure, cut-in/cut-out pressure)
- Nitrogen purity (when using an AVC)
- Zone status (venting, monitoring, stopped) (when using an AVC)

NITROGEN GENERATOR EXCESS AIR ADJUSTMENT PROCEDURE

Air compressors used to meet the NFPA 13 30-minute fill requirement typically have a higher production rate than the maximum feed rate of the nitrogen generator separation membrane. When using the same air compressor to meet the NFPA 13 30-minute fill requirement and nitrogen production, the compressed air rate to the separation membrane must be held below the air compressor cut-out (turn-off) pressure to eliminate short cycling of the air compressor during the nitrogen production cycle. To prevent air compressor cycling, an excess air bleed-off assembly is included in the nitrogen generator. The excess air bleed-off assembly regulator is adjusted so that the air compressor operating pressure, when running in the nitrogen production mode, is below the cut-out pressure of the air compressor allowing the air compressor to operate continuously throughout the nitrogen production cycle.

NOTE: The performance and configuration of the separation membrane(s) can result in lower than anticipated feed pressure to the separation membrane, which is acceptable. The purpose of the excess air regulator is to exhaust the excess air to prevent the air compressor from cycling during nitrogen production.

1. If the air compressor's air receiver tank pressure gauge and the excess air bleed-off regulator gauge, when operating, are more than 10 to 15 psig (0.7 to 1 bar) below the cut-out pressure of the air compressor during nitrogen production cycle, decrease excess air bleed-off regulator (turn regulator clockwise). This raises the relief pressure of the regulator by exhausting less air thereby increasing the air compressor operating pressure resulting in increased nitrogen production.
2. If the air compressor is cycling during the nitrogen production cycle, increase excess air bleed-off regulator (turn regulator counterclockwise) until the pressure gauge on the regulator is approximately 10 to 15 psig (0.7 to 1 bar) below the cut-out pressure of the air compressor. This lowers the relief pressure of the regulator by exhausting more air thereby decreasing the air compressor operating pressure, resulting in sustained operation below the air compressor cut-out pressure thus eliminating the air compressor short cycling.

NITROGEN PURITY and FLOW RATE PROCEDURES

Nitrogen Purity Level Check Procedure

Nitrogen purity level in the fire sprinkler system can be checked by inserting the Handheld Gas Analyzer (PHGA-1) into the nitrogen sampling port in the nitrogen generator cabinet or the gas sampling port on the PAV-D/DQ and PSV-D/DE Vents.

1. Power On the PHGA-1 by pressing the power on button.
2. Calibrate the PHGA-1 by pressing and holding the calibration button for three seconds until **CAL** is displayed.

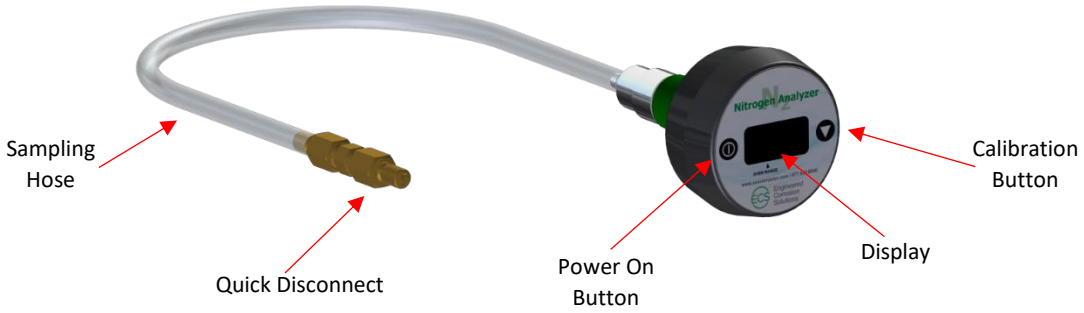
   NOTE: To calibrate analyzer, unscrew sampling hose from analyzer and move back and forth until reading is displayed.

   a. PHGA-1 must be recalibrated if nitrogen percentage displayed is above 80.1% or below 78.1% when reading normal atmosphere, not connected to the nitrogen generator cabinet/vent.
   b. Recommended to recalibrate analyzer daily when in use.

3. Once the PHGA-1 is calibrated, insert the quick disconnect of the sampling hose into the sampling port in the nitrogen generator cabinet/vent.

   NOTE: Nitrogen generator must be operating (running) and in Nitrogen Production Mode to sample nitrogen in cabinet.
   Vent must be open to sprinkler system pressure to sample nitrogen in sprinkler system.

4. Allow one minute for the PHGA-1 to stabilize, verify and document reading on PHGA-1 (nitrogen level should be approximately 98%). If nitrogen level from generator is below 96%, contact ECS.



Handheld Gas Analyzer: Factors Influencing Accurate Readings

1. Elevation changes will affect the accuracy of the nitrogen purity readings. The deviation of the nitrogen purity can be approximately 1% per 250 feet of elevation.
   a. Calibration of the instrument should be performed when elevation at which the product used changes more than 500 feet.
2. Temperature affects the accuracy of the nitrogen purity readings. The gas analyzer will hold calibration and correctly read nitrogen purity ±3% when thermal equilibrium within the operating temperature range. The gas analyzer must be thermally stable when calibrated and allowed to thermally stabilize after experiencing temperature changes before readings are accurate.
   a. For best results, perform the calibration procedure at a temperature close to the temperature where analysis will occur.
   b. Allow adequate time for the sensor to equilibrate to a new ambient temperature.

CAUTION: **CAL Err St** may result from a sensor that has not reached thermal equilibrium.

Nitrogen Production Flow Rate Check Procedure

The production rate of the nitrogen generator can be verified using the production flow meter in the nitrogen generator cabinet (see “Generator Configuration Diagrams” on page 77).

1. With the nitrogen generator powered and in the nitrogen production mode:
   a. Open the nitrogen production flow meter isolation ball valve to automatically start the nitrogen generator.
   b. Close the regulated and fast fill valves on the air maintenance device (AMD) to the fire sprinkler system(s).
   c. Read and document the nitrogen production flow rate on the nitrogen production flow meter.
      i. Flow rate indicated is in standard cubic feet per hour (SCFH).
      ii. The production rate is measured using the center of the silver ball in the flow meter.
   d. Open the regulated valve on the AMD to the fire sprinkler system(s).
   e. Close the flow meter isolation ball valve.
   f. Compare the nitrogen production flow rate with the values listed in the following chart.

Nitrogen Generator Flow Rates

Nitrogen Generator	Production Rate – SCFH (L/min)	
	Bypass Mode	Nitrogen Generation Mode
AG-6500 Stand Alone w/ Quincy COMP-QY5 Air Compressor	1,044 (492.7)	170 (80.2)
AG-11000 Stand Alone w/ Quincy COMP-QY7.5 Air Compressor	1,416 (668.3)	240 (113.3)
AG-18500 Stand Alone w/ Quincy COMP-QY7.5 Air Compressor	1,416 (668.3)	425 (200.6)
AG-25000 Stand Alone w/ Quincy COMP-QY10 Air Compressor	2,160 (1,019.5)	630 (297.3)

NOTES: Production rates are nominal rates based on 70°F (21°C) operating temperature at sea level. Changes in ambient temperatures, humidity levels, elevations, air compressor performance and coalescing filter performance can affect the production rate.

If production flow rate is lower than flow rates in the production chart, check pressure regulator of the excess bleed off assembly.

If production flow rate identified and documented varies more than 10% of the flow rates in the production chart, contact ECS.

NITROGEN GENERATOR SHORT CYCLING PREVENTION PROCEDURE

In situations where the nitrogen generator experiences short cycling, the short cycling is typically the result of an erratically operating air maintenance device (AMD). Installations where the AMD doesn't close properly or partially closes, the nitrogen supply line pressure increases to the cut-out (turn-off) pressure of the nitrogen generator before the sprinkler systems being supplied are at the proper operating pressure. Because one or more of the supplied systems did not reach the proper operating pressure when the nitrogen generator shuts off. The nitrogen supply line depressurizes through the AMD into the sprinkler system(s). This depressurization allows the supply line pressure to fall below the cut-in (turn-on) pressure of the nitrogen generator resulting in the nitrogen generator turning on. The process of filling the nitrogen supply line is repeated.

NOTE: Short cycling is exacerbated by a small or short nitrogen supply line between the nitrogen generator and sprinkler system.

Procedure:

1. Increase set point of AMD to prevent premature shut-off of AMD regulator.
2. If set point modifications do not prevent short-cycling, repair (clean out) or replace the erratically operating AMD.

AIR MAINTENANCE DEVICE PRESSURE ADJUSTMENT PROCEDURE

The sprinkler system air maintenance device (AMD) operating pressures are determined by the sprinkler system valve, system water pressure and water delivery time requirements as defined by NFPA 13. The AMD operating pressures should not need to be readjusted unless one of the above fire sprinkler system parameters change.

The following procedure has been developed to compensate for:

1. *The differences in production between air compressor only and nitrogen generator.*
   Setting air maintenance devices using compressed air only and then changing to nitrogen mode can result in discrepancies in sprinkler system operating pressure and erratic operation of the nitrogen generator.
2. *Tolerances of the gauges used on fire sprinkler systems.*
3. *Pressure differential between the nitrogen generator pressure transducer and the pressure restriction through the mechanical air maintenance device.*
4. *Inlet pressure fluctuations to the AMD resulting in pressure fluctuations of the AMD.*
5. *Interaction between AMDs when multiple sprinkler systems are connected to a single nitrogen generator.*

   NOTES:

   1. When the nitrogen generator is connected to multiple dry pipe and preaction systems, the **fire sprinkler systems must operate at the same supervisory gas pressure**.
   2. Any changes to the AMD pressure settings must be correlated with the nitrogen generator cut-in (turn-on) and cut-out (turn-off) pressure settings and be authorized by and under the direction of ECS.
   3. Accuracy of pressure gauges typically used in the fire sprinkler industry can vary as much as 8 to 12 psi (0.55 to 0.83 bar) (see “Operational Information” on page 13).

Determine the operating pressure for <u>all</u> AMDs connected to a single nitrogen generator. The operating pressure must be the same for all AMDs.

NOTE: AMDs operating at different operating pressures will have an adverse effect on the operation and can reduce the service life of the nitrogen generator.

Initial Setting of AMDs

1. Close the valves to <u>all</u> accelerators on the sprinkler systems (if installed).
2. **Systems not being checked:** Close all the AMD valves.
3. **System being checked:** Verify the AMD fast fill (bypass) valve is open and the inlet/outlet (regulated) valves are closed.
4. Use the flow meter ball valve to relieve gas from nitrogen/air supply line to sprinkler system’s AMD allowing the nitrogen generator to cycle on.
5. **Enable Bypass** through the user interface of the nitrogen generator (air only mode) to fast fill sprinkler system with air to 3 to 5 psig (0.2 to 0.3 bar) **<u>below</u>** operating pressure.
6. **Disable Bypass** through the user interface of the nitrogen generator (Nitrogen Mode), open the AMD inlet/outlet (regulated) valves, close AMD fast fill (bypass) valve and complete filling of sprinkler system.
7. When sprinkler system air pressure gauge reaches desired system operating pressure:
   Slowly decrease AMD regulator pressure (turn counterclockwise) until pressure indicated in the user interface transitions from steady pressure to climbing pressure, the AMD regulator should be properly set.
8. Verify AMD operating with nitrogen generator using AMD Operation with nitrogen generator verification procedure.
9. Repeat 4 through 8 for each additional AMD connected to the nitrogen generator.

NOTE: Once the AMDs are set, the gas pressure in the sprinkler system will fluctuate between the desired set pressure and the turn-on pressure of the nitrogen generator.

AMD Operation with Nitrogen Generator: Verification

1. **Systems not being checked:** Close all the AMD valves.
2. **System being checked:** Verify the AMD fast fill (bypass) valve is closed and the inlet/outlet (regulated) valves are open.
3. Set the cut-in (turn-on) pressure of the nitrogen generator to 3 to 5 psig (0.2 to 0.3 bar) **below** the AMD set pressure. (See "Nitrogen Generator Pressure Adjustment Procedure" on page 71.)
4. Slowly drain 3 to 5 psi (0.2 to 0.3 bar) of pressure out of the sprinkler system.
5. Use the flow meter ball valve to relieve gas from nitrogen/air supply line to sprinkler system AMDs allowing the nitrogen generator to turn on.
6. Allow the sprinkler system to fill with nitrogen while monitoring the pressure on the nitrogen generator display screen.
    a. As pressure increases in sprinkler system and on the nitrogen generator display (through the AMD), the pressure increase will be gradual.
    b. When the sprinkler system operating pressure reaches the AMD set pressure and the AMD closes:
        i. The pressure on the sprinkler system air gauge will stop rising.
        ii. The pressure on the pressure display screen will increase at a rapid pace until the nitrogen generator turns off (cut-out pressure).
7. Compare the pressure indicated on the display screen at the transition (gradual increase to rapid increase) with the pressure indicated on the system air pressure gauges.

    NOTES: The pressure indicated on the display screen at the transition of gradual to rapid increase will be the pressure at which the AMD pressure regulator is currently set.

    Any discrepancy between pressure indicated on the display screen and the pressure indicated on the system air pressure gauges is a result of digitally controlled pressure transducer, analog sprinkler system gauges and pressure restriction through mechanically operated AMD.

    a. If the pressure indicated on the display screen at the transition (gradual increase to rapid increase) is the sprinkler system's target pressure, proceed to **9**.
    b. If the pressure indicated on the sprinkler system's air pressure gauge at the transition (gradual increase to rapid increase) is **LESS THAN** the sprinkler system's target pressure, proceed to **8a**.
    c. If the pressure indicated on the sprinkler system's air pressure gauge at the transition (gradual increase to rapid increase) is **MORE THAN** the sprinkler system's target pressure, proceed to **8b**.
8. Pressure settings.
    a. If the pressure on the sprinkler system's air pressure gauge is **LESS THAN** the target operating pressure, increase the pressure setting of the AMD by ¼ of a turn increment (cw) (increment can be different at discretion of operator) and return to **5**.
    b. If the pressure on the sprinkler system's air pressure gauge is **MORE THAN** the target operating pressure, decrease the pressure setting of the AMD by ¼ of a turn increment (ccw) (increment can be different at discretion of operator) and return to **4**.

9. Repeat 5, 6 and 7 to verify that the operating pressure readings are consistent.
    a. If the pressure reading is as expected, mark the location of the indicator on the sprinkler system air pressure gauge of the system being tested (and on the AMD pressure gauge if applicable).
10. Additional sprinkler systems.
    a. **Other sprinkler systems not tested:** If there is another system supplied by the nitrogen generator, proceed to that system and return to **2**.
    b. **No other sprinkler systems to test:** If there are no other systems supplied by the nitrogen generator to be tested, proceed to **11**.
11. Test operation of nitrogen generator with all sprinkler systems operating.
    a. Confirm AMD fast fill (bypass) valve(s) are closed, and the regulated valve(s) are open on all the system AMD(s).
    b. Slowly drain 1 to 2 psi (0.07 to 0.14 bar) of pressure out of one of the sprinkler systems.
    c. Use the flow meter ball valve to relieve gas from nitrogen/air supply line to sprinkler system AMDs allowing the nitrogen generator to turn on.
    d. Allow nitrogen generator to fill the sprinkler system(s) and turn off.
    e. Compare sprinkler system pressures on all systems are the same as the target operating pressure.
    f. If system pressures are NOT the same as the target operating pressure, repeat **8**, as necessary.
    g. If system pressures are the same as the target operating pressure, proceed to **12**.
12. Determine the nitrogen generator cut-in (turn-on) pressure by subtracting 5 psig (0.3 bar) from the target system operating pressure determined at the beginning of this procedure.
    a. If subtracting 5 psig (0.3 bar) from the target operating pressure results in a cut-in pressure that is within 3 psig (0.2 bar) of the low air alarm, subtract 3 psig (0.2 bar) from the target operating pressure.
    b. If subtracting 3 psig (0.2 bar) from the target operating pressure results in a pressure that is within 3 psig (0.2 bar) of the low air alarm, contact ECS for direction.
13. Program the cut-in pressure into the display screen in the nitrogen generator (see “Nitrogen Generator Pressure Adjustment Procedure” on page 71).
14. Slowly depressurize the sprinkler system(s) individually to the cut-in (turn-on) pressure where the generator turns on and verify:
    a. The pressure setting on the AMD and sprinkler system air pressure gauge when the nitrogen generator turns on.
    b. That a low air alarm is not received on any fire sprinkler system supplied by the nitrogen generator prior to the nitrogen generator turning on.
    c. The nitrogen generator fills the sprinkler system(s) to the appropriate operating pressure and then turns off.
15. Confirm all AMD fast fill (bypass) valve(s) are closed and the regulated valve(s) are open on all the system AMD(s).
16. Open all valves to the accelerators on the sprinkler systems (if installed).

NITROGEN GENERATOR PRESSURE ADJUSTMENT PROCEDURE

The nitrogen generator cut-in (turn-on) and cut-out (turn-off) pressure settings are established and set during the commissioning process of the nitrogen generator and do not need to be readjusted unless the fire sprinkler system parameters change. Any adjustments to the nitrogen generator cut-in (turn-on) and cut-out pressure settings will affect the Standard Vent (PAV-D/DQ) or SMART Vent (PSV-D/DE) backpressure regulator settings, which will require readjusting the backpressure regulators to coincide with the changes to the nitrogen generator cut-in and cut-out pressure settings. (See "Generator Configuration Diagrams" on page 77.)

Nitrogen generator pressure adjustments are accomplished through the user interface.

NOTE: Any changes to the nitrogen generator cut-in and cut-out pressure settings or the vent backpressure regulator settings are to be authorized by and under the direction of ECS.

Cut-In Pressure Adjustment

1. Press the **Main Menu** button on the **Home** screen.
2. Press the **Operations Settings** button on the **Main Menu** screen.
3. Press the **Cut-In Pressure** window, a keypad will be displayed.
4. Enter the appropriate pressure, then press **Enter** button on the keypad.
5. Press the **Home** button to return to the **Home** screen.

Cut-Out Pressure Adjustment

1. Press the **Main Menu** button on the **Home** screen.
2. Press the **Operations Settings** button on the **Main Menu** screen.
3. Press the **Cut-In Pressure** window, a keypad will be displayed.
4. Enter the appropriate pressure, then press **Enter** button on the keypad.
5. Press the **Home** button to return to the **Home** screen.

LEAK CHECKING NITROGEN GENERATOR AND NITROGEN SUPPLY LINE

Leaks in the nitrogen generator or in the nitrogen supply line to the air maintenance devices (AMDs) will result in a short cycling effect of the nitrogen generator. Short cycling of the nitrogen generator will result in a premature failure of the nitrogen generator.

1. Nitrogen Generator Leak Check
    a. Isolate (close the isolation valve) the nitrogen generator from the supply line.
    b. Monitor the display screen.
        i. If displayed pressure remains constant for a minimum of one minute, no leaks in nitrogen generator.
        ii. If displayed pressure decreases, leak in cabinet between top manifold assembly and isolation valve.
    c. Repair leaks as needed.
    d. Open Isolation Valve.
2. Nitrogen Supply Line Leak Check
    a. Isolate (close all AMDs valves) the supply line from the sprinkler systems.
    b. Monitor the display screen.
        i. If displayed pressure remains constant for a minimum of one minute, no leaks in supply line.
        ii. If displayed pressure decreases, leak in supply line.
    c. Repair leaks as needed.
    d. Open regulated valves on AMDs with fast fill valves remaining closed.

FILTER REPLACEMENT

The nitrogen generators contain three separate cartridge filters and a water separator. **It is recommended that each filter be replaced at a minimum as part of an annual preventative maintenance program.** ECS offers a replacement filter kit for each model.

ECS Recommends that all cartridge filters (Filters 2, 3 & 4) in the nitrogen generator be replaced when replacing the filters.

Filter Replacement Kit Installation Instructions

Filter Kit: FKSA-FS (Filter Replacement Kit for AG-6500/11000/18500/25000 Nitrogen Generator Cabinet)

Part Description	Location with Autodrain	Qty.
Water Separator	Right Housing	*
5-Micron Coalescing Filter	Center-Right Filter Housing	1
1-Micron Coalescing Filter	Center-Left Filter Housing	1
0.01-Micron Coalescing Filter	Left Filter Housing	1

***Water separator is not included in filter replacement kit.** Inspect water separator and clean as necessary, as part of the filter replacement procedure.*

NOTE: Before beginning the filter replacement process, **ensure all internal components are cool to the touch**. Components can be very hot after long run cycles and can present risk of injury.

WARNING: Filters are Pressurized

Isolate nitrogen generator from air compressor and depressurize before attempting to service. Ensure filter bowls are fully seated and locked before restoring pressure.

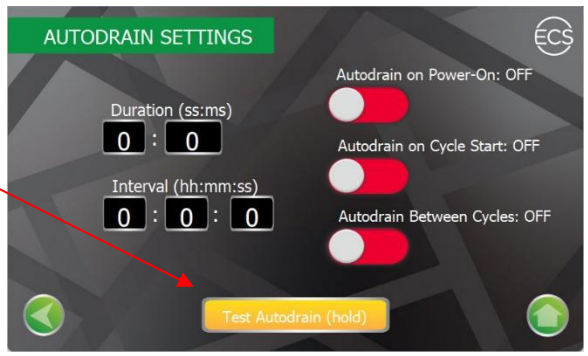
Failure to follow procedures may result in injury or damage to equipment

Replacement Guide

1. Isolate nitrogen generator from the air supply. Close the isolation valve between the nitrogen generator and the air source.
2. Drain air pressure from filter housings by pressing and holding the Test Autodrain button on the Autodrain Settings screen.

   Access: **Home** screen→ **Main Menu** button→ **Operating Settings** button→ **Autodrain Settings** button.

Press and hold to depressurize the filter housing assembly



3. Remove filter housing of 5-Micron Coalescing Filter Housing by pulling down on blue housing lock and turning filter housing counterclockwise.
4. Remove black plastic filter plate underneath filter by turning counterclockwise. Black plastic filter plate should be finger/hand tight.
5. Remove old Coalescing Filter from the filter housing.

Black Plastic Filter Plate

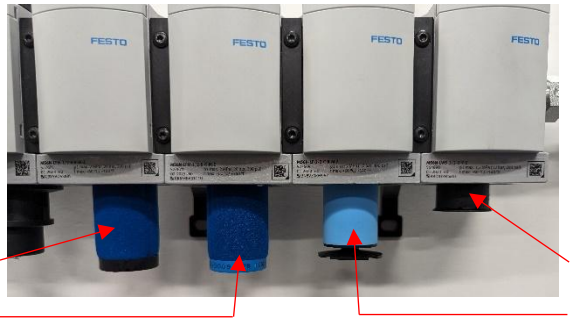
6. Replace with new 5-Micron Coalescing Filter, reinstall black filter plate. Black plastic filter plate should be finger/hand tight.
7. Reinstall filter housing turning filter housing clockwise until blue housing lock latches.

8. Repeat this process for 1-Micron and 0.01-Micron filters adjacent to water separator, using the kit contents table as a guide to match the filters with the correct housings. Be very careful to do this process **<u>one filter at a time</u>** to ensure the filters do not get mixed in the process.

   NOTE: The 1-Micron and 0.01-Micron Filters do not include black plastic filter plate and screw directly into the top of the housing. Filters should be finger/hand tight.

0.01-Micron Coalescing Filter

1-Micron Coalescing Filter



Water Separator

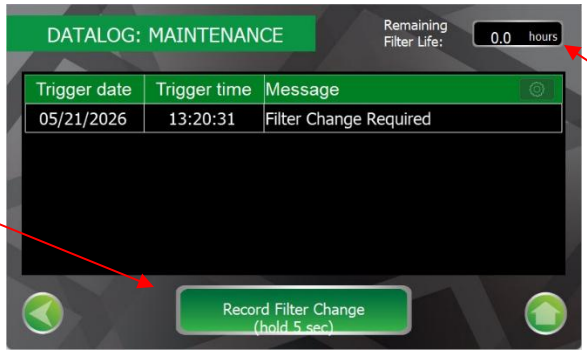
5-Micron Coalescing Filter

9. Inspect Water Separator and clean as necessary.
10. Once all filter cartridges have been replaced, water separator has been cleaned, verify all filter housings are re-installed properly.
11. **Slowly** open isolation valve between the nitrogen generator and the air source.

Once the filters have been replaced, log the filter replacement by pressing and holding the **Record Filter Change** button for five seconds on the Maintenance screen.

Access: **Home** screen→ **Main Menu** button→ **Historical Data** button→ **Maintenance** button.

Press and hold for five seconds to log a filter change



Displays Anticipated Remaining Filter Life
Hours of Use

For further filter replacement orders, contact an ECS representative at 314-432-1377 or service@ecscorrosion.com.

Air Compressor Maintenance

Air compressors connected to the nitrogen generator must be maintained in accordance with the manufacturer's recommendations, which includes changing the oil filters on a regular basis.

OXYGEN REMOVAL VENT MAINTENANCE: PAV-D/DQ & PSV-D/DE

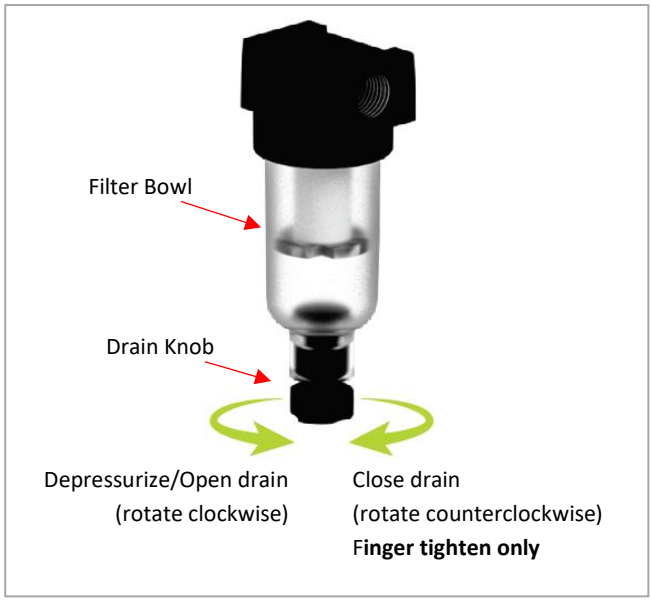
Maintain vents annually at a minimum: inspect the filter, clean the Y-strainer, and verify the regulator pressure setting.

1. **Depressurize the vent.**
   a. Close the vent isolation ball valve.

CAUTION: During normal operation, vents are pressurized. Uncontrolled release of energy may cause injury. Using eye protection, release air pressure before servicing.

CAUTION: To avoid damage to the drain, when closing the drain finger tighten only.

b. To depressurize the vent, open the filter bowl drain by rotating the drain knob clockwise, as viewed from the bottom. (If needed, use a tool for additional leverage to loosen the knob.) Then close the drain by rotating the knob counterclockwise. Finger-tighten only.

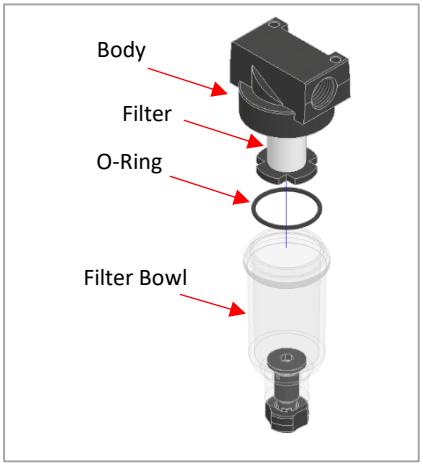


2. **Visually inspect the filter by looking through the filter bowl.** Proceed with this step if you see that the filter has accumulated excessive debris or if you cannot see through the filter bowl.

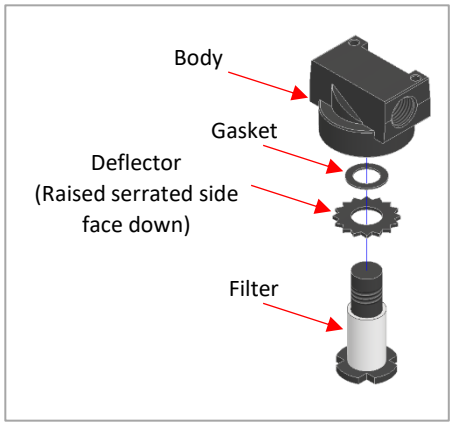
NOTE: For replacement parts, contact ECS to order the *Dry System Protector Air Vent Filter Replacement Kit: Bowl, O-Ring, and Filter* (PV-DRF3). (This kit is the complete filter assembly, which also includes the body, gasket, and deflector.)

a. Unscrew and remove the filter bowl with O-ring.

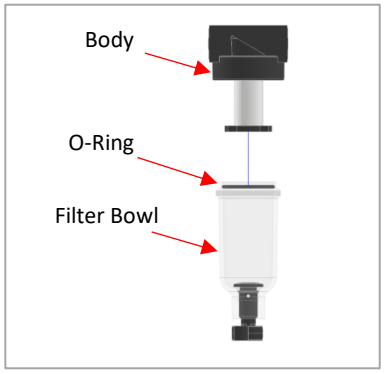
b. Inspect the filter element for excessive debris.



c. If needed, replace the filter.
   - Remove the filter by turning the filter counterclockwise.
   - Using only mild soap (e.g. liquid dish soap) and water, clean the filter bowl and the inside of the body.
   - Install a new filter with gasket and deflector; finger tighten the filter (0.9 to 1.4 Nm / 8 to 12 in-lbs).



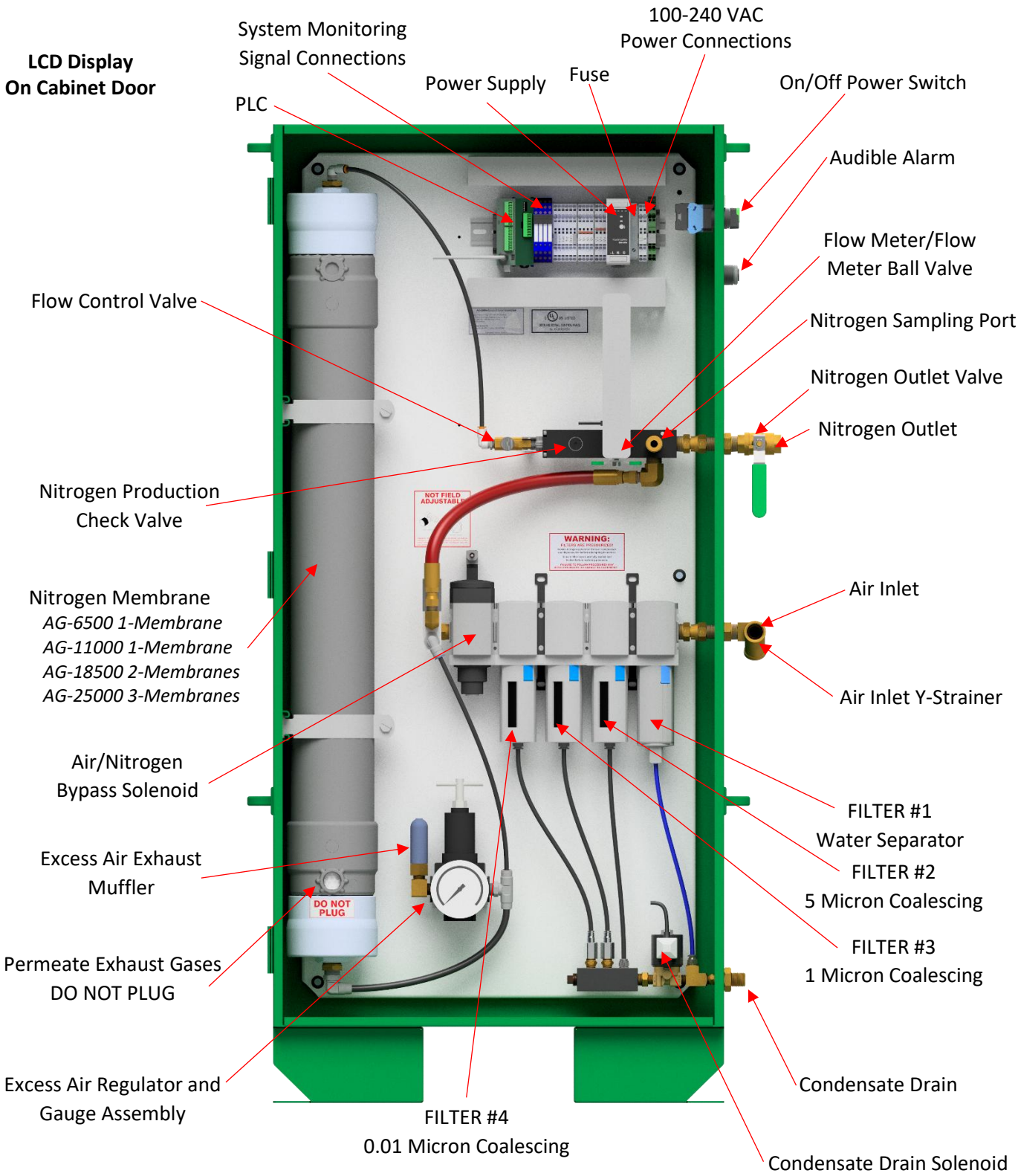
d. Lubricate a new O-ring with a mineral-based oil or grease; then install the O-ring on the filter bowl.
e. Install the filter bowl into the body until it is stopped by the body; then back off the bowl 1/8 turn.



3. **Clean the Y-strainer/inspect for blockage.**
   a. Unscrew and remove the Y-strainer cap.
   b. Remove and clean the screen.
   c. Reinstall the screen.
   d. Reinstall Y-strainer cap by turning clockwise until wrench tight.
4. **Open the vent isolation ball valve;** then check for air leaks and verify that the regulator gauge is showing system operating pressure.
5. **Verify the vent regulator** is set above the low air alarm pressure and below the turn-on pressure of the nitrogen generator.
   a. Close the isolation ball valve.
   b. For a PAV-D, continue to step c; otherwise, perform the below as applicable:
      - PSV-D/DE Vents: Push the **Vent** button.
      - PAV-DQ Vents: Disconnect the 5/32” tubing from the push fitting.
   c. Open then close the vent isolation ball valve. The regulator gauge increases to system operating pressure and then drops to the current pressure setting for the regulator.
   d. Verify that the regulator gauge is above the low air alarm pressure and below the turn-on pressure of the nitrogen generator.
   e. Reset vent for normal operation.
      - PAV-D: Isolation valve remains closed unless starting 14-day nitrogen inerting process.
      - PSV-D/DE: Open Isolation valve and reset Control Cabinet (turn power ***Off*** then ***On***).
      - PAV-DQ: Open the isolation ball valve and reinstall 5/32” tubing into PAV-DQ push fitting.

GENERATOR CONFIGURATION DIAGRAMS

AG-6500/AG-11000/AG-18500/AG-25000 Nitrogen Generator Configuration



TROUBLESHOOTING

Safety Warning

Only qualified personnel can perform inspection, testing and maintenance of the nitrogen generation equipment. Prior to any system troubleshooting on the nitrogen generation system, ensure that the nitrogen generator is isolated from the compressed air supply and all system risers. Be aware of pressurized system components as some of the troubleshooting procedures require system components to be pressurized. Failure to do so can result in system damage and/or personal injury.

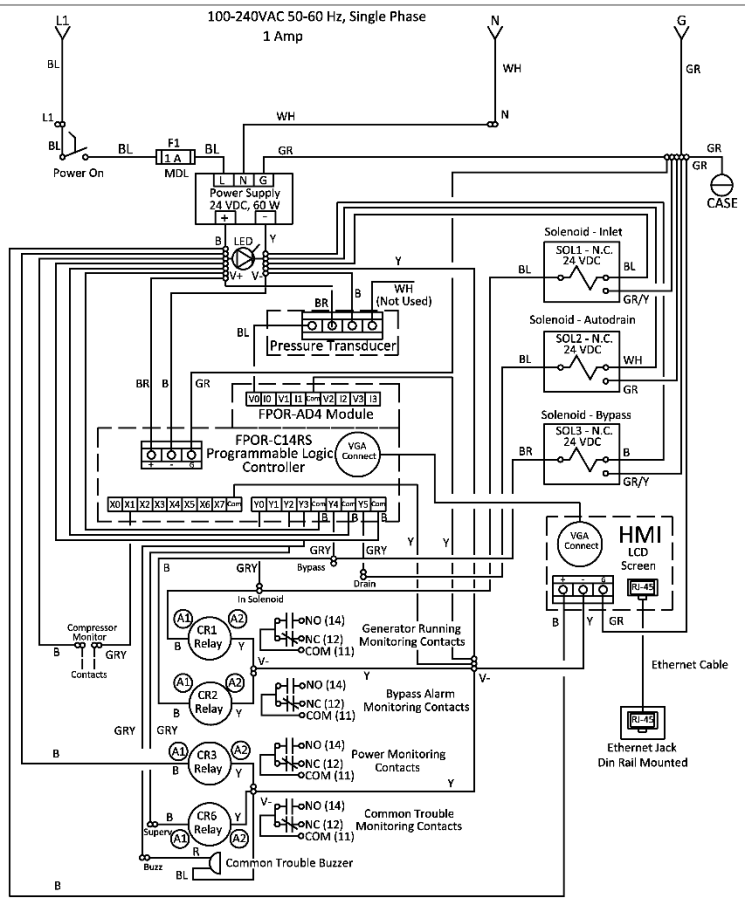
SYMPTOM	PROBLEM	RESOLUTION
Display: Storage Space Insufficient *Error Message*	The flash drive in the back of the display module is improperly seated or missing	Reseat the Flash drive or install a flash drive in the display module
Display: Device No Response *Error Message*	PLC is switched to PRG or is not receiving power	○ Verify PLC is switched to RUN ○ Verify PLC power wires are connected to V+ and V- and PLC is receiving power
	Communications cable between PLC and display screen is not properly seated or is defective	Reseat or replace cable
Nitrogen generator not running	Lights, display screen, or indicators on generator <u>off</u>.	• Check On/Off Power Switch on generator • Check incoming power to generator • Check fuses in generator • Check input and output of power source in generator • Repair or replace as necessary
	• Lights, display screen, or indicators on generator <u>on</u> • Display screen is blank, displays no values, or displays “Device no response” error message	• Verify PLC is switched to RUN, not PRG. • Verify PLC is properly connected to and is receiving power from V+ and V- terminal blocks
	• Lights, display screen, or indicators on generator <u>on</u> • Display pressure <u>above</u> generator cut-in pressure	• The nitrogen generator may be in the depressurizing phase of the breathing cycle. When sprinkler system reaches the generator cut-in pressure, the nitrogen generator will automatically turn on. (normal operation). • Open flow meter isolation valve to decrease supply line pressure and turn on generator • Repair or replace as necessary
	• Lights, display screen, or indicators on generator <u>on</u> • Display pressure <u>below</u> generator cut-in pressure	• Check status of solenoids in generator. ○ Solenoids should be energized (LED on) when running • Check output of digital controller/PLC • Check power to air compressor. • Check operation of air compressor ○ See air compressor O&M Manual for procedures • Repair or replace as necessary
Nitrogen Generator short cycling Turns on multiple times with a short period	Digital display pressure decreases when generator shuts off	○ Isolate generator from sprinkler system(s) ○ Display pressure should remain constant ○ If pressure decreases, leak in plumbing between generator an isolation valve, leak in top rail/manifold assembly or bypass assembly in generator ○ Repair or replace as necessary (see “Leak Checking” on page 71)
		○ Open generator isolation valve and close AMD valve(s) on sprinkler system(s) ○ Display pressure should remain constant • If pressure decreases, leak in supply line to AMD(s) or in AMD(s) • Repair or replace as necessary (see “Leak Checking” on page 71)
	Digital display pressure remains constant when generator shuts off	• AMD pressure below or too close to generator cut-in pressure. • Verify the AMD pressure is 3 to 5 psig (0.2 to 0.3 bar) <u>above</u> generator cut-in pressure • Adjust, repair, or replace AMD as necessary (see “Air Maintenance Device Pressure Adjustment Procedure” on page 67)

SYMPTOM	PROBLEM	RESOLUTION
Nitrogen not flowing in sprinkler system with nitrogen generator running	Nitrogen generator in bypass mode	Place nitrogen generator in nitrogen generation mode.
	• Nitrogen generator in nitrogen production mode • Feed pressure to separation membrane below 140 psi (10 bar)	• Isolate nitrogen generator from sprinkler systems • Open flow meter isolation valve • Verify air source (compressor) is producing more than 140 psi (9.6 bar) of pressure • Check for leaks in air compressor supply line to nitrogen generator • Check for leaks in inlet and filter assembly of nitrogen generator to separation membrane • Check generator condensate drain for air leaks o Autodrain solenoid or drain tubing is leaking, if installed o Repair or replace solenoid and/or drain tubing o Check filter housing drain tube for air leak, if filter housing float is installed o Clean, repair or replace filter housing float • Check excess air blow off regulator is not exhausting air below 145 psi (10 bar) (see “Nitrogen Generator Excess Air Adjustment Procedure” on page 65) o Adjust as needed to exhaust air above 145 psi (10 bar)
	• Nitrogen generator in nitrogen production mode • Feed pressure to separation membrane at or above 145 psi (10 bar)	• Isolate nitrogen generator from sprinkler systems • Open flow meter isolation valve • Verify nitrogen backpressure regulator is adjusted for approximately 80 psi (5.5.bar), if installed • Verify nitrogen production rate (see “Nitrogen Purity and Flow Rate Procedures” on page 65) • Compare nitrogen flow rate with commissioning documentation and/or factory test report • Use a gas analyzer to measure the nitrogen output quality • If nitrogen production or nitrogen purity significantly lower, contact ECS
Nitrogen generator running continuously or running more than four hours *Nitrogen generator is designed to run for up to three hours per cycle*	• Generator in nitrogen generation mode • Unable to pressurize sprinkler system • Close AMD and unable to pressurize generator cabinet and supply line.	• Isolate nitrogen generator from sprinkler systems • Open flow meter isolation valve • Verify air source (compressor) is producing more than 150 psi (10 bar) of pressure • Check for leaks in air compressor supply line to nitrogen generator • Check for leaks in inlet and filter assembly of nitrogen generator to separation membrane • Check generator condensate drain for air leaks o Autodrain solenoid leaking, if installed o Repair or replace solenoid o Check filter housing drain tube for air leak, housing float is installed o Clean, repair or replace housing float • Check excess air blow off regulator is not exhausting air below 150 psi (10 bar) (see “Nitrogen Generator Excess Air Adjustment Procedure” on page 65) • Adjust as needed to exhaust air above 150 psi (10 bar) • Verify nitrogen backpressure regulator is adjusted for approximately 80 psi (5.5. bar), if installed • Verify nitrogen production rate (see “Nitrogen Purity and Flow Rate Procedures” on page 65) • Compare nitrogen flow rate with commissioning documentation and/or factory test report • If nitrogen production is significantly lower, contact ECS
	• Generator in nitrogen generation mode • Unable to pressurize sprinkler system • Close AMD and able to pressurize sprinkler system	• Close AMD, supply line pressurizes, and generator shuts off • Check pressure setting of AMD • AMD pressure is more than 5 psi (0.3 bar) above generator cut-in pressure • Adjust, repair, or replace AMD as necessary (see “Air Maintenance Device Pressure Adjustment Procedure” on page 67)

SYMPTOM	PROBLEM	RESOLUTION
Air Compressor short cycling Turns on and off multiple times with a short period	• Generator <u>is not</u> making nitrogen • Air compressor cycles on & off	• Check for leaks in air compressor supply line to nitrogen generator • Check for leaks in inlet and filter assembly of nitrogen generator to separation membrane • Check generator condensate drain for air leaks o Autodrain solenoid leaking, if installed o Repair or replace solenoid o Check filter housing drain tube for air leak, housing float is installed Clean, repair or replace housing float
	• Generator <u>is</u> making nitrogen • Air compressor cycles on & off	• Check excess air blow off regulator is not exhausting air below 150 psi (10 bar) (see “Nitrogen Generator Excess Air Adjustment Procedure” on page 65) o Adjust as needed to exhaust air above 150 psi (10 bar)

WIRING DIAGRAMS

AG-6500/11000/18500/25000 Nitrogen Generator



Wiring Notes:

AC Wiring: 14 AWG. After Fuse
DC Wiring: Blue+ Yellow- (16 AWG.)
Ground: Green
Use Copper Conductors Only
Field Wiring Temperature Rating: 60°C (140°F)
Use Terminal Blocks As Required
Required Field Wiring Terminal Tightening Torque 14 In. Lbs.
120-240 VAC, 15 Amp Circuit Breaker Minimum Provided By Installer
As Means Of Branch Circuit Protection
Bond Doors

Wiring Color Legend:

BL	BLack
WH	White
GR	Green
B	Blue
R	Red
Y	Yellow
GR/Y	Green/Yellow
BR	Brown
GRY	Grey

Monitoring Notes:

1 Optional Nitrogen Generator Running Monitoring Output.
(Contacts Shown Energized When Nitrogen Generator is Running)
2 Optional Bypass Alarm Monitoring Output.
(Contacts Shown Energized In Bypass (Air Only) Mode)
3 Optional Power Monitoring Output.
(Contacts Shown Energized)
4 Optional Common Trouble Monitoring Output.
(Contacts Shown De-Energized)

Alarm Indicator Operation

Flashing Indicator on HMI Screen: Nitrogen Generator In Bypass
Air Only Mode
Buzzer Activated: System Common Trouble

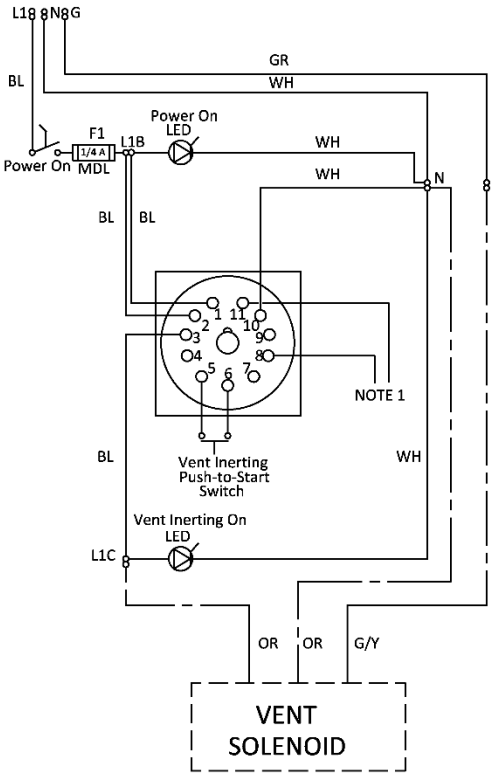
Air Compressor Monitoring Option

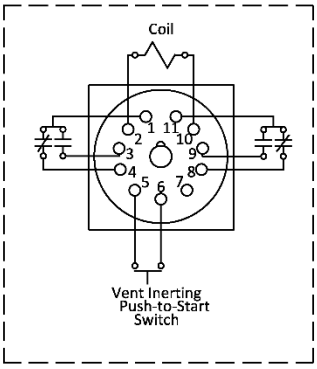
Connect air compressor normally open (N.O.) contacts (Terminals 13NO & 14NO) in air compressor control box to Nitrogen Generator (Terminals C-MON B1 & V+ B2).

Rev. 10.0

Dry SMART Vent

115-120 VAC, 60 Hz, Single Phase
1 Amp





ADJUSTABLE TIMER

WIRING LEGEND:
AC WIRING 16 AWG. AFTER FUSE
GROUND GREEN
BOND DOORS
USE TERMINAL BLOCKS AS REQUIRED

WIRING COLOR LEGEND:

BL	BLACK
WH	WHITE
GR	GREEN
OR	ORANGE
G/Y	GREEN/YELLOW

NOTES:

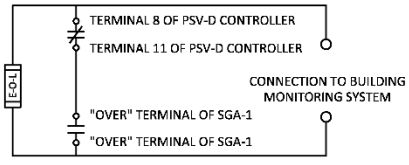
TIMER COIL RATED AT 120-240 VAC, 50-60 Hz, 6.6 W
LEDs RATED AT 120 VAC
SOLENOID ON PSV-D RATED AT 120 VAC, 6.9 W
ON/OFF POWER SWITCH LED RATED AT 120 VAC
ON/OFF POWER SWITCH RATED AT 600 VAC

TIMER PROGRAMMING:

1. SET MODE TO "E"
2. SET SCALE TO "20, 30, 40, 50, 60"
3. SET RANGE TO "10H"
4. ROTATE KNOB TO "35"

NOTE - WHEN PSV-D IS USED INCONJUNCTION WITH SGA-1

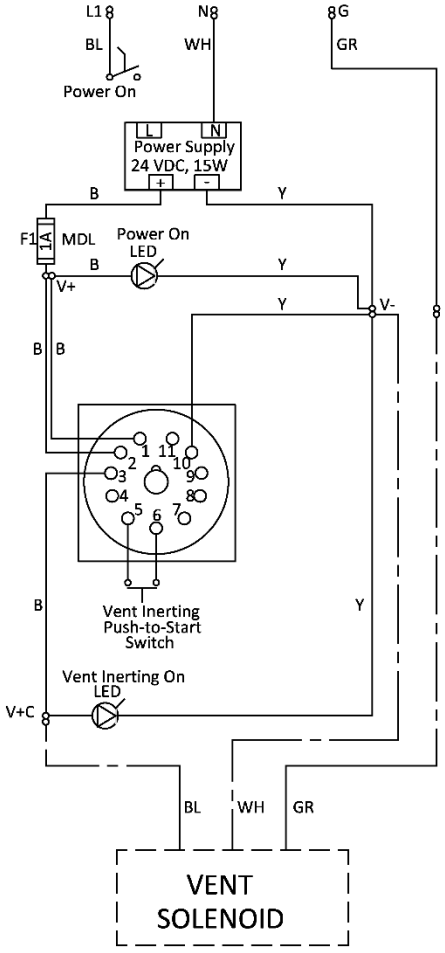
1. CONNECT TERMINALS 8 & 11 TO OUTPUT SIGNAL OF SMART GAS ANALYZER (SGA-1) TO BYPASS THE LOW PURITY ALARM SIGNAL DURING THE 14 DAY NITROGEN INERTING PROCESS. (SEE INERTING BYPASS WIRING DIAGRAM)

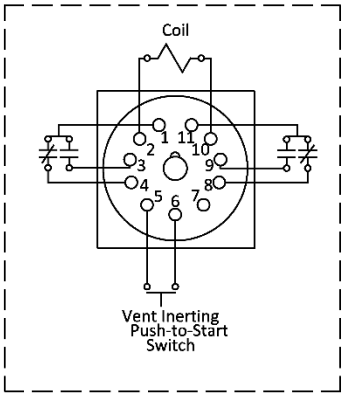


INERTING BYPASS SIGNAL WIRING DIAGRAM

Dry SMART Vent (E)

220-240 VAC, 50 HZ, Single Phase
1 Amp





ADJUSTABLE TIMER

WIRING LEGEND:

AC WIRING 16 AWG. AFTER FUSE
GROUND GREEN
BOND DOORS
USE TERMINAL BLOCKS AS REQUIRED

WIRING COLOR LEGEND:

BL	BLACK
WH	WHITE
GR	GREEN
OR	ORANGE
Y	YELLOW

NOTES:

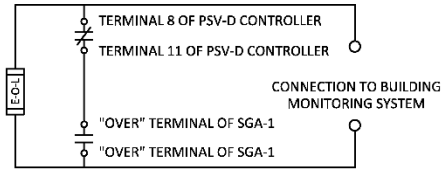
TIMER COIL RATED AT 24 VDC, 1.7 W
LEDs RATED AT 24 VDC
SOLENOID ON PSV-DE RATED AT 24 VDC, 10 W
ON/OFF POWER SWITCH LED RATED AT 24 VDC
ON/OFF POWER SWITCH RATED AT 600 VAC

TIMER PROGRAMMING:

1. SET MODE TO "E"
2. SET SCALE TO "20, 30, 40, 50, 60"
3. SET RANGE TO "10H"
4. ROTATE KNOB TO "35"

NOTE - WHEN PSV-D IS USED INCONJUNCTION WITH SGA-1

1. CONNECT TERMINALS 8 & 11 TO OUTPUT SIGNAL OF SMART GAS ANALYZER (SGA-1) TO BYPASS THE LOW PURITY ALARM SIGNAL DURING THE 14 DAY NITROGEN INERTING PROCESS. (SEE INERTING BYPASS WIRING DIAGRAM)



INERTING BYPASS SIGNAL WIRING DIAGRAM

INSPECTION, TESTING, AND MAINTENANCE REPORT

Customer		Date	
Address		Inspector	
City		Customer No.	
State		Contract No.	
ZIP		Inspection No.	

Only qualified personnel can perform inspection, testing and maintenance of the nitrogen generation equipment. Prior to any system maintenance on the nitrogen generation system, ensure that the nitrogen generator is isolated from the compressed air supply and all system risers. Ensure that the nitrogen generation system and the associated piping that is to be manipulated is completely depressurized prior to performing any maintenance. Failure to do so can result in system damage and/or personal injury.

Sprinkler System Information			psig (bar)	Verified
Qty of Systems		AMD Set Pressure		
AMD Manufacturer		Low Air Alarm Pressure		
AMD Model No.		System Trip Pressure		

Nitrogen Generator Air Compressor Information		Cut-In psig (bar)	Cut-Out psig (bar)	Verified
Manufacturer				
Model No.				
Serial No.				

Existing/Backup Air Compressor Information		Cut-In psig (bar)	Cut-Out psig (bar)	Verified
Manufacturer				
Model No.				
Serial No				

Nitrogen Generator Information		Cut-In psig (bar)	Cut-Out psig (bar)	Verified
Manufacturer				
Model No.				
Serial No.				

Air Compressor: Quarterly Maintenance	Hours	Verified
Verify run time (hours) on air compressor: *Use nitrogen generator hours*		
Verify compressor is turning on/off at low/high pressure		
Verify pressure gauges are in working order: *Replace as necessary*		
Verify all manual valves fully open and close: *Repair/replace as necessary*		
Verify all manual valves operate smooth-clean and un-corroded: *Repair/replace as necessary*		
Check air compressor filter(s): *Clean or replace as necessary*		
Check electrical connections in control box and pressure switch: *Repair as necessary*		
Check air compressor and supply piping for leaks: *Repair as necessary*		
Air Compressor: Splash Lubricated		
Check drive belt and drive belt tension: *Repair/replace as necessary*		
Replace crankcase oil: *3-months or 500 hours, whichever comes first*		
Air Compressor: Oil-Less		
Rebuild compressor cylinders: *5,000 hours*		

Nitrogen Generator: Quarterly Maintenance	Hours	Cycles	Verified
Verify run time (hours) on nitrogen generator			
Verify cycle count on nitrogen generator			
Verify nitrogen generator is turning on/off at low/high pressure			
Verify pressure gauges are in working order: *Replace as necessary*			
Verify all manual valves fully open and close: *Repair/replace as necessary*			
Verify all manual valves operate smooth-clean and un-corroded: *Repair/replace as necessary*			
Check coalescing filters: *Replace filters as necessary*			
Check electrical connections in cabinet, control box and pressure switch: *Repair as necessary*			
Verify correct nitrogen purity level out of cabinet sampling port	Nitrogen Purity:		
Verify nitrogen production level through cabinet flow meter	SCFH:		
Check nitrogen generator and supply piping for leaks (repair as necessary)			
Nitrogen Generator: Annual Maintenance	Hours	Cycles	Verified
Verify run time (hours) on nitrogen generator			
Verify cycle count on nitrogen generator			
Verify nitrogen generator is turning on/off at low/high pressure			
Verify pressure gauges are in working order: *Replace as necessary*			
Verify all manual valves fully open and close: *Repair/replace as necessary*			
Verify all manual valves operate smooth-clean and un-corroded: *Repair/replace as necessary*			
Replace coalescing filters			
Check electrical connections in cabinet, control box and pressure switch: *Repair as necessary*			
Verify correct nitrogen purity level out of cabinet sampling port	Nitrogen Purity:		
Verify nitrogen production level through cabinet flow meter	SCFH:		
Check nitrogen generator and supply piping for leaks: *Repair as necessary*			
Oxygen Removal Vents: Annual Maintenance			Verified
Inspect Y-Strainer for dirt and debris: *Clean as necessary*			
Insect vent filter dirt and debris: *Clean/replace as necessary*			
Verify pressure regulator and gauges are in working order: *Replace as necessary*			
Verify the pressure regulator closes at determined set pressure: *Repair/replace as necessary*			
Verify all manual valves fully open and close: *Repair/replace as necessary*			
Verify all manual valves operate smooth-clean and un-corroded: *Repair/replace as necessary*			
Check electrical connections in cabinet and solenoid (SMART Vent): *Repair as necessary*			
Verify correct nitrogen purity level out of vent sampling port	Nitrogen Purity:		
Check vent and piping for leaks: *Repair as necessary*			
Corrosion Monitoring: Quarterly Maintenance			Verified
Verify corrosion detector has not activated: *Replace probe/detector as necessary*			
Verify remote test station batteries operational: *Replace as necessary*			
Verify all manual valves fully open and close: *Repair/replace as necessary*			
Verify all manual valves operate smooth-clean and un-corroded: *Repair/replace as necessary*			
Check electrical connections on corrosion detector pressure switch and monitoring equipment			
Check corrosion monitor and piping for leaks: *Repair as necessary*			
Permanent Gas Analyzer/Vent Controller: Annual Maintenance			Verified
Verify correct nitrogen purity level displayed on Gas Analyzer	Nitrogen Purity:		
Compare sprinkler system pressure to Vent Controller pressure displayed	Pressure: psig (bar)		
Check electrical connections in control cabinet: *Repair as necessary*			
Check nitrogen sampling tubing for leaks: *Repair as necessary*			

Miscellaneous

ORDER FORM

PART #	REPLACEMENT CORROSION PRODUCTS	QUANTITY
Wall Mount Nitrogen Generator System (AG-675/950/2000/3500)		
FKWM-FS	Filter Maintenance Kit, Wall Mount: Annual	
Stand Alone Nitrogen Generator System (AG-6500/11000/18500/25000)		
FKSA-FS	Filter Maintenance Kit, Stand Alone: Annual	
Oxygen Removal Vents (PAV-D/DQ and PSV-D/DE)		
PV-DRF	Oxygen Removal Vent Filter	
Handheld Gas Analyzer		
PHGA-1	Portable Handheld Gas Analyzer	
Inline Corrosion Detector		
ILD-X	Inline Corrosion Detector	Pipe sch. - Pipe size -

For additional information about ECS products and services, please visit our website at www.ecscorrosion.com.

SYSTEM SUMMARY

Existing Air Compressor			Cut-In	Cut-Out	Gen.	30-Min.
Manufacturer	Model Number	Serial Number	psig (bar)	psig (bar)	Backup	Fill

New Air Compressor			Cut-In	Cut-Out
Manufacturer	Model Number	Serial Number	psig (bar)	psig (bar)

Air Maintenance Device (AMD)		Pressure		**Sprinkler System**	Pressure
Manufacturer	Model Number	psig (bar)			psig (bar)
				Trip Pressure	
				Low Air Alarm	
				High Alarm	

Nitrogen Generator		Cut-In	Cut-Out
Model Number	Serial Number	psig (bar)	psig (bar)

Oxygen Removal Vent	Vent	Control Panel	Orifice
Model Number	Serial Number	Serial Number	
Vent Pressure Regulator: psig (bar)			

Engineered Corrosion Solutions

Complete Corrosion Control.

ECS Website QR Code

ECS Commissioning Video QR Code

CONTACT US

- Contact ECS for 24/7 engineering and technical support **(314) 432-1377**
- Office business hours: Monday thru Friday, 8 AM - 5 PM (central time zone)
- Technical information available online or email info@ecscorrosion.com
- Website: www.ecscorrosion.com