

# Operation and Service Instructions

## PowerFlo® PF2400

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This manual covers all variations of the PF2400 series  
(PF2400-1, PF2400-2, ETC)  
Using Software Version 4.0 and later

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# Welcome!

Welcome to the User's Manual for the Comco PowerFlo® model PF2400 Micro-abrasive Blaster! You have purchased the finest micro-abrasive blaster available today, and this manual is designed to help you set up, operate, and maintain the PowerFlo® PF2400.

**NOTE:**        **Prior to setting up and operating your PowerFlo, the operator and the department supervisor should carefully review this entire manual.**

## The Comco Warranty

Comco warrants that the PowerFlo® PF2400 will be free from all defects in material and workmanship under normal use for a period of one year from the date of purchase or 2,000 hours of normal operation, whichever comes first.

The warranty period begins when the equipment ships from the Comco facility and applies to the original owner only. Comco is not liable for damages from any cause or use of such equipment beyond the cost of repairing any defective parts.

If the equipment fails to perform satisfactorily during the warranty period, Comco has the option to do any one of the following: 1) Send replacement parts to the customer to be installed by the customer; 2) Repair the unit at the customer's facility; or 3) Request that the unit be returned to the Comco factory. Any replacement parts shall be furnished by Comco without cost, F.O.B. the Comco factory in Burbank, California, provided that Comco is notified of the defect within the warranty period. Any defective parts shall be returned to Comco for inspection and analysis.

## Exclusions

The above warranty does not apply to defects or problems resulting from improper or inadequate maintenance by the customer; unauthorized modification or misuse; failure to follow the operating instructions; the use of any supplies or parts, including but not limited to nozzles, powders, and attachments, not manufactured or supplied by Comco.

The warranty also does not cover problems resulting from improper or inadequate facilities (contaminated air, improper power) or items that should be expected to wear in normal operation, such as nozzles, abrasives, tubing, or fittings.

***This is Comco's only warranty and is in lieu of all other warranties of merchantability and fitness for any particular purpose. No representations or warranties are authorized except as herein stated.***

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# Safety Precautions

## **General Safety Considerations**

The PowerFlo® model PF2400 has been designed to be safe to operate when used properly. Any device that is pressurized and requires electrical power, however, requires that certain safety precautions be observed to avoid potentially hazardous situations. The primary safety-related issues involved in the use of the PowerFlo® model are listed below; and addressed in detail on the following pages.

1. Working with a device that is pressurized.
2. Working with an electrical device.
3. Working with a device that uses abrasive powders that could be potentially dangerous if inhaled or ingested in large quantities or put in constant contact with the skin.
4. General issues involved in operating machinery.

## **Working with a Device that is Pressurized**

The PowerFlo® model PF2400 uses pressurized air to perform its basic function. While Comco's blasting machines incorporate relief valves and check valves to minimize the risk of an accident related to air pressure, Comco also recommends the following:

- ✓ The air supply system should have a shutoff valve located upstream of the blasting machine so that the supply pressure can be turned off independently of the blaster.
- ✓ Pressure relief valves should be incorporated into the supply system to minimize the risk from system over pressure.
- ✓ Anyone who will use the PF2400 should be trained in its basic operation.
- ✓ The PF2400 should always be turned OFF and vented prior to performing any maintenance.
- ✓ When replacing parts during maintenance, use only Comco parts and verify that all installations are correct before using the PowerFlo® PF2400.

Improper set-up or use of the PowerFlo® model PF2400 may result in a condition that could be hazardous. All fittings and covers must be properly installed and tightened in order to minimize any hazard.

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## **Working with an Electrical Device**

The electrical hazards associated with the PF2400 are minimal, since all primary electrical components are inside the primary housing. However, the operator should take precautions that apply to any electrical device that has a power cord that plugs into an electrical outlet. These precautions include:

- ✓ Verify the proper operating voltage on the PF2400 by checking the voltage select switch located on the back of the unit.
- ✓ Before plugging the power cord into an electrical outlet, examine it for evidence of damage such as cracked, worn, or torn insulation; exposure of bare wires; or bent tines on the plug.
- ✓ Ensure that the machine is never operated near water or while it is wet.
- ✓ Always verify that the power switch is in the OFF position when the machine is not in use for long periods of time.

When working inside the PowerFlo® housing, there is the possibility of electrical shock. To minimize this hazard, Comco recommends the following:

- ✓ Unplug the unit from facility power any time the machine's cover will be removed.
- ✓ Do not operate the PowerFlo® PF2400 with its cover removed.
- ✓ Keep the interior of the PF2400 clean of dust, powder, and any foreign object or substance that could conduct electricity.

<p><b>CAUTION:</b> Some abrasive powders are conductive and may present a hazard if allowed to accumulate inside the machine.</p>
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## **Working with the Abrasive Media**

The PowerFlo® model uses several types of abrasive media that should not be inhaled or ingested in large quantities or maintained in prolonged contact with the skin. When working with the abrasive media, Comco recommends the following:

- ✓ Do not direct the abrasive blast on bare skin or face/eyes.
- ✓ A workstation and dust collector **must** be used in conjunction with the PF2400. If you must blast outside a workstation, a full face mask and oxygen supplied respirator and hand protection are required per NIOSH (National Institute for Occupational Safety and Health).
- ✓ Handling operations such as repackaging or refilling of the abrasive media should only be performed in well-ventilated areas and with proper care to minimize dust in the eyes or breathing passages. Always use a dust respirator for dust protection when exposed to dust clouds. The 3M respirator #8710 is NIOSH/MSHA approved for these types of abrasive handling operations.



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## **Working with the Abrasive Media (cont'd)**

- ✓ Certain abrasive media, such as glass beads, can present a slipping hazard if they are spilled on the ground. Always clean up spilled abrasive, and place appropriate warning signs in areas where the abrasive will be on the ground (such as during long-term operation).
- ✓ Abrasive powders, particularly glass beads and plastic, may generate static charges. To minimize the risk of electrostatic discharge, ground the PowerFlo® model and the workstation. In some instances, the operator may also wish to use grounding straps (Wrist-Stats™ or equivalent).
- ✓ Flammable powders, such as walnut shell and plastic, may pose a fire or explosion hazard. Always use a vigorous dust extraction device to prevent hanging dust clouds.
- ✓ After using the PF2400, or after handling any of the abrasive media, wash your hands before touching or rubbing your eyes.
- ✓ Gloves may be necessary for operators who are sensitive to powders or dust on their skin.
- ✓ Some powders, if allowed to collect inside the machine, may cause electrical shorts.

Material safety data sheets (MSDS) for all abrasives distributed by Comco are available from the Comco factory. Every powder shipment includes an MSDS. Contact the Comco Customer Service department to obtain extra copies of any MSDS.

## **Avoiding Hazards Associated with Operating Machinery**

- ✓ Place the PowerFlo® model securely on a solid workbench or counter so that the unit cannot tilt or fall over.
- ✓ Always secure the nozzle end of the abrasive blast hose before pressurizing a blasting unit. An unsecured hose may whip around and cause injury or damage.
- ✓ Keep fingers out of the vent hose pinch.
- ✓ When working inside the cabinet, avoid possible sharp edges and remember that solenoids on valves can become hot.
- ✓ Set up the PF2400 and workstation so that it is ergonomically correct to allow safe and comfortable use by all operators.
- ✓ Route the foot pedal cord from behind the bench to prevent it from becoming a possible trip hazard.

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## Avoiding Hazards Associated with Operating Machinery (cont'd)

The following warning labels/pictograms are utilized in the PowerFlo® model PF2400 CE (European) versions:

Symbol	Meaning
	ELECTRICAL HAZARD
	HAND PROTECTION RECOMMENDED WHERE APPROPRIATE
	EYE PROTECTION RECOMMENDED WHERE APPROPRIATE
	RESPIRATORY PROTECTION RECOMMENDED WHERE APPROPRIATE

# Chapter 1: The PowerFlo® PF2400

## In This Chapter

- ◆ A general description of the PowerFlo® PF2400 model
- ◆ How the PowerFlo® PF2400 model works
- ◆ Detail specifications

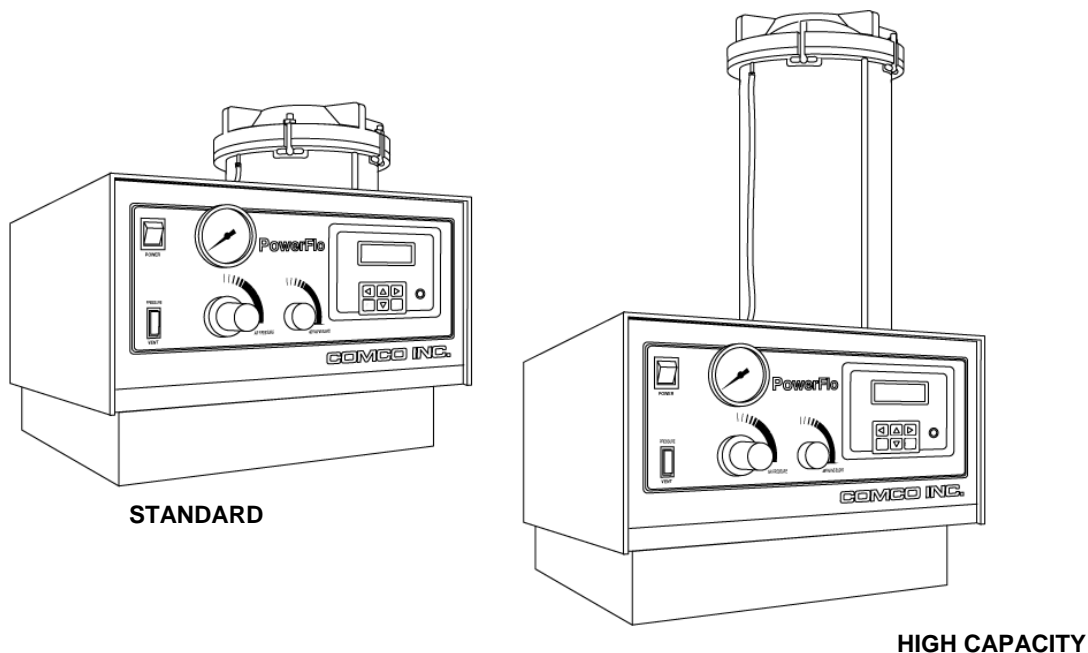
## 1.1 Overview

The Comco PowerFlo® Model PF2400 is a bench-top machine that delivers a precisely controlled stream of micro-abrasive particles at high velocity. With the appropriate abrasive powder and the necessary adjustments, it will clean, deburr, cut or drill any material, particularly hard or brittle ones. Since dry air is used as a propellant, it is a relatively clean process.

The machine is essentially simple and uncluttered (see Figure 1.1a). It consists principally of an inlet air valve (rear panel), air pressure regulator with gage, modulator (internal), abrasive powder tank, and mixing chamber. The abrasive PowderGate® valve assembly to stop and start the abrasive flow, the footswitch to actuate it, and a handpiece that holds the precision nozzle, complete the machine. All the component parts are manufactured to the highest standards and are designed for maximum life consistent with reasonable cost. The basic mechanisms employed, particularly the modulator, are covered by the following patents:

United States:	3,053,016 Johnson
	3,084,484 Hall
	3,638,839 Weightman
United Kingdom:	1,243,294

Additional United States and foreign applications for patents are pending.

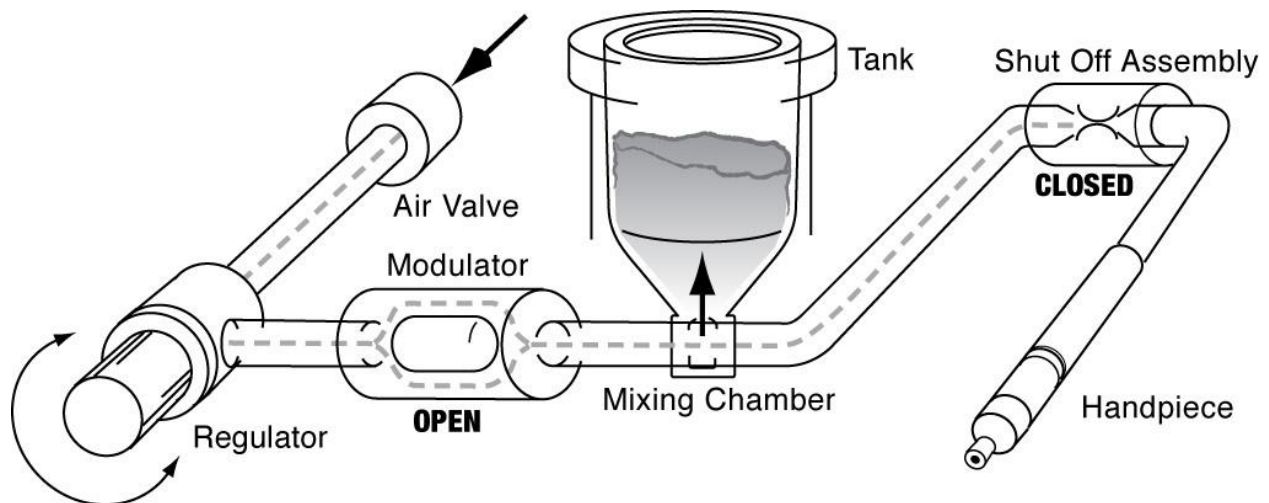


**The Comco PowerFlo® PF2400**  
**Figure 1.1a**

## **1.2 How the PowerFlo® Model PF2400 Works**

As shown in Figure 1.2a below, when the PowerFlo® Power Switch on the front panel is initially turned "ON", supply air enters through the energized air valve at the back of the unit. The supply air passes through a regulator that allows the operator to control the system pressure, as indicated by the gage on the front of the machine.

The regulated air then passes through an open, or de-energized, modulator assembly and into the mixing chamber and abrasive tank. Air cannot escape through the nozzle because the PowderGate (or shut-off) assembly is closed. The air pressure inside the system builds up until it reaches the regulated pressure.



**PowerFlo® Model, Pressurized**  
**Figure 1.2a**

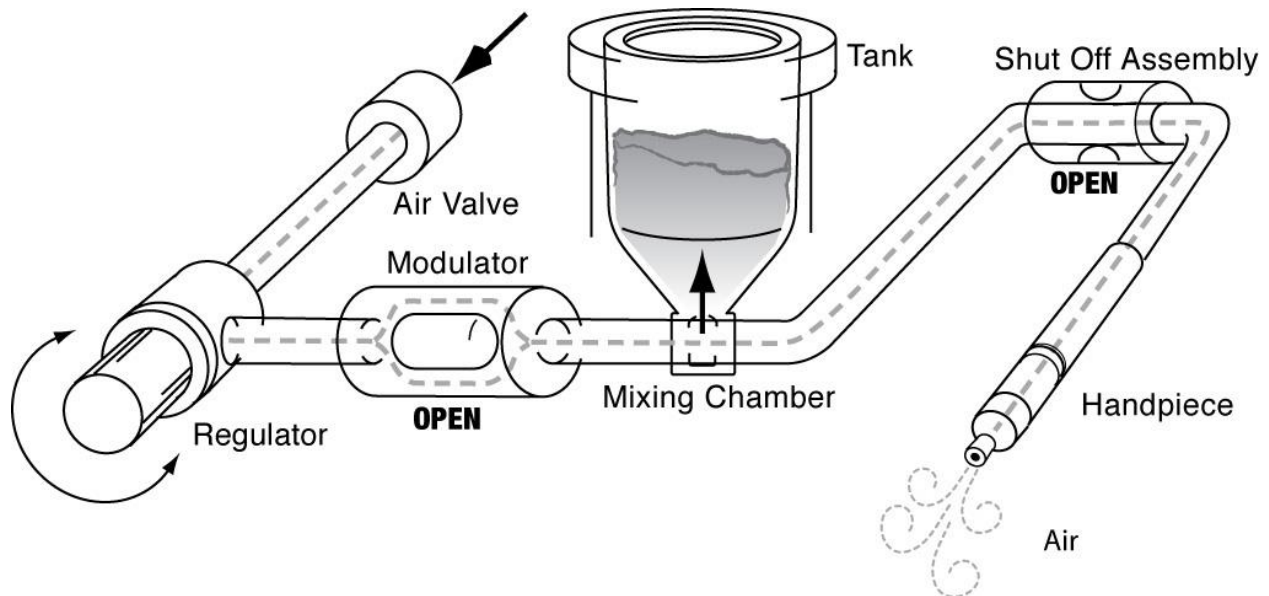
The PowerFlo® PF2400, as shown in the illustration above, is now pressurized and ready to use. To operate the PowerFlo® PF2400 from this point would simply require picking up the nozzle, pointing it at the item to be blasted, and depressing the footswitch to begin blasting. What happens when the machine is actually in operation is explained on the following pages.

## How the PowerFlo® PF2400 Works (cont'd)

Stepping on the footswitch used to operate the PF2400 causes two things to happen:

- 1) The PowderGate (shut-off) assembly opens, which allows air to flow from the nozzle. Refer to Figure 1.2b, item 1.
- 2) An electrical signal is sent to the coil of the modulator assembly which energizes and de-energizes it 60 times every second. Refer to Figure 1.2c, item 2.

At the beginning of the operating cycle (as shown in Figure 1.2b, below), the PowderGate assembly is opened. Before the modulator has had a chance to energize, regulated air flows freely through the open modulator valve, the mixing chamber, and out the nozzle.



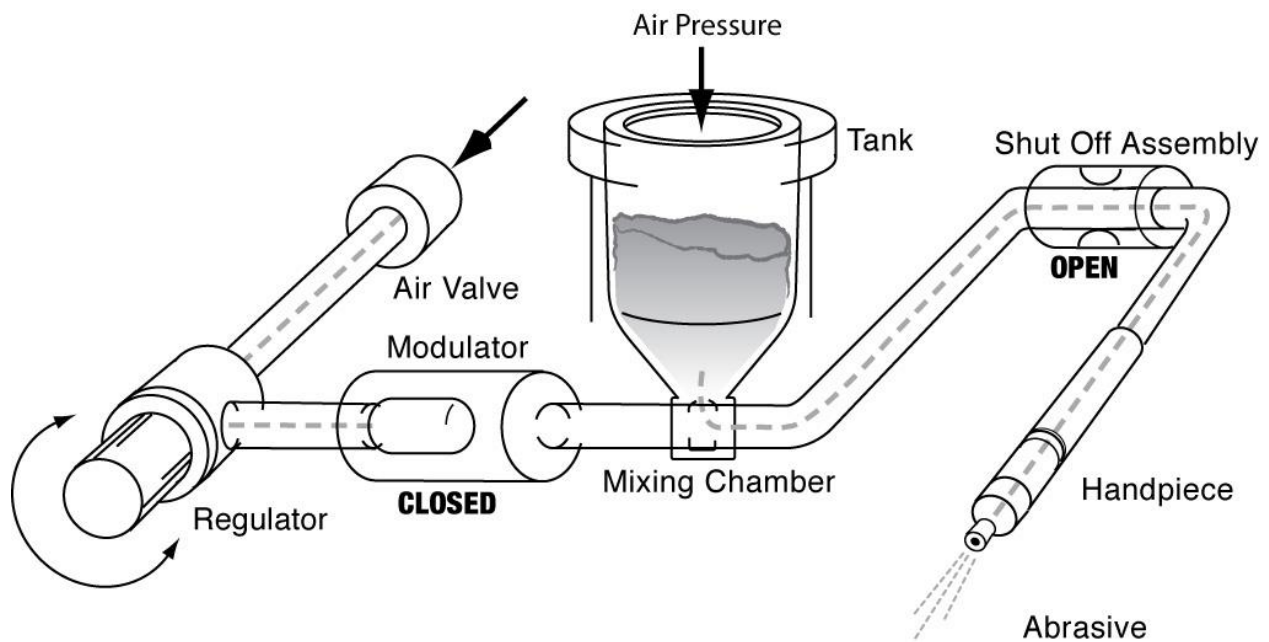
**Modulator Open**  
**Figure 1.2b**

Since the air flowing from the regulator into the mixing chamber is at basically the same pressure as that in the tank, the upward force of the air keeps the abrasive in the tank. At this point, little or no abrasive is being injected into the air stream.

## How the PowerFlo® PF2400 Works (cont'd)

In the second half of the operating cycle, the modulator coil becomes energized. This pulls the modulator core against the seat (see Figure 1.2c, below), shutting off the airflow from the regulator. The pressure in the mixing chamber now decreases because the downstream end of the system, at the nozzle, is open to the atmosphere.

Since the pressure in the mixing chamber is lower than the pressure in the abrasive tank, the two pressures try to balance. Air pressure inside the abrasive tank pushes a small amount of abrasive through a precision orifice at the bottom of the tank, into the mixing chamber and out through the nozzle.



**Modulator Closed**  
**Figure 1.2c**

When the next cycle begins, the modulator is again de-energized, and opens to allow pressurized air to freely flow into the mixing chamber and out the nozzle. This forces air back into the abrasive tank, stabilizing the pressure between the tank and the mixing chamber (refer back to Figure 1.2b).

Each cycle happens very quickly; 50-60 times per second. The end result of this “stop/start” action of the modulator is a consistent stream of abrasive out the nozzle, as long as the footswitch is depressed. Releasing the footswitch stops the modulator from cycling and causes the PowderGate valve to close the outlet air hose.

The only way for the abrasive powder in the tank to reach the mixing chamber is via the orifice at the bottom of the tank. By changing the size of the tank orifice, you can change the amount of abrasive that enters the mixing chamber, and thus change the abrasion or cutting rate at the nozzle. Additional information regarding the tank orifice, nozzle sizes, abrasives, and other variables in the abrasive blast process is presented in Chapter 3 of this manual.

## 1.3 Detail Specifications

### 1.3.1 Abrasive (see Chapter 3)

Type	Selected powder, smooth to sharp, soft to hard
Size	20 to 300 Microns

### 1.3.2 Nozzles (see Chapter 3)

Material	Highest quality Tungsten Carbide
Sizes, Round	0.046 to 0.080 in. Dia. (1.2 to 2 mm)
Sizes, Rect.	0.008 x 0.125 to 0.016 x 0.190 in. (0.2 x 3.2 to 0.4 x 4.8 mm)

### 1.3.3 Air

Type	Nitrogen, CO <sub>2</sub> , or Dry Compressed Air
Supply Pressure	90 to 140 PSIG (6.2 to 9.6 Bars)
Working Volume, Max	6 SCFM (170 SLM) Typical <sup>[1]</sup>
Working Pressure	40 to 140 PSIG (2.7 to 9.6 Bars)
Moisture	200 PPM Max
Oil	10 PPM Max
Particles	5 Microns Max

### 1.3.4 Electrical

Voltage <sup>[2]</sup>	115 or 230 (+10, -20) VAC
Frequency	50/60 Hz
Power	Less than 100 Watts
Data Output	Open Collector, Low Voltage

### 1.3.5 Physical

	<u>Standard Model</u>	<u>Tall Tank Model</u>
Width	18 in. (46 cm)	18 in. (46 cm)
Depth	16 in. (40 cm)	16 in. (40 cm)
Height	17 in. (43 cm)	25.2 in. (64 cm)
Weight	64 lbs. (29.5 kg)	72 lbs. (32.6 kg)
Tank Size	200 in <sup>3</sup> (3300 cm <sup>3</sup> )	400 in <sup>3</sup> (6600 cm <sup>3</sup> )
Tank Capacity, abrasive	10 lbs. (4.5 kg)	20 lbs. (9 kg)

During normal operation, employing a 0.060" diameter nozzle a 0.025" diameter tank orifice, and 25 micron aluminum oxide powder; a full tank of powder, approximately 10 lbs. (standard tank), will last about 6 to 9 hours of actual blast time; air will be used at about 250 standard cubic feet per hour (SCFH) at 80 psig; and nozzle life will be 8 to 35 hours depending on the amount of wear that can be tolerated.

<sup>[1]</sup> Units supplying abrasive to multiple nozzles may require up to 16 SCFM.

<sup>[2]</sup> Operating voltage is selectable - see "Set-up"



## Chapter 2: Getting Started

### In This Chapter

- ◆ The work area required to properly use the PowerFlo® model PF2400
- ◆ What you received with the PF2400
- ◆ Basic Components of the PF2400
- ◆ Setting up and testing the PF2400

## **2.1 The Proper Work Area**

The PowerFlo® model PF2400 should be used in an environment that:

- Provides adequate ventilation.
- Provides adequate lighting both inside and outside the workstation.  
Comco recommends that the general environment be illuminated with at least 50 decaluxes and that the interior of the workstation be illuminated with a minimum of 125 decaluxes.
- Is between 68°F and 85°F, with less than 40 percent relative humidity.

The PowerFlo® model PF2400 is intended for use in a factory or shop environment. It is **not** designed for use where it could be exposed to rain, caustic chemicals, heavy vibration, and other non-standard environments. Use in applications other than those described in this manual may result in hazardous conditions and void the warranty.

Since it is impossible to achieve 100% containment of the abrasive within the system, it is not recommended for use in a “clean room”.

In addition to the PowerFlo® model, three additional elements are typically needed for proper micro-abrasive blasting: a workstation, a dust collector, and a dry air supply. The following paragraphs explain the importance of each of these items. Refer to figure 2.1a to see how these items work together as a complete system.

### **2.1.1 Workstation**

A suitable hood or box providing a means of working with the abrasive material without contaminating the atmosphere of the room is required. It must protect the operator's face and provide adequate light. The Comco WS2200 and WS6000 WorkStations are designed for this purpose.

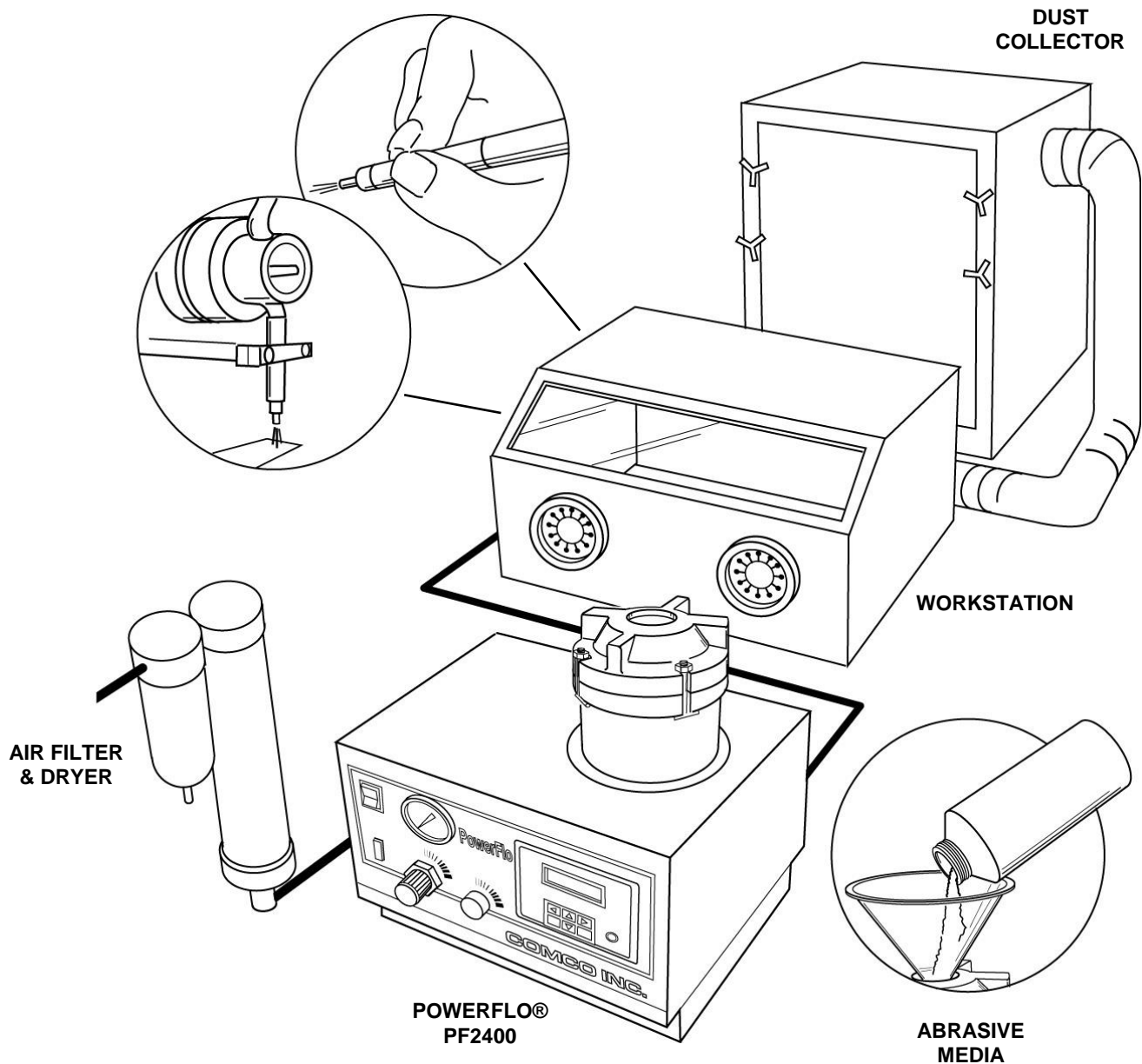
### **2.1.2 Dust Collector**

In order to remove the spent abrasive, a suitable industrial dust collector is required. These dust collectors have both high airflow and large filter areas to keep work areas clean and dust free. The Comco DC2100 is a suitable dust collector for most micro-abrasive blasting applications. In heavy usage, multiple blaster, and automated applications the continuous duty DC3100 dust collector is recommended.

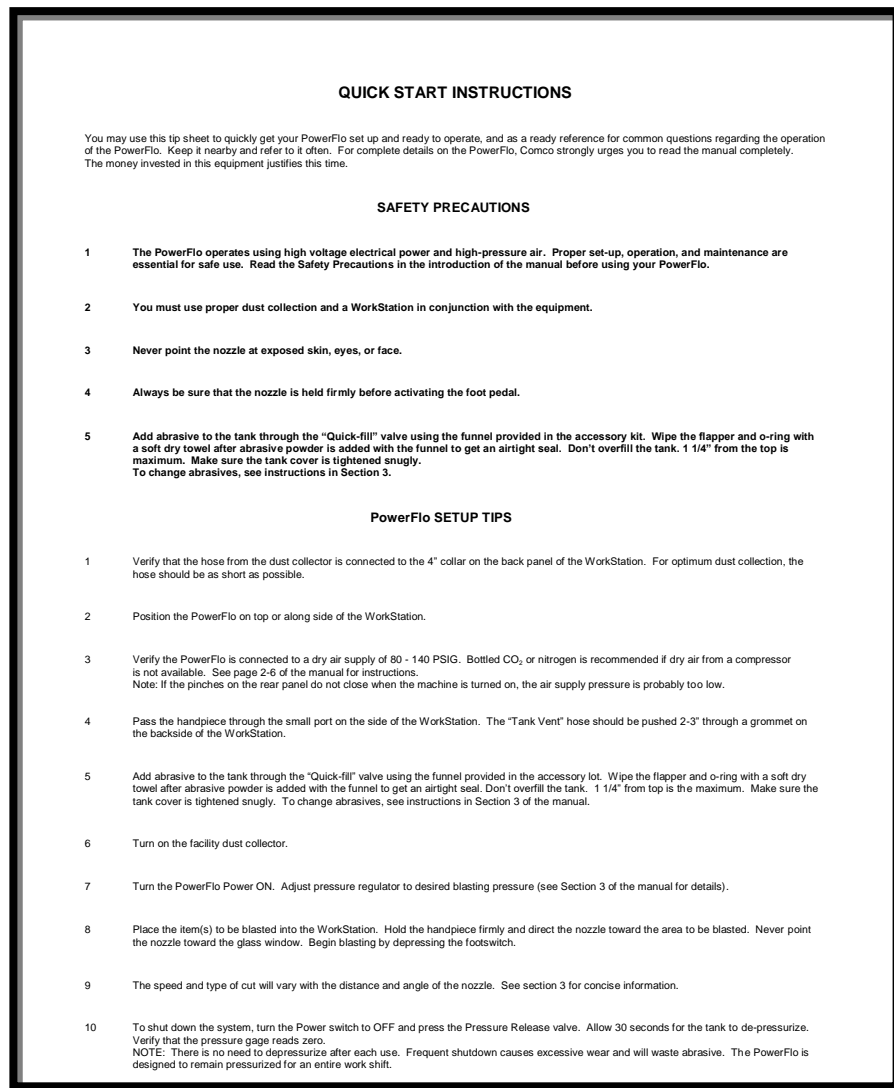
### **2.1.3 Air Supply**

The propellant required for the abrasive is compressed air or neutral gas that meets the Detail Specifications outlined in Chapter 1. Comco has a complete line of air dryers for shop (compressed) air supplies that will meet or exceed those specifications.

Bottled gas such as CO<sub>2</sub> or nitrogen provides clean, dry air, and may be used if shop air is not available. However, depending on operating conditions, a 50 lb. bottle of gas will only last 3-4 hours. Bottled gas does not require air dryers, but may require special regulators. Contact Comco for more information.

**Micro-abrasive Blasting System Requirements****Figure 2.1a****2.1.4 Electric Power**

A source of 115 or 230 VAC, 50/60 Hz, capable of providing 100 watts is required for the PF2400. If the WS2200 or WS6000 WorkStation is used, it requires 40 watts. The DC2100 Dust Collector, if used, requires about 16 amps for its 1-HP motor. Actual voltage required for each machine will be found on the nameplate.



**PowerFlo® PF2400 Reference Sheet**  
**Figure 2.1b**

Figure 2.1b is an illustration of the Reference Sheet that comes with your PF2400. It contains important information you can use to get the most out of your investment. Keep it nearby and refer to it often. However, it cannot substitute for the comprehensive data found in this manual. Prior to setting up and operating your PowerFlo® model PF2400, the operator and the department supervisor should carefully review this entire manual.

## **2.2 What You Received With Your PowerFlo® model PF2400**

<p><b>CAUTION:</b> The shipping carton containing the PF2400 and accessories weighs 70 to 85 pounds, depending on the model. Use appropriate caution while lifting.</p>
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The PowerFlo® PF2400 is shipped fully assembled and requires only minimal set-up to use. The following pages describe what is needed, and how to set up and test your micro-abrasive blasting system for proper operation.

Once you receive your PowerFlo® PF2400, check the contents of the shipping carton to make sure that you have received all of the items. Besides this manual and the Reference Sheet pictured on the previous page, you should find the standard Accessory Parts Kit. Note that two additional items, a .025" tank orifice, MB1409-25, and a .060" nozzle, PF2110-1 (red), should already be installed on the PowerFlo® PF2400.

Open all small packages within the large carton carefully, since many small parts are included with the shipment.

## **2.3 Basic Components of the PowerFlo® PF2400**

### **2.3.1 Power Switch**

The Power Switch is located on the upper left-hand corner of the front panel. It is not only the primary ON/OFF switch for electrical power it also depressurizes the unit when set to the OFF position. The Power Switch will illuminate when the power is "ON".

### **2.3.2 Pressurize/Vent Switch**

The Pressurize/Vent switch is located directly below the ON/OFF switch on the left-hand side of the unit. It is a 3-position momentary contact switch, with the center position being neutral. Pressing the switch "Up" to the "Pressurize" position starts the tank pressurizing sequence. Pressing the switch "Down" will "Vent" the tank pressure.

### **2.3.3 Handpiece**

The handpiece, which holds the blasting nozzle, should be inserted into one of the holes in the side of the workstation provided for this purpose. The PF2400 is a pressurized device. Never depress the footswitch without holding the handpiece firmly in place.

### **2.3.4 Air Pressure Regulator**

The Air Pressure Regulator knob on the front of the unit controls the PowerFlo® model's operating air pressure as indicated on the pressure gage located directly above it. To adjust the pressure, pull the knob out. Rotate it clockwise to increase the pressure or counterclockwise to decrease the pressure. Push the knob in to lock it in position.

### **2.3.5 Pressure Gage**

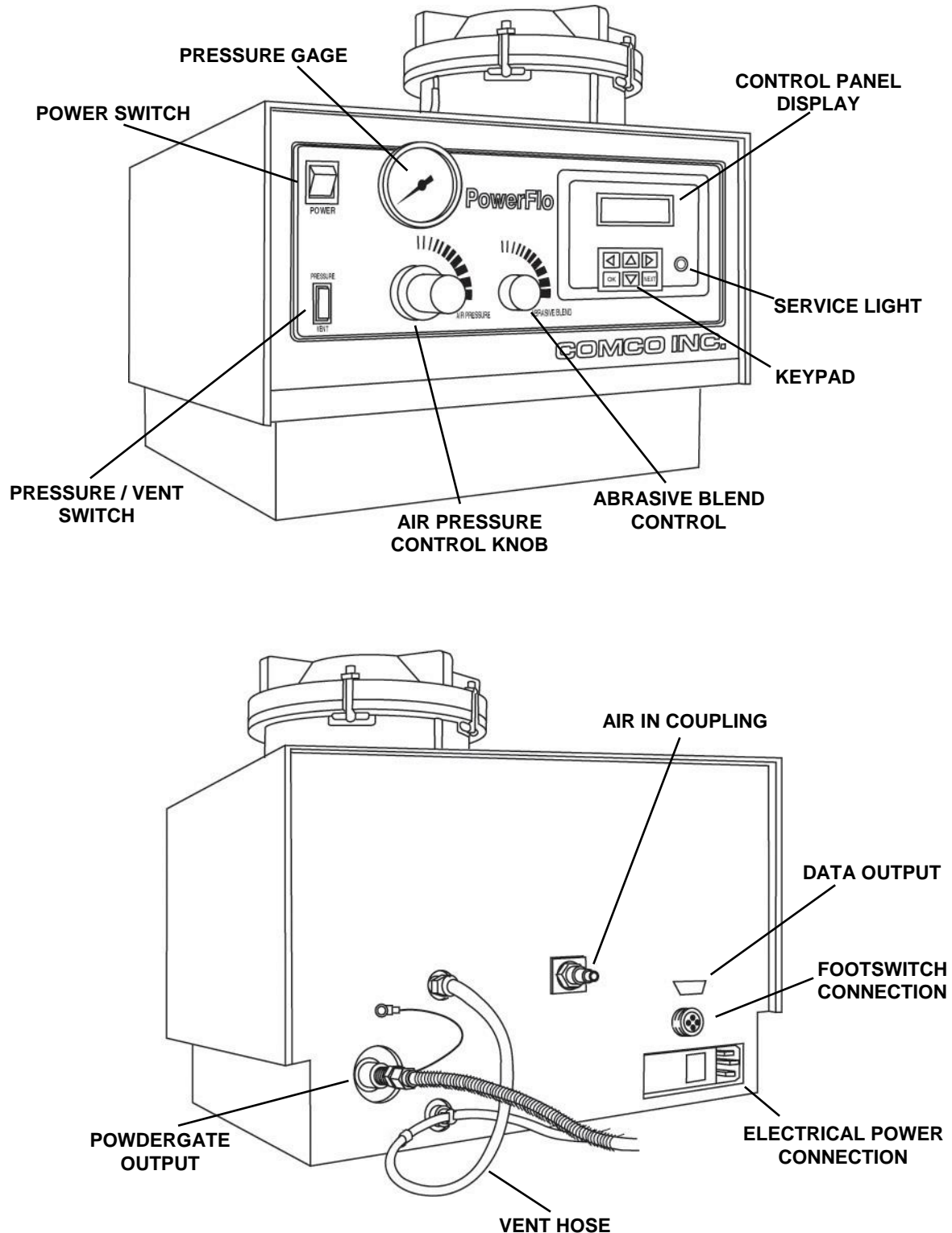
The Pressure Gage on the front of the unit indicates the air pressure in the abrasive tank. Typically, operating pressure selected for the process will be between 40 psig and 125 psig.

### **2.3.6 Abrasive Blend Control**

The Abrasive Blend Control knob controls the ratio of the air/abrasive mixture. Turning the knob clockwise increases the concentration of media in the air stream. The Abrasive Blend control is designed for "fine-tuning" the abrasive blast only. Turning the knob counterclockwise to the minimum setting will not stop abrasive flow. The main control for the amount of abrasive in the air stream is the Tank Orifice (explained fully in Chapter 3).

### **2.3.7 Footswitch**

The Footswitch activates the abrasive hose pinch and the modulator, allowing abrasive to flow from the tank to the blasting nozzle. An external controlling device can replace the footswitch.

**External Component Locations****Figure 2.3a**

## Basic Components of the PowerFlo® PF2400 (cont'd)

### 2.3.8 "Quick- Fill" or Flapper Valve

The Flapper Valve is located on the top of the tank cover. It is used to fill the tank with abrasive powder. **NOTE:** Only refill the abrasive tank after the PF2400 Power has been turned "OFF" and the unit has been vented.

### 2.3.9 PowderGate

The PowderGate Valve is used to control the air/abrasive flow from the PowerFlo® model. The valve protrudes from the rear of the unit. It is designed for high reliability in a production environment.

### 2.3.10 Vent Pinch

The Vent Pinch is located on the rear panel. The pinch squeezes the blue poly hose in order to stop the flow of air and abrasive out of the tank vent when the unit is pressurized. When the PF2400 is vented with the Pressurize/Vent Switch or turned off, the Vent Pinch opens to allow the PF2400 to depressurize.

### 2.3.11 Control Panel

The Control Panel located on the front of the unit is the interface between the operator and the PowerFlo® model microprocessor. The LCD panel displays the state of the machine and any abnormal conditions that require operator attention. The display also functions as a maintenance and trouble-shooting guide. The signal light illuminates to indicate a condition that requires attention. The keypad is used to navigate through the display's maintenance and trouble shooting menus.



## 2.4 Set-Up and Test

1. Place the PowerFlo® model within reach of the electrical outlet and the air source. Refer to “The Proper Work Area” discussed at the beginning of this chapter.

<b>CAUTION:</b> The PF2400 weighs approximately 65 to 80 pounds, depending on the model. Use caution while lifting.
---

2. Remove the tank cover by loosening (do not remove) the four nuts with the 9/16" wrench provided in the accessory kit. Let the cover bolts swing down and lift off the tank cover (see figure 2.4a).
3. Grasp the powder basket by the lip and lift straight up. Avoid lifting the powder basket near the slot, since this is the weakest point in the lip. The slot is for pouring. It is not a handle.
4. Carefully clean out any foreign material from both the basket and the tank. Check the orifice at the bottom of the powder basket to make sure it is clear. Remove it if necessary (see Figure 3.1.2b) and clean or replace. Insert the basket back into the tank by pushing down with a slight twist, to seat the O-ring. Clean off the tank cover and check to make sure that the O-rings are not damaged and that the sealing surface is clean.
5. Wipe off the top surface of the tank and replace the tank cover. Be sure that the tank cover is properly oriented on the tank, with the vent holes at the front and rear. Swing the bolts up into the slots in the cover and tighten the nuts firmly, but not too tight.
6. Remove the protective red cap from the end of the PowderGate's output connector and connect the Abrasive Hose to the connector. The Abrasive hose is tethered to the PowerFlo's back panel by the hose's ground wire. Leave this ground wire attached to the panel.
7. Connect the PowerFlo to a dry air supply using a **1/4" Industrial Shape Quick-Disconnect Coupling Socket** (customer supplied).

Example couplings: Foster 3 Series SG1513 or McMaster Carr 6536K38

The blasters air input plug is located on the back of the blaster(see Figure. 2.3).

8. Set the air pressure upstream of the PowerFlo® PF2400 to at least 90 PSIG but not more than 140 PSIG.

<b>CAUTION:</b> Inlet pressures above 140 psig may damage the PowerFlo® PF2400. The PF2400 has an integral pressure relief valve, however, Comco recommends that the system inlet line have a relief valve also.
--

**Set-Up and Test** (cont'd)

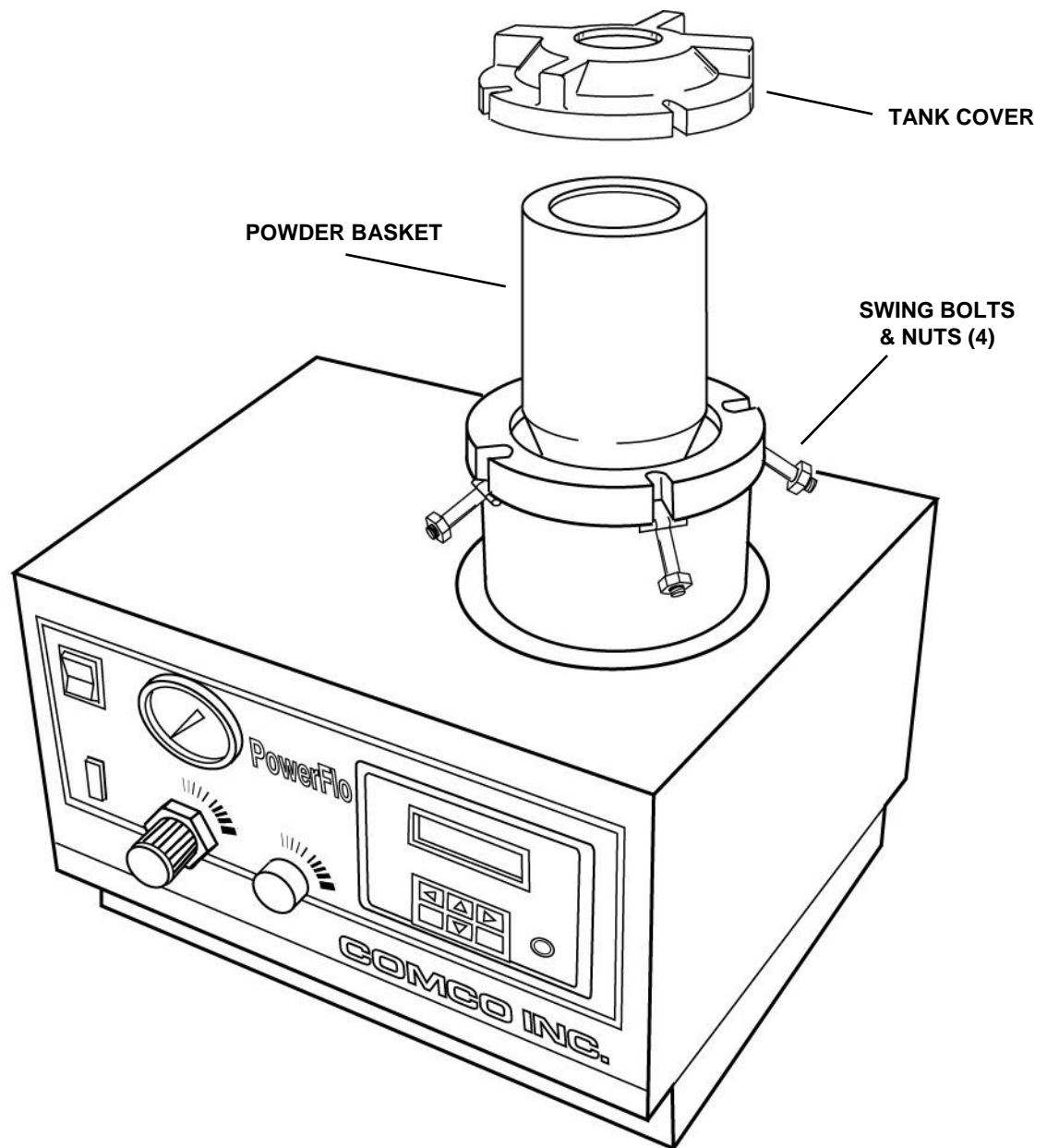
9. Make sure that the Power switch located on the front of the panel is in the OFF position.
10. Find the power cord in the accessory kit and plug it into the 3-prong male connection located on the back of the unit (see Figure 2.3a).

<p><b>CAUTION:</b> The PF2400 is manufactured to be selectable for either 115 VAC or 230 VAC. Check the voltage indicator on the power connection located on the back of the PowerFlo® PF2400 unit to ensure that it is selected to the correct operating voltage.</p>
--

11. Plug the 3-prong male end of the power cord into the appropriate facility outlet.
12. Find the footswitch in the accessory kit and plug it into the 4-pin connector located at the back of the unit (see Figure 2.3a). Place the footswitch on the floor in a convenient position for the operator.
13. Insert the end of the hose connected to the “Tank Vent” on the rear of the machine into one of the tube grips located in the back of the workstation. Push the tubing through the grip 1 to 2 inches, and hand tighten the grip’s nut to secure the tubing. When connecting the PowerFlo to an automated system, the vent tube grips can be found on, or near the dust collection outlet of the blast chamber.

<p><b>CAUTION:</b> The air that comes out of the vent hose will contain abrasive. Place the free end of the vent hose into the workstation or the dust collector. <b>Always</b> secure the free end of the hose.</p>
--

14. When routing the abrasive hose into the workstation or a system’s blast chamber avoid tight hose bends. Use as large bend radii as feasible to reduce internal hose wear. Abrasive hoses wear quickest at their bends and small bend radii accelerates the wear.



**Tank Inspection**  
**Figure 2.4a**

**Set-Up and Test (cont'd)**

15. Turn the Power switch to "ON". The switch should illuminate and the display should read *NOT PRESSURIZED*.
16. Actuate the Pressurize switch by momentarily pressing it upward to the "Pressurize" position. The system should start to pressurize with an audible hissing sound (approximately 5 seconds). The display will read *PRESSURIZING*. The PowderGate will close and the pressure gage on the front of the unit should indicate pressure in the unit. Prior to tank pressurization the system performs a cover test operation. As this test occurs air will leak from the cover. This is normal. After the tank is pressurized the display will read *READY TO BLAST*. Listen for prolonged, obvious leaks.

<b>CAUTION:</b> Do not lean over the abrasive tank while the system is pressurizing.
--

<b>NOTE:</b> The Service light will be lit and the display will read <i>POWDER LEVEL LOW</i> . This is a normal condition, since powder has not yet been added to the tank. Adding powder will be covered in a later chapter.
---

17. The regulator is set to 0 when the unit is shipped. Adjust the pressure with the "Air Pressure" regulator knob (Figure 2.3a) until the needle on the pressure gage is centered at 80 PSI. Pull the knob out to unlock the regulator before adjusting. To increase the pressure, turn the knob clockwise.
18. Firmly hold the nozzle inside the workstation or hood, and step on the footswitch. Be sure the nozzle is pointed away from the glass window. Air should immediately flow from the nozzle and the modulator will hum audibly, indicating that it is working properly. The display will read *BLASTING*. As air flows out of the nozzle, observe that the Service light on the control panel is lit and the display reads: *NO POWDER FLOW*.

Both the air and the modulator should stop when the foot is lifted from the footswitch.

<b>CAUTION:</b> The air that comes out of the nozzle contains abrasive. Do not point the nozzle at anything that could be harmed or damaged as a result of abrasive flow, especially the workstation glass window.
--

**Set-Up and Test (cont'd)**

19. Step on the footswitch again. As air escapes from the nozzle, watch the pressure gage. The needle should remain steady or oscillate slightly around the set pressure. If the air pressure drops significantly, check your air source to ensure that it can consistently deliver at least 6 SCFM of air.
20. Press the Pressure /Vent switch down to the "Vent" position. The abrasive tank should immediately vent through the vent hose and the pressure gage on the front of the unit should rapidly drop towards zero pressure. **The tank takes between 10 and 15 seconds to fully vent.** If the PowerFlo® model is equipped with an extended powder tank, it will take between 30 and 45 seconds to fully vent.
21. Turn "OFF" the power using the Power switch.
22. You are now ready to select the proper abrasive, nozzle and other operational parameters to begin using your PowerFlo® model PF2400. These issues, as well as detailed operational instructions, are discussed in the next chapter.

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## Chapter 3: Using the PowerFlo® Model PF2400

### In This Chapter

- ◆ Abrasive selection
- ◆ Orifice and Nozzle selection
- ◆ General operation of the PF2400
- ◆ Advanced operation of the PF2400

## 3.1 Micro-Abrasive Blasting Parameters

There are many variables that affect the results you will get from the micro-abrasive blasting process. In order to get the most from your PowerFlo® Model PF2400, a thorough understanding of these parameters is essential.

**The single most important factor in getting the maximum benefit from your PowerFlo® Model PF2400 is in proper abrasive selection.** With the right abrasive, you can lightly clean soft materials or deburr machined metal parts.

Once the correct abrasive is chosen, the remaining factors that affect the abrasive action are: the number of particles striking the work area, the velocity of the particles, and the angle of the blast. These factors are controlled by the PF2400 through the following operator selections:

- Tank Orifice Size
- Nozzle Size
- Nozzle to Work Distance
- Angle of Nozzle to Work Surface
- Air Pressure
- Powder Flow Adjustment Setting

Table 3.1a gives a brief overview of all of these essential factors. Each of them is discussed in detail on the following pages, beginning with abrasive selection.



**General Summary of Factors Affecting Abrasive Blasting**  
**Table 3.1a**

<b>Variable</b>	<b>Comments</b>	<b>Manual Reference*</b>
The Abrasive	The abrasive you use has the most significant impact on how well the unit works. Hardness, sharpness, and particle size all affect cutting speed. In general, the larger the particle size, the faster the cutting or abrading will be.	See the information in section 3.1.1 <b>Abrasive Selection</b> .
The Tank Orifice	Other factors being equal, the amount of powder flow is directly proportional to the size of the tank orifice. The orifice should be sized according to the abrasive used, so that a small orifice is not used with large particles.	See the <b>Tank Orifice</b> discussion in section 3.1.2.
The Nozzle	Nozzles with larger openings produce larger blast patterns, thus speeding up some blast processes.	See the <b>Nozzle Size</b> discussion in section 3.1.3.
The Air Pressure	The higher the pressure, the faster the part will be abraded. Blasting at higher pressures can however, increase the likelihood of damage to delicate parts.	See the <b>Air Pressure</b> heading 3.1.4, in this chapter.
The Distance between the nozzle and the work	Up to a point, the closer the nozzle gets to the work the faster the material will be removed beneath the nozzle. A distance of about 5-8 times the nozzle diameter will generally remove the maximum material.	See the <b>Nozzle Distance</b> discussion in section 3.1.5.
The Angle of the abrasive stream to the work	Cutting rate will improve as the nozzle is tipped at an angle relative to the surface of the material. Angling the nozzle also tends to work better for cleaning a surface.	See the <b>Angle of Approach</b> section 3.1.6, in this chapter.
The Abrasive Blend control	Fine adjustments in the amount of powder in the air stream can be made with the powder flow control knob on the front panel. Less powder and more air tend to cut faster at close nozzle distances.	See the <b>Abrasive Blend Adjustment</b> discussion in section 3.1.7.

\* Additional Information can be found in these sections

### 3.1.1 Abrasive Selection

An abrasive material has three characteristics that affect its cutting action: shape, hardness, and particle size. The most common abrasive materials are listed below.

#### Abrasive Selection

**Table 3.1.1a**

<b>Material</b>	<b>Hardness</b>	<b>Shape</b>
Sodium Bicarbonate	Soft	Needle
Walnut Shell	Soft	Irregular
Plastic	Moderate	Block
Glass Bead	Hard	Sphere
Crushed Glass	Hard	Irregular
Aluminum Oxide	Very Hard	Block
Silicon Carbide	Extremely Hard	Block

#### Particle Shape

The shape of individual particles of an abrasive material gives a good indication of its cutting action. A spherical particle like a glass bead has virtually no cutting ability, while a “blocky” shaped particle has points and edges that will cut and strip away surface material on impact.

#### Particle Hardness

In conjunction with the basic shape of the abrasive particle, the hardness of the particle must also be considered. For example, an irregular shaped particle such as crushed glass may have sharper edges than a blocky particle like aluminum oxide, but the hardness of aluminum oxide makes it much more aggressive.

#### Particle Size

Choosing the abrasive material defines both hardness and sharpness, so the only variable remaining is size. Many different sizes of abrasive media are available for use with the PowerFlo® (see Table 3.1.1b). Particle sizes between 10 and 300 microns (800 - 75 grit) work best. Since the very small orifices in the PF2400 may be easily clogged by oversized particles, it is very important that only those materials that have been approved be used and only as directed. Extreme care should be taken that foreign material is not allowed to fall into the powder. **Never try to salvage spent abrasive.**

Typically, the larger the abrasive particle size, the faster the cutting. The PowerFlo® propels the abrasive at a velocity approaching 500 feet per second. At this speed, the increased mass of a larger particle will deliver a greater impact to the work surface. Each impact creates a larger crater, producing more texture on the surface of the part.

**Common Abrasives and Their Applications****Table 3.1.1b**

Comco Type	Abrasive Material	Particle Size			Description/Characteristics
		Average Particle Size		Range (Microns)	
		Micron	Inch		
A	Aluminum Oxide	10	0.0004	5 - 25	The most common abrasive used. A very hard abrasive that cuts well through almost any material, particularly brittle ones. Normally leaves a matte finish, with the surface roughness being dependent upon the abrasive size and the blast pressure. Somewhat sensitive to moisture.
J	Aluminum Oxide	17.5	0.0007	10 - 25	
B	Aluminum Oxide	25	0.001	15 - 35	
C	Aluminum Oxide	50	0.002	30 - 80	
N	Aluminum Oxide	150	0.006	75 - 200	
D	Glass Beads	50	0.002	40 - 80	Good for light deburring and satin finishing of some metals but not good for cutting. Can be used to remove loose surface particles such as oxides. Sensitive to moisture.
E	Silicon Carbide	20	0.0008	10 - 40	The fastest cutting of the standard abrasives. The best abrasive to deburr stainless steel and titanium parts. Does not absorb moisture. Dark gray or black in color.
F	Silicon Carbide	50	0.002	30 - 80	
G	Sodium Bicarbonate	50	0.002	20 - 150	A very gentle abrasive, good for very light cutting of soft materials. Can be used to remove conformal coating from PCBs. Water soluble and easily removed from delicate parts. Susceptible to moisture and cannot be heated to above +150°F.
H	Walnut Shell	250	0.010	80 - 300	Gentle abrasive that can clean metal or ceramic surfaces without changing the surface finish. Absorbs moisture easily.
M	Plastic	200	0.008	150 - 300	Good for stripping soft materials, such as paint or conformal coating, from harder substrates.
K	Crushed Glass	80	0.003	40 - 90	For light cutting of soft to medium materials.

**Note:** Always start the work shift with fresh abrasive powder. Powder left sitting in an unpressurized machine overnight can absorb moisture. This contaminated powder can cause flow problems. Keep powder containers sealed and stored in a cool, dry place.

### 3.1.2 Tank Orifice

The powder basket within the abrasive tank is fitted with a single orifice at the bottom through which all powder must pass (see Figure 3.1.2b). The amount of powder flowing is directly proportional to the size of this opening.

As seen in the table below, a small increase in the diameter of the tank orifice results in a large increase in the area of the opening. In other words, increasing the tank orifice by only a few thousandths of an inch, can almost double the amount of powder that will pass through it and out the nozzle. This is a very important factor, since the number of abrasive particles striking the work surface has a direct relation to the speed of the cutting action.

Some judgment is required in selecting an orifice. A very small orifice should not be used with large abrasives. Likewise, a very large orifice may cause a small nozzle to plug from excessive powder in the line. Table 3.1.2a should be used as a guideline for selecting orifice size.

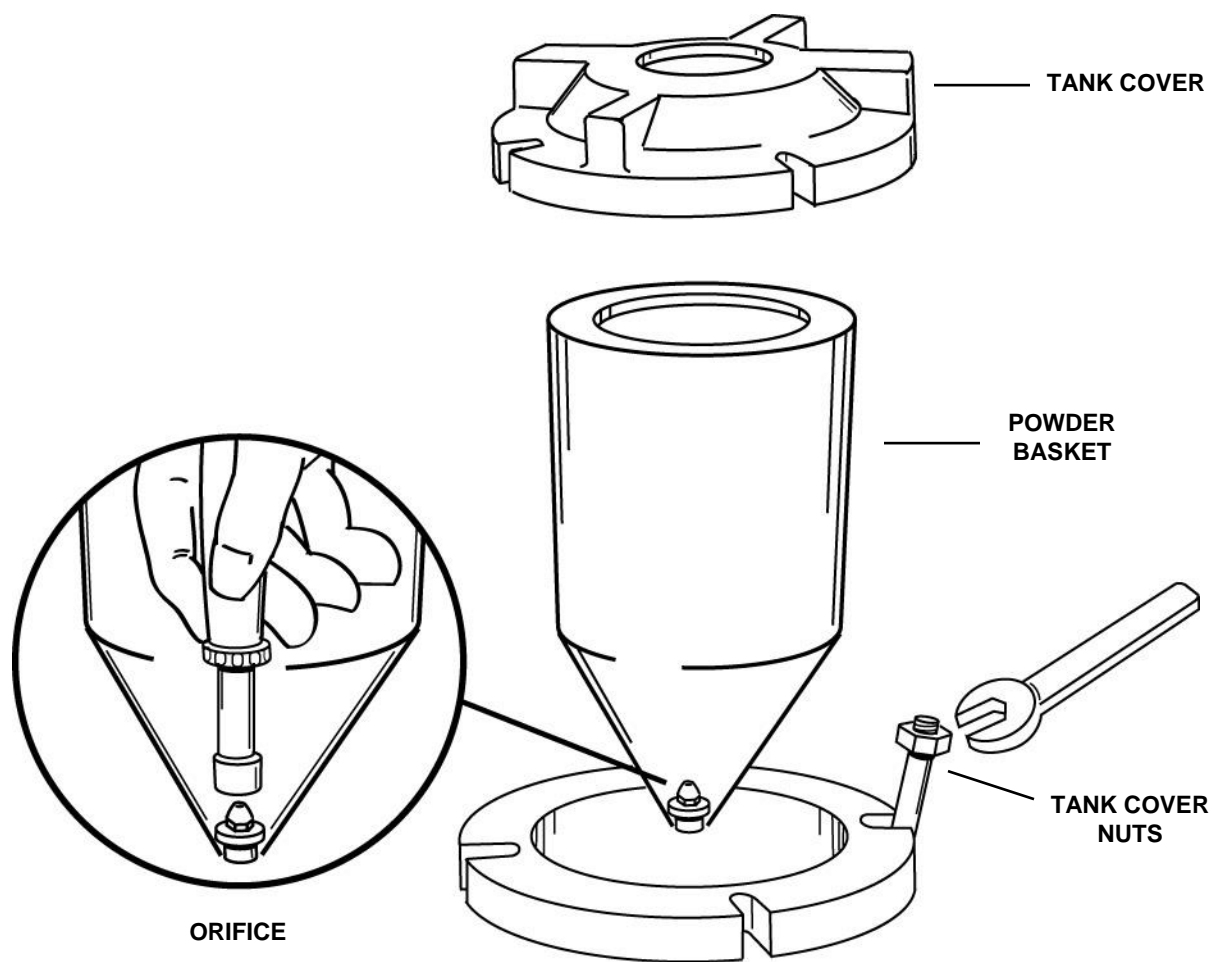
**Orifice Selection Chart**  
**Table 3.1.2a**

<b>Comco P/N</b>	<b>Diameter, in.</b>	<b>Area, in<sup>2</sup>.</b>	<b>Recommended Media Selection</b>
MB1409-18	0.018	$2.5 \times 10^{-4}$	10-25 micron
MB1409-25	0.025	$4.9 \times 10^{-4}$	17.5-50 micron
MB1409-30	0.030	$7.1 \times 10^{-4}$	25-100 micron
MB1409-40	0.040	$12.6 \times 10^{-4}$	25-250 micron
MB1409-60	0.060	$28.3 \times 10^{-4}$	25-250 micron

The PF2400, as shipped from the factory, is equipped with the 0.025" diameter orifice (MB1409-25). A 0.030" orifice is provided in the accessory parts kit. The orifice will have a number stamped on the side that corresponds to the dash number, and opening size. Refer to the table above to determine the size.

To change the tank orifice, refer to the procedures in Chapter 2, "Set-up and Test", to remove the powder basket from the tank. The tank orifice can then be removed from the powder basket with a 1/4" nut driver (see Figure 3.1.2b). The replacement orifice should be installed securely, but not too tight. Insert the powder basket back in the tank and replace the tank cover.

For improved performance and longer life, all Comco orifices are carbide lined.



**Changing the Tank Orifice**  
**Figure 3.1.2b**

### 3.1.3 Nozzle Selection

The PowerFlo® PF2400 is capable of using a wide range of nozzles. These nozzles vary in size, shape, and direction to match specific applications.

Comco offers a variety of nozzles that can be used with the PF2400. An application's parameters dictate the appropriate nozzle for a job. Important considerations when selecting a nozzle are the size of the area that needs to be blasted, the size of abrasive being used, the shape and intricacy of the part, and the process being performed.

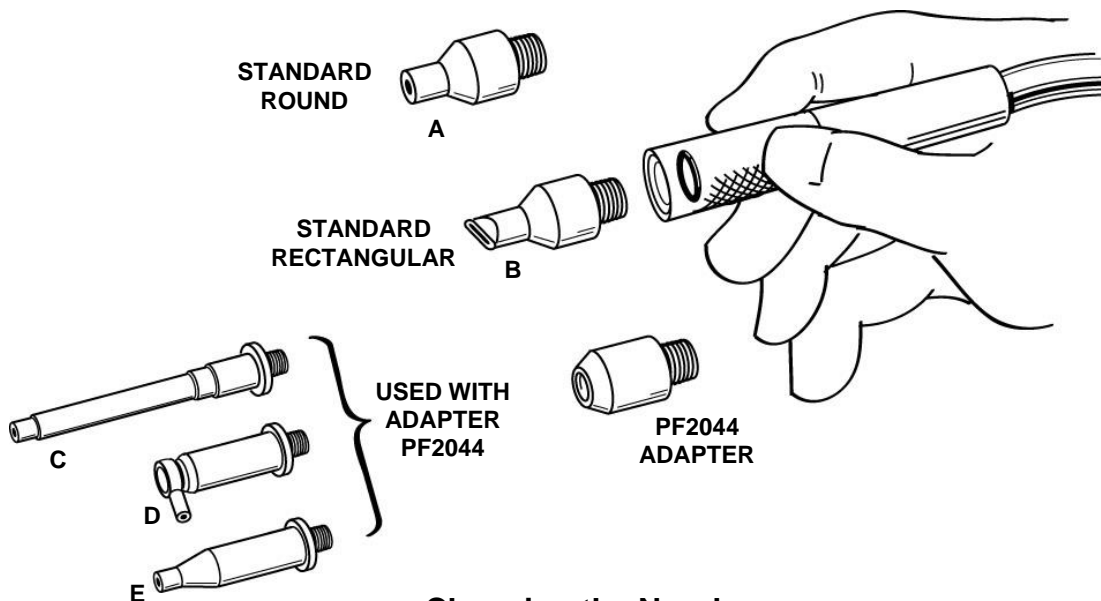
The most common nozzles used for the PF2400 are standard round nozzles. These nozzles offer the best combination of features for coverage and durability. All standard PowerFlo® units come with a 0.060" and a 0.080" round nozzle.

When selecting a nozzle, it is important to make sure that the nozzle is large enough for the abrasive being used. We recommend choosing a nozzle that has a diameter of at least 4 times the size of the average particle. Using a nozzle that is too small results in particles plugging the tip.

When an application calls for preparing the entire surface of a part, larger nozzles are more effective. The larger spray pattern results in a more uniform surface finish and faster processing time. Rectangular nozzles can also be used to generate a wide spray pattern.

For more involved applications, we also manufacture nozzles with alternative tips. The extended nozzles are very effective at reaching down inside a part to focus the blast on a specific region. Right angle nozzles change the direction of the blast stream, improving performance when the inside surface of a cylinder is blasted. Additionally, custom nozzles can be manufactured to meet unique requirements.

The threads on the handpiece nose are designed to connect to the large PowerFlo® / DirectFlo™ nozzles, 0.060" – 0.125". For applications better suited to MicroBlaster® nozzles, an adaptor is included to enable their installation onto the handpiece. We recommend using a MicroBlaster® nozzle of not less than 0.046" diameter.



**Changing the Nozzle**  
**Figure 3.1.3a**

**Nozzle Chart <sup>[1]</sup>**  
**Table 3.1.3b**

Item Fig.3-2	Comco P/N	Holder Color	Size I.D.	Size (ID mm)	Tip O.D.	Recommended Tank Orifice Diameter
Round Nozzles						
A	PF2110-1	Red	0.060	1.5	0.125	0.018 - 0.040
A	PF2110-3	Blue	0.080	2.0	0.156	0.018 - 0.060
A	PF2110-7	Red	0.107	2.7	0.185	0.030 - 0.060
A	PF2110-5	Red	0.125	3.2	0.250	0.030 - 0.060
Rectangular Nozzles						
B	PF2110-4	Red	0.008 x 0.150	0.2 x 3.8	0.195	0.018 - 0.030
B	PF2110-6	Blue	0.016 x 0.190	0.4 x 4.8	0.250	0.018 - 0.040
MicroBlaster® Nozzles						
<i>Certain applications are better suited for blasting with a MicroBlaster® nozzle.  The Comco Nozzle Adapter PF2044 is required for installing standard  or Hi/Performance MicroBlaster® nozzles on the PowerFlo® model.</i>						
Straight Round and Rectangular Nozzles						
E	MB1500-11 <sup>[2]</sup>	Green	0.030	0.8	0.074	0.018 - 0.040
E	MB1500-29	Yellow	0.046	1.2	0.125	0.018 - 0.040
E	MB1500-23	Black	0.008 x 0.150	0.2 x 3.8	0.195	0.018 - 0.040
E	MB1500-32	Blue	0.012 x 0.150	0.3 x 3.8	0.195	0.018 - 0.040
Straight Round Nozzles with Extended Carbides (1.5 inches long)						
C	MB1503-2 <sup>[2]</sup>	Green	0.030	0.8	0.074	0.018 - 0.040
C	MB1503-3	Yellow	0.046	1.2	0.120	0.018 - 0.040
90-Degree Angle Nozzles						
D	MB1501-14 <sup>[2]</sup>	Green	0.030	0.8	0.074 <sup>[3]</sup>	0.025 - 0.040
D	MB1501-28	Yellow	0.046	1.2	0.125 <sup>[3]</sup>	0.025 - 0.040
Straight Nozzles, High Performance						
E	MB1520-30 <sup>[2]</sup>	Green	0.030	0.8	0.074	0.025 - 0.040
E	MB1520-46	Yellow	0.046	1.2	0.125	0.025 - 0.040
E	MB1520-60	Red	0.060	1.5	0.125	0.025 - 0.040

**[1]** Dimensions are in inches unless noted otherwise.

**[2]** Should only be used with a multiple nozzle array. See page 3-10 and Chapter 6, Options.

**[3]** Overall width is approximately 2".

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## **Multiple Nozzle Arrays and Splitters**

High volume applications often require some type of fixturing or automation. In many cases, multiple nozzles can be integrated to combine several blasting operations into a single station. The PF2400 is specifically engineered with the capability to supply sufficient air flow and abrasive media to drive up to 4 nozzles. This process is achieved without any adverse effects of leaning out the abrasive stream.

Supplying abrasive to multiple nozzles is accomplished by integrating wear resistant splitters that evenly divide the air stream generated by the PF2400. The splitters are engineered to efficiently channel the abrasive into multiple lines without causing the destructive turbulence often found in this type of device. Installation instructions and additional information about splitters can be found in Chapter 6, Options.

### **3.1.4 Air Pressure**

The simplest method of changing cutting speed is to vary the air pressure to the tank with the "Air Pressure" adjustment knob. Increasing the pressure increases the velocity of the abrasive particles. Therefore, the higher the pressure, the faster the work surface will be abraded.

### **3.1.5 Nozzle Distance**

The velocity at which the abrasive particles are expelled from the nozzle produces a well-defined stream that only flares about 9 - 12 degrees. Therefore, the distance the nozzle is held from the work surface will determine the size of the blast pattern as well as the material removal rate (or cutting action). Generally, as the nozzle is moved closer to the work, the blast pattern decreases and the material removal rate increases. What this means is, the distance the nozzle is held from the work surface will determine whether you get a deep, narrow cut with well defined edges, or just a light abrasion over a large area.

### **3.1.6 Angle of Approach**

Typically, a nozzle held perpendicular to the work surface is only done for precision drilling applications. In most cases, it is far easier to obtain the desired results from abrasive blasting with a nozzle held at an angle. The resulting blast pattern when the nozzle is at an angle to the work surface does not tend to dig holes or produce sharp edge cuts.

As the nozzle is tipped at an angle to a surface, the cutting of a groove will improve, since the action is self-cleaning. In this manner, a saw cut may be made with relatively straight sides through relatively thick materials. In any case, nozzle angle can be adjusted in two planes to result in at least one side being cut perpendicular to the surface.

### **3.1.7 Abrasive Blend Adjustment**

For most applications the ideal setting for the Abrasive Blend Valve is max. Turning the knob counterclockwise will lean out the abrasive stream. This mixes clean air into the abrasive stream as it leaves the tank. Drilling applications benefit from tight control and less abrasive in the air stream.



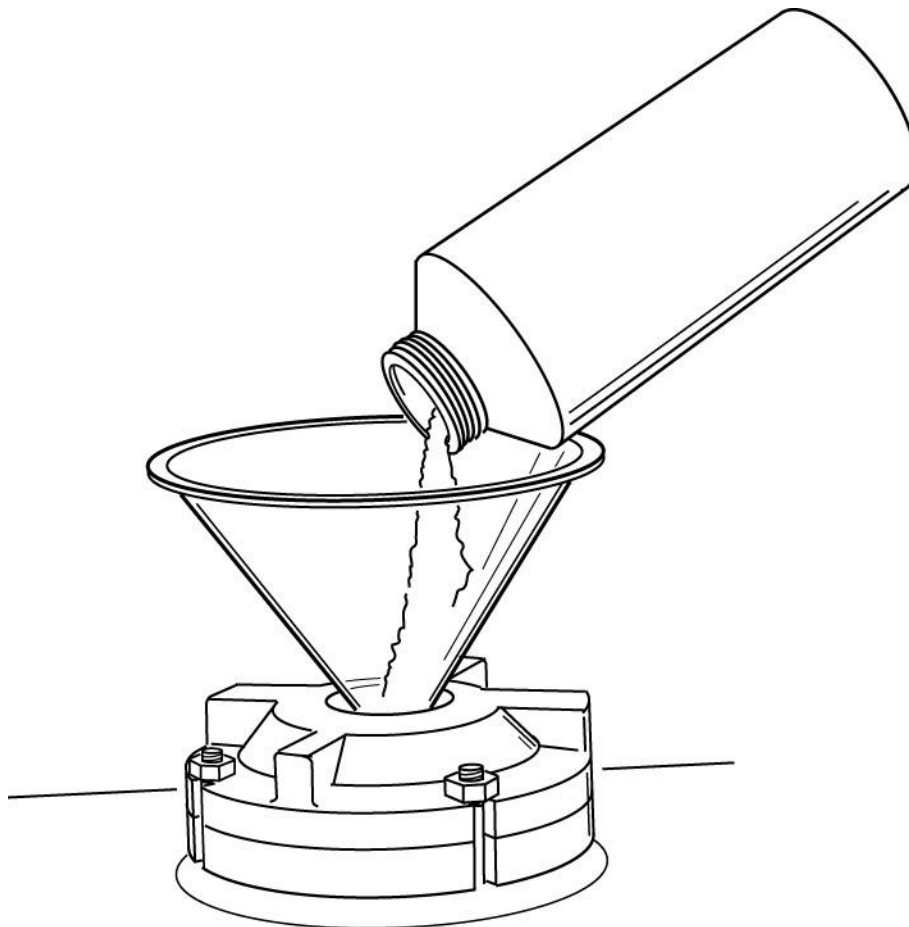
## **3.2 General Operation of the PowerFlo® Model PF2400**

This section gives step-by-step procedures on how to use the PowerFlo® Model PF2400. Before proceeding, make sure you have:

- ✓ Reviewed the safety precautions in the introductory chapter of this manual.
- ✓ Properly set up your PowerFlo® model PF2400 according to the procedures in Chapter 2.
- ✓ Set operating parameters based on the recommendations in Section 3.1.

### 3.2.1 Before You Begin

1. Check the tightness of the tank cover. The O-ring seal must be firmly seated against the tank.
2. Check to see that the end of the tank vent hose is inserted into the back of the workstation or dust collector hose.
3. Depress the tank cover flapper (see Figure 3.2.1a), and using the funnel from the accessory kit, pour the selected abrasive powder into the tank, filling it at least half full. **Do not overfill.** Tap the flapper as it closes so that any powder on it will be dislodged into the tank and not interfere with sealing of the O-ring.



**Filling the Abrasive Tank**  
**Figure 3.2.1a**

### 3.2.2 Power Up

1. Switch "Power" to the "ON" position. The Power indicator should light and the service light will flash 3 times and then turn off. The Control Panel Display should read *NOT PRESSURIZED*. Errors during the start-up test will cause the service light to stay on.
2. Actuate the Pressurize switch by momentarily pressing it upward to the "Pressurize" position. The system will start to pressurize with an audible hissing sound (approximately 5 seconds). The display will read *PRESSURIZING*. The pressure gage on the front of the unit should indicate pressure in the unit and the display should read *READY TO BLAST*. If not, see Chapter 5, Trouble-shooting.

**Note:** The blaster can be configured to automatically pressurize the tank at power-up by selecting the *AUTO PRESSURIZE* option in the *BLASTER OPTIONS* menu in *SETUP* mode.

3. Adjust the "Abrasive Blend" knob to "MAX" (fully clockwise).
4. Adjust the "Air Pressure" knob as necessary until the needle on the pressure gage is centered at about 80 psi. To adjust the pressure, pull the knob out. Rotate it clockwise to increase the pressure, or counterclockwise to decrease the pressure. Push the knob in to lock it in position.

**Note:** We use a non-relieving regulator on the PF2400. After turning the pressure down, hold the nozzle and step on the footswitch to allow the blast pressure to stabilize.

### 3.2.3 Blasting

1. Place the work piece in the workstation. The window will provide a suitable transparent barrier between the operator's face and the work piece to prevent flying abrasive particles from entering the eyes, nose, or mouth.
2. Turn on the dust collector that is connected to the workstation.
3. Install the appropriate nozzle on the handpiece, being sure that the O-ring is in place, and firmly seat the nozzle finger tight. The machine is initially equipped with a 0.060" diameter nozzle (red), which is suitable for most abrasives and applications. The O-ring is retained in the handpiece nose.
4. Make sure the handpiece is inserted into the workstation through one of the side openings. Grasp it firmly as if it were a pencil, aiming the tip of the nozzle at the work piece. The tip should be about 1/4" to 1/2" away from the surface to be blasted.

**CAUTION:**

The air that comes out of the nozzle contains abrasive. Do not point the nozzle at anything that could be harmed or damaged as a result of abrasive flow, especially the workstation glass window.

**Blasting** (cont'd)

5. Step on the footswitch to start blasting. The PowderGate will open and the modulator will start to hum. The Control Panel Display should read *BLASTING*. Abrasive will continue to flow as long as the footswitch is pressed. Move the handpiece or the work piece as required by the job.
6. If more or less abrasion is desired, turn the "Air Pressure" knob to raise or lower the blast pressure.
7. To change cutting speed, type of cut, or surface finish produced, experiment with nozzle distance and angle of the nozzle with respect to the surface of the work piece. Refer to Table 3.1a for factors that affect abrasive blasting results.
8. The speed and quality of a cut can be affected by the concentration of abrasive media in the air stream. This is adjustable using the Abrasive Blend adjustment knob. Turning the knob counterclockwise decreases the media concentration.

**3.2.4 Refilling the Tank**

1. Depressurize the PF2400 tank by pressing the Pressurize/Vent switch to the "Vent" position. Tank pressure will take 20 to 30 seconds to fully vent. The tall tank model PowerFlo® will take between 30 and 45 seconds to fully vent.
2. The tank may be refilled as soon as the pressure drops to zero and the flapper opens easily. Insert the funnel into the Flapper valve (see Figure 3.2.1a) and pour in the abrasive. **Do not overfill the tank.**
3. Tap the Flapper as it closes so that any powder on it will be dislodged into the tank and not interfere with sealing of the O-ring.

### 3.2.5 Changing the Abrasive

1. Depressurize the PowerFlo® PF2400 tank by pressing the Pressurize/Vent switch to the "Vent" position.
2. Loosen (do not remove) the four cover hold-down bolts with the 9/16" wrench provided in the accessory kit. Let the cover bolts swing down and lift off the tank cover (see figure 2.4a).
3. Grasp the powder basket by the lip and lift straight up. Avoid lifting the powder basket near the slot, since this is the weakest point in the lip. The slot is for pouring powder out it is not a handle.
4. Empty the powder from the basket into a suitable waste container. **Do not try to save this abrasive.**
5. Carefully clean out any remaining powder from both the basket and the tank. The preferred method is by using a vacuum, or slip the dust collector hose off the back of the workstation and use it to vacuum the inside of the basket, tank and cover.
6. Insert the basket back into the tank by pushing down with a slight twist, to seat the O-ring.
7. Fill the basket with the new abrasive.
8. Wipe off all abrasive on the tank top surface and the tank cover O-rings to ensure that the sealing surface is clean. **It is critical that the tank cover seals properly to the tank surface.** Check to make sure that the O-rings are not damaged. Replace the O-rings if necessary (see Chapter 5: Trouble-shooting and Repair, "Tank Cover").
8. Replace the tank cover. Be sure that the tank cover is properly oriented on the tank, with the vent hole at the front and rear. Swing the bolts up into the slots in the cover and tighten the nuts firmly, but not too tight.

## 3.3 Advanced Operation of the PowerFlo® PF2400

The PowerFlo® Model PF2400 is designed to work in two semi-automatic modes as described below.

### 3.3.1 Blast Timer

The PowerFlo® model can be configured to blast for a preset amount of time. Each time the footswitch is pressed, the blast will activate for the set duration. The footswitch must be released and pressed again to repeat the blast cycle. Any footswitch activity during the blast cycle is ignored.

From the “Power On” screen, depress the “OK” key on the keypad. This will advance you to the Set-up Menu.

```
-----SETUP MENU-----  
>BLASTER OPTIONS  
>MAINTENANCE MENU  
>USAGE DATA MENU
```

Use the up and down cursor keys to position the flashing cursor onto the *>BLASTER OPTIONS* line. Press the “OK” key. The Blast Options menu is displayed:

```
---BLASTER OPTIONS---  
>BLAST TIMER SETUP  
>AUTO PRESSURIZE  
>ERROR HANDLING
```

Use up and down to select *>BLAST TIMER SETUP* and press the “OK” key. The Blast Timer Set-up menu is displayed:

```
-BLAST TIMER IS OFF-  
>ENABLE TIMER  
>ADJUST TIMER VALUE
```

Position the cursor over *ADJUST TIMER VALUE* and press the “OK” key. The blast timer mode has a range between 0.1 and 999.9 seconds. Entering a value of zero is not allowed. Use the right and left cursor keys to position the cursor to the desired time field. Use the up and down cursor keys to change the value of that field.

```
-ADJUST BLAST TIMER-  
TIMER VALUE: 010.0 s  
  
ABORT[BACK] SAVE[OK]
```

The above screen shows the Blast timer set for 10 seconds. To accept and store this selection, press the “OK” key. To abort this operation and return to the previous screen, press the “BACK” key.

In the Blast Timer Set-up menu screen, position the cursor over *ENABLE TIMER* and press the “OK” key. The text on the top line changes to reflect that the timer is currently enabled.

```
-BLAST TIMER IS ON--
>DISABLE TIMER
>ADJUST TIMER VALUE
```

### 3.3.2 Remote Control

The PowerFlo® Model PF2400 is designed to operate in conjunction with automated systems where an external controller manages activation and monitoring. This is accomplished through the use of the data output connector on the back panel of the PF2400.

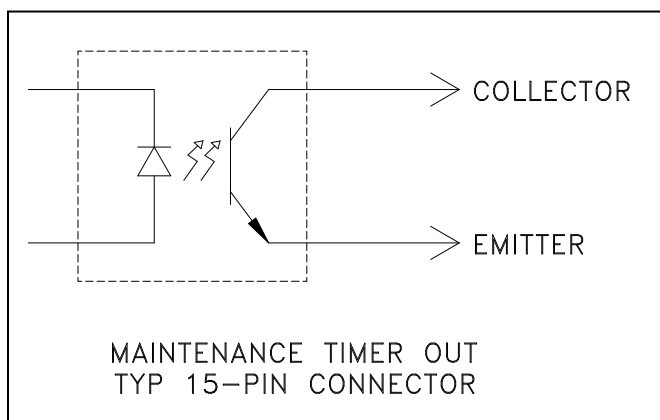
To use this data output, connect a cable with a 15 pin “D” connector between the PF2400 and the controller. This cable is to be supplied by customer. The Data Output provides opto-isolated data outputs for some of the PF2400 operating signals. The isolators have open collector type outputs and will pass up to 15.0 Milliamps. The signals provided are:

15-pin “D”      Pins 2, 4, 6, 10, 12, 15, are the device emitters.

		15-Pin “D”
1.	Maintenance	Pin 5, 6
2.	Error	Pin 11,12
3.	Low Powder Warning	Pin 14, 15
4.	Powder Flow Warning	Pin 9, 10
5.	Tank Pressurized	Pin 1, 2
6.	Abrasive On	Pin 3, 4

Pins 7 and 8 are connected to ground internally.

Pin 13 is used as a slave trigger drive. Bring pin 13 to +24V to activate the abrasive blast.



**Note:** The Powder Flow Warning presented at Pins 9 & 10, is a real time active output. At any time this signal could go true for a very short period. This type of momentary fluctuation does not necessarily indicate a problem with the machine. This signal should be filtered or sampled before acting upon its output. It is possible to have the PowerFlo software handle the filtering of this warning. Select *ERROR HANDLING* in the *BLASTER OPTIONS* menu in *SETUP* mode to adjust the amount of time that this warning should exist before being considered an actual error.



## Chapter 4: Maintenance

### In This Chapter

- ◆ Maintenance Alerts
- ◆ Maintenance Intervals

# Normal Maintenance

## 4.1 General Notes

The maintenance intervals given in this chapter are intended for use as guidelines only. The machine's frequency of use will determine how often these maintenance items will need to be performed. Contact Comco if you have questions.

Note the following cautions before beginning any maintenance or repair task:

- Unless specifically directed otherwise, ALWAYS depressurize the unit and unplug it before removing the cover or doing any maintenance or repairs.
- There may be sharp edges inside the cabinet, which could cause injury to personnel or damage to components.
- Observe all safety precautions provided within this manual.

## 4.2 Maintenance Alerts

The PowerFlo® Model PF2400 is equipped with a microcontroller that continuously monitors and records critical blaster functions. An amber lamp on the front panel of the machine illuminates when the blaster needs attention. The type of attention required is shown on the LCD display. When maintenance is due, the amber lamp will blink and the LCD will state what maintenance needs to be performed:

```
*P' GATE SERVICE DUE  
  
>SETUP
```

The message will change depending on the service required:

```
*P' GATE SERVICE DUE  
*TUNEUP SERVICE DUE  
*OVRHAUL SERVICE DUE
```

Turn off the machine and perform the required maintenance as listed on the following pages. If you wish to wait, you may continue to use the machine as normal, but the maintenance due message will continue to be displayed on the LCD.

## 4.3 Clearing Maintenance Alerts

Once the maintenance has been completed, turn the blaster on and press the “OK” key to enter the Set-up Menu. Then position the cursor over *MAINTENANCE MENU* and press “OK”. On the Maintenance Menu screen, select *CLEAR MAINT ALERT* and press “OK”.

```
-----SETUP MENU-----  
>BLAST TIMER SETUP  
>MAINTENANCE MENU  
>USAGE DATA MENU
```

```
--MAINTENANCE MENU--  
>CURRENT STATUS  
>CLEAR MAINT ALERT  
>SET MAINT INTERVALS
```

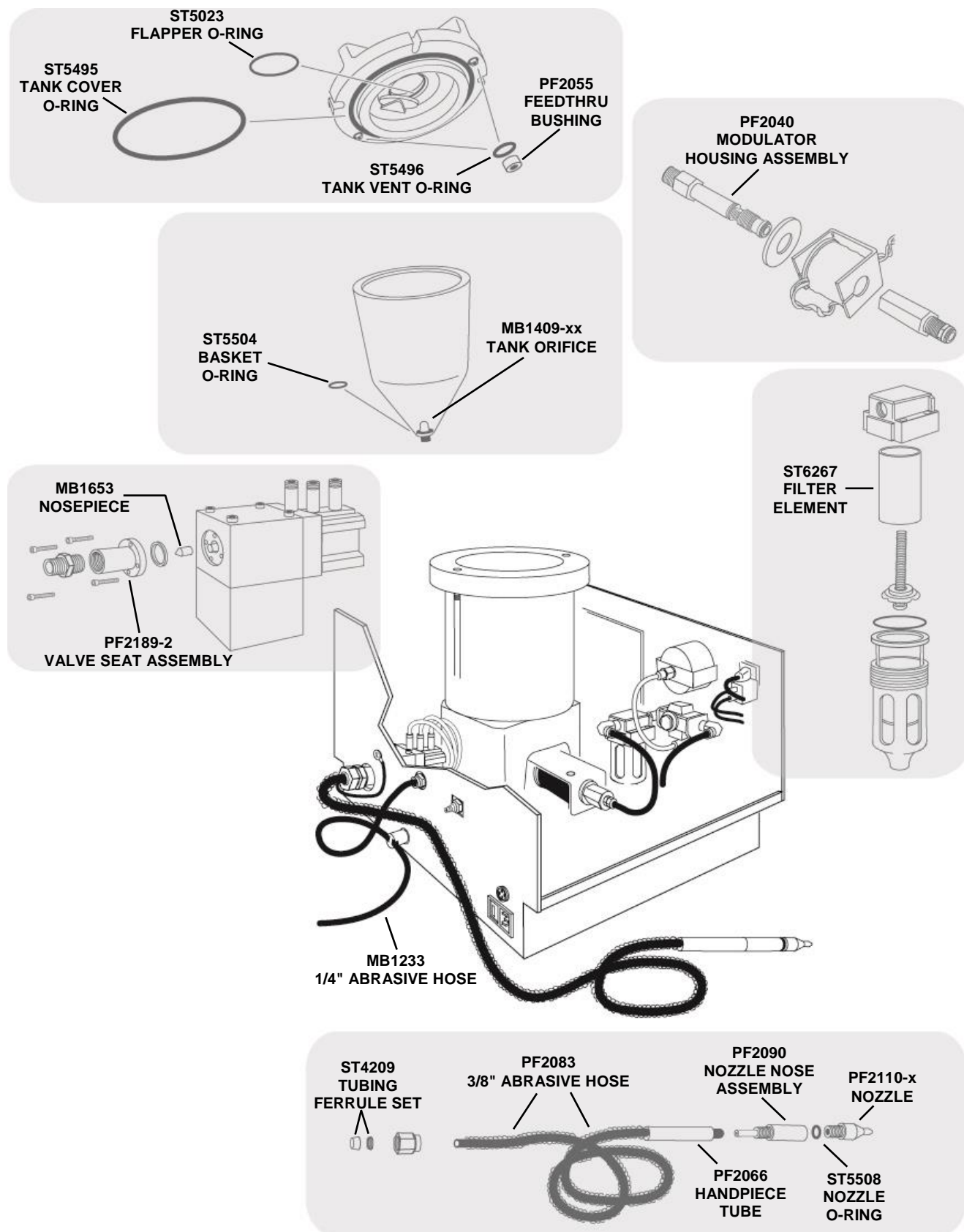
Press the up or down keys to select the maintenance that was performed and press “OK” to reset the maintenance alert. An acknowledgement screen will tell you that the maintenance reset was accepted.

Any of the maintenance counters can be reset at any time by following the above procedure, even if a “Maintenance Due” message is not active on the LCD.

By default, PowderGate service is scheduled for every 200,000 cycles of the PowderGate valve, Tune-up service is scheduled for every 750 hours of blasting, and Overhaul service is scheduled for every 1,500 hours of blasting. These service intervals can be adjusted by selecting *SET MAINT INTERVALS* from the Maintenance Menu screen, as shown above.

Table 4.1a: Maintenance Intervals

Interval	Item	Details in Section
<b>Monthly</b>	<b>Nozzles</b> – Inspect for wear and replace as needed. Cutting abrasives such as Aluminum Oxide and Silicon Carbide wear nozzles more rapidly, and daily or hourly replacement may be necessary when using such abrasives.	4.4.1
	<b>Abrasive Hose</b> – Inspect for weak spots and replace or cut as needed. (3/8" Clear = ST4228, 3/8" Blue = PF2083, 1/4" Blue = MB1233.) Aggressive abrasives may require weekly or daily inspection.	4.4.2
	<b>Tank Orifice</b> – Inspect for wear or obstruction and replace or clean as needed. (MB1409-xx where xx depends on size.)	4.4.3
	<b>Dust Collector</b> – Empty dust collector of spent abrasive. Heavy use may require more frequent cleanings.	4.5.1
<b>PowderGate Service Alert</b>	<b>PowderGate Nosepiece</b> – Replace (MB1653).	4.4.6
	<b>PowderGate Seat</b> – Inspect for wear and replace as needed (PF2189-2).	4.4.6
<b>Tune Up Alert</b>	<b>Perform Monthly Inspection</b> – As listed above, perform a monthly inspection.	
	<b>Perform PowderGate Service</b> – Inspect the items listed above in "PowderGate Service Alert" for wear and replace as needed.	
	<b>Air Dryer</b> – Service per the instructions included with the air dryer.	4.5.3
	<b>Powder Storage</b> – Inspect your storage location for your powder to ensure it is kept clean and dry.	
	<b>Vent Pinch Hose</b> – Reposition hose in pinch to a spot that has not been previously pinched.	4.4.4
	<b>Nozzle Nose</b> – Replace (PF2090).	4.4.5
	<b>Tank Cover &amp; Basket Assembly</b> – Check for leaks, replace O-rings (Kit# PF2139), inspect Feedthru Bushings for wear and replace as needed (2x PF2055).	4.4.8
	<b>Modulator</b> – Replace housing assembly (PF2040).	4.4.7
	<b>PowderGate Exit Fitting</b> – Replace Hose Connector (ST4184).	4.4.5
	<b>Abrasive Hose</b> – Inspect and cut back or replace as required	4.4.2
<b>Overhaul Alert</b>	<b>Perform Tune Up</b> – Perform the steps listed in the Tune Up list shown above.	
	<b>General Inspection</b> – Inspect the power cord and footswitch cable for wear or breaks in the rubber jacket. Remove the cover and check for air leaks.	4.4.9
	<b>Vent Pinch Assembly</b> – Inspect pinch assembly for worn or inoperable parts.	
	<b>Filter Bowl</b> – Check for accumulation of powder and clean as needed.	4.4.10
	<b>PowderGate Seat</b> – Replace (PF2189-2)	4.4.6
	<b>Tank Cover Feedthru Bushings</b> – Replace (PF2055)	4.4.8
	<b>Tank Cover Bolt Hardware</b> – Replace (4x PF2079, 4x ST1289, 4x ST5163-6)	
	<b>Flow Detector Tube</b> – Replace (PF2417)	



### Regular Maintenance Items

**Figure 4.1b**

NOTE: See Appendix Parts List and Drawings for Part Numbers not listed here

## 4.4 Parts Subject to Normal Wear

All the parts through which the abrasive flows are subject to wear. These include the nozzle, nozzle nose, hose, abrasive hose connectors, and the tank orifice. As a general rule, the smaller the opening through which the abrasives must flow, the greater the possibility of wear. Parts also subject to wear are the tank cover O-rings and the modulator.

### 4.4.1 Nozzles

Although manufactured from a high grade of tungsten carbide, nozzles are usually subject to the greatest wear. They may start to bell-mouth (widen) within a few hours and be 50% oversize within a day, depending on the aggressiveness of the abrasive powder, the pressure, and the duty cycle. More information on nozzles can be found in Chapter 3 of this manual.

### 4.4.2 Abrasive Hose

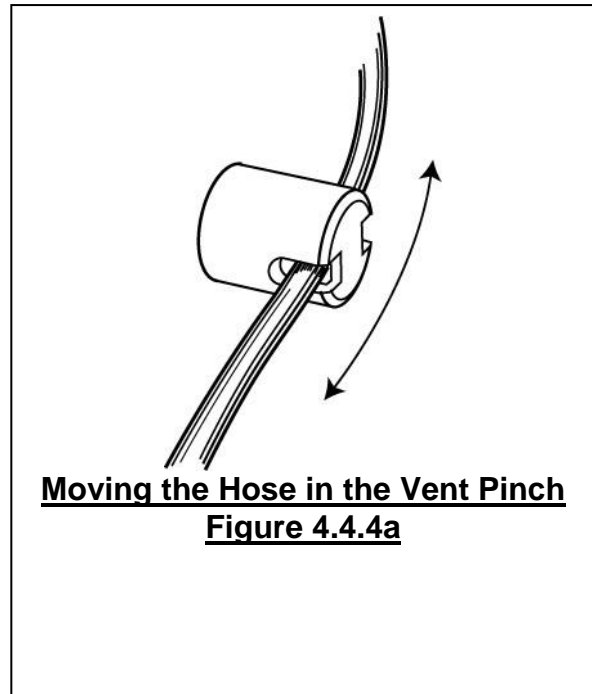
With the machine off and depressurized, squeeze the Abrasive Hose between thumb and forefinger in the area along the first 2 - 3 inches adjacent to the PowderGate output. It should be evenly firm along its length, without any soft spots. Whenever a soft spot is detected, the hose should be cut back to slightly beyond that point and reattached to its connector. See the procedures in Chapter 5 to replace the Transition Tube.

### 4.4.3 Tank Orifice

The orifice controls the amount of abrasive injected into the mixing chamber. The abrasive nature of the blasting media will cause the orifice to erode over time, increasing in diameter. As the size of the orifice changes the abrasive flow increases, potentially clogging the nozzle or reducing the efficiency of the abrasive.

### 4.4.4 Vent Hose

Periodically the vent hose should be moved about 2" through the pinch assembly on the rear panel (with air pressure off). This will allow the pinch to squeeze the hose in a different spot. The movement will greatly increase the life of the hose.



#### **4.4.5 Hose Connectors**

The connectors that attach the hoses to the PowerFlo® PF2400 and its handpiece are also subject to abrasive wear. These include the PowderGate exit connector (ST4184), the Handpiece Nose (PF2090) and the Vent Hose Bulkhead Connector (ST4014). Be sure to check them each time you replace hoses. Refer to Chapter 5 of this manual when replacing hose or hose connectors.

#### **4.4.6 PowderGate**

The PowderGate is a control valve for turning on and off the abrasive flow to the nozzle, and has been designed for minimal maintenance. During normal operation it is very easy to monitor the functioning of the PowderGate valve. While the footswitch is not depressed, place a finger over the tip of the nozzle feeling for any escaping air. Air escaping from the nozzle is an indicator that the blue nosepiece of the PowderGate needs to be replaced.

Periodically the valve will need to be maintained. Normal maintenance includes removing the four screws that retain the valve seat assembly and inspecting the blue nosepiece. In addition the valve seat assembly will need to be inspected for grooves or channels that may inhibit proper sealing of the nosepiece. These two items are designed as standard replacement items for the PowderGate valve.

#### **4.4.7 Modulator**

The modulator is an electro-mechanical device that is activated each time the footswitch is depressed. The stop/start action of the modulator contributes to a consistent flow of abrasive powder from the tank into the mixing chamber and out the nozzle. The principles of operation are described in detail in Chapter 1 of this manual.

Due to its constant movement and its close proximity to the abrasive in the mixing chamber, the modulator housing assembly is considered a wear point and should be inspected on a regular basis. Applications that include heavy use, or very aggressive abrasives, may require checking the modulator on a monthly basis. See Chapter 5 for inspection and repair procedures.

#### **4.4.8 Tank Cover & Basket Assembly**

The tank cover seals the abrasive tank and allows for replenishing the abrasive powder. Always fill the tank through the flapper valve and refrain from removing the tank cover unless absolutely necessary. Whenever the tank cover is removed to change powder, excess powder must be wiped off the top of the tank and the tank cover O-rings.

Always check to make sure the tank cover is firmly tightened. If the tank cover is not firmly seated so that the O-ring seals properly, abrasive can be forced out by the system pressure and seriously damage both the tank and tank cover. Inspect the tank cover and basket for worn O-rings (5 places) and worn Feedthru Bushings (2 places).

#### **4.4.9 General Inspection**

Unplug the power cord and inspect it for cracks or cuts. Also check the footswitch cable. Remove the cabinet cover and inspect the inside of the PF2400 for obvious leaks. Clean thoroughly with a small brush and vacuum hose.

#### **4.4.10 Filter Bowl**

The filter is part of the Air Pressure Regulator assembly and is designed to trap abrasive that may otherwise be forced back into the “clean air” side of the PF2400, causing major component failures. Check and empty the filter bowl (unscrew it). If at any time the filter bowl is more than 1/4 full, it could be an indication of a check valve failure and the whole regulator assembly may need to be replaced. See Chapter 5 – “Check Valve”.

### **4.5 Auxiliary Equipment**

As discussed in Chapter 2, a micro-abrasive blasting system usually contains a dust collector, a workstation, and an air dryer, along with the PF2400. Optimum operation of the PF2400 is in many ways dependent upon proper operation of its auxiliary components. Detailed operation and maintenance procedures for these units are contained in each individual unit’s instruction manual. Only basic maintenance concerns are mentioned here as part of an overall system maintenance plan.

#### **4.5.1 Dust Collector**

Empty the spent abrasive from the dust collector on a regular basis. Typically, this should be done monthly. However, in high use facilities, it should be done weekly. If the airflow through the work area seems low, the dust collector may need cleaning.

#### **4.5.2 Workstation**

Make sure the workstation has good air draw and remains clear of abrasive build-up. If abrasive begins to build up, refer to the above paragraph on “Dust Collector”. Keep the glass window clean and replace it if it becomes damaged by abrasive.

#### **4.5.3 Air Dryer**

Only a continuous duty, membrane air dryer such as the Comco AD5300 series air dryer should be used with the PF2400. Membrane air dryers do not require maintenance, however, they are usually provided with filters that may need emptying or cleaning.



## Chapter 5: Trouble-shooting and Repair

### In This Chapter

- ◆ What to look for if your PowerFlo® Model PF2400 does not operate properly and how to determine the specific problem
- ◆ How to correct most problems which may develop with the PF2400
- ◆ How to contact Comco's Customer Service Department
- ◆ How to order replacement parts for the PowerFlo® Model PF2400

## **Troubleshooting**

This chapter explains what to do if you have any problems with the PowerFlo® PF2400. The first part of the chapter describes some of the problems that may occur, and the second part contains detailed repair procedures.

**Note: Improper repairs may void your warranty. If you have any questions, consult with Comco before you do any work on the inside of the PowerFlo®.**

Most problems that can occur with your PowerFlo® model will fall into either one of two categories:

- 1) No air flow - Nothing happens when you depress the footswitch. Neither air nor abrasive is expelled from the nozzle.
- 2) No abrasive flow - Air flows freely from the nozzle when the footswitch is depressed. However, there appears to be no abrasive in the air stream, or it flows erratically.

The tables that follow address each of these conditions specifically.

### **5.1 Customer Service**

Comco's Customer Service Department is open Monday through Friday from 6:30am to 4:30pm, Pacific Time, to help you with any problems you may have with your PowerFlo® unit. The telephone number is listed below:

Phone: 1-818-841-5500

Check our website for additional tech support information and videos:

[www.comcoinc.com](http://www.comcoinc.com)

You may also e-mail your questions to:

[techsupport@comcoinc.com](mailto:techsupport@comcoinc.com)

## **5.2 How To Order Replacement Parts**

Replacement parts for the PowerFlo® PF2400 may be ordered directly from Comco Customer Service. Please provide the following when ordering parts:

- ◆ Your name
- ◆ Your company's name and location (city and state)
- ◆ The machine, model number, and serial number
- ◆ The part number of the component you wish to order

Providing this information will expedite your request and will also ensure that you receive the proper component for your unit.

### 5.3 Common Problems, Causes, and Solutions

**No Air Flow**  
**Table 5.3a**

Problem	Items to Check	Solution
<b><i>Nothing happens when the footswitch is depressed</i></b>  (No air is coming out of the nozzle)	✓ <i>Is the electrical power ON?</i>	Verify that the POWER switch is ON and the POWER LIGHT is illuminated. Control Panel Display should read <i>READY TO BLAST</i> . Check connection of Power cord and Footswitch cord.
	✓ <i>Is the fuse good?</i>	Examine the fuse. Replace it if necessary.
	✓ <i>Does the gage indicate pressure in the system and display panel read: READY TO BLAST?</i>	Verify that shop air pressure of 90-140 psig is supplied to the PF2400. The PF2400 will not pressurize properly without at least 90 psig supply air.  Press the Pressurize/Vent switch to the Pressurize position. Does the tank pressurize? If not, Check tightness on tank cover.
	✓ <i>Is the nozzle plugged?</i>	If you are using a nozzle with the nozzle adapter, remove the nozzle and depress the footswitch. If a blast of abrasive occurs, the nozzle was plugged. Tap it on the workbench, back end down. Discard the nozzle if it remains plugged.  If plugging recurs, either the tank is releasing too much powder or the nozzle is too small for the powder.
	✓ <i>Is the PowderGate operating?</i>	When cycling the abrasive flow ON and OFF with the footswitch, an audible clicking sound from the cylinder that opens and closes the PowderGate should be heard. If it is not, see maintenance of the PowderGate below.

**Common Problems, Causes, and Solutions** (cont'd)

**No Abrasive Flow**  
**Table 5.3b**

<b>Problem</b>	<b>Items to Check</b>	<b>Solution</b>
<b><i>Cutting ceases but air is flowing freely</i></b>	✓ <i>Is <u>any</u> abrasive flowing?</i>	Verify the quality of abrasive flow by holding a piece of glass or shiny metal in front of the nozzle and depress the footswitch. If there is no abrasive flow, see below. If flow is erratic, see "Modulator".
	✓ <i>Is the tank empty or almost empty?</i>	Switch "Power" to "Off". Fill the tank as necessary.
	✓ <i>Is the powder "channeling"?</i>	Carefully remove the tank cover without disturbing the powder in the tank. Note if there are obvious holes or cracks in the powder, leading down to the orifice. This is caused by damp powder or moisture in the air supply. Check the air supply and the powder storage conditions. Service the air dryer, or install one.
	✓ <i>Is the tank orifice plugged?</i>	Remove the powder in the tank following normal procedures. Remove the orifice and hold it up to the light. If blocked, clean with high-pressure air or a small wire.
	✓ <i>Is the tank orifice too small for the powder?</i>	Small orifices should not be used with some abrasives (see Chapter 3, Table 3.1.2a).
	✓ <i>Is the Modulator functioning?</i>	Does it hum audibly when the footswitch is actuated? If not, or if it rattles noisily, the modulator should be checked. See procedures below.

## 5.4 Moisture

Contamination of the abrasive powder due to moisture is one of the most common problems associated with micro-abrasive blasting. Moisture causes the powder to “clump up”, preventing it from flowing freely from the tank. If the cutting action of your PowerFlo® unit appears to be degraded but air is flowing freely from the nozzle, the problem is usually caused by moisture in the abrasive powder.

### 5.4.1 How to Check for Moisture in the Powder

With the Power OFF and the unit depressurized, carefully remove the tank cover so as not to disturb the contents. Is the powder “channeling”? In other words, are there obvious holes or cracks through an apparently solid mass or clumps of powder? If so, you have a moisture problem.

### 5.4.2 Where the Moisture Comes From

Moisture can contaminate your powder in two ways: before it is put into the machine, or after it is put into the tank. If your powder is stored in an area of high humidity, or the containers are not kept properly sealed, you are putting contaminated powder into your micro-abrasive blaster, which will cause poor performance. Inspect your powder storage facility and handling procedures on a monthly basis.

Abrasive powder should never be exposed to moist air with a relative humidity in excess of 40% for more than a short time. Contaminated abrasive powder should be discarded.

The abrasive powder could also become contaminated with moisture after it has been put into the PowerFlo® unit. If the unit sits depressurized for long periods of time, moisture can enter through the Quick Fill valve and contaminate the powder. To prevent this form of contamination, fill the tank with only the amount of abrasive you expect to use that day. Only fill the tank at the beginning of the work shift. Don't fill the tank and let it sit overnight.

The most common cause of moisture contamination, however, comes from the air compressor that feeds the PF2400. Water condensation occurs in compressed air no matter how low the relative humidity might be. For trouble-free operation, the air that mixes with abrasive media must have less than 200 ppm moisture and less than 10 ppm oil. The water traps of most compressors are not sufficient to provide this level of dryness. A positive air dryer should always be installed in the air line and it should be well maintained. Inspect the air dryer monthly to be sure it is operating properly.

Old or poorly maintained air compressors are also a source of oil contaminants in the air supply. Oil in the air supply will not only affect abrasive flow, it can cause major component failures within your PowerFlo® model, resulting in costly repairs. If you suspect oil in the air supply, you should install an oil filter in the line, in addition to an air dryer.

Comco maintains an extensive library of technical bulletins that address issues including the effects of moisture on the micro-abrasive blasting process and methods for reducing moisture contamination. They are available by contacting Customer Service at 1-818-841-5500 or by viewing our website – [www.comcoinc.com](http://www.comcoinc.com) – to download an electronic copy.

## **5.5 Clogging**

### **5.5.1 Tank Orifice**

Moisture or particulate matter contamination in the abrasive powder can cause clogging problems in your PowerFlo® unit. The most likely place for clogging to occur is in the tank orifice. Provided the orifice is sized properly for the type of abrasive being used (see Chapter 3, “Orifice Selection”), the powder should always flow freely from the tank.

Since the tank orifice is the only way for the powder to get from the tank to the mixing chamber, a clog here restricts or prevents powder flow. If air is flowing freely when the footswitch is depressed but there seems to be no abrasive in the air stream, first check for moisture contamination as described in the previous section. Then remove the tank orifice (see Chapter 3, “Changing the Tank Orifice”), check it for clogging and clean if necessary. Try to determine if clogging is due to either moisture or particulate contamination.

### **5.5.2 Nozzle**

If the unit is pressurizing and you can see the pinch opening when the footswitch is depressed, but no air is flowing from the nozzle, the nozzle is probably plugged. This is a common problem only when using a small nozzle with the nozzle adapter. The most likely cause of nozzle clogging is an oversized tank orifice. Too much powder in the air stream can overload the nozzle and cause clogging (see Chapter 3, Orifice/Nozzle selection).

Remove the nozzle. Tap it on the workbench, back end down, to release the clog. Check it by holding the tip to a light. A point of light should be visible through the tip. Discard the nozzle if it remains plugged.

If plugging recurs, either the tank is releasing too much powder or the nozzle is too small for the powder. Refer to Chapter 3 for direction.

## 5.6 Tank Cover

The tank cover seals the abrasive tank and allows for replenishing the abrasive powder by filling through the “quick-fill” flapper valve. The PF2400 will not pressurize if the tank cover is not tightened firmly in place. ***Always fill the tank through the flapper valve and refrain from removing the tank cover unless absolutely necessary.*** The tank cover should be well maintained to ensure a good seal. Inspect the tank cover regularly for worn O-rings or Feed Thru Bushings and pitting due to abrasive leakage.

### 5.6.1 Tank Cover Flapper Valve

The flapper valve allows for quick filling of the abrasive tank. If the valve becomes worn or damaged, replace it with Comco part number MB1145. Refer to Appendix B, Figure 5.

### 5.6.2 Tank Cover Flapper Valve Replacement Procedure (MB1145)

1. Turn Power OFF and depressurize unit.
2. Remove the tank cover by loosening the four retaining bolts.
3. Using a 3/32” Allen wrench, remove the flapper valve. Replace the O-ring if necessary. See procedure below.
4. Install the new flapper valve (MB1145).
5. Install the tank cover.

### 5.6.3 Tank Cover O-ring Replacement Procedure

1. Turn Power OFF and depressurize unit.
2. Remove the tank cover by loosening the four retaining bolts.
3. Using long-nose pliers, remove the tank cover O-rings. It is best to replace all three O-rings at the same time. Lift the flapper valve to access the O-ring underneath.
4. Clean the O-ring grooves thoroughly.
5. Press the new O-rings firmly in place. The O-ring Replacement Kit PF2139\* includes part numbers ST5023 flapper O-ring, ST5495 large O-ring, and ST5496 (2) vent O-rings for use in this procedure. The kit also includes ST5504, basket O-ring, which should be replaced at this time.
6. Install the tank cover.

\* We recommend keeping a spare O-ring Replacement Kit on hand.  
Contact Comco Customer Service and ask for part number PF2139.



## Tank Cover (cont'd)

### **5.6.4 Tank Cover Feedthru Bushing Replacement Procedure**

1. The bushings are bonded into the cover with an anaerobic retaining adhesive. Remove the bushings by twisting out with a Spiral-Flute Extractor.
2. Before installing the new bushing(s) (PF2055) carefully scrape out any of the old bonding compound and thoroughly clean the hole in the cover. Also thoroughly clean the surfaces of the bushing prior to bonding.
3. Bond the new bushing(s) into the cover with Loctite 680 retaining compound or equivalent. Allow the compound to cure for at least 1 hour before use.
4. Install new O-rings.

## **5.7 The Handpiece Nose**

The handpiece nose is the main part of the handpiece that holds the nozzle. The nose holds together the abrasive hose, handpiece tube, and the nozzle. Abrasive will wear away the inside of the nose to a point where it can no longer support the hose. Also, if the nozzle is not tightened firmly into the nose, abrasive leakage will wear away the threads and the nozzle will not fit properly. Refer to Appendix B, Figure 8.

### **5.7.1 Handpiece Nose Replacement Procedure (PF2090)**

1. Remove the nozzle.
2. Unscrew the handpiece tube from the nosepiece and slide it back. For handpieces with static guard (spring), it may be necessary to hold or tape the handpiece back out of the way.
3. Remove the hose from the nosepiece (it may be easier to cut hose).
4. Slip the hose onto the nosepiece. Sometimes a little moisture helps.
5. Screw on the handpiece tube.
6. Install the nozzle.

## **5.8 The Abrasive Hose**

The Abrasive Hose will eventually wear out and need to be replaced. The entire Handpiece and Abrasive Hose Assembly (PF2406) can be replaced, or its individual components. Most of the wear in the hose will be in the first 2 or 3 inches at the end that exits from the PowderGate. The proper procedure for cutting and reinstalling the hose is explained below.

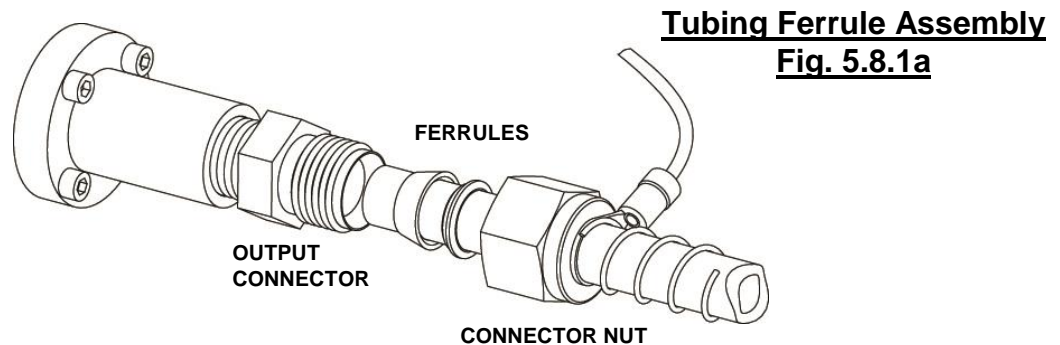
#### **CAUTION:**

Always use the proper hose when replacing a worn or damaged abrasive hose. The use of a different hose or a hose with a different pressure rating may present a hazard.

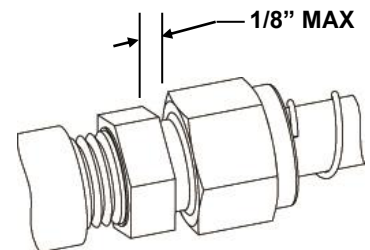
**Abrasive Hose (cont'd)****5.8.1 Cutting and Reinstalling Abrasive Hose**

1. Remove the Handpiece and Hose Assembly by loosening the hose's connector nut with a 3/4" wrench.
2. Pull the connector nut, ground wire and spring back along the hose to a point a few inches beyond where the hose is to be trimmed and cut the tubing. The hose ferrules are crimped to the hose and cannot be removed or slid back. They will need to be replaced with a new ferrule set (ST4209) when re-attaching the hose to the output connector.

**Note:** Special attention must be given to cutting the tubing's end straight, flat, and perpendicular (square) to the tubing's centerline. Failure to cut the tube end correctly will cause premature wear of the hose end and connector.



4. Slide the nut and new ferrules onto the tubing end as shown in Fig. 5.8.2a
5. Insert the tubing end into the PowderGate's output connector and hold the tubing straight into the fitting with its end firmly seated against the shoulder inside the fitting.
6. Slide the ferrules up to the fitting and thread the nut onto the connector finger tight.
7. Using a 3/4" open-end wrench, tighten the nut onto the fitting approximately 1-1/4 turns (beyond finger tight). The gap between the nut and connector hex should be no greater than 1/8".



**Connector Nut Gap**  
**Fig. 5.8.1b**

**5.8.2 Handpiece and Abrasive Hose Assembly Replacement.**

Refer to Appendix B, Figure 8 for drawing of the Handpiece and Hose Assembly.

The complete Handpiece and Hose Assembly (PF2406) includes the handpiece, handpiece nose, a 7 ft length of polyurethane tubing with the ESD grounding spring wrapped around it, and a connector nut with ferrules. Replace complete assembly by disconnecting at PowderGate output.

## 5.9 The Vent Hose

Moving the hose through the pinch on a regular basis will greatly extend the life of the hose. However, the vent hose will eventually wear out and need to be replaced. This procedure explains how to replace the vent hose.

### **CAUTION:**

Always use the proper hose when replacing a worn or damaged abrasive hose. The use of a different hose or a hose with a different pressure rating may present a hazard.

### 5.9.1 Vent Hose Replacement Procedure

1. Turn the power off, depressurize the unit, and unplug the power cord.
2. At the rear panel of the PowerFlo, loosen the hose connector nut from the connector using a 7/16" open-end wrench and remove the hose.
3. Remove and save the rubber grommet from the old hose.
4. Pull the hose through the pinch tube and inspect the pinch tube and plunger as described in Section 5.13.3
5. Inspect the hose connector for wear, replace if necessary.
6. Feed a six-foot length of new hose MB1233 (or the old cut back hose) through the pinch tube. Slip the rubber grommet (ST5010) and the connector nut onto the hose.
7. Work the end of the hose onto the hose connector fitting and tighten the nut onto the connector using a 7/16" open-end wrench. It is only necessary to tighten the nut enough to clamp the hose to the fitting's tube.

## 5.10 Leaks

Small leaks can increase air usage considerably and reduce the efficiency of the PowerFlo® unit. A large drop in pressure while the machine is operating can be an indication of an air leak. Check the supply air inlet hose and the supply regulator for leaks. This is a high-pressure line therefore small leaks can cause the loss of large volumes of air.

If a leak is suspected within the PF2400, switch off the power and remove the cabinet cover. Are there any noticeable powder clouds or unusual powder buildup inside the machine? This is an indication of a leak in the abrasive or vent lines. Check for loose hose connections.

If necessary, switch the power on to re-pressurize the unit. Are there any noticeable or audible leaks? Listen near the tank top, PowderGate, tank vent hose and pressure regulator; or apply a soap solution to these locations and watch for bubbles.

**CAUTION: There is High Voltage at the Terminal Block!!**

It is very hard to detect a slight leak in the tank cover. If you cannot locate a leak anywhere else, it is probably the tank cover O-rings. See the previous discussion, "Tank Cover".

## 5.11 PowerFlo Internal Parts

Accessing parts within the PowerFlo requires removing the protective cover. Follow these directions in order to safely remove the cover.

1. Turn the Power OFF and unplug the unit.
2. Loosen, but do not remove, the four (4) screws that hold the cover in place. Lift the cover off the PowerFlo.

**Note:** If necessary, you may turn on and pressurize the unit with the cover removed. However, be sure that the tank cover and all air hoses are securely in place.

**CAUTION:** There is High Voltage at the Terminal Block!!

3. To install the cover, set it in place with the screw slots aligned with the screws in the chassis.
4. Make sure the lock washers are on the outside surface of the cover. Tighten the screws to hold the cover in place.

## 5.12 Vent Pinch

### 5.12.1 Hose Failure

During unit pressurization and depressurization the hose pinch will open and close. This action weakens the hose at the squeeze point and leads to eventual hose failure. Refer to Chapter 4 of this manual, "Maintenance", for detailed information on reducing this type of failure.

If for some reason the pinch does not close tightly enough to completely seal the hose, a very slight leak can rapidly wear through the hose and cause it to leak. Should this occur, the pinch must be examined and the problem corrected. See: "Repairing the Pinch Valve and Cylinder" below.

The pinch and plunger are the parts of the pinch assembly that make contact with the hose. Hoses can sometimes develop leaks at the point where they are pinched. Leakage of abrasive at these points can cut into the pinch tube and plunger causing sharp edges that damage hoses. Inspect the pinch and plunger on a regular basis (see Table 4.1a, "Maintenance Intervals") for pitting and sharp edges. Abnormal hose breakage, always at the pinch, is an indication of pinch or plunger damage.

**Vent Pinch (cont'd)****5.12.2 Replacing the Vent Pinch Assembly** (refer to Appendix B, Figure 9)

Prior to replacing the Vent Pinch Assembly, check for proper pinch cylinder operation by performing the "Set-up and Test Procedure" in Chapter 2, beginning with step 14. If any problems are encountered, verify at least 80 psig is supplied to the cylinder from the air source when the unit is turned ON. And the pressure to the cylinder drops to 0 psi when the unit is turned OFF.

If the vent hose pinch will not close to stop the flow of air, or open to allow the venting of the PowerFlo, the pinch assembly will need to be replaced. Follow the procedure below, "Vent Pinch Assembly Replacement".

**5.12.3 Vent Pinch Tube and Plunger Inspection**

1. Turn off and unplug the PowerFlo.
2. Use a 7/16" wrench to remove the connector nut on the vent hose fitting on the rear panel. Remove the hose and pull it through the pinch tube.
3. Remove the pinch tube. Inspect it for sharp edges or pitting due to abrasive leakage. Replace if necessary with Comco part number MB1282.
4. Inspect the pinch plunger for sharp edges or pitting due to abrasive leakage. Replace if necessary with Comco part number MB1050-2.
5. Inspect the piston rod by pulling it out about 1/2". It should be clean, dry (not oily), and not "gritty". Wipe thoroughly. The rod should retract easily when released.
6. Install the pinch tube. The pinch tube should be hand tightened all the way onto the cylinder and then backed off about 1/4 turn until the hole is horizontal.
7. Install the hose - see procedure, above.

**5.12.4 Vent Pinch Assembly Replacement Procedure (PF2445)**

1. Turn off and unplug the PowerFlo.
2. Remove the cabinet cover. See instructions above.
3. If not already removed, remove the pinch tube from the pinch.
4. Disconnect the air hose from the rear of the cylinder.
5. With a 7/8" wrench remove the cylinder mounting nut. Pull cylinder out from inside the unit.
6. Reverse procedure to install new cylinder assembly (PF2445)
7. Replace the cover.

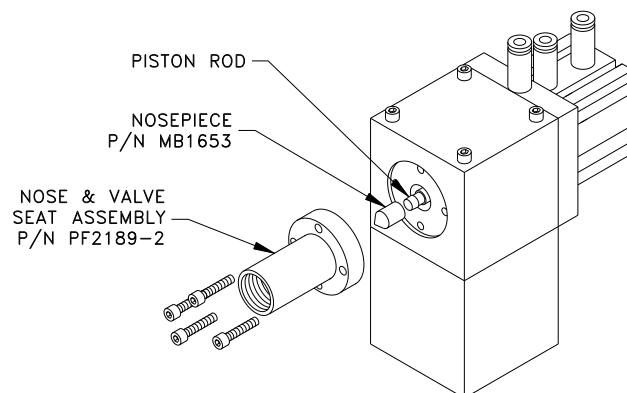
## 5.13 Inspecting and Repairing the PowderGate

The PowderGate is a control valve for turning ON and OFF the abrasive flow to the nozzle. The PowderGate has been designed for minimal maintenance. However over time the polymer nosepiece will wear and require replacement. If leakage through the nose tip is observed when the PowderGate is in the closed position then replacement of the nosepiece is required. If after replacing the Nosepiece the PowderGate continues to leak through the nozzle, then the carbide seat in the Nose & Valve Seat Assembly is excessively worn.

### 5.13.1 Replacing the Polymer Nosepiece or Nose & Valve Seat Assembly

You do not have to remove the PowderGate Assembly from the Blaster to replace a worn nosepiece.

1. Turn power OFF, vent pressure from tank and disconnect air supply from unit.
2. Reaching through the large hole in the blasters back panel with a 3/32" hex T-wrench, remove the 4 socket head cap screws, Nose & Valve Seat Assembly and its O-ring.
3. Remove the blue polymer nosepiece from the end of the Piston Rod by gently wiggling it back and forth and pulling it out toward you with a pair of pliers. The nosepiece is retained on the end of the piston rod by a barb.
4. Install the new nosepiece by pushing it onto the barbed tip of the Piston Rod. Be sure the nosepiece is seated straight and against the shoulder of the Piston Rod.
5. Inspect the carbide seat inside the Nose & Valve Seat Assembly. If it shows noticeable wear then it should be replaced. The seat is bonded into the Nose and is replaced with the nose as a complete assembly.
6. Replace the Nose & Valve Seat Assembly. Secure in place with the 4 socket head cap screws.



**PowderGate Nosepiece and Nose & Valve Seat Replacement**  
**Figure 5.14.1a**

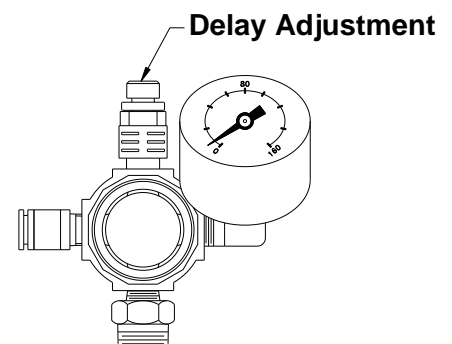
## Inspecting and Repairing the PowderGate (cont'd)

### 5.13.2 Removing and Disassembling the PowderGate (Refer to Appendix B, Figure 10)

1. Remove the valve seat assembly as described above.
2. Disconnect the 3 air lines connected to the PowderGate. It is suggested that these lines be labeled for easy identification during re-installation.
3. Remove the 4 socket head screws located on the top of the PowderGate and lift the assembly up and out of the machine.
4. To disassemble the PowderGate. Remove the 4 socket head cap screws located at the rear of the cylinder. The PowderGate should now be able to be pulled apart.
5. Inspect all of the internal parts for excessive wear and look for any noticeable amounts of abrasive leaking past the felt wipers and collecting around cylinder shaft where it enters the cylinder. The felt wipers are a normal wear item. It is a good practice to replace them whenever the unit is disassembled for normal inspection and maintenance.
6. Test the cylinder for free and smooth piston movement. The piston on the air cylinder assembly can become eroded from the abrasive flow and should be paid special attention when inspecting internal parts. The piston is part of the cylinder assembly and is replaced as a complete unit.
7. Reassemble and install the PowderGate by reversing the above steps.
8. Be sure the O-ring is in the PowderGate base prior to installing the assembly into the machine.

### 5.13.3 PowderGate Delay Adjustment

The PowderGate's control valve air source is equipped with a delay valve (flow control) to prevent the PowderGate from opening for 45 - 60 seconds after internal pressure is released. This allows the tank pressure to escape through the vent hose, rather than the nozzle. This flow control is located on the top of the system regulator on the inside rear panel. It is set at the factory and should not require and further adjustment. However, if the PowderGate opens too quickly when depressurizing, or fails to open, the flow control adjustment can be checked. The delay valve has a locking ring and an adjustment knob. Loosen the locking ring by turning counterclockwise then adjust the delay valve with the knob by turning it fully clockwise until it stops. Turn the knob back out counterclockwise 1/4 to 1/2 turns. Tighten the locking ring in place.



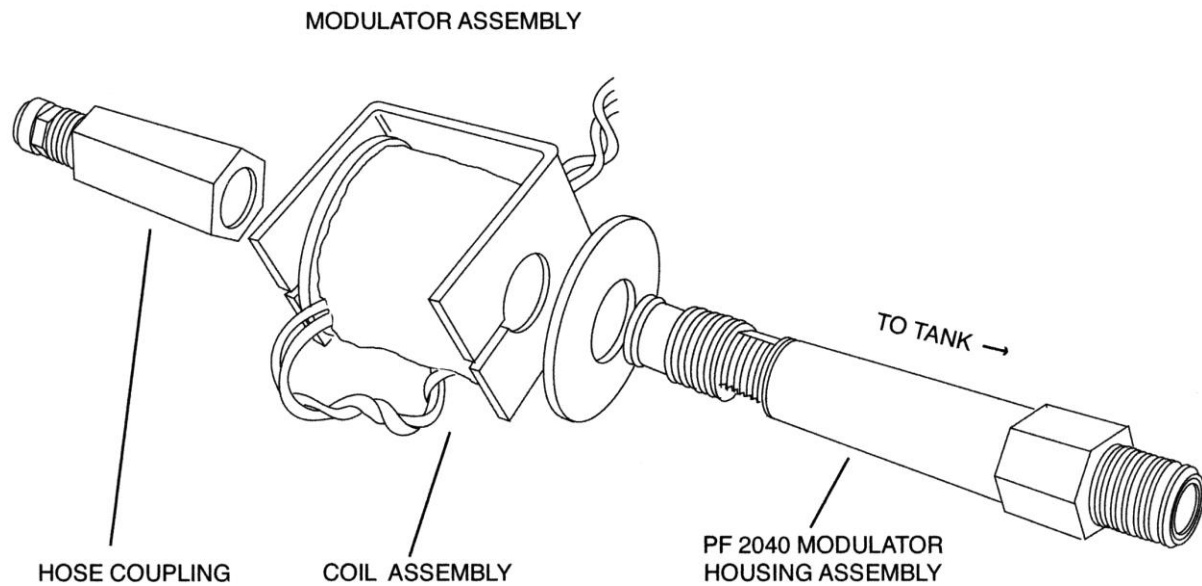
## 5.14 Inspecting and Repairing the Modulator (refer to Figure 5.15a)

Proceed as far as necessary according to the problem.

1. Turn the power OFF and unplug the unit.
  2. Remove the tank lid and the powder basket from the tank.
  3. Remove the cabinet cover. See instructions above.
  4. Detach the air hose from the modulator.
  5. Using a 3/4" open-end wrench, remove the coil retaining coupler from the modulator housing. Slide the coil and 1" washer off the modulator housing.  
**Save the washer.**
  6. With a 7/16" open-end wrench across the two flats of the modulator nose, remove the modulator nose from the stainless steel body.
  7. Examine the polyurethane seat cemented on the modulator nose. It should be smooth and unmarked except for a faint ring (impression) matching the ring seat on the core.
  8. Tip the PowerFlo onto its left side and allow the core to slide out. Note the core's orientation, the cross-holes must be nearest the tank.
  9. Examine the edges and ring seat of the core. They must be smooth and even. If it has any scratches or roughness that can be felt with a fingernail, replace the entire Modulator Housing Assembly PF2040. If neither the nose seat nor the core is worn, reassemble the modulator housing assembly and skip to step 13.
- Note:** Make sure the core is inserted properly into the housing. The cross-holes must be nearest the tank.
10. Using a 5/8" open-end wrench, remove the modulator housing from the tank. Access the housing through the opening in the bottom of the chassis.
  11. Use a vacuum to remove any residual powder from inside the tank mixing chamber (at the modulator connection).
  12. Make sure threads are clean and abrasive free. Install the new Modulator Housing Assembly (PF2040) to the tank.
  13. Slide the 1" washer over the modulator housing and then slide the modulator coil over the modulator housing.
  14. Replace the retaining coupler.
  15. Install the air hose.
  16. Replace the PowerFlo cover and install the tank cover.



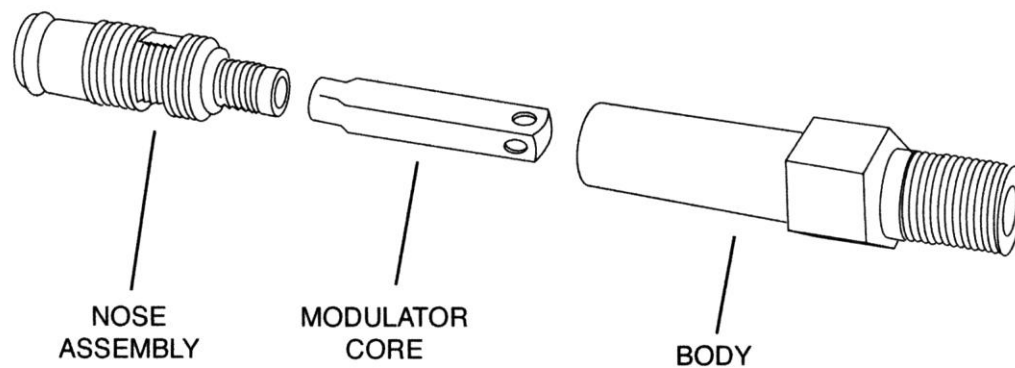
**PF2034 Modulator Assembly and Modulator Housing Assembly**  
**Figure 5.15a**



See illustration below

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**PF2040 Modulator Housing Assembly, part of Modulator Assembly above**  
**Figure 5.15b**



## **5.15 Air Pressure Regulator Assembly**

The Air Pressure regulator adjusts the source air pressure down to a useful blasting pressure as indicated by the gage. The regulator assembly contains the regulator, check valve, filter and hose fittings. Refer to Appendix B, Figure 11.

### **5.15.1 Indications of a Regulator Failure**

- a) Gage goes to "Max" at idle but drops drastically when blasting.
- b) Regulator knob will not turn in either direction.
- c) Regulator knob turns freely, but never tops or bottoms out (no high or low stop).

### **5.15.2 Air Pressure Regulator Assembly Replacement Procedure**

- 1. Turn Power OFF and depressurize unit.
  - 2. Remove the PowerFlo cover (4 screws).
  - 3. Disconnect the hoses from the regulator assembly. You may want to label each air hose before removing.
  - 4. Remove the retaining nut from the front of the regulator.
  - 5. Pull the regulator assembly back into chassis and remove.
- Note:** Remove the cap from the knob by squeezing the sides of the cap and pop it off (similar to removing a child-proof cap from a pill bottle). You will need to do the same with the new regulator.
- 6. Install the new regulator (PF2443).
  - 7. Attach the air hoses to the regulator assembly.
  - 8. Install the cover.

## **5.16 Powder Flow Detector Inspection and Repair**

The Powder Flow Detector monitors the flow of media out of the tank. If no powder flow is detected, the signal light on the control panel will light and the LCD display will read *NO POWDER FLOW*.

The Powder Flow Detector requires no normal maintenance. However at some point the transparent tube (PF2417) inside the detector may need to be replaced due to abrasive wear. The Powder Flow Detector can automatically detect a worn tube, and the Control Panel will report *FLOW DET. BLOCKED* when the tube may need to be replaced. This error message can also occur when the tube is filled with powder. Flushing the system with clean air may clear this error.

## **Powder Flow Detector Inspection and Repair (cont'd)**

### **5.16.1 Detector Assembly Repair Procedure**

1. Turn Power OFF and depressurize unit.
2. Remove PowerFlo cover.
3. Remove PowderGate from its base block. Abrasive hose may not have to be removed from output of PowderGate.
4. Remove the screw and washer under the unit which secures the PowderGate base to the cabinet bottom.
5. Unplug the detector's signal cable from the coupler.
6. Remove the 2 socket head screws that clamp the detector assembly together. The detector should now be able to be disassembled.
7. Replace the tube (PF2417) and O-rings (ST5029). The Detector Block Assembly is a sealed unit and is not serviceable. If defective, replace complete unit.
8. Reassemble detector assembly by using an alternating tightening sequence of the 2 screws. Plug the signal cable back into the coupler.
9. Secure PowderGate base to chassis and re-install PowderGate.

### **5.17 Valve Bank Replacement Procedure (PF2407)**

1. Turn off and unplug the PowerFlo.
2. Remove the cabinet cover. See instructions above.
3. Disconnect electrical connectors from the valves. Disconnect air hoses from valves (it is a good idea to label the hoses and electrical connectors to ensure they are re-installed to the proper locations).
4. Loosen and remove the four screws from the back panel holding the pinch valve in place.
5. Remove the valve bank assembly from the short air line by pulling back the tube locking ring on the quick connector.
6. Install new valve bank assembly (PF2407) using screws removed in previous step.
7. Connect air hoses and electrical connectors.
8. Replace the cover.

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## **Chapter 6: Optional Equipment and Manual Supplements**

### **In This Chapter**

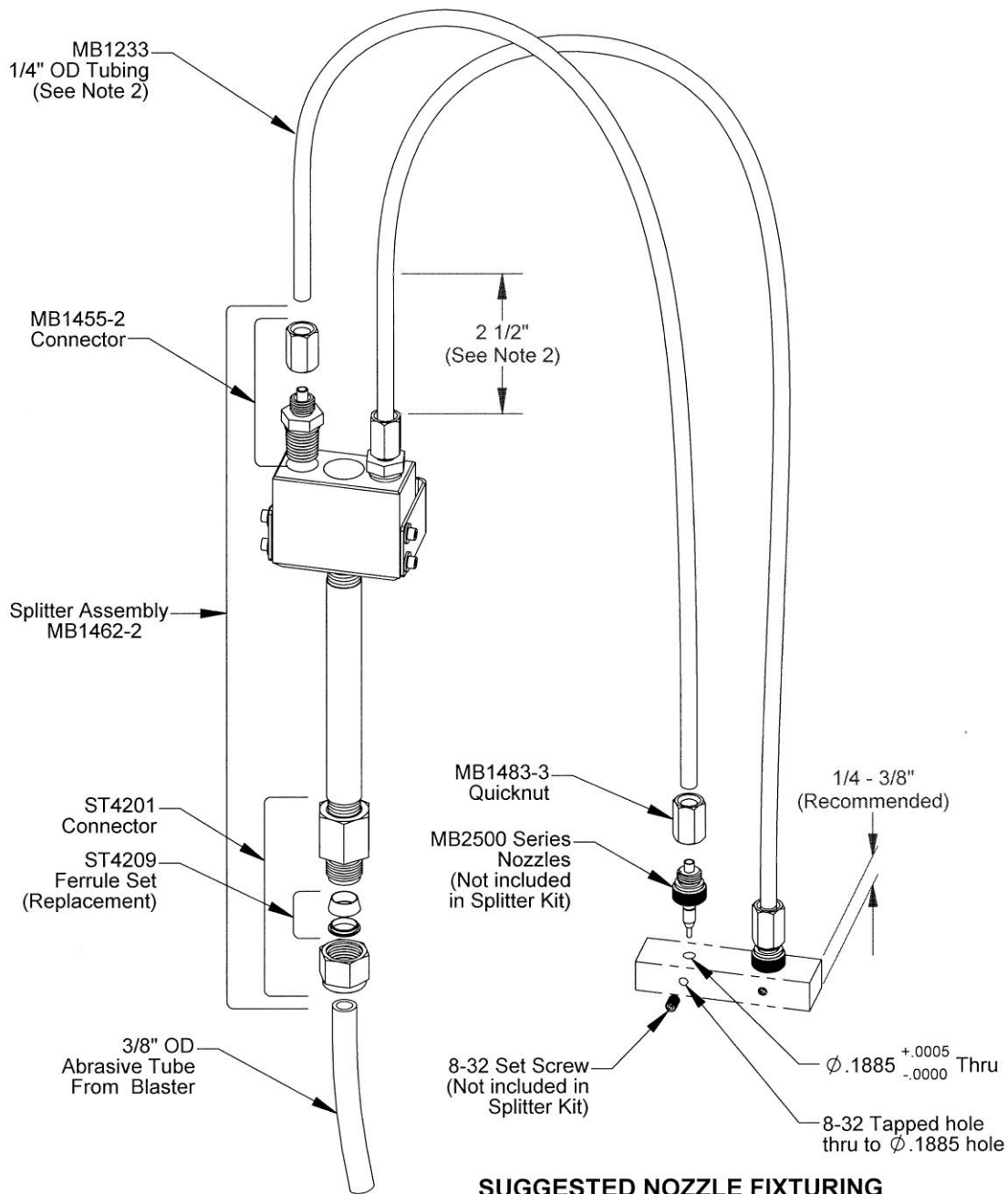
- ◆ Optional equipment available on your PowerFlo
- ◆ Operation and service of these options

## 6.1 Splitters

Splitters can be integrated with the PowerFlo to supply abrasive to multiple nozzles. Additional information on splitters and multiple nozzle arrays is available in Chapter 3, page 10.

### PF2121-3 SPLITTER PARTS AND INSTALLATION

3/8" OD Tube Input - (2) 1/4" OD Tube Output



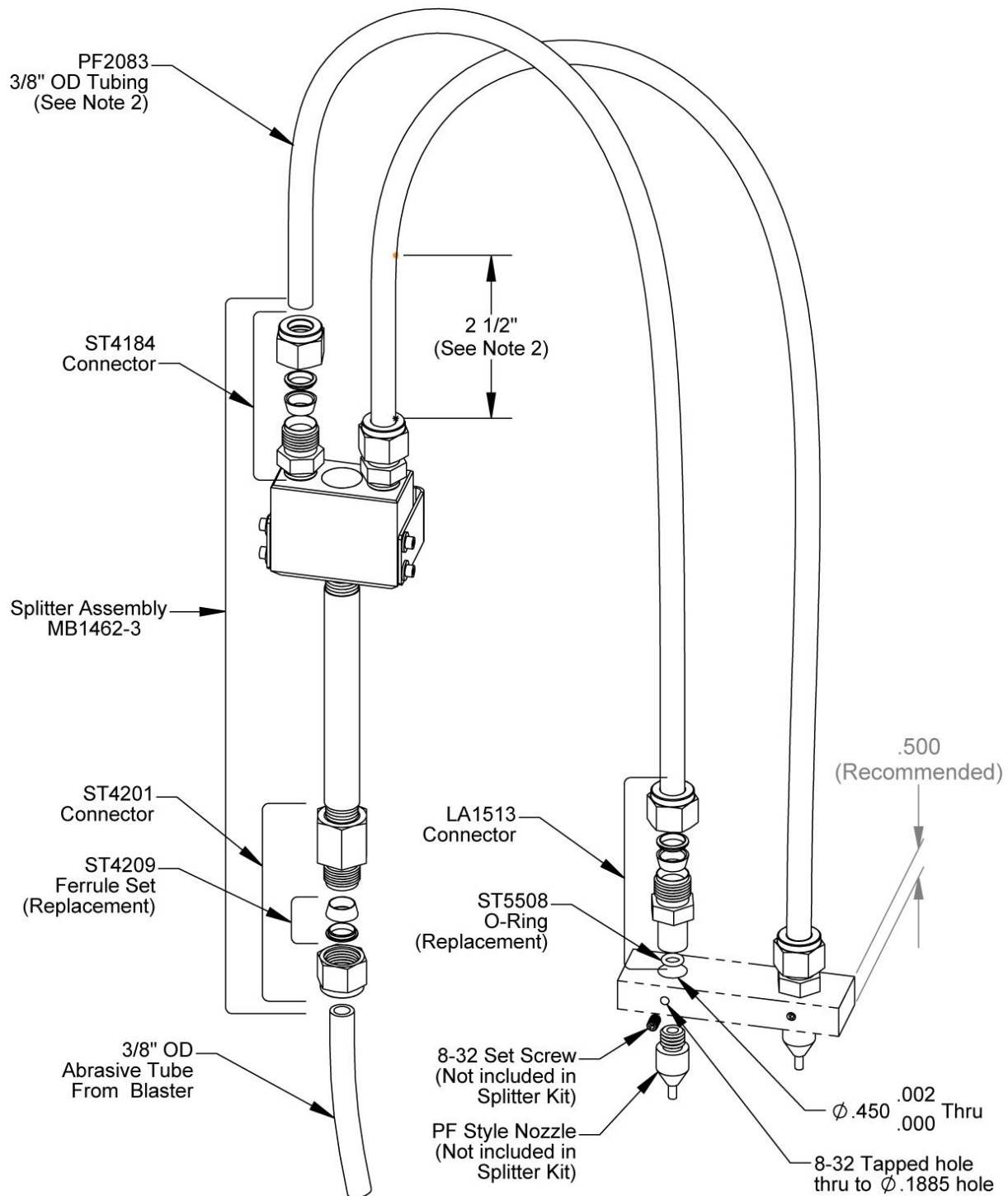
#### INSTALLATION NOTES:

- 1) Install the splitter vertically with the output hoses pointing up as shown.
- 2) The output hoses must be kept straight at the exit of the splitter for a minimum of 2 1/2" and should be cut to equal lengths.
- 3) All of the nozzles must be the same size and style for equal splitting of the abrasive flow and minimum splitter wear.

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**PF2121-4 SPLITTER PARTS AND INSTALLATION**

3/8" OD Tube Input - (2) 3/8" OD Tube Output

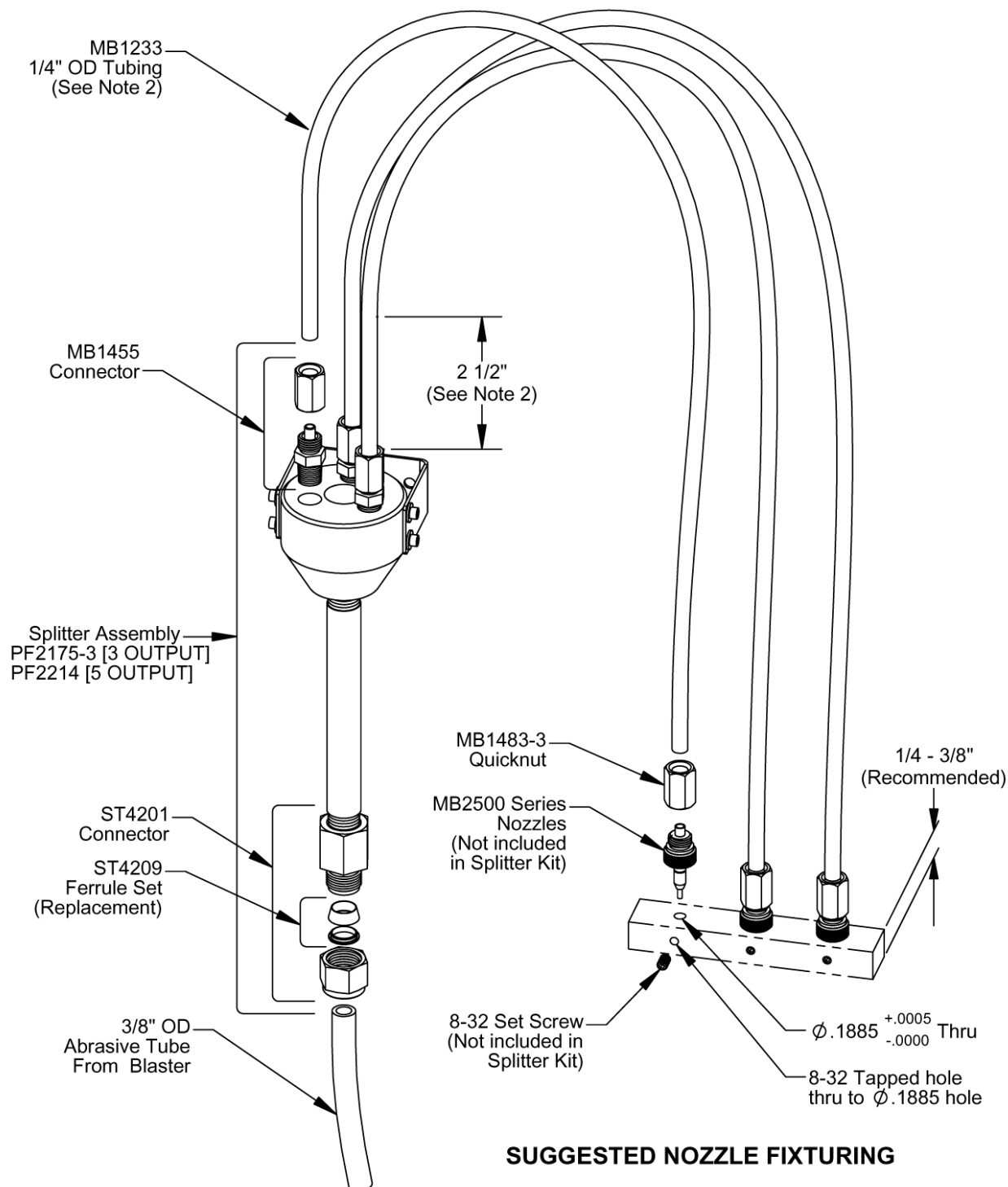
**SUGGESTED NOZZLE FIXTURING****INSTALLATION NOTES:**

- 1) Install the splitter vertically with the output hoses pointing up as shown.
- 2) The output hoses must be kept straight at the exit of the splitter for a minimum of 2 1/2" and should be cut to equal lengths.
- 3) All of the nozzles must be the same size and style for equal splitting of the abrasive flow and minimum splitter wear.

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## SPLITTER PARTS AND INSTALLATION

**PF2131-3** 3/8" OD Tube Input - (3) 1/4" OD Tube Output (Shown)  
**PF2215** 3/8" OD Tube Input - (5) 1/4" OD Tube Output



### INSTALLATION NOTES:

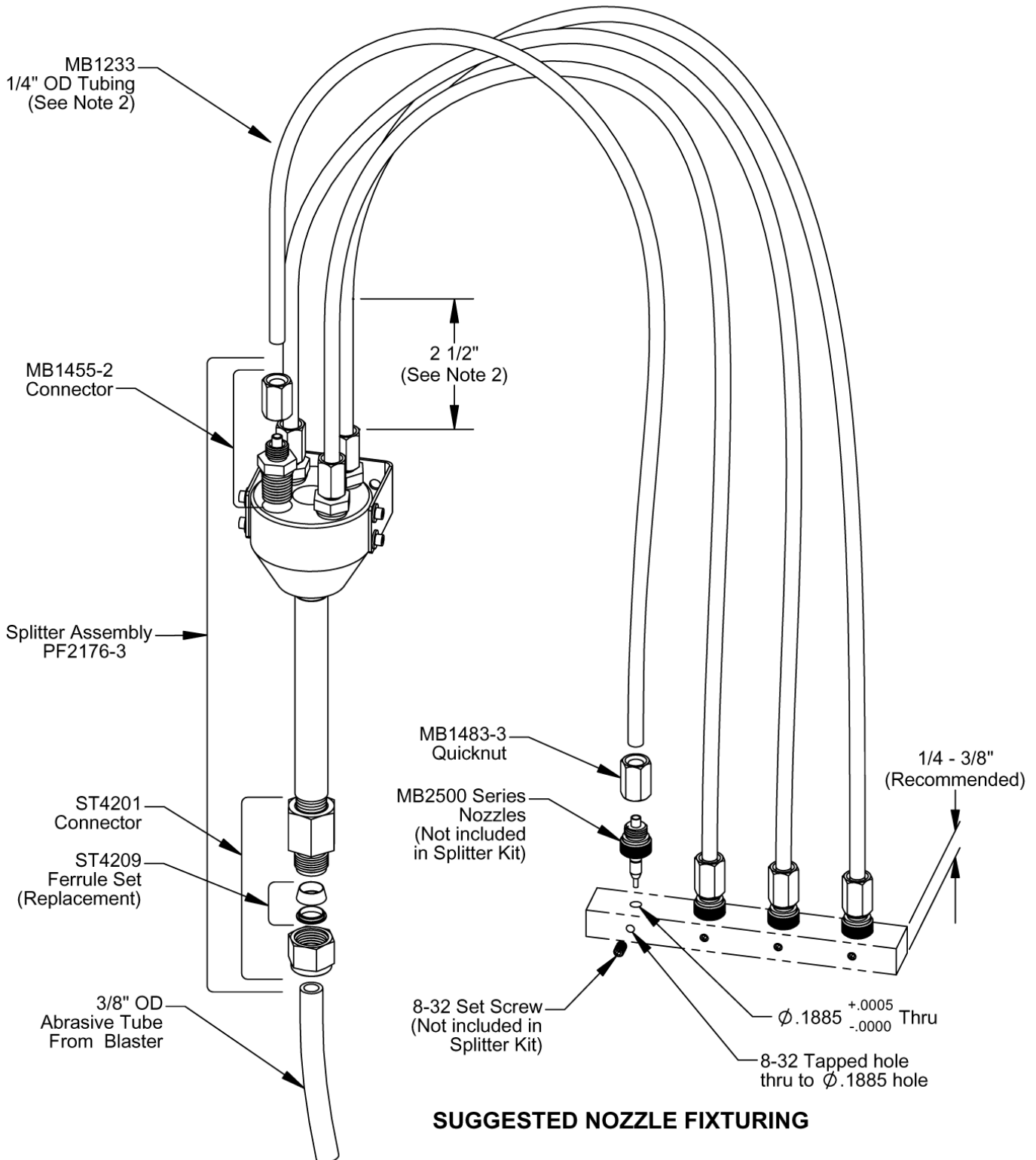
- 1) Install the splitter vertically with the output hoses pointing up as shown.
- 2) The output hoses must be kept straight at the exit of the splitter for a minimum of 2 1/2" and should be cut to equal lengths.
- 3) All of the nozzles must be the same size and style for equal splitting of the abrasive flow and minimum splitter wear.

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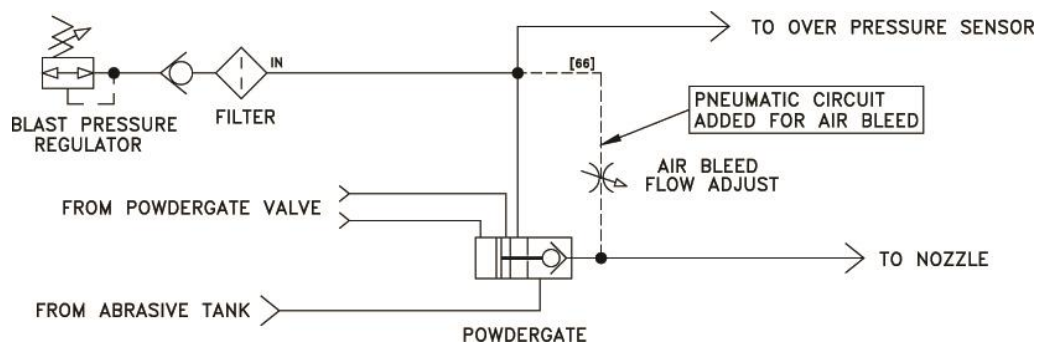
**PF2141-3 SPLITTER PARTS AND INSTALLATION**

3/8" OD Tube Input - (4) 1/4" OD Tube Output

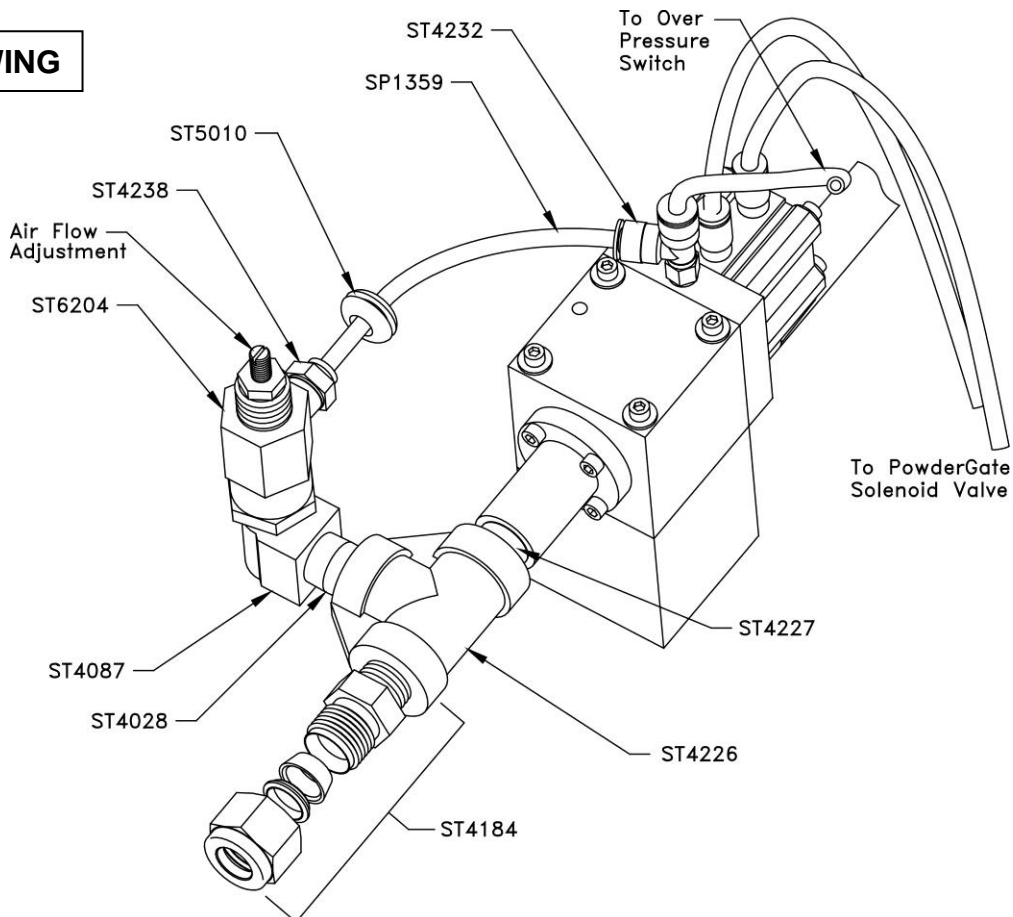
**INSTALLATION NOTES:**

- 1) Install the splitter vertically with the output hoses pointing up as shown.
- 2) The output hoses must be kept straight at the exit of the splitter for a minimum of 2 1/2" and should be cut to equal lengths.
- 3) All of the nozzles must be the same size and style for equal splitting of the abrasive flow and minimum splitter wear.

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**PF2495 CONSTANT AIR BLEED (OPTIONAL)****Figure 6.2****PNEUMATIC DIAGRAM**

For a complete Pneumatic Diagram of the blaster see Appendix "B" of this manual.

**PARTS DRAWING**

ST4184	Connector S.S., 3/8T x 1/4 NPT	ST4227	Nipple 1/4 NPT Stainless Steel
SP1359	Tubing, Poly, 5/32 OD Clear	ST4232	Tee, Male Run, 5/32 T x 10-32
ST4028	Nipple, 1/4 NPT, Brass	ST4238	Connector, 5/32 T x 1/8 NPT
ST4087	Elbow, Street 1/8 NPT	ST5010	Grommet
ST4226	Tee, 1/4 NPT Stainless Steel	ST6204	Needle Valve

In some applications it is necessary to have the nozzle located in an environment near cutting fluids or moisture, such as on an automatic hypodermic needle grinder. For these situations it is desirable to have a low pressure, continuous stream of air flowing out through the nozzle, preventing moisture from migrating up inside the tip. Moisture in this area could cause the abrasive media to clump up and plug the nozzle tip. Blasters equipped with the optional Constant Air Bleed provide this continuous air flow.

### **6.2.1 Air Flow Adjustment**

The air flow adjustment located on the PowderGate output sets the bleed air flow out of the abrasive nozzle when the blaster is pressurized but not blasting. The adjustment is set at the factory to flow 20 SCFH at 100 psi (560 SLH / 700 kPa). The flow can be increased or decreased if desired.

To set the bleed air flow:

- 1) Loosen the lock nut on the threaded adjusting shaft protruding from the Flow Control.
- 2) Set flow by inserting a screwdriver into the end of the adjusting shaft and turn counterclockwise to increase or clockwise to decrease flow. If a flow meter is available, it can be connected to the nozzle end of the abrasive hose to assist in achieving the desired flow.

***DO NOT TURN ON BLAST WHILE SETTING FLOW.***

- 3) After setting the air flow, lock down the adjusting screw with the lock nut.

### **6.2.2 Service**

If the bleed air fails to flow out of the nozzle, service may be necessary.

- 1) Check the nozzle to make sure it is not clogged. Does abrasive flow when the blast is on?
- 2) Adjust for proper air flow as detailed above.
- 3) Flow Control valve may be clogged with abrasive powder. Flush out valve by turning up the bleed air flow to its maximum and allow the bleed air to flow for 15 to 20 seconds. Removing or disconnecting the nozzle(s) from the abrasive hose will increase the flushing air flow.

***DO NOT TURN ON BLAST WHILE FLUSHING BLEED HOSES.***

After flushing, reset bleed air to its normal operating flow as detailed above.

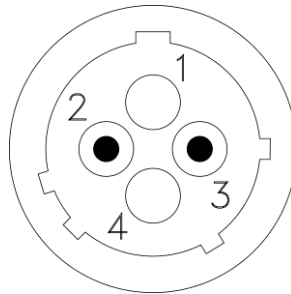
- 4) If the bleed air still does not flow, it is likely caused by an obstruction in the bleed air path such as a clogged filter, check valve, or regulator port. Locate clog by disconnecting or removing components one at a time and checking for air flow.

### 6.3 ELECTRONIC REGULATOR OPTION PF2474

#### I/O Connector Pin Signals:

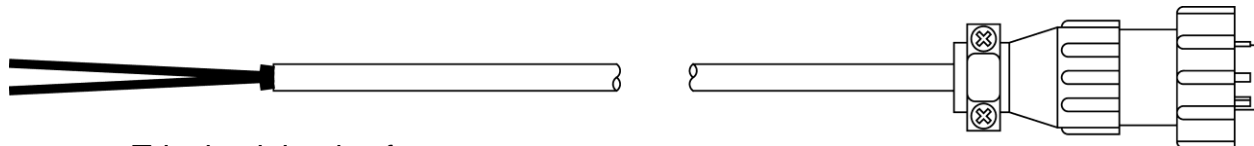
Pin No.	Signal	SP1856-2 Cable Wire Color
1	No Connection	Black
2	Signal Ground	White
3	0-10V = 0-145 psi	Red
4	No Connection	Green

Host must supply 0-10 V signal into pin 3 to adjust regulator pressure.



REGULATOR I/O SIGNAL CONNECTOR  
ON POWERFLO BACK PANEL

#### SP1856-2 Connection Cable Assembly (not included with PowerFlo)



Trim back leads of  
unused Black and  
Green wires.





Appendix A  
Parts Lists  
for the  
PowerFlo® PF2400

## MAJOR ASSEMBLIES AND PRINCIPAL PARTS

<b><u>PART NUMBER</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY.</u></b>
PF2407	Valve Bank Assy	1
● ST4003	Vent, 1/8 NPT	2
● ST4166	Conn., Male, 1/4T, 1/8 NPT	1
● ST4222	Elbow, Male, 5/32T, 10-32 Thd	4
● ST6270	Valve, 4 Way, 24VDC	3
PF2409 <sup>[1]</sup>	Tank Assembly	1
● PF2027	Bracket, Bolt	4
● PF2071-2	Detector Assembly	1
● PF2079	Swing, Bolt, Cover	4
● PF2082-2	Emitter Assembly	1
● ST1270	Washer, Hardened	4
● ST1289	Nut, Hex, 5/16-18	4
● ST4029	Coupling, 1/8P, Brs	1
● ST4162	Elbow, 3/8T, 1/4 NPT	1
● ST4184-2	Conn. Body, 3/8 T, 1/4 NPT, SS	1
● ST4172	Conn., 5/32T, 10-32 Thd	2
● ST4265-2	Conn. Body, 3/8 T, 1/8 FNPT, SS	1
● MB1455	Conn. w/Quicknut, 1/8NPT-1/4P	1
● ST5163-6	Pin, Dowel, 1/4 X 1 1/4	4
● PF2498-1 <sup>[2]</sup>	Bypass Tube Assy, PF Std Tank	1
PF2446	Inlet Valve, Assy.	1
● PF2095-2	Valve, Main, PowerFlo	1
● PF2096-3	Valve, Tank, PowerFlo	1
● ST4136	Elbow, 3/8T, 3/8NPT	1
● ST4146	Plug, Quick-Disconnect Coupling	1
● ST6147	Regulator, 0-125 PSI	1
● ST6218	Gage, 0-160 PSI	1
● ST4157	Valve, Flow Control	1
● ST4166	Conn., Male, 1/4 Tube, 1/8 NPT	1
PF2450	PowderGate Assembly	1
● PF2189-2	Nose & Valve Seat Assembly	1
● MB1653	Nosepiece, Polymer	1
● PF2471	Air Cylinder Assembly	1
● PF2441	Disk, Retainer	1
● PF2442	Wiper, Felt	2
● ST4184-2	Conn., Body, 3/8 T, 1/4 MPT, SS	1
● ST4172	Fitting, 5/32 Tube, 10-32 Thd	3
● ST5546	O-ring, .801 ID x .070 W	1
● ST5161	O-ring, .489 ID x .070 W	1
● ST5031	O-ring, .739 ID x .070 W	1
● ST5067	O-ring, .614 ID x .070 W	1

[1] Extended Tank Model requires Tank P/N PF2429

[2] Extended Tanks require a PF2498-2 Bypass Tube Assembly

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**MAJOR ASSEMBLIES AND PRINCIPAL PARTS** (cont'd)

<b><u>PART NUMBER</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY.</u></b>
PF2445	Vent Pinch Assy	1
● MB1050-2	Plunger, Pinch	1
● MB1282	Tube, Pinch	1
PF2419	Powder Flow Detector Assy	1
● PF2417	Tube, Flow Detector	1
● PF2418	Detector Block Assy	1
PF2480	Cover Assy, Tank	1
● MB1145	Flapper Assembly	1
● ST5023	O-ring, 2-224	1
● ST5495	O-ring, 5.859ID x.139W	1
● ST5496	O-ring, .2961ID x.139W	1
● PF2055	Bushing, Feed Thru	2
PF2034	Modulator, Assy	1
● PF2040	Housing, Modulator, Assy	1
▶ MB1294	Core, Modulator	1
▶ PF2199	Body, Modulator DF/PF	1
▶ PF2050	Nose Assy, Modulator	1
● PF2042	Coupler, Modulator	1
● MB1310-7	Coil, Modulator	1
PF2443	Regulator Assy, Main	1
● PF2472	Regulator, 3/8NPT	1
● PF2210	Filter Assembly	1
● ST6209	Valve, Check	1
● MB1560	Filter & Check Valve Assy	1
PF2142	Powder, Adj. Assy, High Flow	1
● PF2148	Valve, Needle, RFC 1/4-P	1
● ST6209	Valve, Check, .250P	1
● ST6232	Filter, In Line 1/2" 20 Micron	1
PF2227-1 <sup>[1]</sup>	Basket Assy, Abrasive	1
● MB1409-25	Orifice, Tank, Carbide, .025	1
● ST5504	O-ring, .359ID x.139W	1

<sup>[1]</sup> Extended Tank Model requires Powder Basket PF2227-2

▶ For reference only, parts not sold individually

**MAJOR ASSEMBLIES AND PRINCIPAL PARTS** (cont'd)

<b><u>PART NUMBER</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY.</u></b>
PF2405	Vent Manifold Assembly	1
● ST6212	Switch, Adj. Pressure	1
● ST6247	Switch, Pressure Preset	1
PF2406	Handpiece and Hose Assembly	1
● PF2066	Tube, Handpiece	1
● PF2090	Nose Assembly	1
● PF2083	Tube, Abrasive, .375 Polyhose	6 ft
● ST4266	Nut & Ferrule Set, 3/8 Tubing	1
● ST4209	Ferrule Set (only), 3/8 Tubing	1
● ST5552	Spring, Grounding	1
●		
PF2425-2	Control Panel Assy	1
● PF2423-2	Keypad	1
● PF2421	Standoff Display	4
● PF2424	Standoff Cover	4
● ST2155	Display, LCD	1
● PF2410 <sup>[1]</sup>	Interconnect PC Board	1
● MB1407-1 <sup>[1]</sup>	Gage, Cutting Speed	1
● ST5520 <sup>[1]</sup>	Knob, Black	1
● ST2045 <sup>[1]</sup>	Switch, Rocker, Power	1
● ST2165 <sup>[1]</sup>	Switch, Rocker, Vent	1
● ST5493 <sup>[1]</sup>	Spacer, 5/8 Lg	4
● PF2428-1 <sup>[2]</sup>	Keypad Cable Assy	1
● PF2428-2 <sup>[2]</sup>	Signals Cable Assy	1
● PF2427 <sup>[2]</sup>	Display Cable Assy	1
● PF2100 <sup>[2]</sup>	Data IO Cable Assy	1
● PF2488 <sup>[2]</sup>	PCB Assembly, Main Board	1
● PF2454 <sup>[2]</sup>	Power Inlet Cable Assy	1
● PF2438 <sup>[2]</sup>	Bracket, PCB	1
● PF2412-2 <sup>[2]</sup>	Powder Level Cable Assy	1
● ST2164-1 <sup>[2]</sup>	Recept. Conn., 4 Pin, Sq. Flange	1
● ST7317 <sup>[2]</sup>	Suppressor, 130V	2
● ST7487 <sup>[2]</sup>	Conn. Molex Recept. 2-Pin	3
● ST7787-4 <sup>[2]</sup>	Connector RFI	1
● PF2226 <sup>[2]</sup>	Power Supply Assy, 24V	1
● ST4014 <sup>[2]</sup>	Union, Blkhd, 1/4 Tube	1
● MB1483 <sup>[2]</sup>	Quicknut, 1/4 Poly Tubing	2

<sup>[1]</sup> Part of Front Panel Assembly, PF2439

<sup>[2]</sup> Part of Cabinet Assembly, PF2422-1

**MAJOR ASSEMBLIES AND PRINCIPAL PARTS (cont'd)**

<b><u>PART NUMBER</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY.</u></b>
● PF2402 <sup>[1]</sup>	Cover, Chassis	1
● ST2005-010 <sup>[1]</sup>	Fuse, 220V, 1A, Time Delay	2
● ST4040 <sup>[1]</sup>	Tube, .375x.050, Polyflo, Blk	50"
● MB1233 <sup>[1]</sup>	Tube, Abrasive, Poly, Blue	6 ft
● SP1359 <sup>[1]</sup>	Tube, Poly, 5/32 OD, Clear	6 ft
● ST7177 <sup>[1]</sup>	Diode, Zener	1
● PF2447 <sup>[1]</sup>	Gasket, Tank	1
● PF2451 <sup>[1]</sup>	Cable, Powderflow Extension	1
● ST2176 <sup>[1]</sup>	Coupler, RJ11, F/F	1

<sup>[1]</sup> Part of Machine Assembly, PF2420-1

**STANDARD ACCESSORY PARTS, PF2408-1 <sup>[\*]</sup>**

<b><u>PART NUMBER</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY.</u></b>
MB1409-25	Orifice, Tank, Carbide, .025	1
MB1409-30	Orifice, Tank, Carbide, .030	1
PF2044	Nozzle adaptor	1
PF2414	Footswitch	1
PF2083	Tube, Abrasive, Poly	12 ft
PF2110-1	Nozzle. 0.060, red	1
PF2110-3	Nozzle. 0.080, blue	1
PF2120	Sleeve, Tube	3
ST5066	Funnel, Abrasive	1
ST5114	Nut driver, 1/4	1
ST7716-1*	Power cord	1
ST5508	O-ring, nozzle	5
ST5518	Wrench, 9/16	1
ST4209	Ferrule Set, 3/8 Tubing	2
PF2090	Nose Assembly, Nozzle	1
MB1653	Nosepiece, PowderGate	2

<sup>[\*]</sup> The Accessory Parts kit for 230V machines is PF2408-2; Power cord is ST7716-9, and two fuses are added, ST2005-005 (500ma) and ST2005-0315 (3.15a).

## RECOMMENDED SPARE PARTS (Optional)

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
MB1409-x*	Orifice, Tank, Carbide	2
MB1653	Nosepiece, PowderGate	2
PF2189-2	Nose/Valve Seat Assembly	1
PF2040	Housing Assy, Modulator	2
PF2079	Swing Bolt, Cover	2
PF2083	Tube, Abrasive, .375 Polyhose	30 ft.
PF2417	Tube, Flow Detector	1
PF2090	Nose Assy, Nozzle	2
PF2120	Sleeve, Tube	24
ST2005-010	Fuse, 220V, 1.0A	1
ST2005-0315	Fuse, 220V, 3.15A	1
ST1289	Nut, Hex, for Cover Bolts	4
ST4014	Union, Bulkhead	1
ST4184	Connector, 3/8 Tubing X 1/4 NPT, SS	1
ST4209	Ferrule Set, 3/8 Tubing	5
ST4159	Nut, Tube .375	2
PF2139	O-ring Replacement Kit, Tank Cover	1
ST5209	O-ring, .426 ID	2
ST5161	O-ring, .489 ID	1
ST6209	Valve, Check	1
ST6210	Regulator	1
ST6267	Filter Element, Replacement	1

- Orifice and Nozzle sizes are determined by application requirements. Refer to Chapter 3 for details.

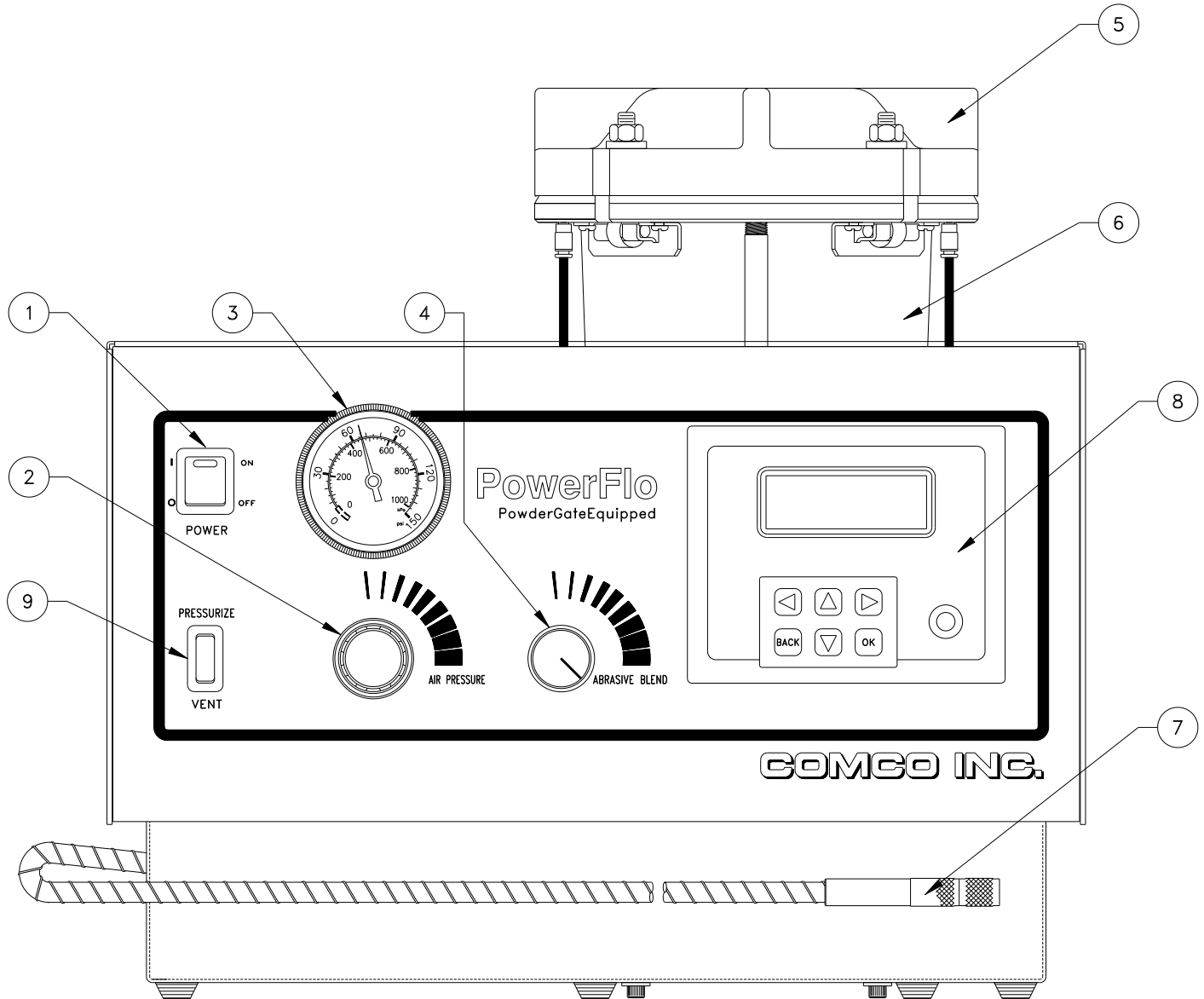
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Appendix B  
Drawings and Schematics  
for the  
PowerFlo PF2400

## **List of Figures**

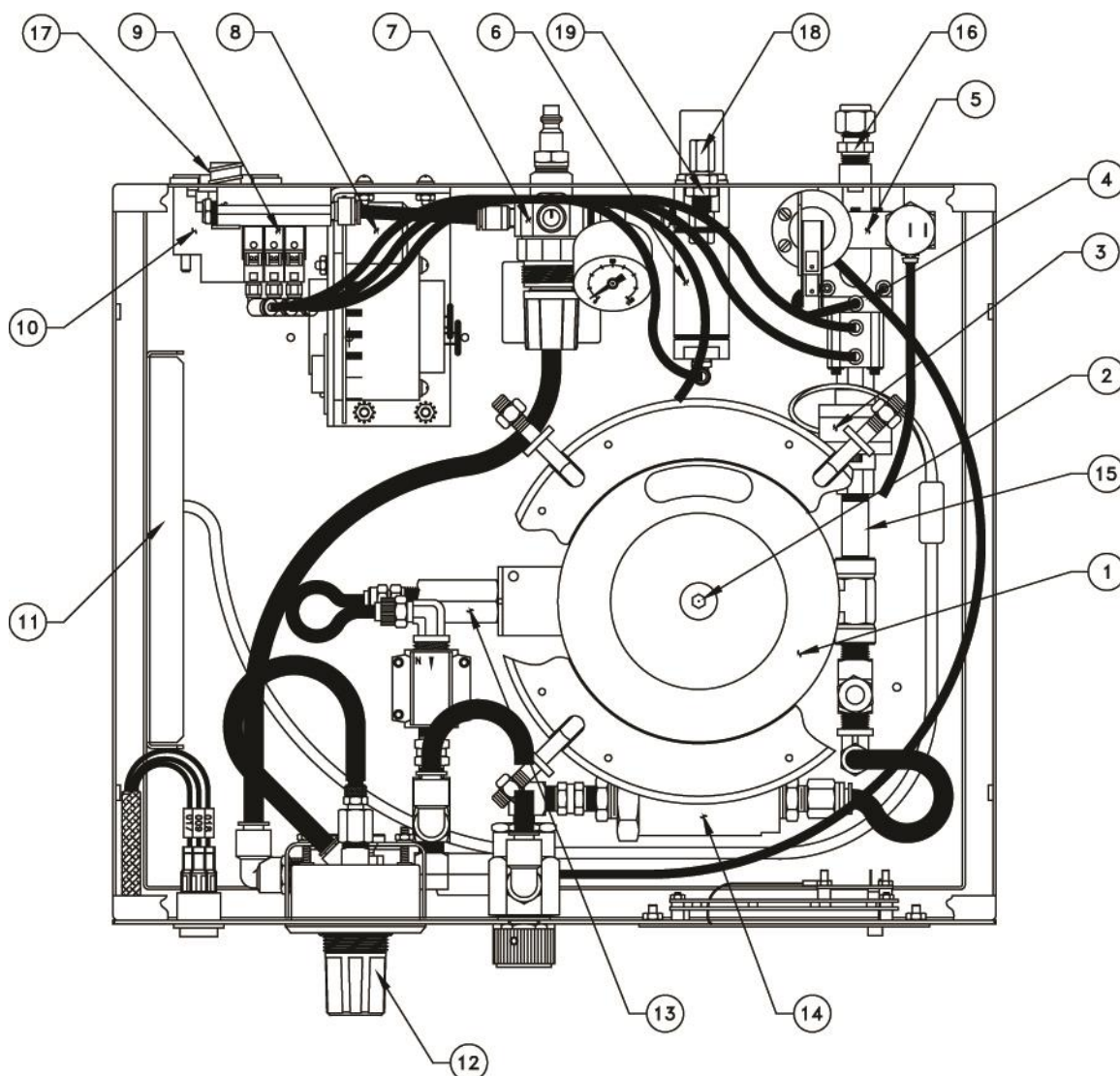
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Figure 18:	PF2425-2 Control Panel Assembly .....	B-22



**FIGURE 1: FRONT VIEW, MODEL PF2400**

Item No.	Description	Part No.	Item No.	Description	Part No.
1	Power Switch	ST2045	6	Abrasive Tank	[1]
2	Regulator Assy	PF2443	7	Handpiece Assy	PF2406
3	Pressure Gage	MB1407-1	8	Control Panel Assy	PF2425-2
4	Powder Flow Ctl	PF2142	9	Press/Vent Switch	ST2165
5	Tank Cover	PF2480			

[1] See individual Part Drawing for Part Numbers

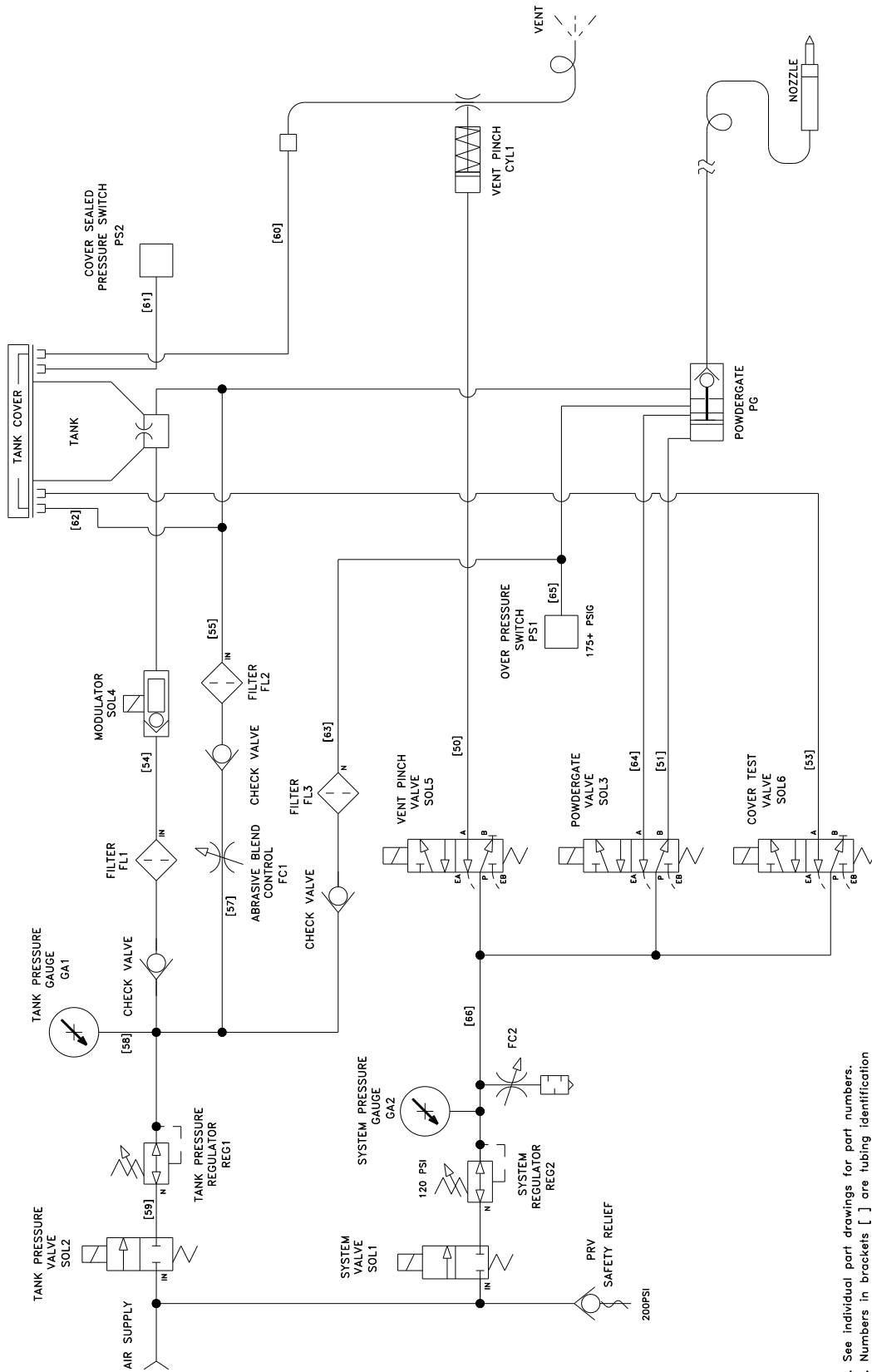
**FIGURE 2: TOP VIEW, MODEL PF2400**

Item No.	Description	Part No.	Item No.	Description	Part No.
1	Abrasive Basket	[1]	11	PCB Assy, Main Bd	PF2488
2	Tank Orifice	MB1409-X[*]	12	Air Pres. Reg Assy	PF2443
3	Powderflow Detec.	PF2419	13	Modulator Assy	PF2034
4	PowderGate Assy	PF2450	14	Powder Adj. Assy	PF2142
5	Vent Manifold Assy	PF2405	15	Nipple, 1/4-NPTx2.0	ST4203
6	Vent Pinch Assy	PF2445	16	Conn., 3/8T, 1/4 NPT, SS	ST4184
7	Inlet Valve Assy	PF2446	17	Receptacle, SQ	ST2164-1
8	Power Supply 24V	PF2226	18	Quicknut	MB1483
9	Valve Bank Assy	PF2407	19	Union, Bulkhead, 1/4 Tube	ST4014
10	Connector RFI	ST7787-4			

[\*] Tank Orifice Size, determined by application

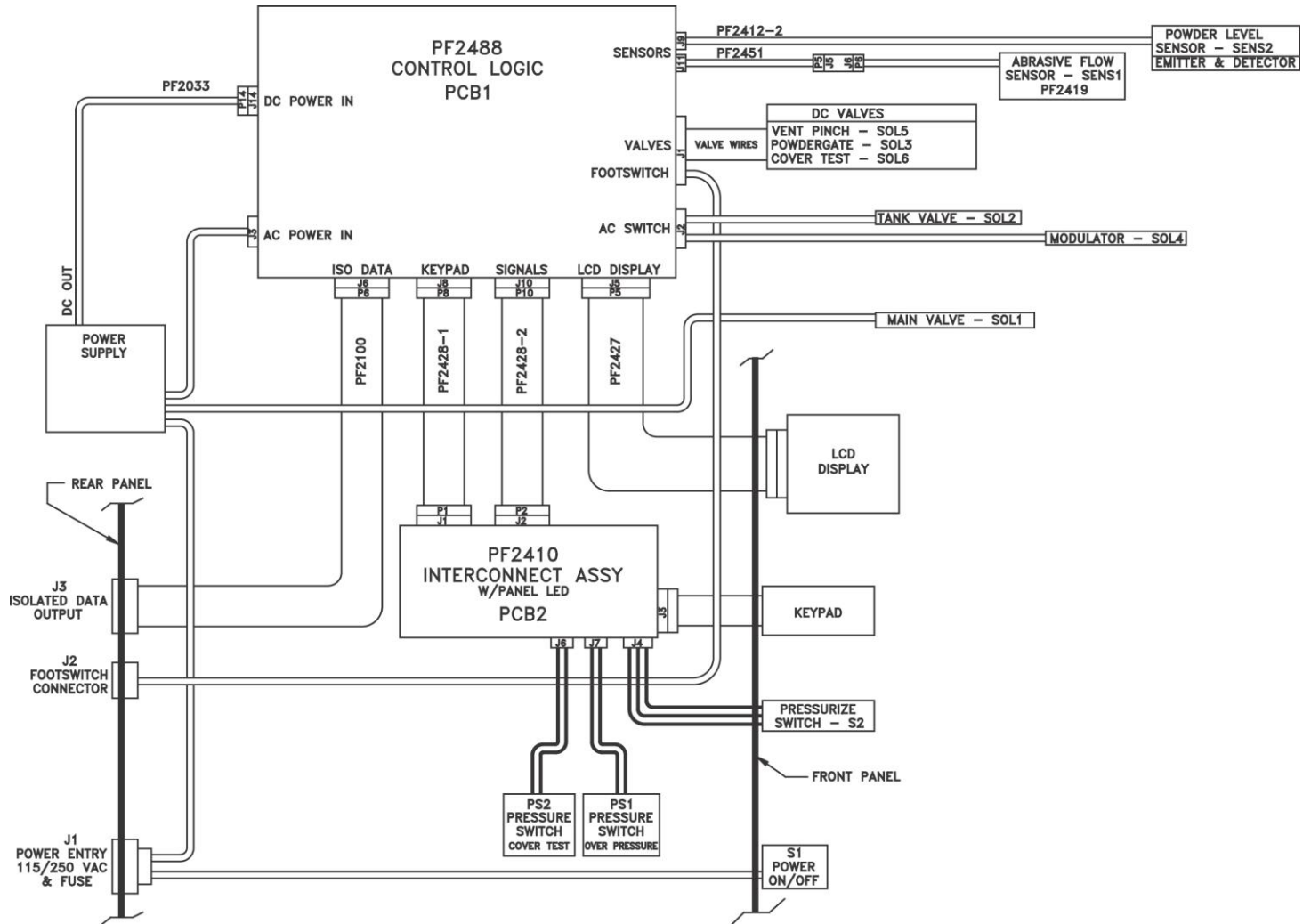
[1] See individual Part Drawing for Part Numbers

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**FIGURE 3: PNEUMATIC SCHEMATIC, MODEL PF2400**

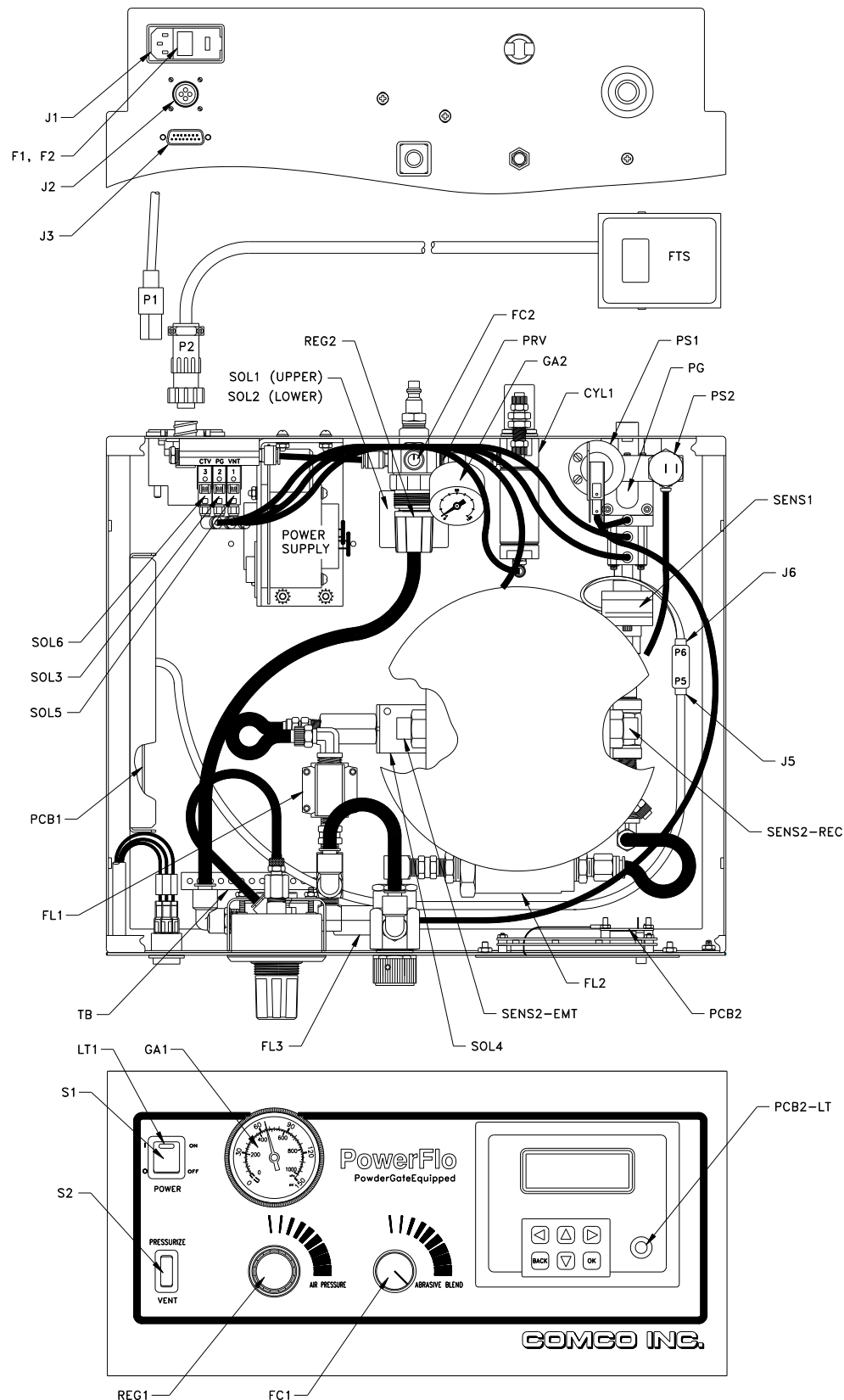
1. See individual part drawings for part numbers.
2. Numbers in brackets [ ] are tubing identification numbers and appear on CE units only.

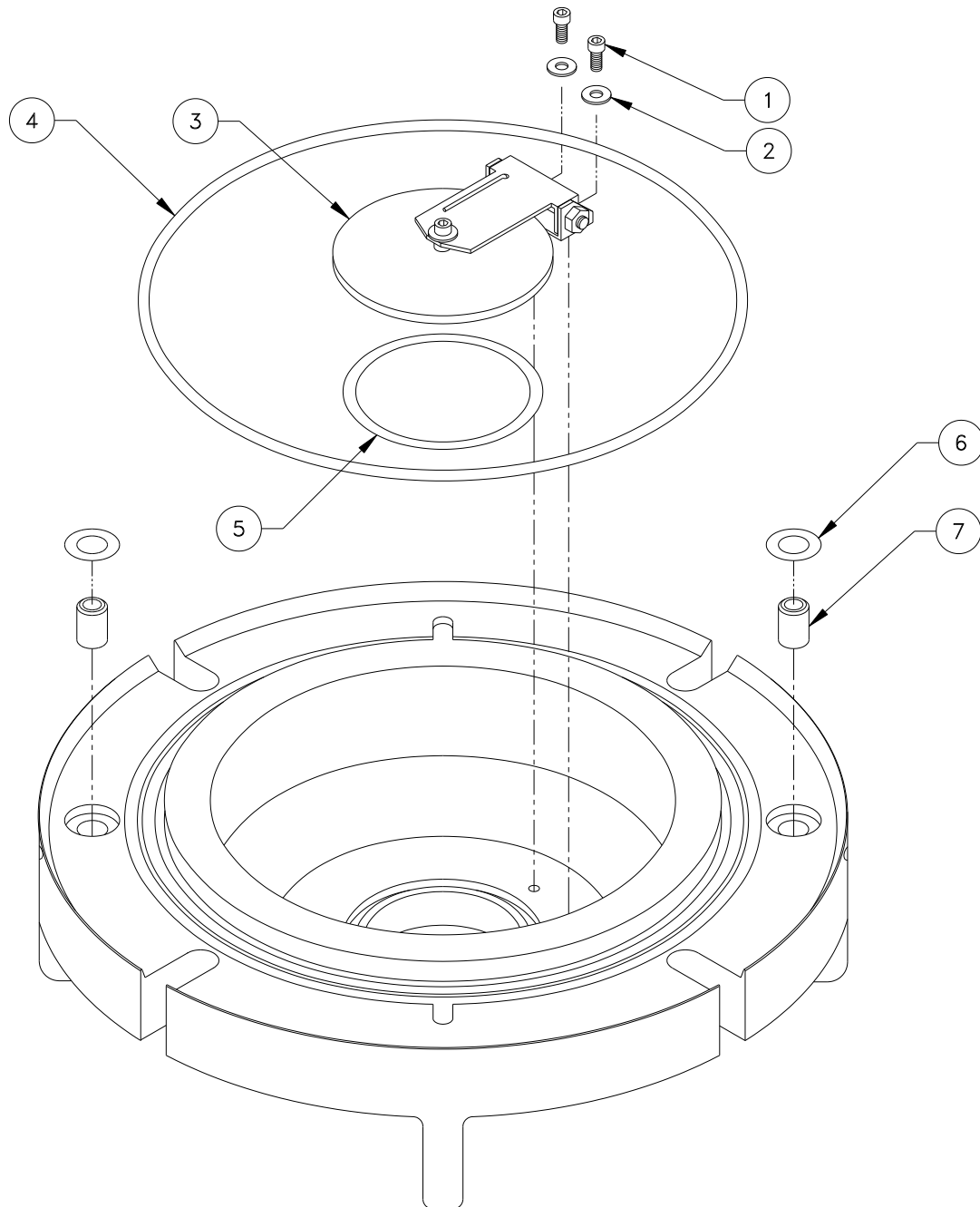
FIGURE 4A: WIRING DIAGRAM, MODEL PF2400





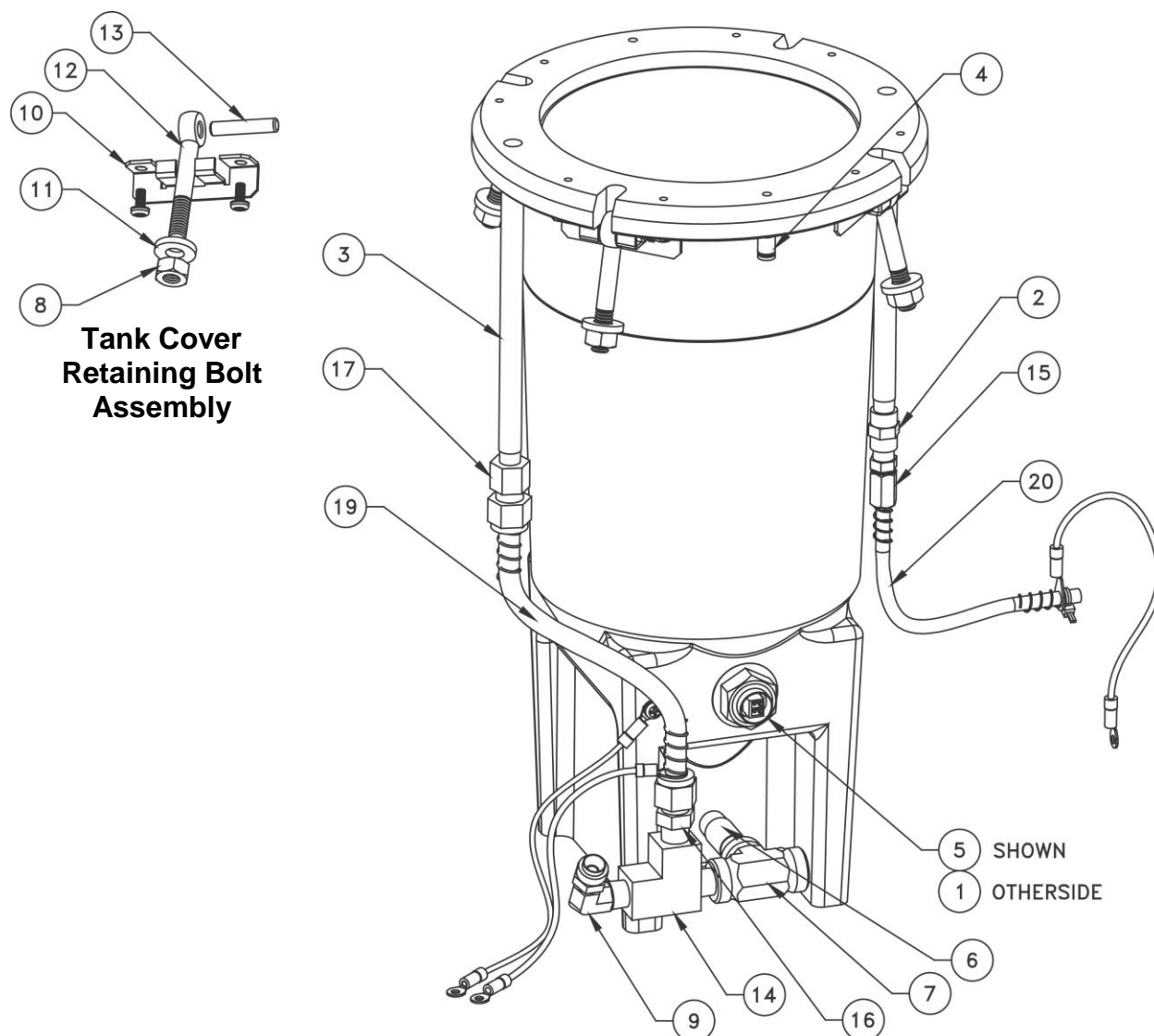
### FIGURE 4C: COMPONENT DESIGNATIONS PF2400



**FIGURE 5: PF2480 TANK COVER ASSEMBLY**

Item No.	Description	Part No.	Item No.	Description	Part No.
1	Screw 4-40 x 1/4	ST1030	5	O-ring ø1.734 ID	ST5023 <sup>[*]</sup>
2	Washer #4	ST1027	6	O-ring ø.296 ID	ST5496 <sup>[*]</sup>
3	Flapper Assy	MB1145	7	Bushing Feedthru	PF2055
4	O-ring ø5.859 ID	ST5495 <sup>[*]</sup>			

<sup>[\*]</sup> These Items are part of PF2139 (O-ring Replacement Kit)

**FIGURE 6: ABRASIVE TANK ASSEMBLY****PF2409 Standard Height (17")****PF2429 Extended Height (25")**

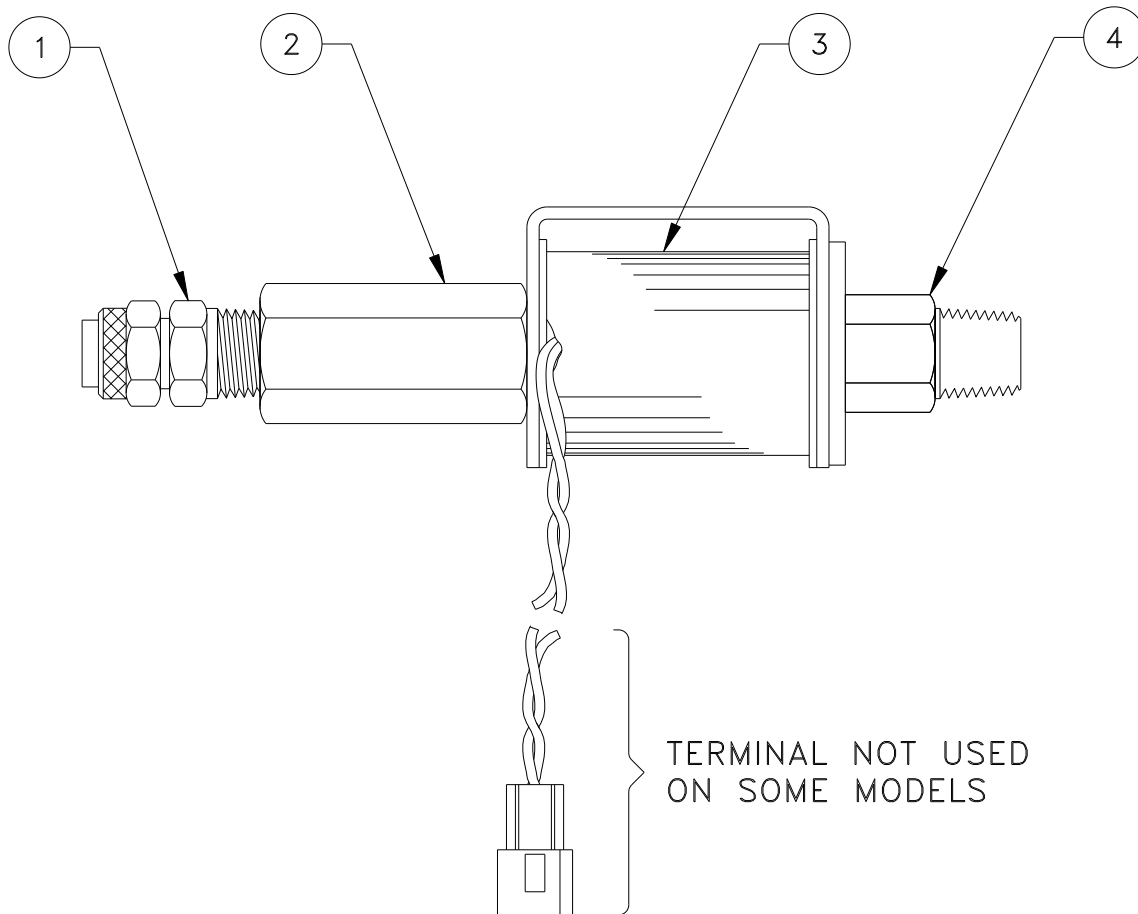
Item No.	Description	Part No.	Item No.	Description	Part No.
1	Emitter Assembly	PF2082-2	11	Washer Hardened	ST1270
2	Coupling, 1/8P, Brass	ST4029	12	Swing Bolt, Cover	PF2079
3	Nipple, 1/8 NPT, 6" Lg	ST4229	13	Pin, Dowel, 1/4 X 1 1/4	ST5163-6
3	Nipple, 1/8 NPT, 12" Lg	ST4236*	14	Tee, Street, 1/4"P	ST4138
4	Fitting, 5/32 OD	ST4172	15	Conn. w/Qknut, 1/8NPT	MB1455
5	Detector Assembly	PF2071-2	16	Conn. Body-1/4NPT	ST4184-2
6	Nipple, 1/4-NPT, 2" Lg	ST4311	17	Conn. Body-1/8 FPT	ST4265-2
7	Tee, Female, 1/4-NPT	ST4235	19	Bypass Tube Assy	PF2498-1
8	Hex Nut, 5/16-18 Brass	ST1289	19	Bypass Tube Assy	PF2498-2**
9	Elbow, 3/8 Tube-1/4 P	ST4162	20	Tubing, 1/4 OD, Blue	MB1233
10	Bracket, Tank Bolt	PF2027			

\* 12" Pipe (ST4236) is used on Extended Tanks

\*\* PF2498-2 Bypass Tube Assembly used on Extended Tanks.

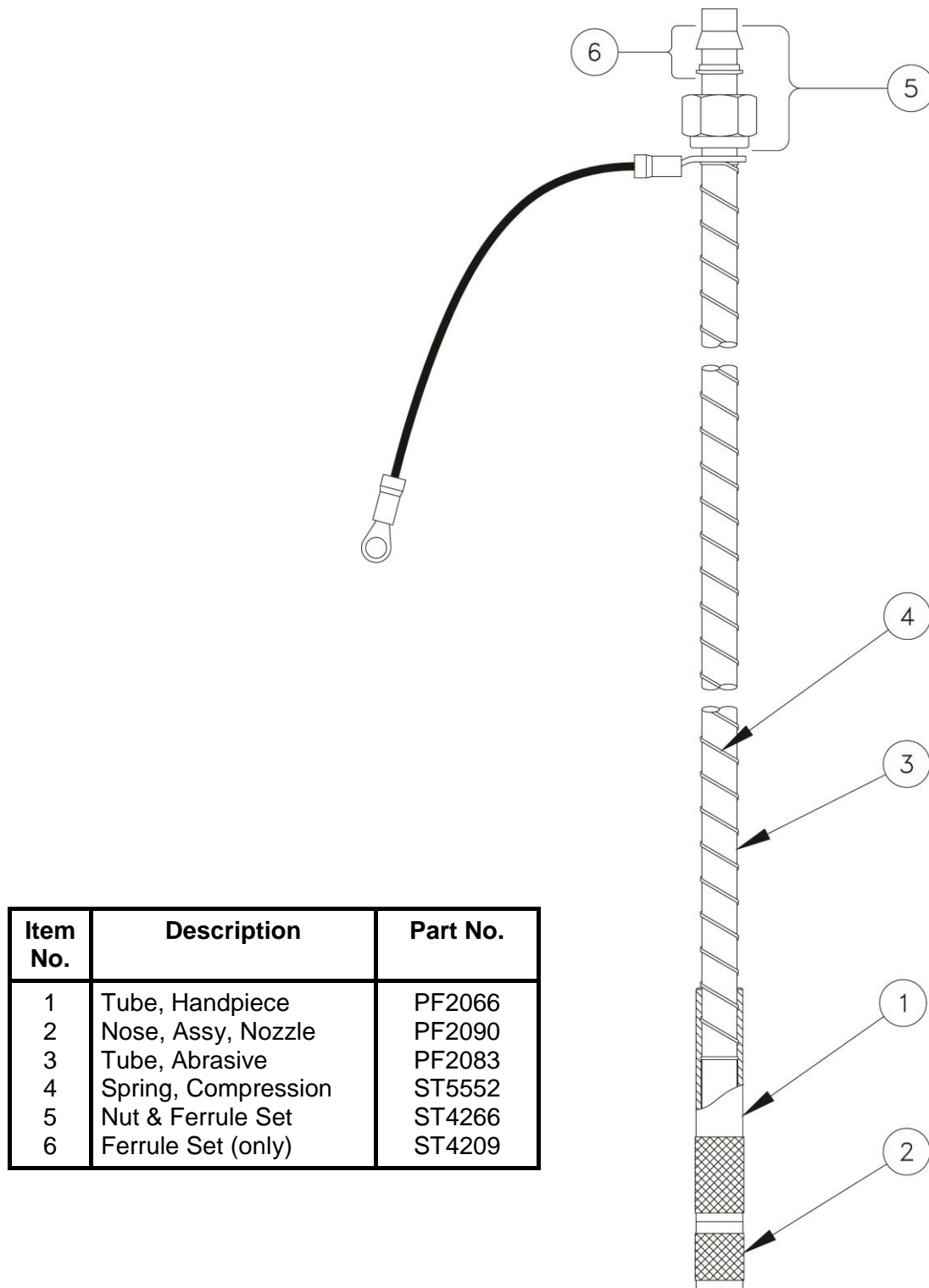
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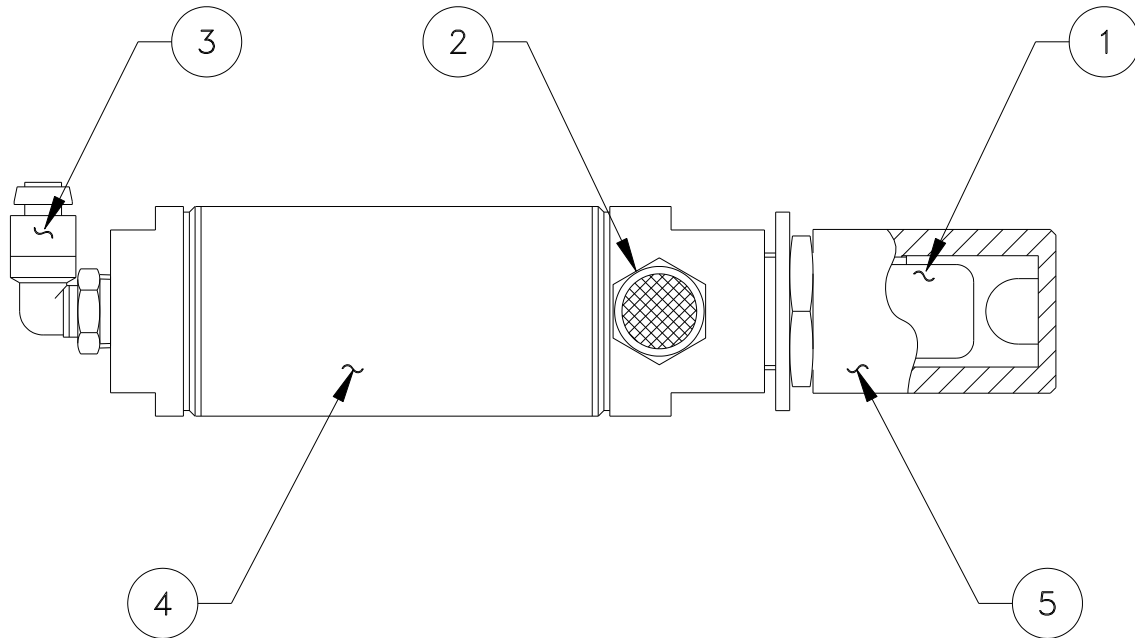


**FIGURE 7: PF2034 MODULATOR ASSEMBLY**

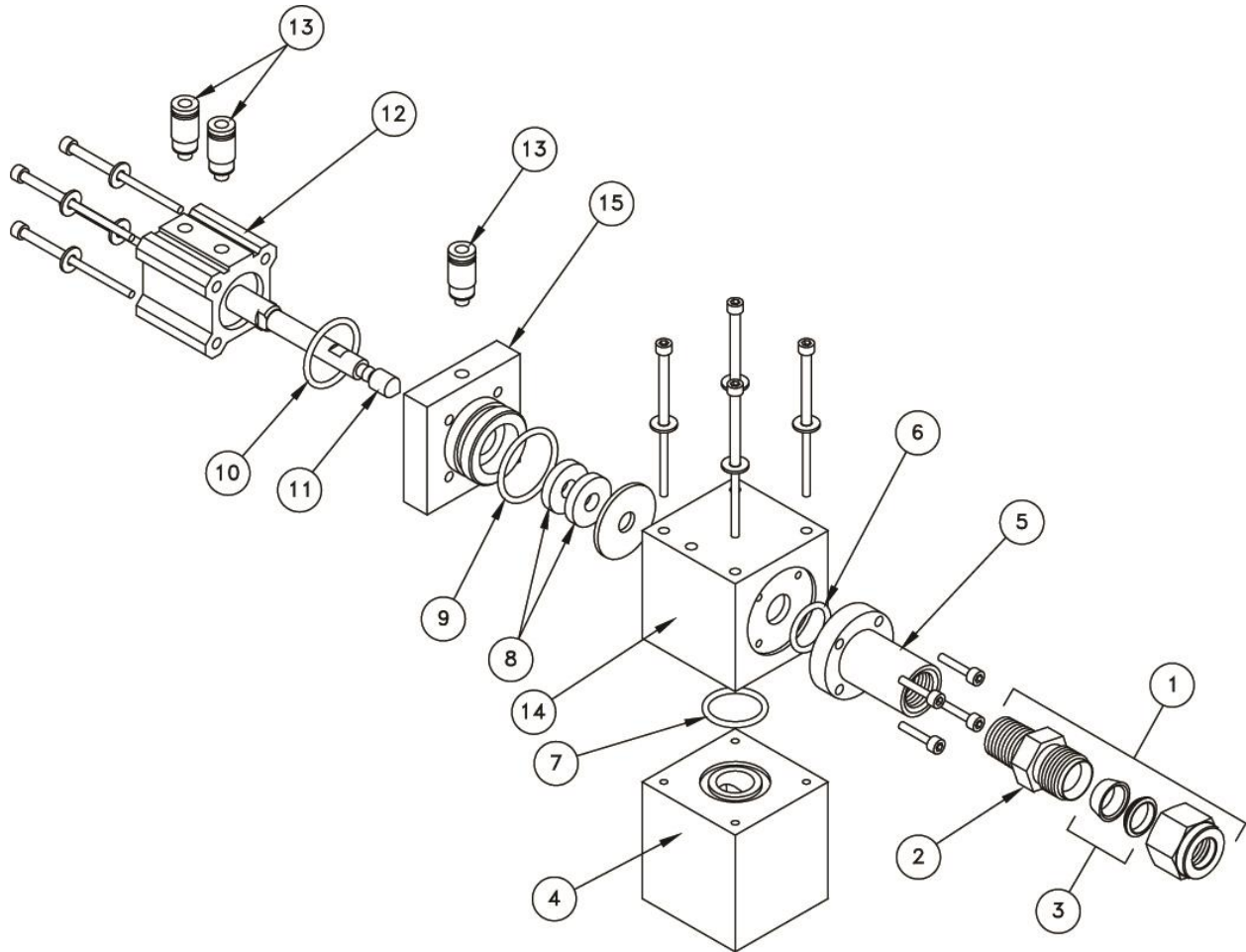
Item No.	Description	Part No.
1	Conn. Male 3/8T x 1/4P	ST4038
2	Coupling Modulator	PF2042
3	Coil, Modulator	MB1310-7
4	Modulator, Housing [1]	PF2040

[1] The Modulator Housing is a Sub-Assembly consisting of three parts typically replaced as one unit.

**FIGURE 8: PF2406 HANDPIECE & ABRASIVE HOSE ASSEMBLY**

**FIGURE 9: PF2445 VENT PINCH ASSEMBLY**

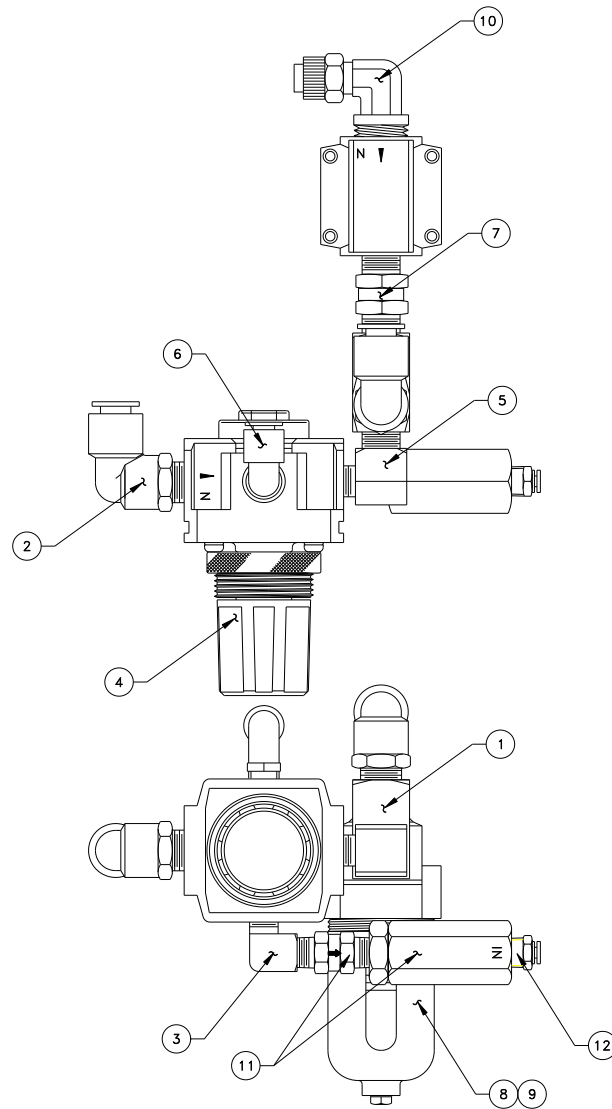
Item No.	Description	Part No.
1	Plunger, Pinch	MB1050-2
2	Vent Breather, 1/8P	ST4003
3	Elbow, Male, 1/8 Thd	ST4224
4	Cylinder, DBL Spring	ST6081
5	Tube, Pinch	MB1282

**FIGURE 10: PF2450 POWDERGATE ASSEMBLY**

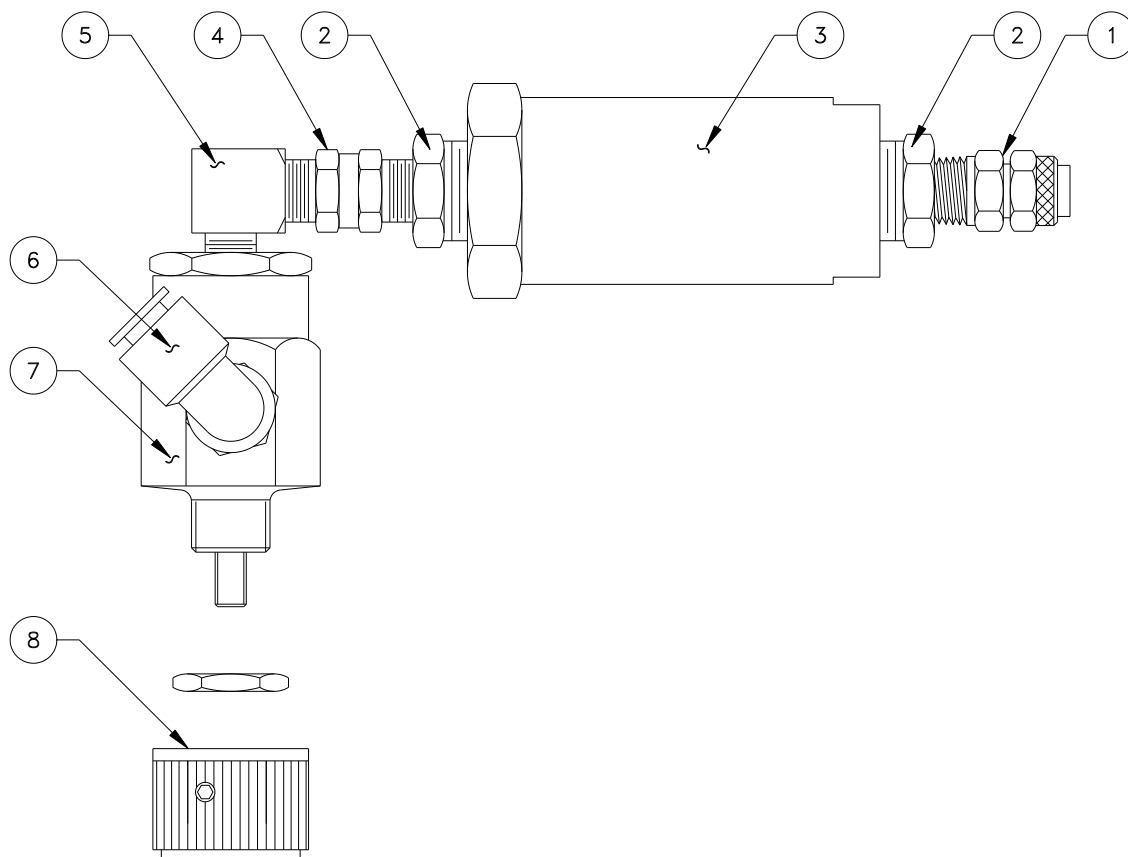
Item No.	Description	Part No.
1	Conn., 3/8 T, 1/4 NPT, SS	ST4184
2	Conn. Body (Only)	ST4184-2
3	Ferrule Set (Only)	ST4209
4	Connector Block, Rear	PF2193-3
5	Nose/Valve Seat Assy [1]	PF2189-2
6	O-ring, 2-014	ST5161
7	O-ring, 2-016	ST5067
8	Wiper, Felt	PF2442
9	O-ring, 2-019	ST5546
10	O-ring, 2-018	ST5031
11	Nosepiece	MB1653
12	Air Cylinder Assy [2]	PF2471
13	Fitting, 5/32 OD	ST4172
14	Body, Valve	PF2434
15	Adapter, Cylinder	PF2436

[1] Includes a ST5161 O-ring

[2] Includes a MB1653 Nosepiece

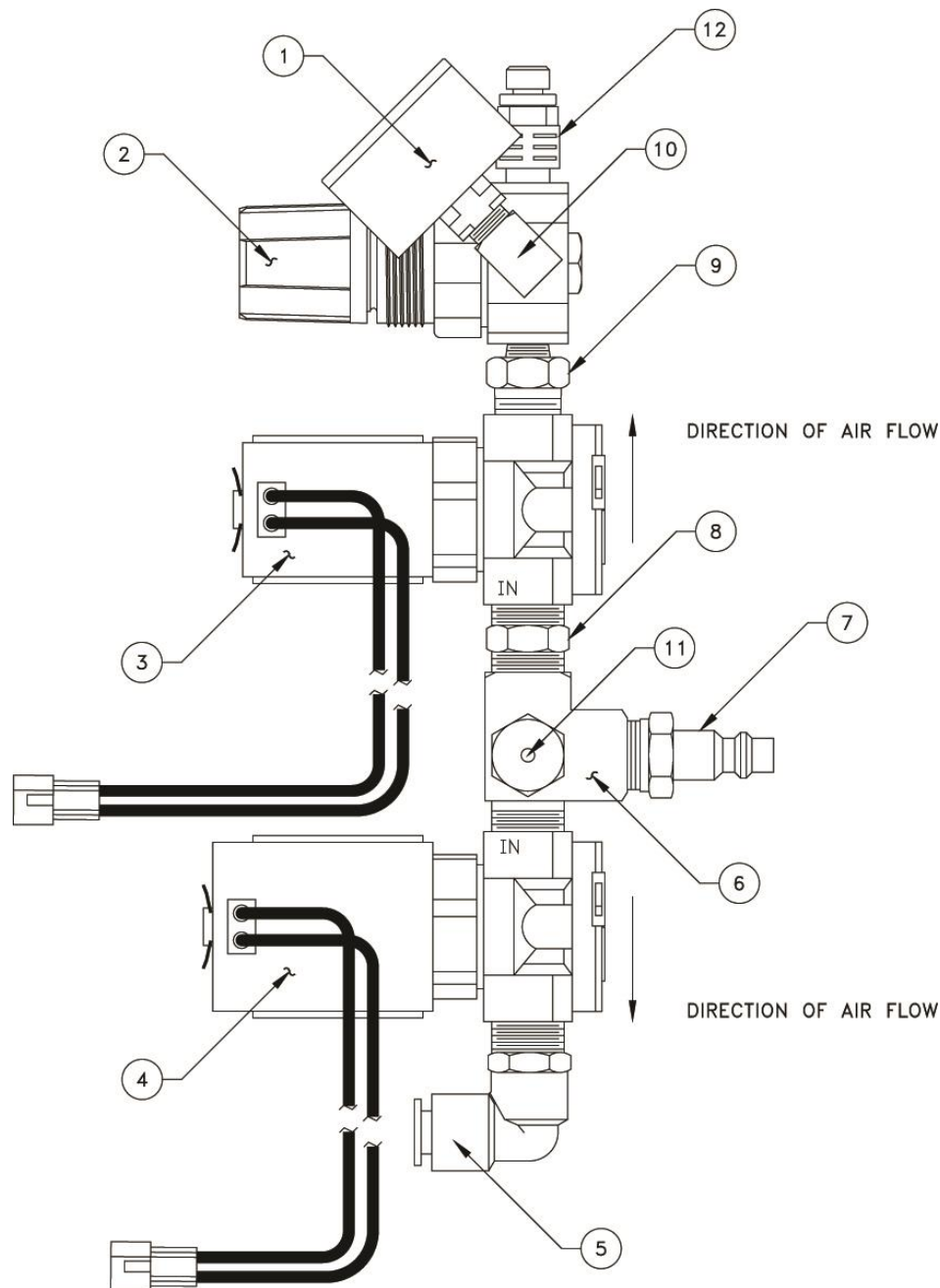
**FIGURE 11: PF2443 PRESSURE REGULATOR ASSEMBLY**

Item No.	Description	Part No.	Item No.	Description	Part No.
1	Tee, Street, 1/4 NPT	ST4138	7	Check Valve, 1/4 NPT	ST6209
2	Elbow, 3/8Tx1/4 NPT	ST4142	8	Filter Assembly	PF2210
3	Elbow, Street, 1/8P	ST4004	9	Replac. Filter Elem.	ST6267
4	Regulator, 3/8 NPT	PF2472	10	Elbow, 3/8Tx1/4NPT	ST4162
5	Elbow, Street, 1/4P	ST4143	11	Filter & Check Valve	MB1560
6	Elbow, 1/4Tx1/8 NPT	ST4144	12	Conn. 5/32Tx1/8 P	ST4238

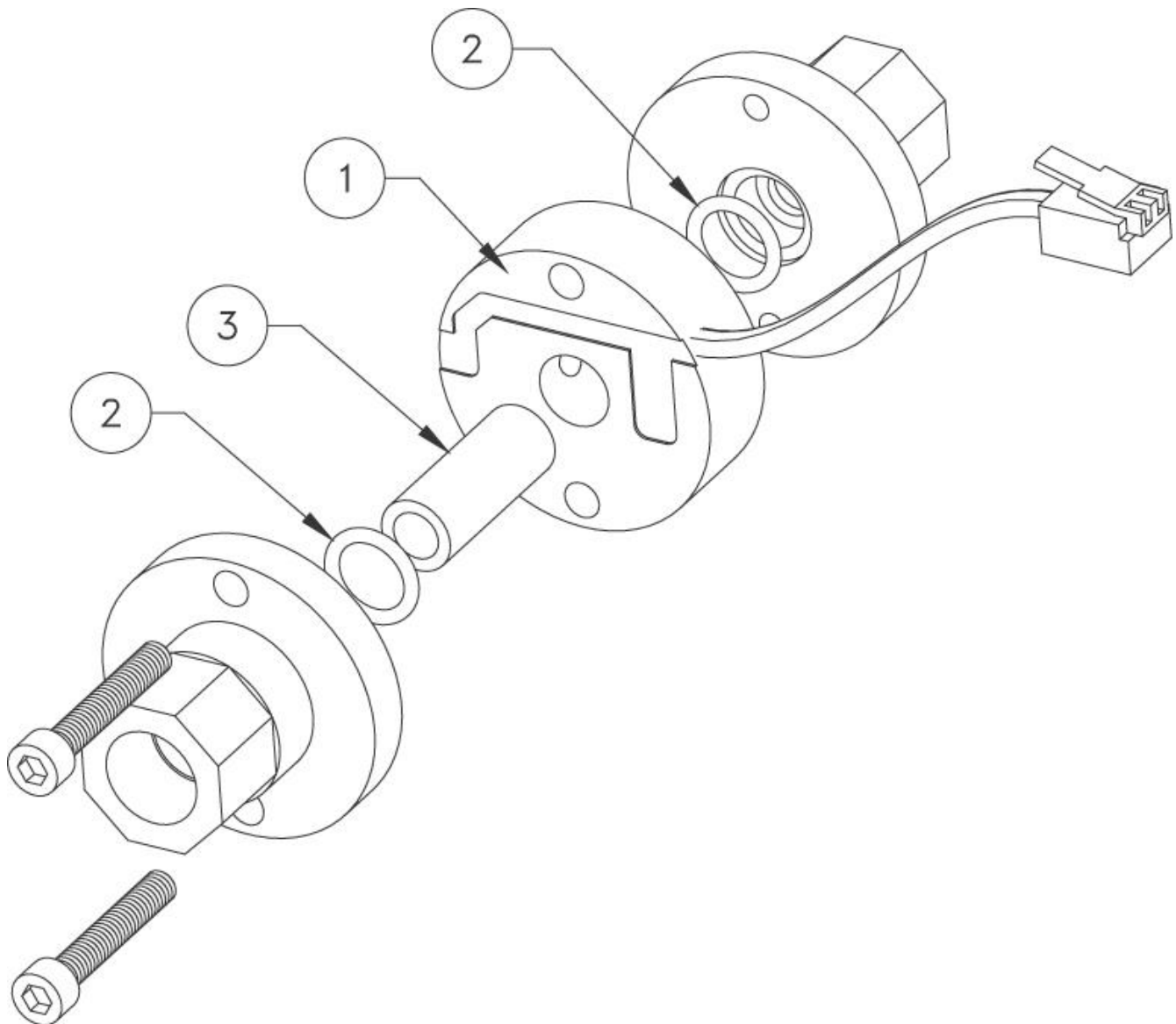
**FIGURE 12: PF2142 POWDER ADJUSTMENT ASSEMBLY**

Item No.	Description	Part No.
1	Conn. 3/8T x 1/4P	ST4038
2	Bushing, 1/2 x 1/4P	ST4125
3	Filter In-Line, 1/2" 20M	ST6232
4	Check Valve	ST6209
5	Elbow Street, 1/4P	ST4143
6	Elbow, 3/8T x 1/4P	ST4142
7	Valve Needle, 1/4-P	PF2148
8	Knob, Black [1]	ST5520

**[1] Not Part of this Assembly**

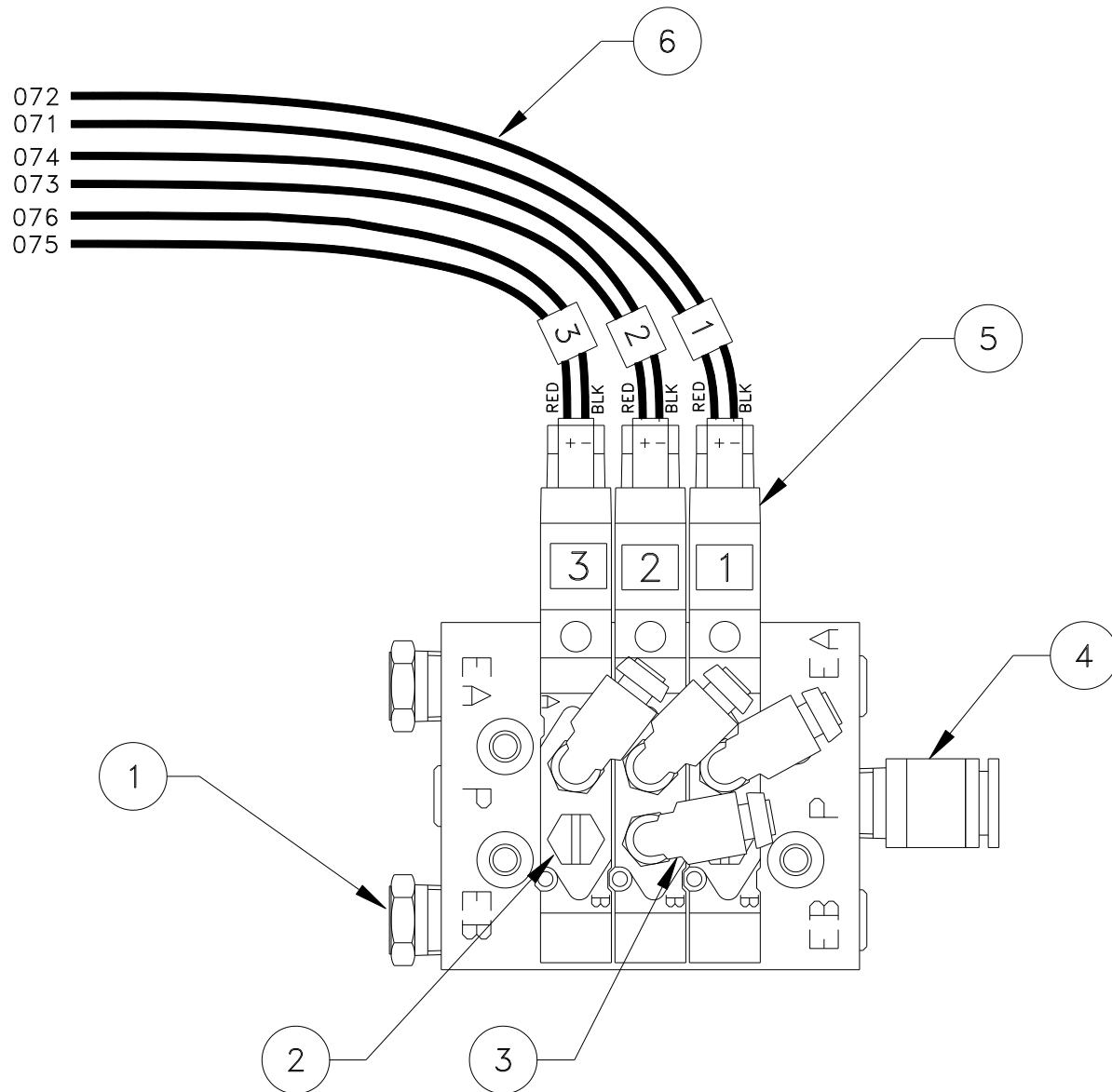
**FIGURE 13: PF2446 AIR VALVE ASSEMBLY**

Item No.	Description	Part No.	Item No.	Description	Part No.
1	Gage, 0-160 PSI	ST6218	7	Plug, Quick Disconn.	ST4146
2	Regulator, 0-125 PSI	ST6147	8	Nipple, Hex, 3/8Tx3/8P	ST4134
3	Valve, Main, PF	PF2095-2	9	Nipple, 3/8P x 1/8P	ST4230
4	Valve, Tank, PF	PF2096-3	10	Elbow, Street, 1/8P	ST4004
5	Elbow, 3/8T x 3/8NPT	ST4136	11	Pressure Relief Valve	ST6091
6	Tee, Street, 3/8T	PF2085	12	Valve, Flow Control	ST4157

**FIGURE 14: PF2419 POWDER FLOW DETECTOR ASSEMBLY**

Item No.	Description	Part No.
1	Block, Detector Assy	PF2418
2	O-ring	ST5029
3	Tube, Flow Detector	PF2417

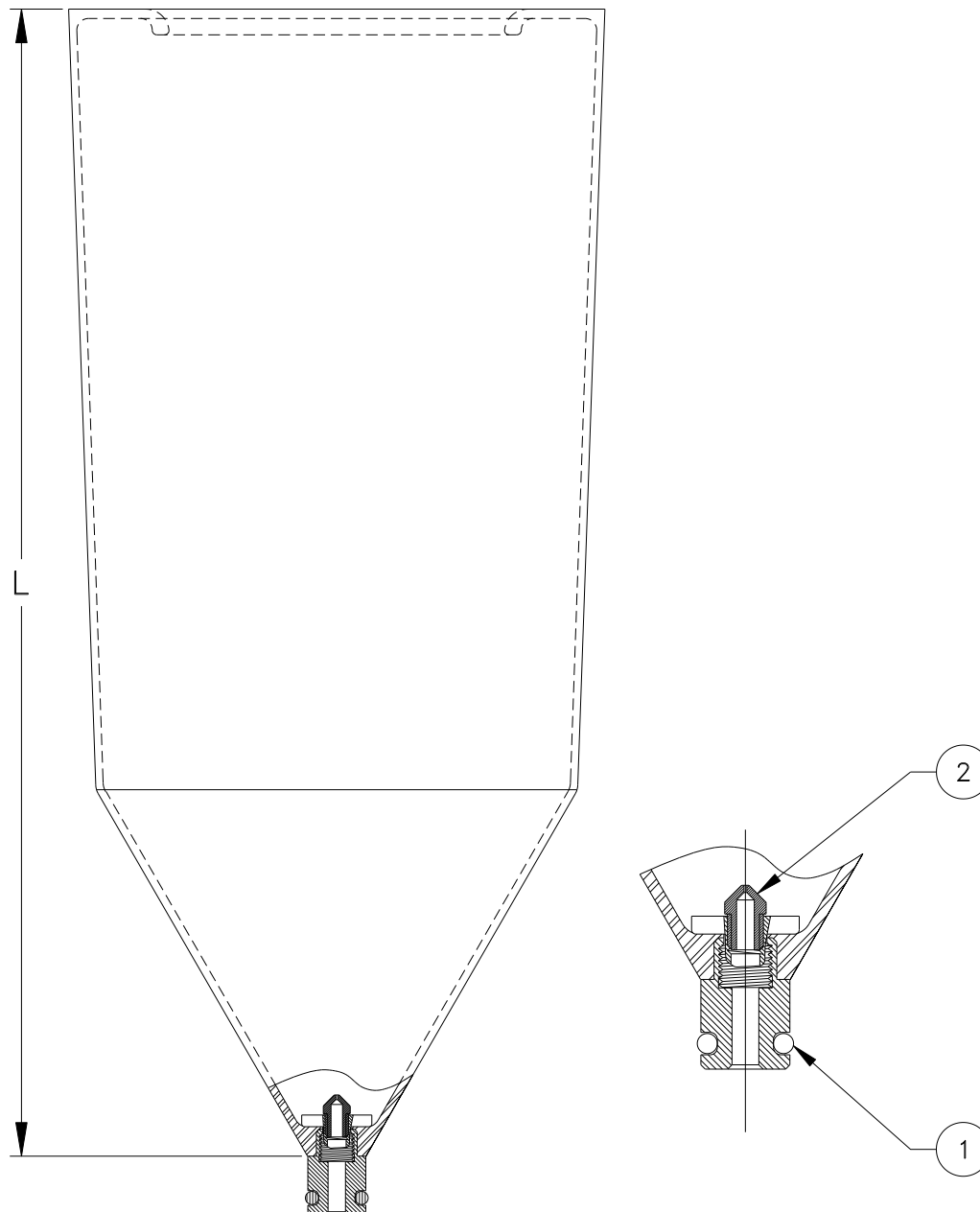


**FIGURE 15: PF2407 VALVE BANK ASSEMBLY**

Item No.	Description	Part No.
1	Vent, Breather, 1/8P	ST4003
2	Plug, 10-32	ST4078
3	Elbow, Male, 5/32 OD	ST4222
4	Conn. Male, 1/4Tx1/8P	ST4166
5	Valve, 4-Way, 24VDC	ST6270
6	Conn. Valve, 40" Wires	ST6269

**FIGURE 16: ABRASIVE BASKET ASSEMBLY**

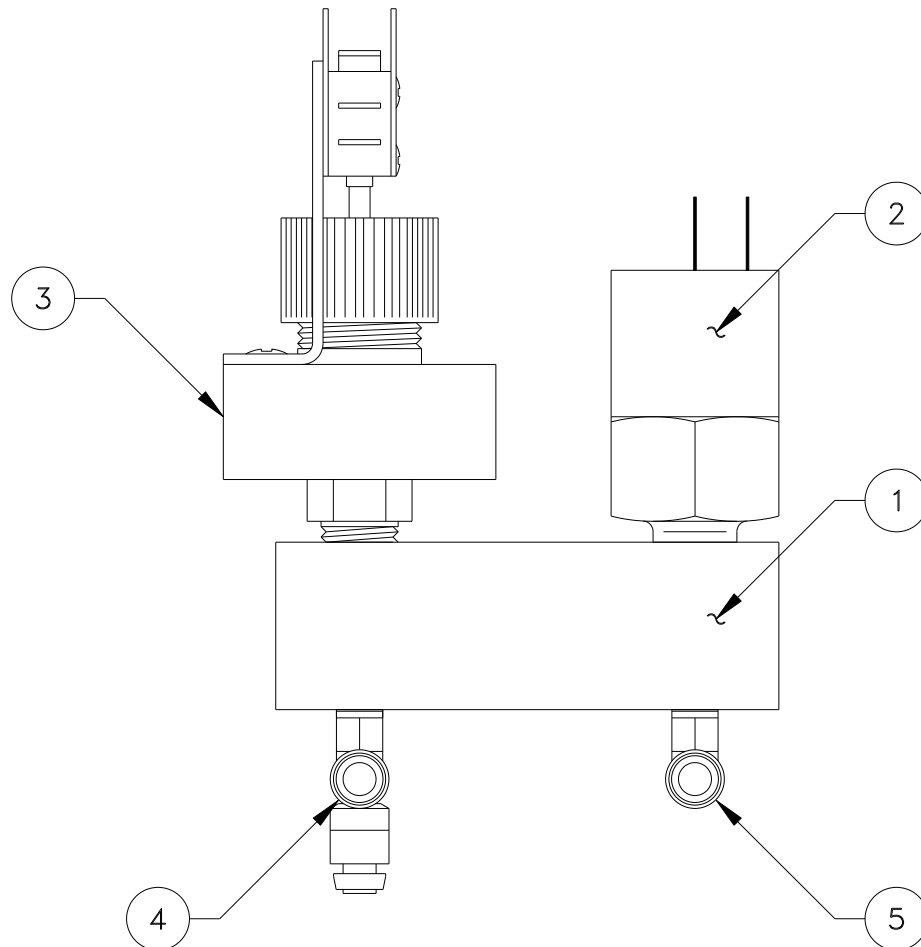
Part No.	Length	Description
PF2227-1	12.375"	Abrasive Basket Assy, Standard
PF2227-2	20.625"	Abrasive Basket Assy, Extended



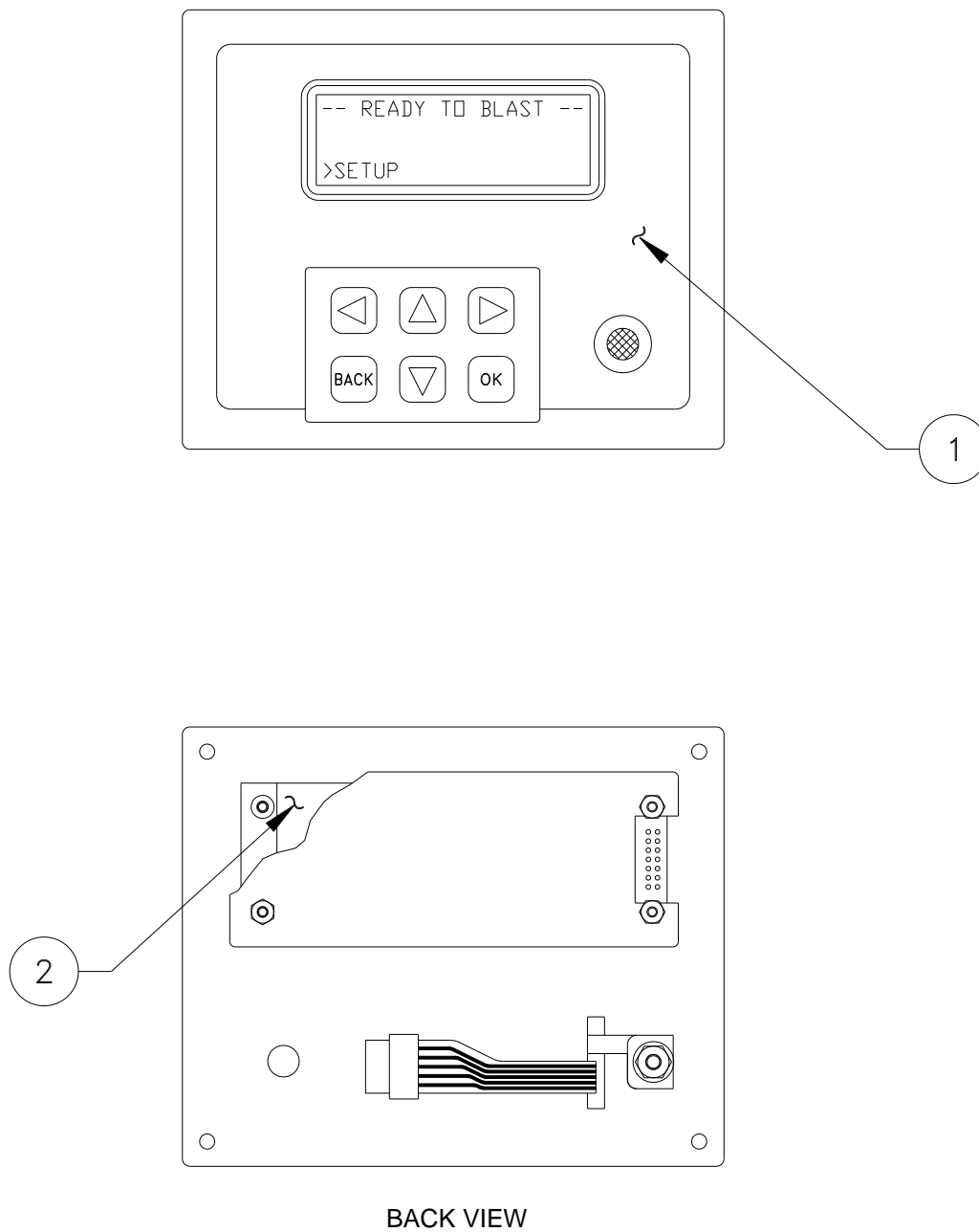
Item No.	Description	Part No.
1	O-ring	ST5504 <sup>[*]</sup>
2	Tank Orifice [1]	MB1409-25

- [1] Tank Orifice size may be changed. Refer to Chapter 3 of the Manual.  
 [\*] This Item is part of PF2139 (O-ring Replacement Kit)

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**FIGURE 17: PF2405 VENT MANIFOLD ASSEMBLY**

Item No.	Description	Part No.
1	Manifold, Press. Switch	PF2404
2	Switch, Press. Preset	ST6247
3	Switch, Adj. Pressure	ST6212
4	Tee, 5/32T x 10-32 Thd	ST4232
5	Elbow, 5/32T x 10-32Thd	ST4222

**FIGURE 18: PF2425-2 CONTROL PANEL ASSEMBLY**

Item No.	Description	Part No.
1	Keypad, Panel	PF2423-2
2	Display, LCD	ST2155