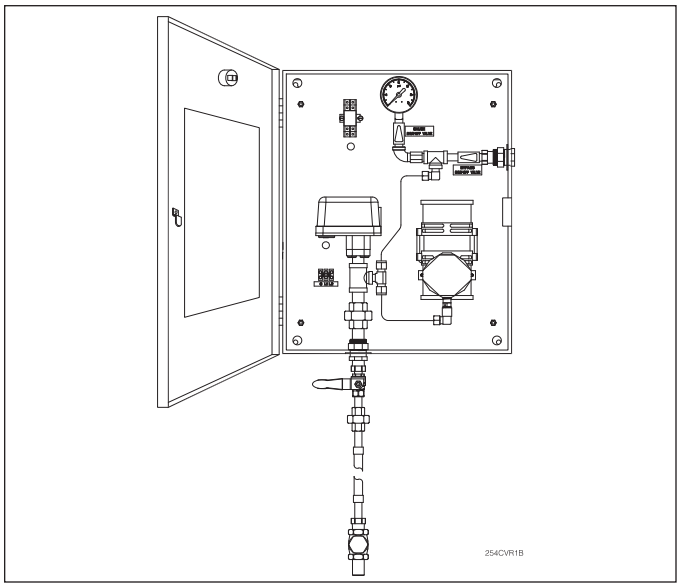
Bulletin 254 Rev. B

Air/Nitrogen Automatic Pressure Maintenance Devices

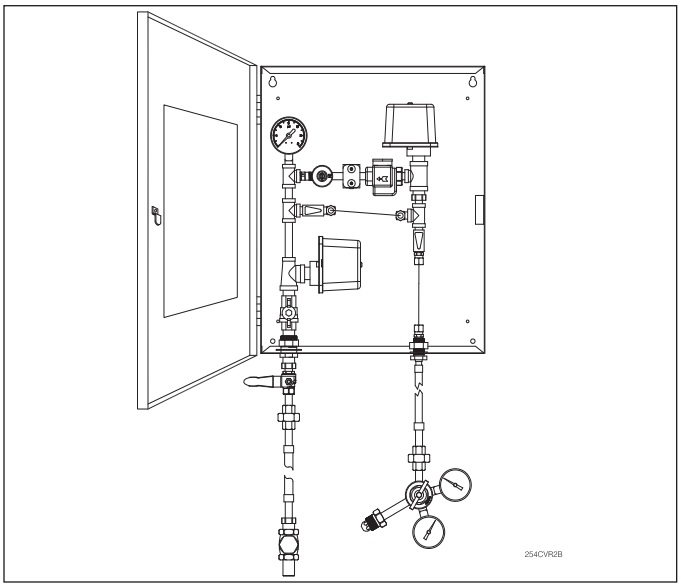
Supervisory Pressure Maintenance Equipment

General

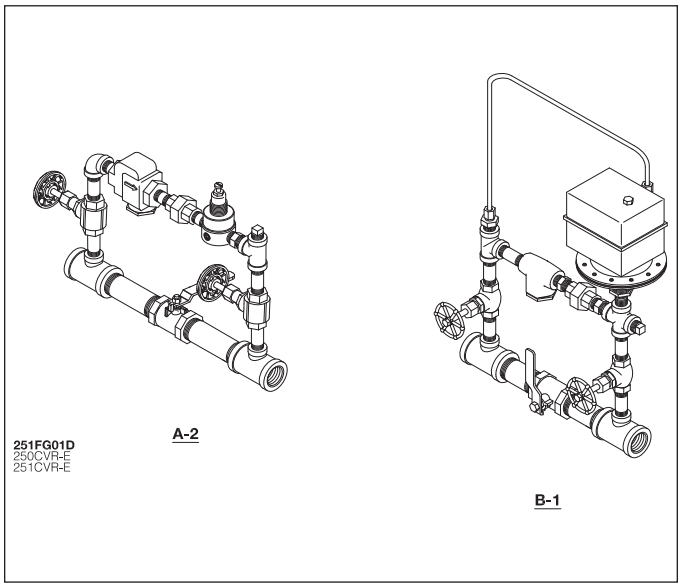
Reliable pressure maintenance devices are used to automatically supply or maintain the correct pressure in dry pipe valve, preaction systems, and in dry pilot lines for deluge systems. When installed in these systems, they eliminate the need for manual filling to overcome small leaks or temperature changes. Reliable pressure maintenance devices do not interfere with the prompt operation of dry pipe valves and deluge valves including when used with quick opening devices.



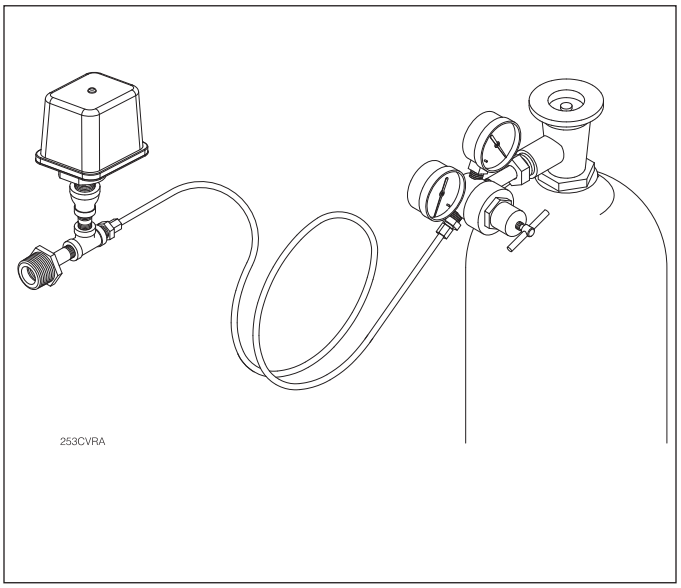
Model B-SI (120 VAC) & C-SI (220 VAC) Air Compressor Panel



Model NS-PaK



Model A2 & B1 Air Maintenance Device



Nitrogen Device Regulator

Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

Model B-SI (120 VAC) P/N 6702010003 and Model C-SI (220 VAC) P/N 6702020003 Air Compressor Panels

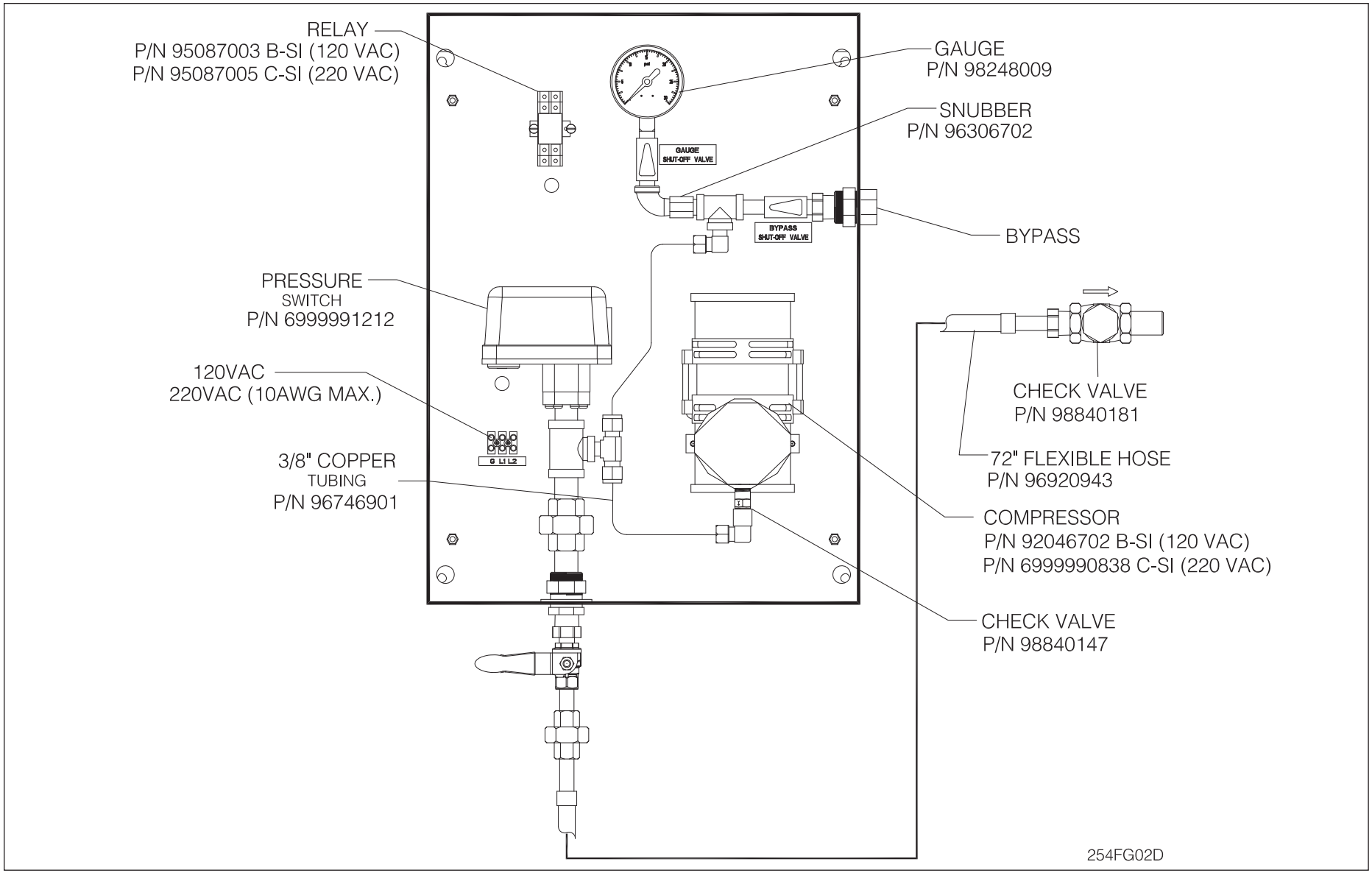


Fig. 1

Features

1. Self contained air supply.
2. System low air indicator.
3. Relay for remote signal of low air and/or power.
4. Bypass valve incorporated for quick filling system.
5. Cabinet with Keyhole slot for easy wall mounting.
6. Stainless steel flexible hose for system connection.

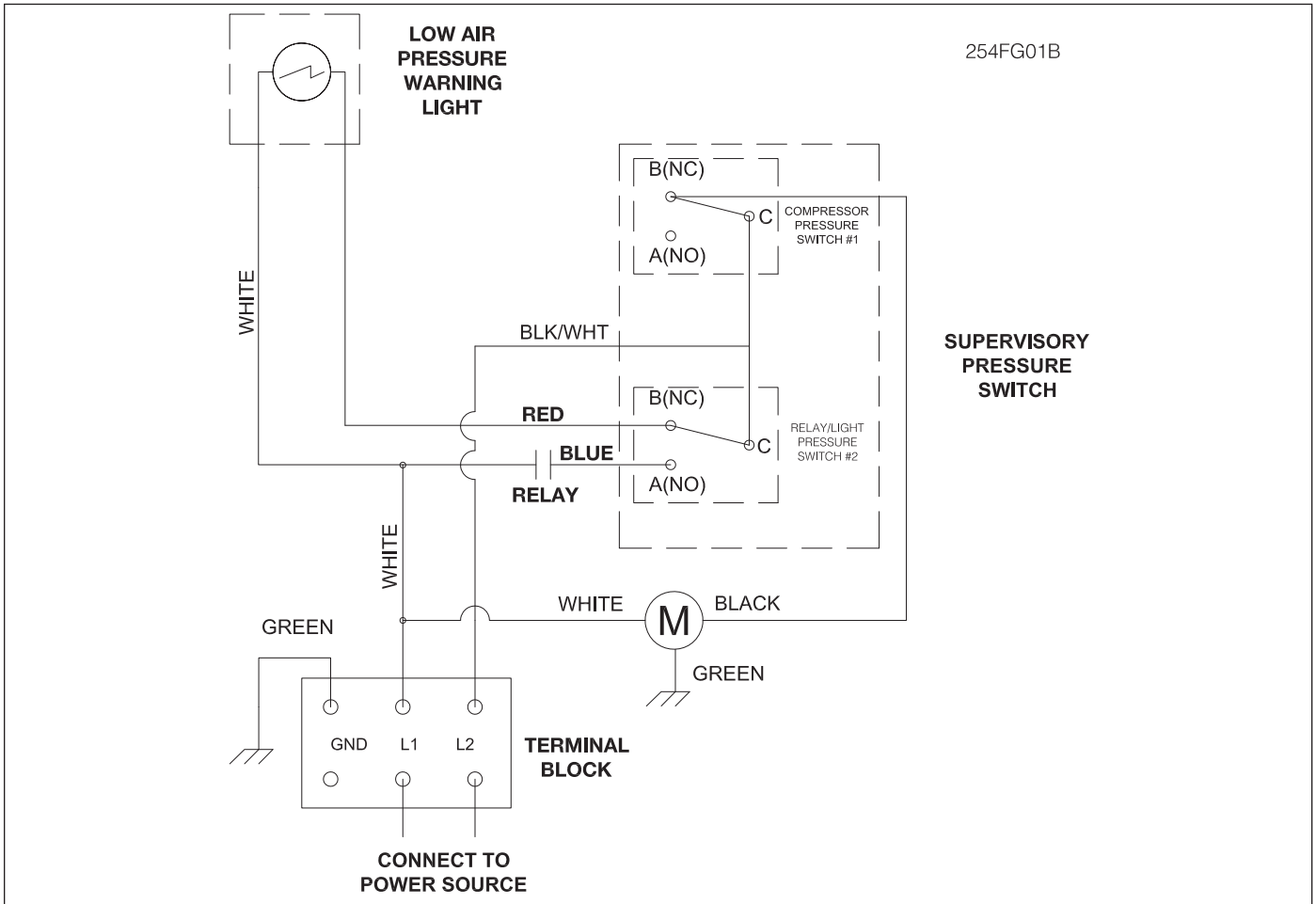
Listings and Approvals

1. Listed by Underwriters Laboratories, Inc. (UL)
2. Listed by Underwriters' Laboratories of Canada. (ULC)
3. Certified by FM Approvals.

Reliable air compressor panels provide self-contained supervisory air supplies for single interlock preaction systems. The air source of the **Model B-SI is a 120 VAC**, 1/16 HP Gast air compressor while the **Model C-SI is equipped with a 220 VAC**, 1/16 HP Gast air compressor. A Potter EPS10-2 pressure switch monitors the system air pressure. Approximately 7 psi (0.48 bar) of air will keep the pressure switch contact open and therefore the air compressor off. A drop of approximately 2 psi (0.14 bar) will switch the contact to closed position; the compressor will turn on to replace the air in the system (in case of a small leak). If the pressure drops approximately 3 psi (0.21 bar) the low air signal will activate. A relay provides dry contacts for remote signal of low air pressure and/or loss of power.

An stainless steel hose assemble provide flexibility to connect the Model B-SI & C-SI air compressor to the system. This hose assembly consist of a ¼" cut off valve, ¼" by 72" stainless steel hose, ¼" x ½" bushing and ½" check valve. This 1/2" NPT check valve must be installed **horizontally** at the open port of the ½" x ¼" x ½" tee provided for air supply in all Reliable Single Interlock Preaction Systems (**Ref. Fig. 5**). When installing the Reliable Air Compressor Panels to a Reliable Model H Single Interlock Preaction System the ½" check valve must be installed **horizontally** on the sprinkler piping above the riser check valve. The Reliable Model G Right-Check™ Riser Valve, which does not require priming water, has a convenient ½" NPT port that may be used for this connection (**Ref. Fig. 6**).

The Model B-SI or Model C-SI Air Compressor Panel is designed with keyhole slots for ease of wall mounting. A quick-fill bypass connection outside the enclosure was added to reduce setup time after installation.



WIRING DIAGRAM

Fig. 2

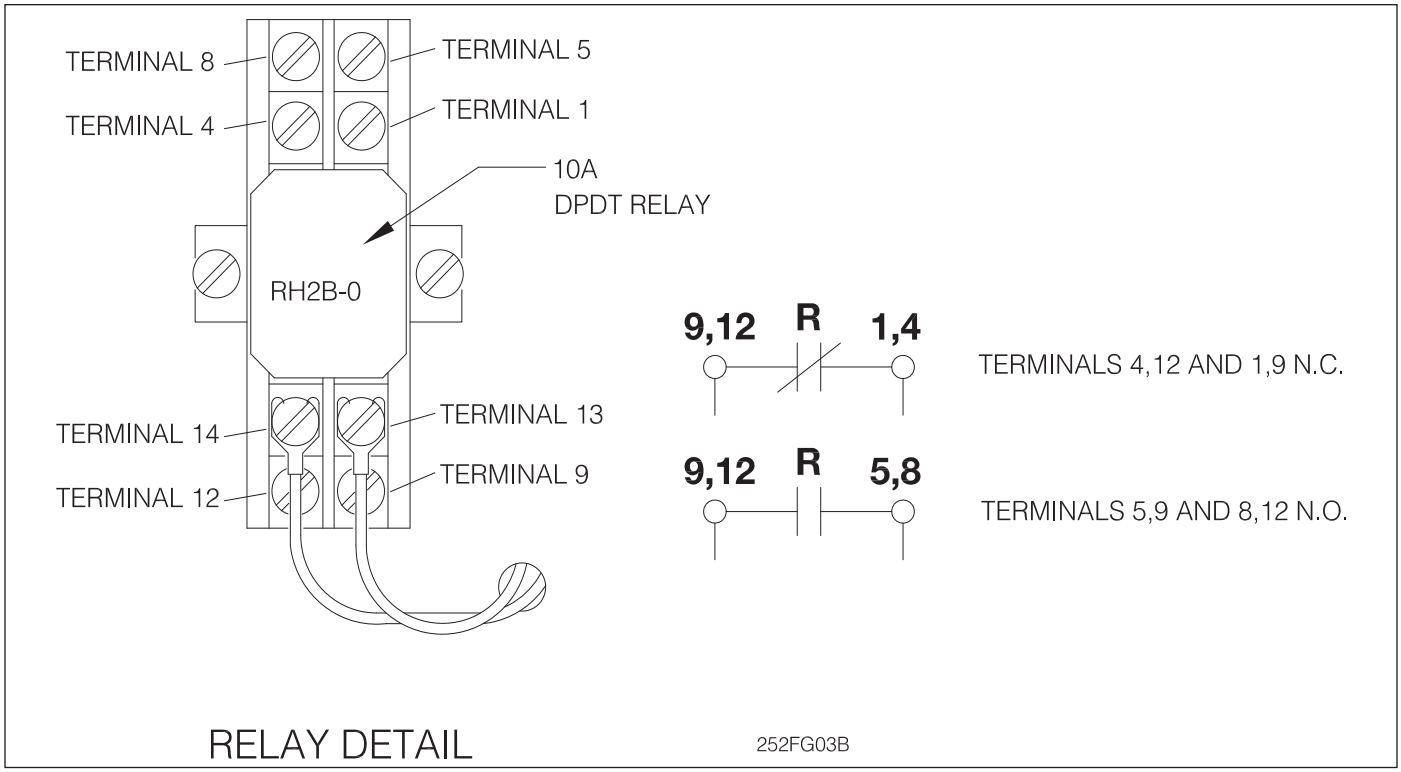


Fig. 3

Caution: The pressure gauge shut-off valve must be closed before operation of quick-fill bypass. The bypass pressure must not exceed 25 psi.

Design Considerations

The Reliable model B-SI and C-SI air compressor panels are designed to provide and supervise the air pressure required for single interlock preaction sprinkler systems. 200 gallons system can be filled within 35 minutes. Because there is no fill time requirement for the SI systems, the bypass can provide a quicker fill for larger systems. **Note:** The Reliable Dry Pilot Single Interlock Preaction system may require up to 26 psi system air pressure, therefore the model B-SI and C-SI are not to be used with these systems. The Reliable NS-PaK and the Model A2 Air maintenance device may be used with Dry Pilot Single Interlock Preaction systems.

Table 1

Factory Settings	Approximate Switch Transfer Pressure psi (bar)	
	Increasing Pressure	Decreasing Pressure
Compressor Pressure Switch # 1	7 (0.48)	5 (0.34)
Low Pressure light Pressure Switch #2	5 (0.34)	4 (0.27)

Model B-SI Air Compressor Panel (P/N 6702010003) (120 VAC)

Model C-SI Air Compressor Panel (P/N 6702020003) (220 VAC)

Panel Dim. W x H x D	Mounting Dim. W x H	Shipping Weight	Approvals
16" x 20" x 6" (406mm x 508mm x 152mm)	14¼" x 18¼" ø ¼" Holes (4) (362mm x 464mm)	27lbs. (12.2 kg.)	UL Listed FM Approved

NS-Pak

Features

1. Designed as a nitrogen supply regulator and supervisory for all Reliable Preaction Systems.
2. Monitors high (inlet) and low (system) pressure.
3. Shut-off valves permit servicing without shutting down sprinkler protection.
4. Bypass valve incorporated for quick filling system.
5. Cabinet with Keyhole slot for easy wall mounting.
6. Stainless steel flexible hose for system connection.

Listings and Approvals

1. Listed by Underwriters Laboratories, Inc. (UL)
2. Listed by Underwriters' Laboratories of Canada. (ULC)
3. Certified by FM Approvals.

The Reliable NS-PaK is design to provide and supervise nitrogen pressure in the Reliable Preaction and Dry Pipe systems. The nitrogen supply is obtained from a high pressure nitrogen cylinder, sold separately.

The NS-PaK includes a single stage pressure regulator equipped with a high pressure inlet and low pressure outlet gauges.

As the nitrogen is gradually depleted and the pressure inside the cylinder drops, the low pressure regulated output remains stable. Connected to the regulator is a braided hose with connector and adapter for a flexible and direct connection to the high and low supervisory pressure

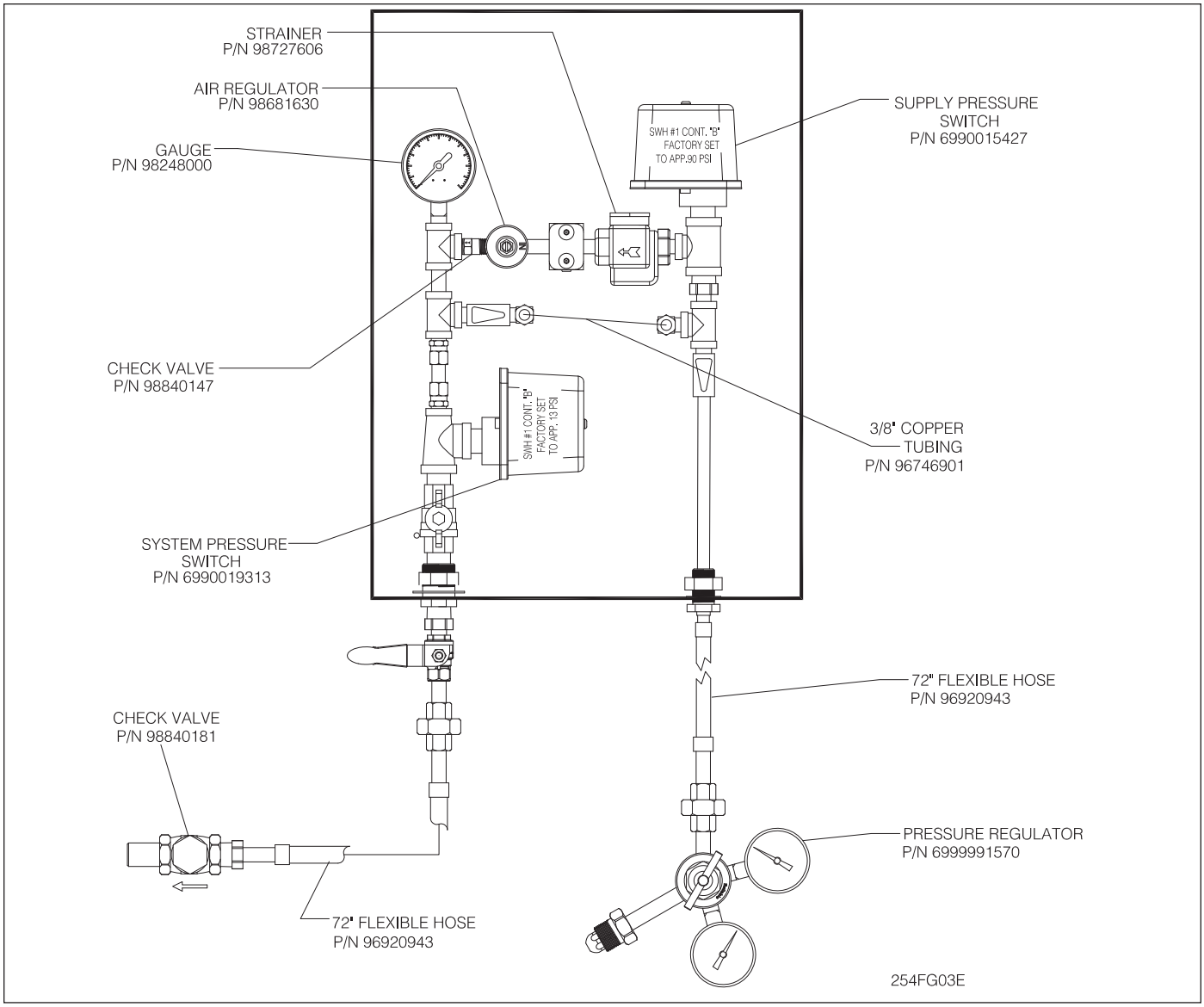


Fig. 4

switches and the system supply regulator assembly. The high pressure supervisory switch (PS100-2) monitor the regulated pressure coming out of the nitrogen cylinders, the low pressure supervisory switch (PS25-2) monitor the system supply pressure. Together with the supervisory pressure switches and regulator a quick by pass segment is incorporated on the NS-PaK to reduce set up time.

The Reliable Nitrogen Supply Pak (NS-PaK) assembly is conveniently presented in a 16" x 20" x 6"(406mm x 508mm x 152mm) enclosure with keyhole slots for ease of wall mounting.

An stainless steel hose assemble provide flexibility to connect the Model B-SI & C-SI air compressor to the system. This hose assembly consist of a ¼" cut off valve, ¼" x 72" stainless steel hose, ¼" x ½" bushing and ½" check valve. This 1/2" NPT check valve must be installed **horizontally** at the open port provided in all the Reliable Preaction and Dry Pipe systems (**Ref. Fig. 5**).

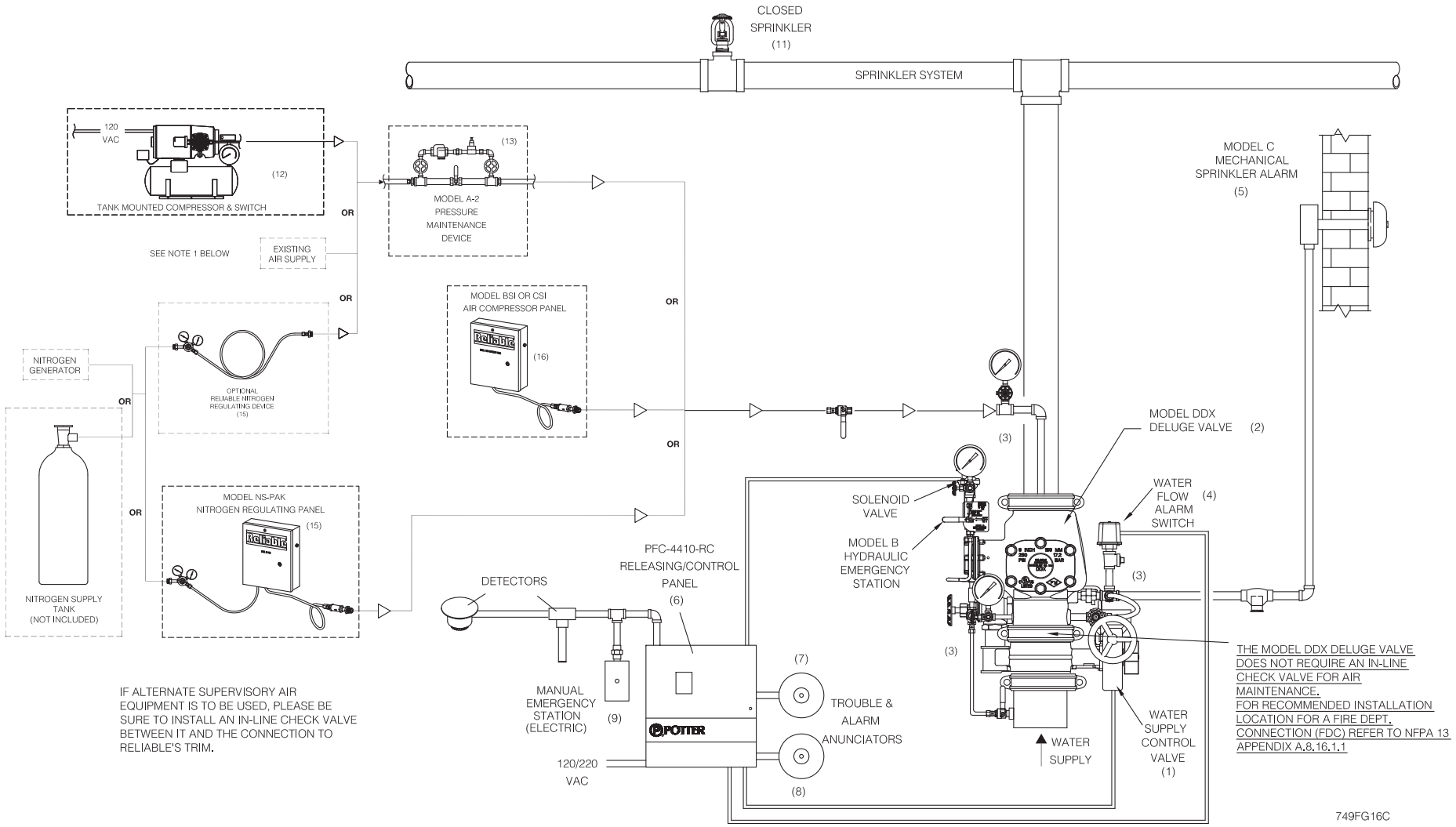
Technical Data

The Reliable NS-PaK consists of components shown in Fig. 4

The single stage high pressure regulator, made of brass, has a 200-4000 psi cylinder pressure gauge and a 10-200 psi outlet pressure gauge. A braided hose allows flexibility connecting the regulator to the main assembly. The low pressure regulator, made of brass, has a adjustable range of 5 to 100 psi and a maximum inlet pressure of 250 psi. The low pressure switch is a Potter PS25-2 (Potter Bulletin 5401564). The high pressure switch is a Potter PS100-2 (Potter Bulletin 5400932).

The high pressure nitrogen cylinder can typically be rented from a local source, with rental fees varying by supplier and cylinder sizes. Typical cylinders are:

ELECTRIC ACTUATUON SINGLE INTERLOCK PREACTION SYSTEM COMPONENTS



NOTE 1: THIS DRAWING DEPICTS THE RECOMMENDED PNEUMATIC SUPPLY SYSTEMS THAT WILL OPTIMIZE SYSTEM PERFORMANCE, BUT IS NOT INTENDED TO PROHIBIT ANY SUPPLY ARRANGEMENT(S) CURRENTLY MEETING THE REQUIREMENTS OF NFPA 13.

Fig. 5

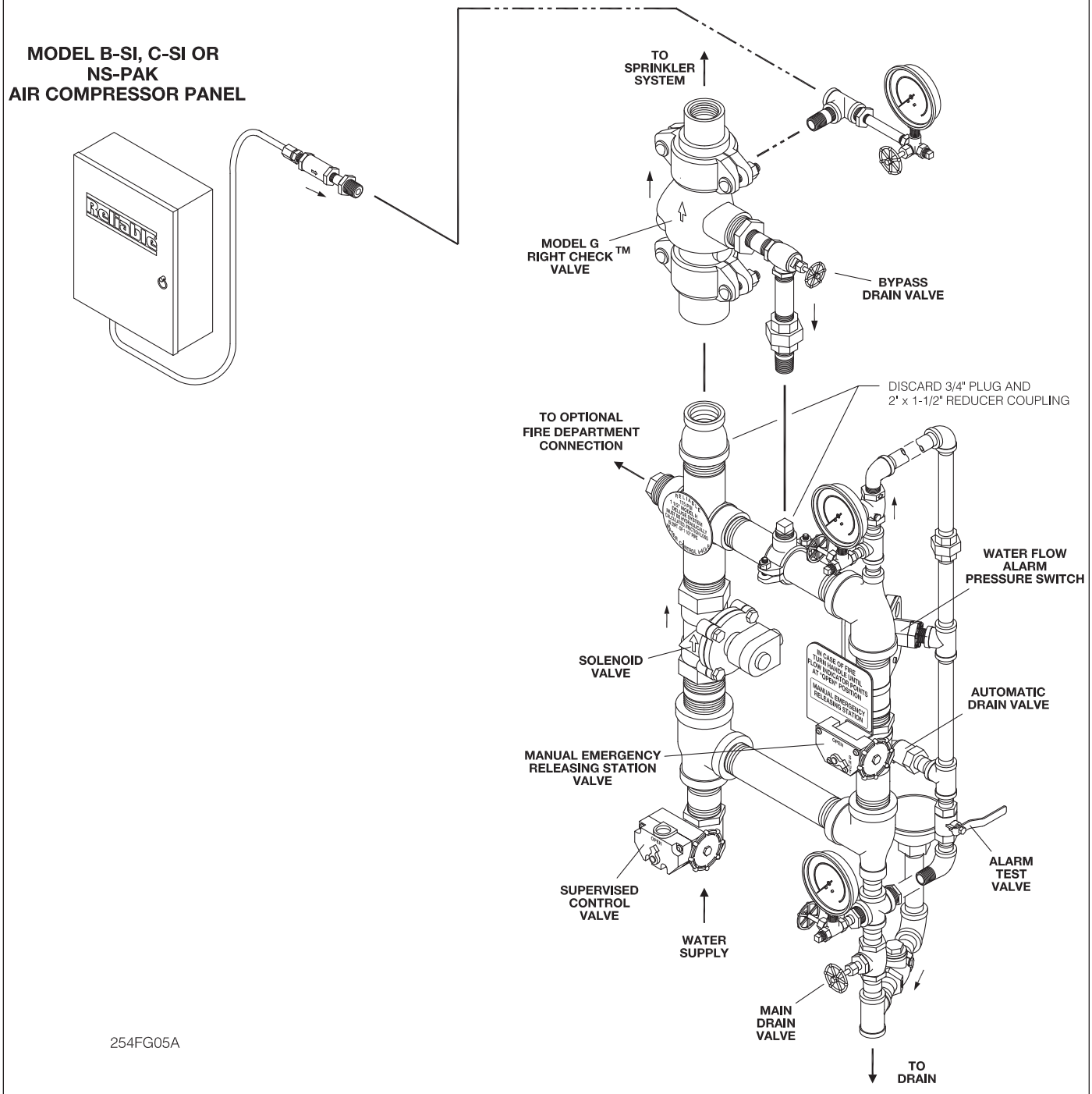

MODEL B-SI, C-SI OR
NS-PAK
AIR COMPRESSOR PANEL
Reliable
TO
SPRINKLER
SYSTEM
MODEL G
RIGHT CHECK ™
VALVE
BYPASS
DRAIN VALVE
DISCARD 3/4" PLUG AND
2" x 1-1/2" REDUCER COUPLING
TO OPTIONAL
FIRE DEPARTMENT
CONNECTION
WATER FLOW
ALARM
PRESSURE SWITCH
SOLENOID
VALVE
AUTOMATIC
DRAIN VALVE
MANUAL EMERGENCY
RELEASING STATION
VALVE
ALARM
TEST
VALVE
SUPERVISED
CONTROL
VALVE
WATER
SUPPLY
MAIN
DRAIN
VALVE
TO
DRAIN
254FG05A

Fig. 6

Cylinder Size	"Q"	"S"	"K"	"T"
Nitrogen Weight (lbs.)	5.50	10.28	16.51	22.01
Nitrogen Volume (cu. ft.)	76	142	228	304
Pressurized at (psig)*	2200	2200	2200	2640

***Note:** Initial pressure and thus nitrogen weight and volume can vary slightly. Check with your local supplier.

When used in conjunction with the Reliable Double Interlock Type D & Type F Preaction System @ up to 26 psi in a refrigerated area, the calculated nitrogen supply (lbs.) to pressurize various system capacities to 10 psig at different freezer temperatures is as follows:

System Capacity (Gal.)	Freezer Temperature (°F)					Approx. Fill Time (min.)**
	20°	0°	-20°	-40°	-60°	
	Nitrogen Supply in lbs.					
250	4.49	4.69	4.90	5.13	5.39	1
500	8.98	9.37	9.80	10.27	10.78	2
750	13.47	14.06	14.70	15.40	16.17	3
1000	17.97	18.75	19.60	20.54	21.56	4

System Operation

The high pressure nitrogen contained in a cylinder is reduced by the adjustable **High Pressure Regulator** to a recommended setting of 100 psi. The PS100-2 pressure switch is factory set at 90 psi. Should the cylinder pressure drop bellow this level, the contacts of the switch will close sending a warning signal to the alarm panel. The 100 psi supply from the cylinder via the **High Pressure Regulator** is reduced down to the system requirements by the **Low Pressure Regulator**. An 80 psi gauge indicate the low pressure regulator setting and a PS25-2 pressure switch (Factory set to approx. 13 psi.) monitors the system pressure. A quick bypass is part of the NS-PaK. It will reduce considerably the initial setup time.

Installation and setup:

(Ref. to fig. 4)

To prevent damage to the equipment or personal injury, retaining straps must be used to secure the nitrogen cylinder to the wall or a beam. A second cylinder, used as a backup, must also be secured. Before mounting the pressure regulator, inspect both the cylinder outlet and the regulator inlet for damaged threads or foreign matter (contaminated threads, oil and grease). Remove foreign matter with a clean cloth, replace cylinder or pressure regulator having damaged threads.

4. Carefully open the cylinder control valve a small amount to dislodge any foreign matter from inside the valve and prepare it for the pressure regulator mounting.
5. Apply thread sealant to male threads and tighten the regulator to the cylinder control valve securely with a wrench. Do not over tighten.
6. Use a soap solution at all joints to verify leak-tight connections.
7. Install the NS-PaK enclosure to the wall using the keyhole slots.
8. Connect the high pressure regulator to the NS-PaK assembly via braided hose.
9. Open the ¼" supply valve and close the ¼" bypass and the ½" system supply valves.
10. Set the high pressure regulator to 100 psi reading on its low pressure outlet gauge.
11. Adjust the low pressure regulator to the level required by the system.
12. Connect the NS-PaK to the open port provided for pneumatic supply in all the Reliable Preaction and Dry Pipe systems. The optional Reliable Part number 6704030001 assembly may by use for this connection.
13. Open the bypass valve and the system supply valve to allow nitrogen flow into the system piping.
14. When the system pressure rises to within 2 psi of required system pressure, fully close the bypass valve and allow the regulator to complete the system fill.

It is strongly recommended that the first nitrogen cylinder be used for the initial system charge only and then replaced with a second fully charged cylinder for supervisory pressure maintenance.

Inspection and Maintenance

The Reliable NS-PaK should be checked for proper operation and condition at least annually and parts cleaned, adjusted or replaced as necessary. Verify that the pressure regulator output is set to 100 psig and adjust the regulator if required. No field repairs are allowed on the pressure regulators. Damage regulator must be replaced. Verify the low and high pressure switches are set to operate at set pressures, wired to the control panel and the wiring insulation is in good condition. Verify that the backup nitrogen cylinder is fully charged and both cylinders are securely strapped in position. Verify that bypass valve is fully closed. Inspection should be performed by qualified personnel only.

Models A-2 & B-1 Automatic Pressure Maintenance Devices

Features

1. Eliminates manual system pressure maintenance.
2. Prevents accidental dry pipe valve and dry pilot line deluge valve operation due to low air pressure.
3. Models suitable for dry nitrogen supply, or local tankless compressor.
4. Suitable for preaction system supervision.
5. May feed dual dry pipe valve systems.
6. Bypass valve incorporated for quick system filling.
7. Shut-off valves permit servicing without shutting down sprinkler protection.
8. Easily adjusted pressure settings.

Listings and Approvals

1. Listed by Underwriters Laboratories, Inc. (UL)
2. Listed by Underwriters' Laboratories of Canada. (ULC)
3. Certified by FM Approvals.
4. NYC MEA 258-93-E.

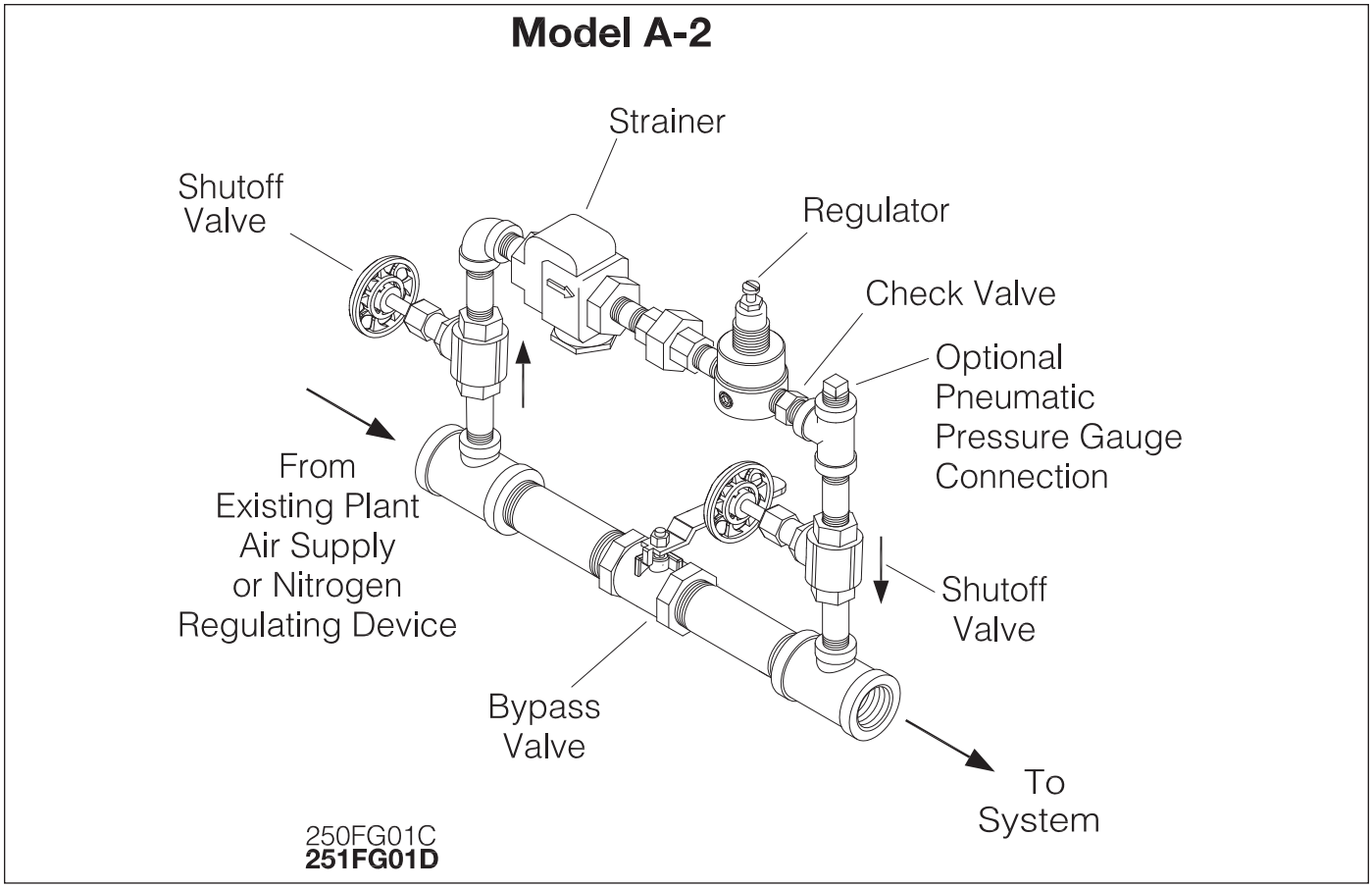


Fig. 7

Application

Reliable pneumatic pressure maintenance devices are used to automatically maintain the correct pressure in dry pipe valve or preaction systems, and in dry pilot lines for deluge systems. When installed in these systems, they eliminate the need for manual filling to overcome small leaks or temperature changes. Reliable pressure maintenance devices do not interfere with the prompt operation of dry pipe valves and deluge valves including when used with quick opening devices.

Operation

Model A-2

The Model A-2 Device is designed for use where a source of compressed gas is available, such as nitrogen cylinders, a plant compressed air system or a tank mounted air compressor with a pressure control switch. The pressure of the compressed gas is reduced by the regulator to the level required by the dry pipe, deluge or preaction system. The Reliable automatic pressure maintenance device will maintain a constant pressure in the system regardless of pressure fluctuations in the compressed gas source.

The strainer prevents any foreign matter in the gas from traveling to the regulator and check valve and interfering with their normal operation. The check valve prevents reverse flow so that water cannot reach the regulators after the dry pipe or deluge valve operates. The shutoff valves permit the servicing of the strainer and regulator without shutting down the sprinkler system. The bypass valve permits the rapid restoration of the required system pressure after service or operation. The bypass valve must be closed and the shutoff valves open for proper automatic operation.

Face to Face Dimensions: 11¼" (286 mm)
Pressure Rating:
5 psi to 100 psi (0.34 bar to 6.9 bar)
Maximum Inlet Pressure: 175 psi (12 bar)
Note: 1 bar = 100 kPa

Models B-1

The Model B-1 Device is designed for use in conjunction with Reliable Model A or Model B tankless air compressors which do not have a pressure control switch to maintain the correct pressure in a dry pipe or deluge valve system. By wiring the compressor motor to the electrical pressure switch of the Reliable Model B-1 Automatic Pressure Maintenance Device, the compressor is controlled by the selected pressure in the dry pipe or deluge valve system.

A drop in the air pressure closes the pressure switch, activating the compressor. When the air pressure is restored to the pre-adjusted setting, the pressure switch opens,

Note: Reliable recommends that both A-2 & B-1 AMD's be installed in the upright & horizontal positions (See Bulletin 251) to prevent the accumulation of condensate on working parts.

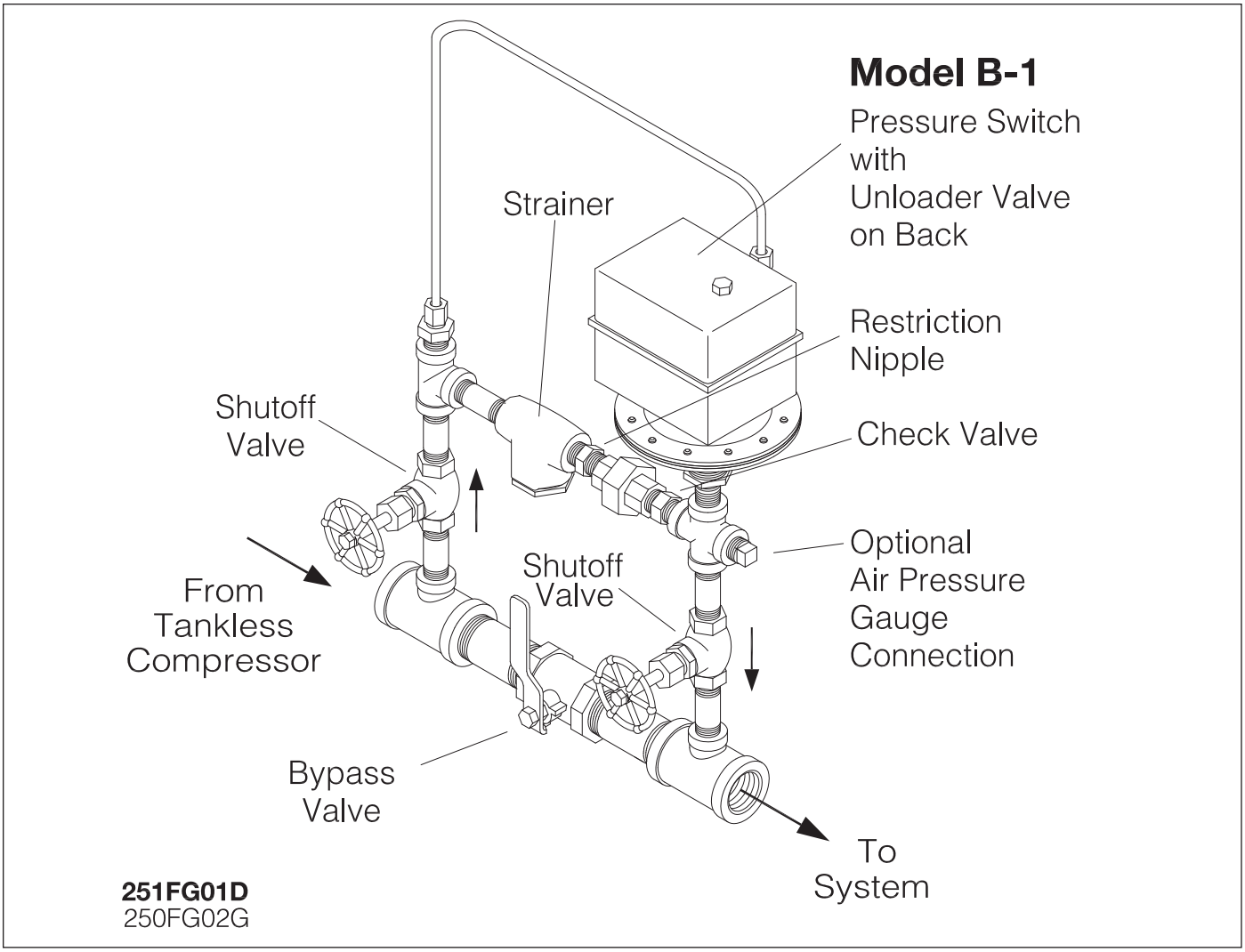


Fig. 8

stopping the compressor. The electrical pressure switch is equipped with an unloader valve which automatically bleeds off the compressor outlet pressure (through the copper tubing) each time the pressure switch opens. This protects the compressor motor from overload at the next startup.

Like the Model A-2 Device, the Model B-1 has a strainer for contamination control and a check valve to prevent reverse water flow. The bypass valve and shutoff valves are identical in configuration and function as with the Model A-2 Device. Likewise, the bypass valve must be closed and the shutoff valves open for proper automatic operation.

Face to Face Dimensions: 9¼" (235 mm)

Electrical Rating

115-230 Volts DC; 3 HP (B-1)

Single Phase	Three Phase
120 Volts AC; 2 HP	120 Volts AC; 3 HP
240 Volts AC; 3 HP	240 Volts AC; 5 Hp
600 Volts AC; 5 HP	600 Volts AC; 5 HP (B-1)

Model B-1: Pressure Rating

Adjustable Range: 14 psi - to - 60 psi (1.0 bar - to - 4.1 bar)

Maximum Inlet Pressure: 175 psi (12 bar)

Nitrogen Regulating Device

Features

1. Designed for use with Reliable's Double Interlock Type D & F Preaction System or any other Reliable system installation using Reliable Model A-2 Air Device.
2. Use of nitrogen instead of air in refrigerated area systems minimizes possibility of ice buildup inside the system piping that could prevent proper system operation.
3. Can reduce a need for additional freezer wall penetrations (required to reduce ice plugging) when using air compressors.
4. Inexpensive to install, operate and maintain.
5. System down time typically limited to a few minutes required for changing cylinders.
6. Can increase the system reliability in installations where air supply is not dependable.
7. Optional adjustable low pressure switch gives warning signal at the control panel when cylinder pressure reaches a low preset level.

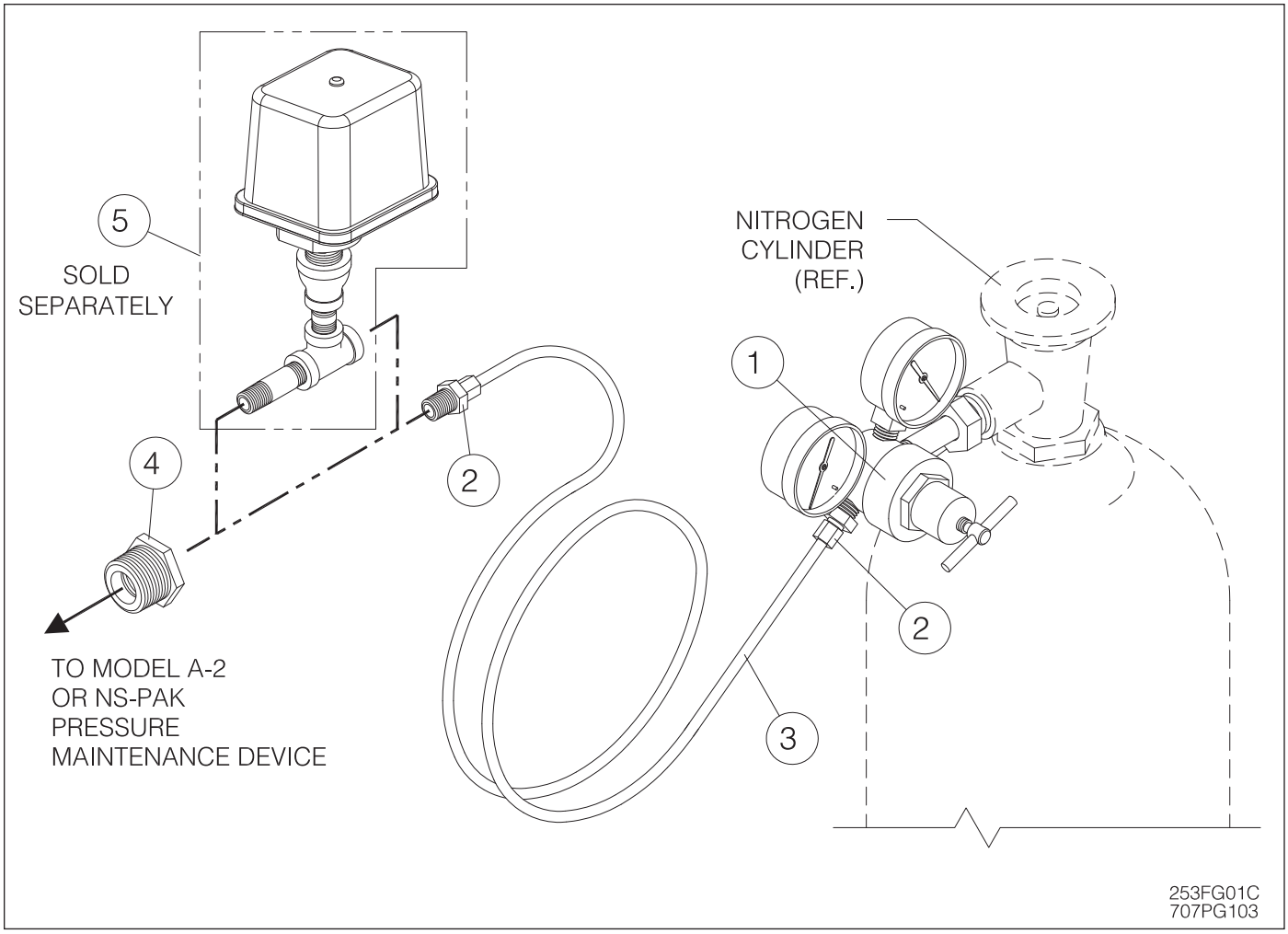


Fig. 9

General Description

Reliable Nitrogen Regulating Device is used to provide nitrogen pressure in Reliable Double Interlock Preaction Type D & F Systems or any other Reliable system installation using Reliable Model A-2 Device. The nitrogen supply is obtained from a high pressure nitrogen cylinder.

Installed at the supervisory pressure port of the system, the Nitrogen Regulating Device includes a single stage pressure regulator equipped with high pressure inlet and low pressure outlet gages. As the nitrogen is gradually depleted and the pressure inside the cylinder drops, the low pressure regulated output remains stable. Connected to the regulator is a coiled copper tubing with connector and adapter for a flexible and direct connection to the above mentioned Reliable pressure maintenance devices.

When required, an adjustable low pressure supervisory pressure switch kit is available. Installed between the Nitrogen Regulating Device outlet and the Model A-2 or NS-Pak inlet, it signals a control panel such as the Potter panel PFC-4410RC the approaching depletion of the nitrogen supply.

The Reliable Nitrogen Regulating Device is available assembled, ready for connection to the system.

Nitrogen Regulating Device

P/N 6304030101 (Item 5 included)
P/N 6304030100 (Without Item 5)
P/N 6304030107 (Item 5 included - Canadian)

Item No.	Part Number	Description	Qty. Req'd
1	6999991570	Pressure Regulator	1
2	98085630	Connector, 1/4" Tubing x 1/4" NPT	2
3	98768004	Tubing, 1/4" O.D. x 6 ft. ¾" Copper	1
4	98048025	Reducer Bushing, 3/4" x 1/4"— Galv.	1
5	6501200100	Sold Separately — Low Pressure Switch Kit	1

Technical Data

The Reliable Nitrogen Regulating Device consists of components shown in Fig. 1.

The single stage pressure regulator, made of brass, has a 200-4000 psi cylinder pressure gauge and a 10-200 psi outlet pressure gauge. A coiled ¼" copper tubing allows for flexibility in connecting the Device to the System air supply inlet.

The low pressure switch kit consisting of galvanized tee, outlet nipple, branch nipple, branch coupling reducer and adjustable low pressure switch is optional. Mounted between the Nitrogen Regulating Device and the supervisory pressure inlet, it sends a warning signal to replace a nitrogen cylinder that is approaching a preset pressure depletion level.

The high pressure nitrogen cylinder can typically be rented from a local source, with rental fees varying by supplier and cylinder sizes. Typical cylinders are:

Cylinder Size	"Q"	"S"	"K"	"T"
Nitrogen Weight (lbs.)	5.50	10.28	16.51	22.01
Nitrogen Volume (cu. ft.)	76	142	228	304
Pressurized at (psig)*	2200	2200	2200	2640

When used in conjunction with the Reliable Double Interlock Type D Preaction System in a refrigerated area, the calculated nitrogen supply (lbs.) to pressurize various system capacities to 10 psig at different freezer temperatures is as follows:

System Capacity (Gal.)	Freezer Temperature (°F)					Approx. Fill Time (min.)**
	20°	0°	-20°	-40°	-60°	
	Nitrogen Supply in lbs.					
250	4.49	4.69	4.90	5.13	5.39	1
500	8.98	9.37	9.80	10.27	10.78	2
750	13.47	14.06	14.70	15.40	16.17	3
1000	17.97	18.75	19.60	20.54	21.56	4

****Note:** When used in conjunction with the Reliable Model A-2 Pressure Maintenance Device having bypass line open.

The nitrogen used in refrigerated area systems minimizes a possibility of ice buildup and blockage inside the system pipes that could prevent proper system operation. **The dew point of nitrogen compressed to maximum 10 psig pressure in the Reliable Double Interlock Type D Preaction System is -52°F.**

Operation (Ref. Figure 9)

The high pressure nitrogen contained in a cylinder is reduced by the adjustable pressure regulator (Item 1) to a recommended setting of 80 psig. The optional adjustable low pressure switch (Item 5) recommended pressure setting is 50 psig. Should cylinder pressure drop below this level, the low pressure switch sends a warning signal to the Control Panel used with systems.

Installation

To prevent damage to the equipment or a personal injury, retaining straps must be used to secure the nitrogen cylinder to the wall or a beam. A second cylinder, used as a backup, must also be secured.

Before mounting the pressure regulator, inspect both the cylinder outlet and the regulator inlet for damaged threads or foreign matter (contaminated threads, oil and grease). Remove foreign matter with a clean cloth, replace the cylinder having damaged threads and return the pressure regulator with damaged threads to Reliable.

Carefully open the cylinder control valve a small amount to dislodge any foreign matter from inside the valve and prepare it for the pressure regulator mounting.

Apply thread sealant to male threads and tighten the regulator to the cylinder control valve securely with a wrench. Do not over tighten. Use a soap solution at all joints to verify leak-tight connections. In a similar way, install and test the rest of the Regulating Device and connect it to the system supervisory pressure port.

Adjust the optional low pressure switch to actuate at 50 psig and wire it to the Control Panel.

It is strongly recommended that the first nitrogen cylinder be used for the initial system charge only and then replaced with a second fully charged cylinder for supervisory pressure maintenance.

Inspection and Maintenance

The Reliable Nitrogen Regulating Device should be checked for its proper operation and condition at least annually and parts cleaned, adjusted or replaced as necessary.

Verify that the pressure regulator output is set to 80 psig and adjust the regulator if required. No field repairs are allowed on the pressure regulator. Return it to Reliable or its representatives for a replacement.

Verify that the optional adjustable low pressure switch is set to operate at 50 psig, wired to the control panel and the wiring insulation is in good condition.

Verify that the backup nitrogen cylinder is fully charged and both cylinders are securely strapped in their position.

When used in conjunction with the Reliable Model A-2 Pressure Maintenance Device, verify that its bypass valve is fully closed.

Inspection should be performed by qualified personnel only.

Manufactured by

Reliable®

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