A flushing and cleaning system specifically designed for pneumatic control air lines. It utilizes DuPont Vertrel®, a premier ozone-safe HFC cleaning solvent.

- **Works quickly and easily to clean and purge the compressed air lines in HVAC control and other pneumatic systems.**
- **Field-tested procedure**
- **Solvent is safe and nonflammable**
- **Process is flexible and easily allows for flushing by floor, by section or even by controller**
- **Fits in with related work in any overhaul or conversion**
- **Avoids troubleshooting call-backs**
- **Process allows for cleaning & flushing in one service call**

Speciality Products

Pneu-Flush®

Description

The Pneu-flush System (patent pending) consists of a pressure-tested canister charged with approximately one quart of Vertrel, a revolutionary HFC solvent that has excellent solvency and performance characteristics. The package is pressurized and R-134a is used as a propellant. It is sealed with a special valve fitting that only accepts a specialized Injection Valve, Part Number 4300-89.

Application

Pneumatic systems are installed in thousands of buildings, and they generally consist of an air compressor that supplies compressed air to controllers (i.e. thermostats) that in turn operate controls (i.e. dampers) for cooling, heating and other functions & applications. If the compressor is improperly sized for the demand or if general maintenance has been lacking over time, the controllers (and eventually the controls) will become clogged or plugged with moisture, dirt and other contaminants. In order to return the system to designed capacity and efficiency, a thorough cleaning and flushing is necessary. Such a cleaning requires a solvent with good solvency, material compatibility complete evaporation and no environmental concerns, Pneu-flush meets this demand.

Packaging

Canister	**4298-01**
Injection Valve	**4300-89**

Equipment Required

The following equipment will be required for each flushing operation:

1. New canisters of flushing solvent. See Table 1 for recommended quantities.
2. Tubing to connect the canister to the air line, including the re-usable Injection Valve (#4300-89). Due to its unique valve design, the canisters of Pneu-flush will require the use of this Injection Valve. It is a one-time purchase, and it should be retained for future cleanings.
3. Access valve(s) will be required in the control line(s) wherever Pneu-flush will be injected.
4. Clean wipes or “Q-tip” style swabs to remove potential oil droplets or condensate that may be purged from the system.
5. A scale to be used to weigh canister.

General Guidelines

1. Use appropriate and established service techniques.
2. Use only the Pneu-flush flushing procedure for purging the lines.
3. Establish baseline performance data through investigation before beginning the repair.
4. Each installation will require estimating the quantity of flushing solvent to use. Factors to consider: will you flush the entire system or only a portion, the total length and sizes of air lines to be flushed, estimated contamination within the system, and ease of access to the system. Keep in mind that most plugging or contamination usually occurs in lines and controllers nearest the compressor.
5. Systems which are hard to flush and/or where solvent entrapment is likely should be isolated from the rest of the system and flushed independently, if possible.
6. Consult Table 1 for estimating Pneu-flush requirements. Generally, as an average, one canister can flush 250 feet of combined 1/4″, 3/8″ and 1/2″ line. Typically, there will be an average of one controller for every 20 feet of line.

Table 1

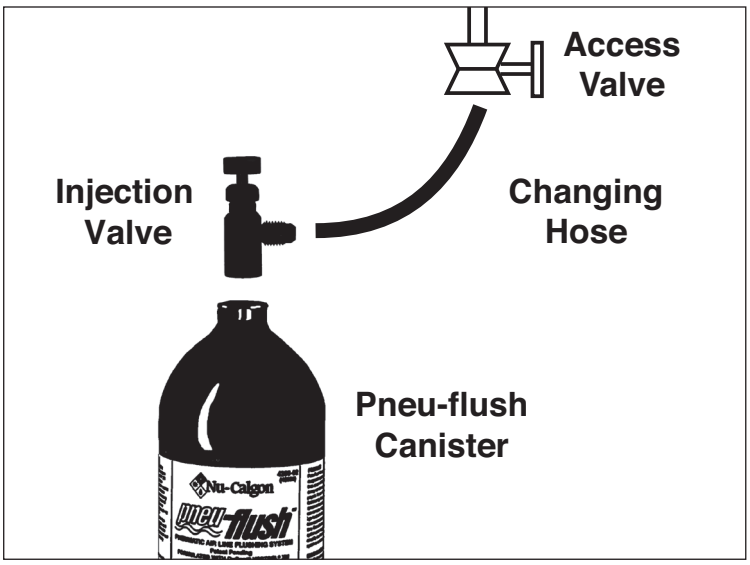
Approximate number of Pneu-flush Canisters required for Control Line Flushing

	Estimated Length of Control Line, in Feet				
Line Diameter	up to 375´	750´	1125´	1500´	2500´
1/4″	1	1 to 2	2 to 3	4	6
3/8″	1	2	3 to 4	4 to 5	7
1/2″	1 to 2	2	3 to 4	4 to 6	8
3/4″	2	3 to 4	5	6	10
1.00″	3	4 to 6	8	12	14

The amount of Pneu-flush required for complete system cleanup will vary by system size, number of controllers and level of contamination. As a general starting point, every 250’ of control line up to 1/2″ diameter (or every 12 controllers installed on line up to 1/2″ diameter) will require 1 canister of Pneu-flush. Unusually heavy contamination may require use of additional canisters. If line length is unknown, estimate 20’ of line per controller.

Specific Instructions

1. If possible, design your flushing plan by sections or floor areas. If you used the traditional “bubble” procedure in the past where the solvent was introduced into the system immediately after the compressor, you will recall that the process was slow. With the Pneu-flush System, you have the flexibility to easily introduce the solvent where the contamination is the heaviest, cleaning it quickly. This allows technicians to clean the entire system or isolate sections and simply flush a portion of an entire system.
2. All controllers and devices can be left installed (except as noted in #3 below). However, they can also be removed from the system and cleaned manually, forcing the flush through them individually. In cases of severe system contamination it is recommended that the controllers be removed while the lines are flushed. This will speed the flushing process by allowing for a faster flush of the lines without flushing debris through the controllers. The controllers should be cleaned and reinstalled after the lines are flushed.
3. Determine compatibility of the flushing process with any controllers remaining in the system. The following Johnson controllers are not compatible with the solvent and should be removed prior to flushing: N-1000, N-2000, P-5215, P-5217, C-9115, C-2100 and T-9000 series. The low airflow of these instruments might cause contamination to be entrapped within the controller; as a result these instruments should be removed from the system and reinstalled with new filters after the system has been flushed.
4. The Pneu-flush canisters should be connected to the air line control system right after the pressure regulator. The internal system air pressure should be approximately 20-25 psig. Verify system pressure before hookup. If flushing entire system, introduce product immediately after pressure regulator. You have the flexibility to discharge a canister wherever you can tie into an air line. Just make sure system pressure is less than 25 psig.



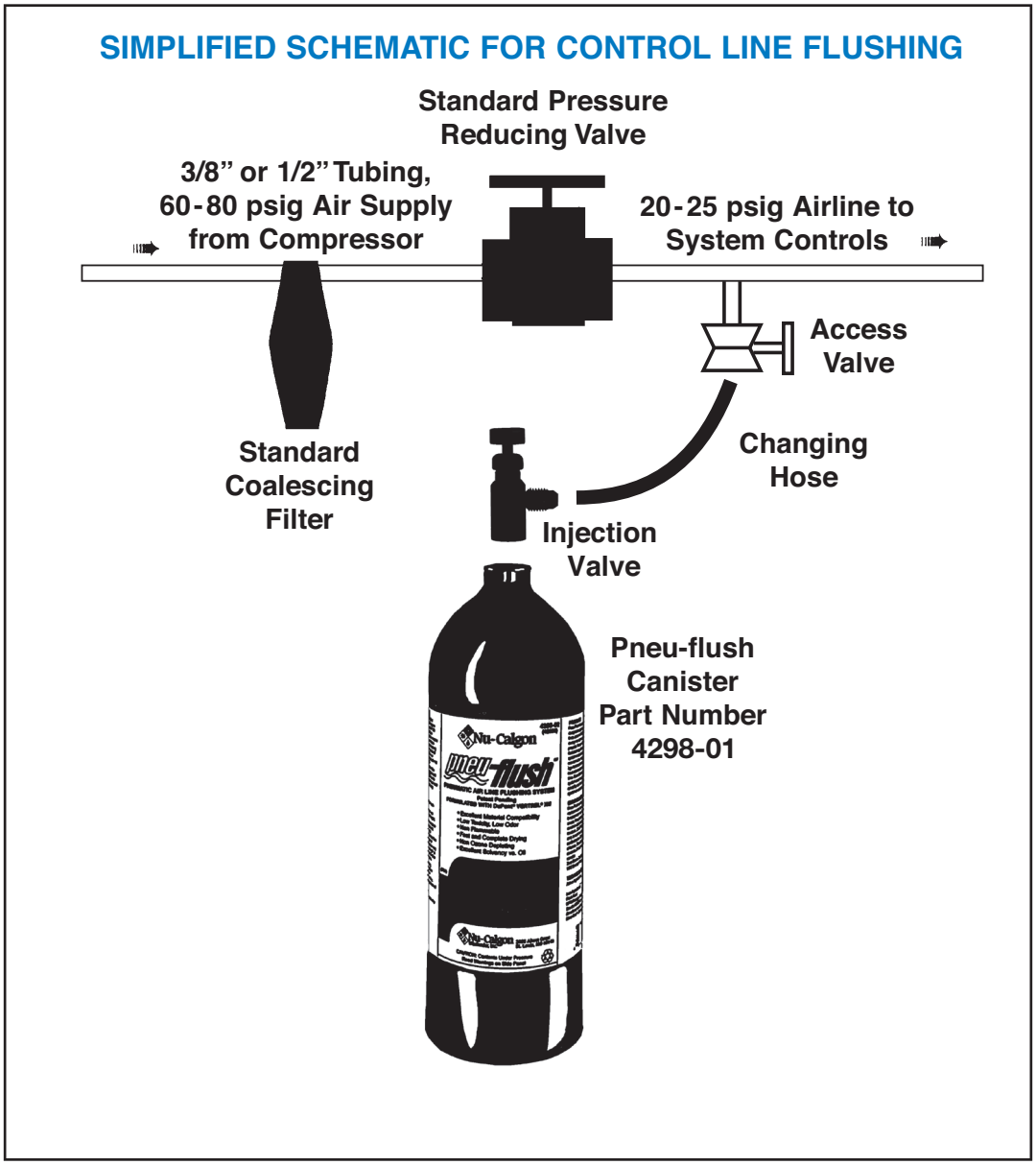
5. The Injection Valve is available separately and will be needed for the process. Once purchased, it can be retained for future applications of Pneu-flush.
6. The canister has been designed to empty completely while standing in the upright position. Failure to use the canisters in an upright position will result in incomplete discharge of solvent into the air line and ultimately wasted solvent.
7. Connect the Injection Valve to the canister, making sure it is closed. Carefully thread the Canister Connection. Hand tighten only. Be careful to avoid cross-threading.
8. After the canister and Injection Valve are connected, insure that the air line access valve is closed. Thread a charging hose onto the Injection Valve and then onto the air line access valve.
9. Open a valve or create an opening in the control line downstream; this will serve as an exit or vent point. It creates a pressure imbalance and starts the flow of solvent from the high-pressure (point of injection) area to the low-pressure (exit) area. It also alerts you to any oil/liquid trapped in the system. It is recommended that every effort be made to minimize restrictions in the air flow within the zone being flushed to ensure a quality flush. Note: This is particularly important if you want to flush a zone, which is a dead end. It is necessary to create a high-to-low pressure flow. This canister has been designed to flow “downstream” with the air pressure.
10. Once everything has been prepared and you are confident the air line is under 25 psig, open the valve on the Injection Assembly about half way. Then crack the air line access valve to slowly inject Pneu-flush into the air line. After a few minutes, you should detect a cooling of both the canister and the air line nearest the injection point. This is an indication Pneu-flush is entering the system. Open the access valve a little wider to increase solvent flow. The solvent is propelled into the air line control system in an atomized form (i.e., a vapor mist). As it enters the air control line, it is further propelled throughout the system by line pressure.
11. Check the air discharge points. If no air is escaping from the discharge point, the air line may be obstructed. In this case, you will want to trouble-shoot the lines to locate and remove the obstruction. In the absence of an obstruction, fully open both the Injection Valve and the air line access valve. As you flush, oil or liquid which had been trapped in the system will leave the system one of two ways: either as a vapor, which may not be detectable, or as droplets that condense and drip at the discharge points. The presence of droplets at discharge points indicates that Pneu-flush is operating properly and is removing contamination from the system. It should take approximately twenty (20) minutes to completely discharge each canister. Weigh the canister after discharging to ensure it is empty; it should weigh approximately 5 ounces without injection valve or 7 ounces with.
12. If the system is large enough to warrant the use of multiple canisters, wait at least five (5) minutes before hooking up the next canister. Before disconnecting the canister from the Injection Valve, close both valves (the access valve and the Injection Valve). Unscrew the Injection Valve from the top of the canister and thread it on to the new canister. Follow these procedures until all of the canisters have been emptied into the system.
13. Remember, you can discharge a canister at any location where you can tie into an air line. Simply ensure the system pressure is less than 25 psig and follow the same procedures discussed above. One useful technique is to first inject the required number of canisters at the point just after the pressure regulator and then, after that first general cleaning, pinpoint suspected trouble areas and purge them locally. And remember, most contamination will occur in areas closest to the air compressor.

Additional Points

When the Pneu-flush solvent comes in contact with oil droplets in the system, it breaks the oil down, and carries it as a vapor through the system. The vapor is discharged through control ports and exhaust openings. Oil vapors that are vented at these points may condense into droplets and could soil wall and floor surfaces. Steps should be taken to protect such areas from oil droplets, or to clean them should the oil droplets occur.

If oil is noted, repeat the flushing process as this will maximize the system flush. If no oil is found, disconnect the injection assembly. A complete system check and recalibration after flushing should be considered. Frequently instruments are restored to the last calibration point. Non functional instruments should be replaced.

Figure 1



Safety

Pneu-flush solvent is one of industry's most successful replacements for CFC-113 solvent. Like CFC-113, it is completely nonflammable and has almost no aroma. Plastic-safe, it is compatible will all common elastomers and gaskets. It dries without any residue and will meet or exceed all of the traditional purity criteria. However, like all solvents, it should be used in a well ventilated area. The solvent is heavier than air and, in extreme cases, will displace oxygen in a confined area. Do not breathe dense concentrations of fumes.

Read and understand the product's label and Safety Data Sheet ("SDS") for precautionary and first aid information.
The SDS is available on the Nu-Calgon website at www.nucalgon.com or is returnable by U.S. Mail upon request.