

Furnish and install a nitrogen-based sprinkler corrosion inhibiting system for replacing the air in the preaction / dry sprinkler system piping with 98% dry nitrogen at the required supervisory pressure. The system shall be supplied by UNITED Fire Systems, Kenilworth New Jersey, 908-688-0300 and referred to as NITROGEN-PAC™ SC Series.

**1. COMPONENTS.** The system shall consist of the following components:

1.1 Self-Contained System Assembly. A self-contained, factory-assembled system assembly for delivering 98% dry nitrogen shall be provided. All parts of the self-contained system assembly shall work together as a system. The assembly shall be properly sized to deliver the proper volume of fast-fill air and 98% nitrogen to the preaction and / or dry-pipe sprinkler system(s) to be protected. The self-contained system shall be UNITED Fire Systems NITROGEN-PAC™ SC Series or approved equal. The self-contained system shall consist of the following parts:

1.1.1 Compressor. The compressor shall be a single unit equipped with an oilless pump, electric motor, and start capacitor. The compressor shall be factory-assembled to the self-contained system assembly. The compressor shall use single-phase 115 VAC power.

1.1.2 Refrigerated Dryer. A refrigerated dryer shall be supplied to remove condensation moisture from the air supplied by the compressor. Systems using only an aftercooler shall not be acceptable. The refrigerated dryer shall be factory-assembled to the self-contained system assembly. The dryer shall produce air with a +40 degree Fahrenheit dew point at the maximum SCFM operating mode of the compressor. The dryer shall be based on motor-driven evaporative cooling, with moisture removed through a separator and automatic condensate drain. A heat exchanger shall re-warm the cooled, dry air. The refrigerant shall be R-134A or other zero-ozone-depletion refrigerant.

1.1.3 Nitrogen Generator Cabinet. The system nitrogen generator cabinet shall produce minimum 98% nitrogen using membrane separator technology. The cabinet shall be factory-assembled to the self-contained system assembly. The membrane shall be sized to produce sufficient 98% purity nitrogen generation rate in SCFM to maintain 98% nitrogen within the sprinkler system piping. The cabinet shall be equipped with a two-stage (particulate and coalescing) filtration system that protects the nitrogen separator membrane to facilitate long service life. The cabinet shall be equipped with valves to facilitate bypassing the nitrogen generation components, allowing fast-fill (30 minute maximum) of the sprinkler piping with air, as required by NFPA 13. The cabinet shall also contain a metering valve, two (2) pressure gauges, a drain valve and all required connections for testing and maintenance. The cabinet shall be a heavy-gage sheet metal enclosure with hinged locking door.

1.1.4 Nitrogen Receiver. The system shall be equipped with a nitrogen receiver with a capacity of 22 gallons. The nitrogen receiver shall be ASME code compliant, and shall be equipped with a safety relief valve. The receiver shall be factory-assembled to the self-contained system assembly.

1.1.5 Control Cabinet. A control cabinet shall be part of the self-contained system assembly. User access to the interior of the cabinet shall be restricted by using screws to fasten the cover to the control cabinet. The cover of the control cabinet shall have a digital runtime monitor displaying, in hours and minutes, the cumulative run time of the compressor motor. The cover shall also have two (2) visual indicators: one (1) red indicating the system is in bypass (providing air) mode, and one (1) green indicating the system is in normal (providing nitrogen) mode.

1.2 Purge Vent Assembly. The sprinkler system piping shall be equipped with at least one purge vent assembly. The purge vent assembly shall be equipped with a manually-operated isolation ball valve, strainer, float valve, restriction orifice, and nitrogen purity analyzer port. The purge vent assembly shall permit purging of the sprinkler system piping per manufacturer recommendations, and monitoring of the nitrogen purity within the piping. At least one (1) purge vent assembly shall be provided per sprinkler system riser. The purge vent assembly shall be a UNITED Fire Systems Model PVA-3 or approved equal.

1.3 Nitrogen Purity Analyzer. The system shall be supplied with a hand-held portable battery-operated nitrogen purity analyzer. The analyzer shall have a digital display, showing the nitrogen purity in percent to one decimal place, or 1/10 of 1 percent. Flexible tubing shall connect the body of the analyzer to a female quick-connect fitting, compatible with the male quick-connect fittings located in the nitrogen generator cabinet and each purge vent assembly. Proper performance of the nitrogen generation system shall be established with readings taken with the analyzer. The nitrogen purity analyzer shall be a UNITED Fire Systems Model NA-1, or approved equal.

1.4 Air Maintenance Device. Each sprinkler riser shall be equipped with an air maintenance device, to properly regulate the nitrogen and air pressure to suit the valve installed in the riser. The device shall be equipped with an adjustable regulator, adjusted at system commissioning to the pressure required by the preaction / dry sprinkler valve. The device shall also be equipped with bypass valving for fast-fill in 30 minutes or less as required by NFPA 13. The air maintenance device shall be a UNITED Fire Systems Model AMD-1, or approved equal.

**2. SYSTEM SIZING.**

2.1 The project submittal shall include the sprinkler system size (in gallons) and a calculation to substantiate system size selection. The system sizing calculation shall take into account the volume of all piping networks, the largest single piping network, the system piping allowable leakage rate permitted by NFPA 13, and the purging sequence that establishes and maintains 98% nitrogen throughout the piping network.

2.2 The system assembly shall be sized to have sufficient capacity (in SCFM) to provide sufficient nitrogen generation rate to maintain minimum 98% nitrogen concentration throughout the sprinkler piping network. In addition, the device shall be sized to comply with the maximum 30 minute fast-fill with air requirement (from NFPA 13) into the largest sprinkler riser connected to the system.

3. SUBMITTALS. The following items shall be submitted for approval by the Engineer for acceptance before installation.

3.1 Manufacturer data sheets of each component, showing dimensions, mounting details, weight, voltage and current requirements, and manufacturer part number.

3.2 The system sizing calculation required in Section 2 of this specification.

3.3 Normal pressure values (in PSIG) to be expected on all system pressure gages.

3.4 Shop drawings of the intended installation, showing system location, installation details, and system normal adjustment values.

4. COMMISSIONING. The system shall be commissioned by a representative from the manufacturer, or a representative from the installing contractor trained by the manufacturer. The Engineer, at his / her option, may observe the commissioning process. The process shall include at least the following steps.

4.1 Verify that all aspects of the installation have been completed, including mechanical interconnection and electrical power installation.

4.2 Perform fast-fill of each sprinkler piping network with air from the compressor with nitrogen system in bypass mode. Each network shall fill in 30 minutes or less. Examine each piping network for excessive leakage. If any network fails to fill in 30 minutes, or excessive leakage is found, the contractor shall correct the leaks before proceeding.

4.3 Restore all valves to normal (not fast-fill or bypass) status.

4.4 Adjust the regulators on each air maintenance device to indicate the normal value (from the shop drawings) on the pressure gages.

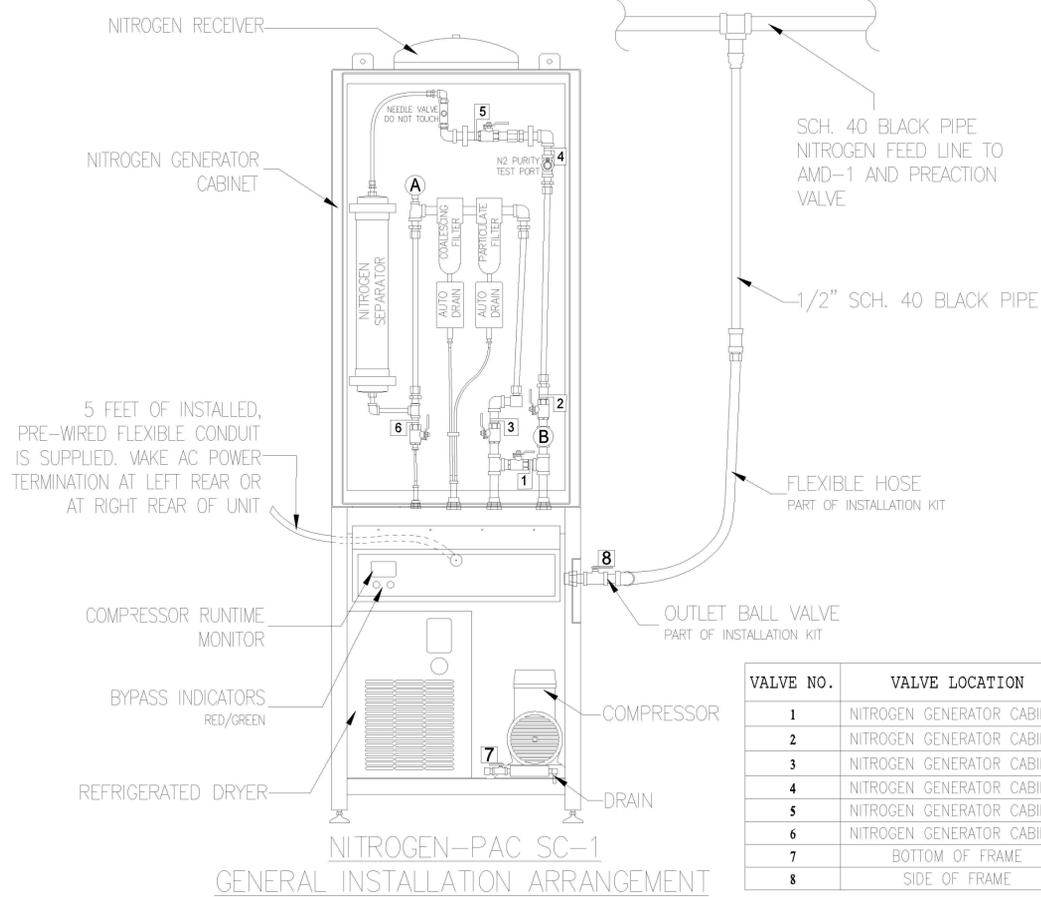
4.5 Open the valves on each purge vent assembly to purge each sprinkler piping network in a pre-determined sequence.

4.6 Record the values shown on each pressure gage, including:  
• Two (2) gages in nitrogen generator cabinet (upstream and downstream of separator membrane),  
• Gage(s) indicating pressure at each air maintenance device.

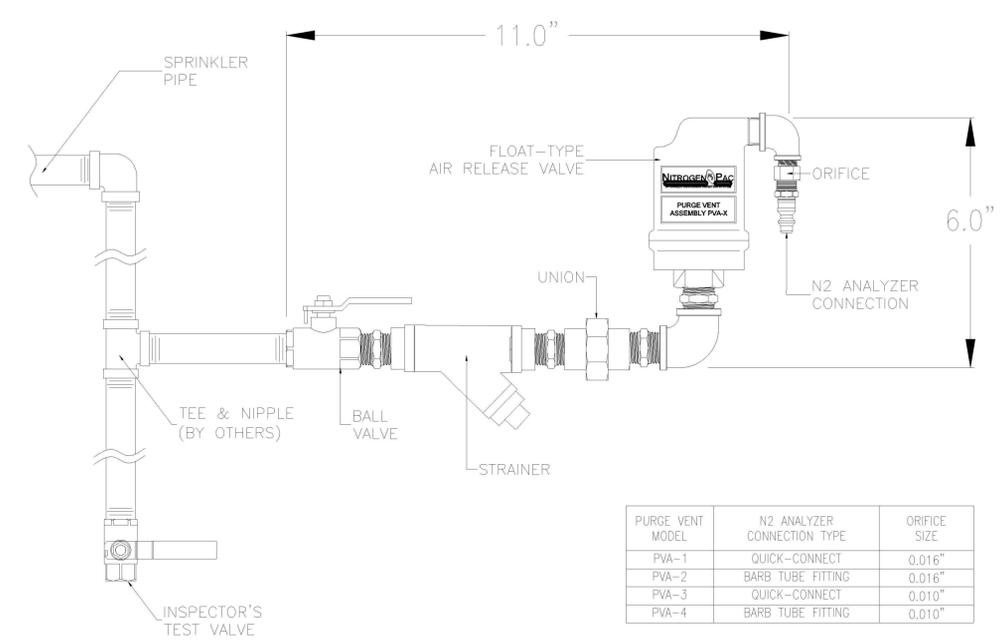
4.7 Use the N2 purity analyzer to verify that sprinkler piping network(s) with open purge valve assemblies are beginning to register a rise in nitrogen purity.

4.8 The contractor shall return at regular, agreed-to intervals to continue the purging process until all sprinkler piping networks register at least 98% nitrogen purity at all purge vent assemblies.

4.9 Submit a final commissioning report, including as-built shop drawings, gage readings as indicated in this specification, and written verification of 98% or more nitrogen purity at each purge valve assembly.

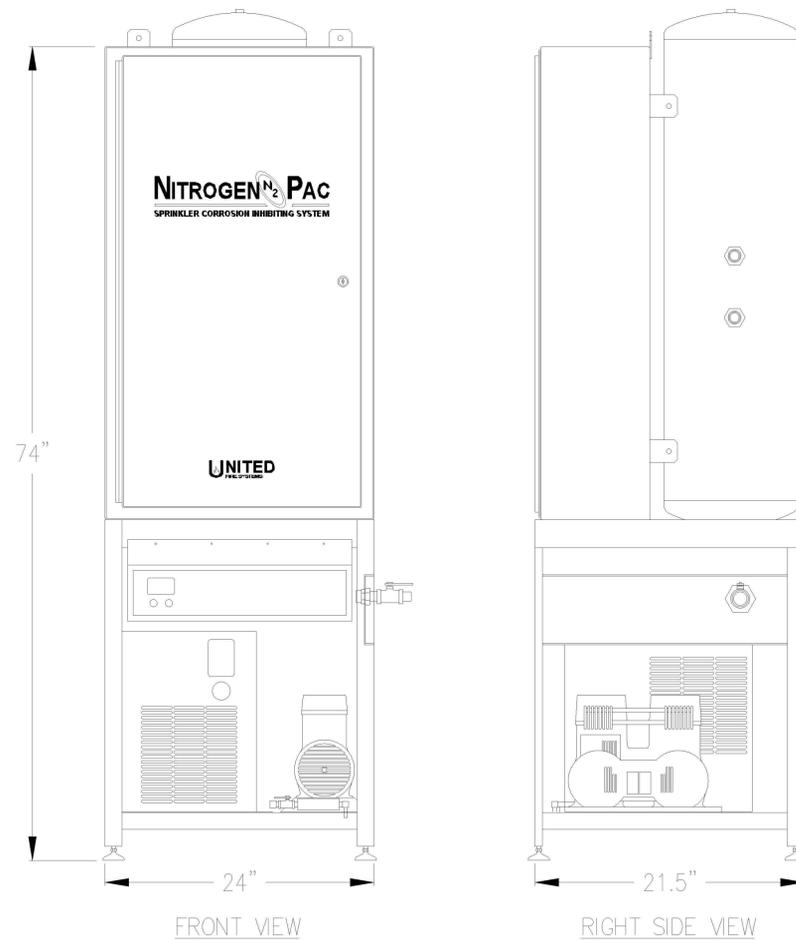


VALVE NO.	VALVE LOCATION	VALVE PURPOSE
1	NITROGEN GENERATOR CABINET	BYPASS
2	NITROGEN GENERATOR CABINET	NITROGEN ISOLATION
3	NITROGEN GENERATOR CABINET	INLET/NITROGEN ISOLATION
4	NITROGEN GENERATOR CABINET	N2 PURITY TEST PORT
5	NITROGEN GENERATOR CABINET	SHUTOFF
6	NITROGEN GENERATOR CABINET	GENERATOR VENT
7	BOTTOM OF FRAME	NITROGEN RECEIVER DRAIN
8	SIDE OF FRAME	OUTLET

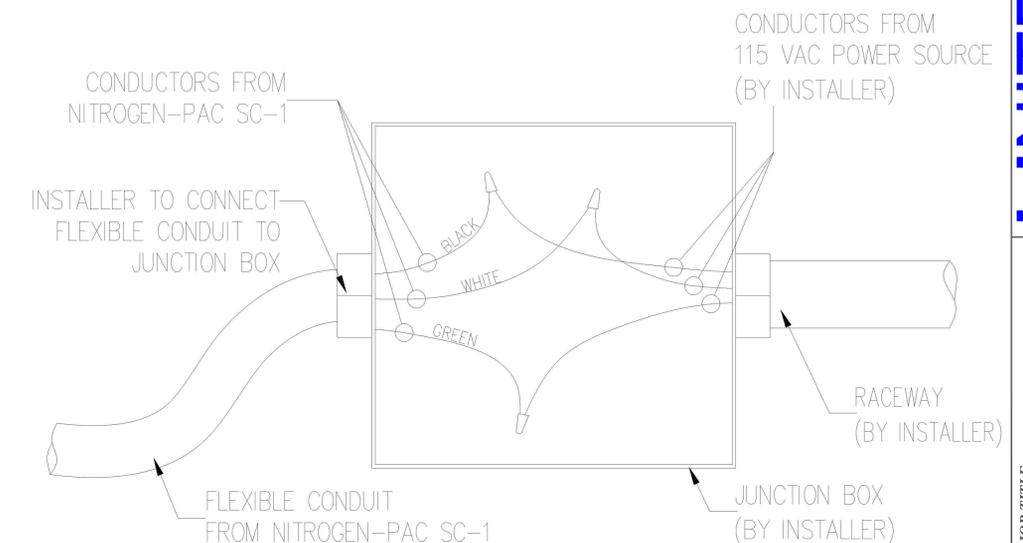


PURGE VENT MODEL	N2 ANALYZER CONNECTION TYPE	ORIFICE SIZE
PVA-1	QUICK-CONNECT	0.016"
PVA-2	BARB TUBE FITTING	0.016"
PVA-3	QUICK-CONNECT	0.010"
PVA-4	BARB TUBE FITTING	0.010"

PURGE VENT ASSEMBLY - MODEL PVA-X  
DIMENSIONS AND INSTALLATION



DIMENSIONS



WIRING DIAGRAM

REV.	DATE	DESCRIPTION
1.01	30 SEP 2015	RELEASED
1.02	28 OCT 2015	REVISED LINE WEIGHT
2.00	01 MAR 2016	UPDATED DESIGN, REVISED TABLE, REVISED ILLUSTRATIONS
2.01	22 MAR 2016	REVISED LINE NUMBERS ON ILLUSTRATION
2.02	21 APR 2016	REVISED PVA MODEL & ILLUSTRATION

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**JOB TITLE**  
SPECIFICATION & DETAILS  
NITROGEN-PAC SC-1 SERIES  
SELF-CONTAINED SPRINKLER CORROSION INHIBITING SYSTEM  
UNITED FIRE SYSTEMS

SCALE	AS NOTED
DRAWN BY	JG
DESIGNED BY	JG
CHECKED BY	SJS
SYSTEM TYPE	NITROGEN-PAC
DATE	30 SEP 2015
SHEET	1 OF 1