

**PT PNEUMATICALLY-OPERATED
ABRASIVE METERING VALVE
O. M. 29586**

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 **WARNING**

Do not use this equipment before **READING this **MANUAL** and **UNDERSTANDING** its contents.**

These **WARNINGS are included for the health and safety of the operator and those in the immediate vicinity. Failure to read and understand these warnings can result in injury or death.**

Electronic files include a preface containing the same important information as in the orange cover.

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1.0 INTRODUCTION

1.1 Scope of manual

1.1.1 These instructions covers setup, operation, maintenance, and replacement parts for Clemco's PT Pneumatically-Operated Abrasive Metering Valves.

1.1.2 This manual contains important safety information. All operators and personnel involved with the abrasive blast process must read and understand the contents of these instructions, including the orange cover. It is equally important that the operator is trained and qualified to safely operate the blast machine, remote controls, and all other equipment used with the blast machine.

1.1.3 All personnel involved with the abrasive blasting process must be made aware of the hazards associated with abrasive blasting. The Clemco booklet "Abrasive Blasting Safety Practices" (Stock No. 22090), which is included with every blast machine, also available in Spanish (Stock NO. 22931), contains important safety information about abrasive blasting that may not be included in equipment operations manuals. To request additional copies, visit www.clemcoindustries.com or email info@clemcoindustries.com.

1.2 Safety Alerts

1.2.1 Clemco uses safety-alert signal words, based on ANSI Z535.4-2011, to alert the user of a potentially hazardous situation that may be encountered while operating this equipment. ANSI's definitions of the signal words are as follows:



This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

NOTICE

Notice indicates information that is considered important, but not hazard-related, if not avoided, could result in property damage.

CAUTION

Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

WARNING

Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury.

DANGER

Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury.

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1.4 Specifications

- Minimum pressure to begin opening 40 psi
- Pressure to fully open and function correctly .. 80 psi
- Maximum working pressure 150 psi

1.5 Components and Operating Principles

1.5.1 Components

Components of the valve assemblies include the metering valve, pipe fittings for 1-1/4-NPT piping, and control hose adaptor elbow, as shown in Figure 1. **NOTE: User provided 1-1/2" NPT pipe couplings can be used to connect the valve to machines with 1-1/2" piping.**

1.5.2 Operating Principles

The PT is a normally closed pneumatically-operated abrasive metering valve. When the valve is at rest (the

remote control handle is up, in the nonblast position), spring pressure keeps the valve closed. When control air is applied (the control handle is pressed), air pressure overcomes the spring pressure and opens the valve to a specific point, which is set by turning the metering knob. When the control handle is released, control pressure vents, spring pressure closes the valve, stopping abrasive flow.

1.5.3 Operating Pressure

The PT valve requires approximately 80 psi of control pressure to fully open and function properly.

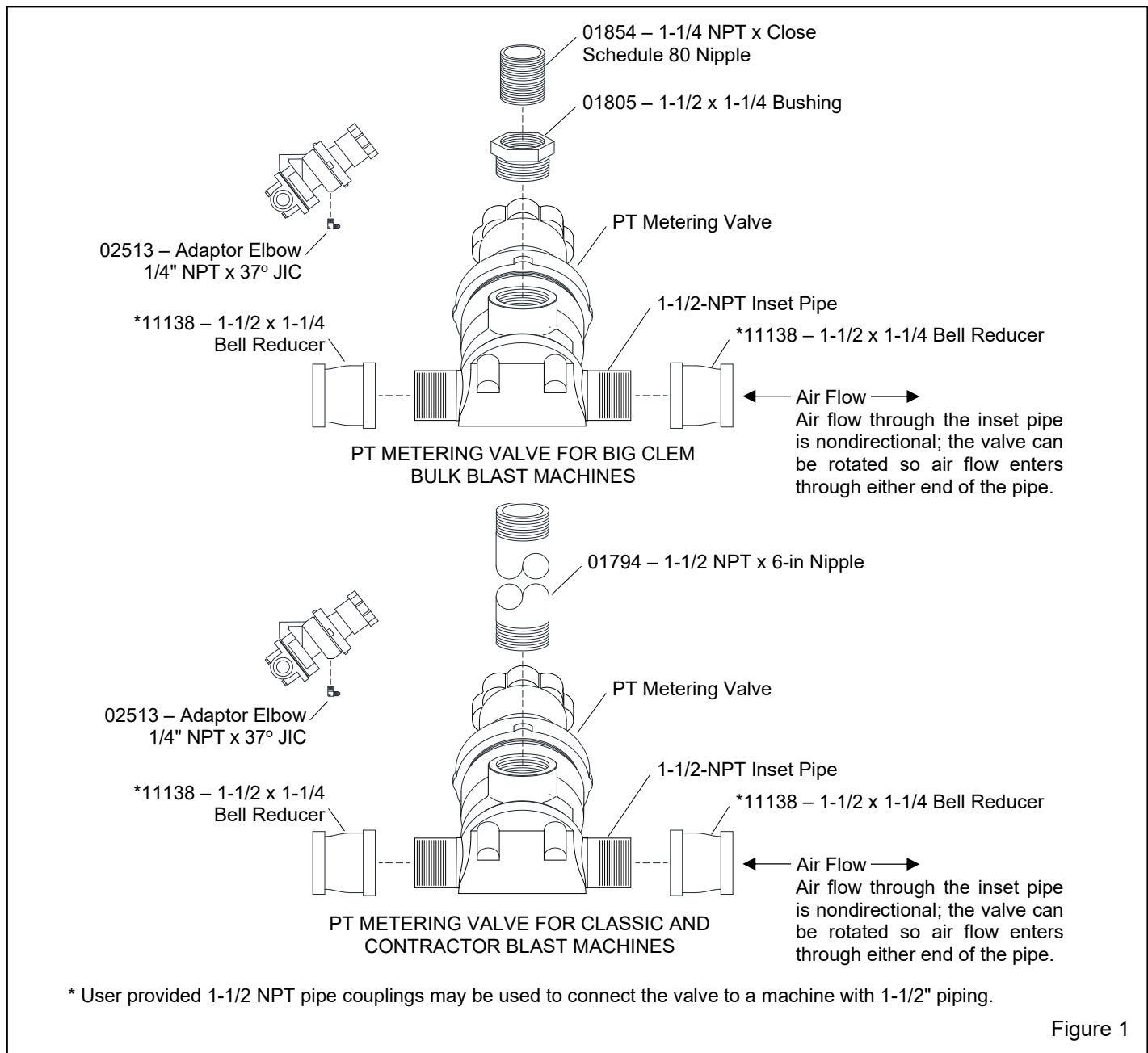


Figure 1

2.0 INSTALLATION

2.1 Remove Existing Metering Valve from Blast Machine

2.1.1 Empty the blast machine of abrasive and depressurize the machine.

⚠ WARNING

Failure to observe the following before performing any maintenance on the blast machine could cause serious injury or death from the sudden release of trapped compressed air:

- Depressurize the blast machine.
- Lockout (be certain the air supply is off and that it cannot be started while work is in process) and tagout (make sure the air supply is clearly marked to prevent re-starting while work is in process) the compressed-air supply.
- Bleed the compressed-air supply line to the blast machine.

2.1.2 Shut down the compressed-air source, lockout and tagout the air supply, and drain the air-supply line.

2.1.3 Remove control hose(s) from the existing metering valve. Make a note of the piping and control hose connections because connections shown in the illustrations can differ, based on remote control options. If the control connections are different from those supplied with the PT valve, save the connections from the existing valve for reuse on the PT. Refer to Paragraph 2.6.1.

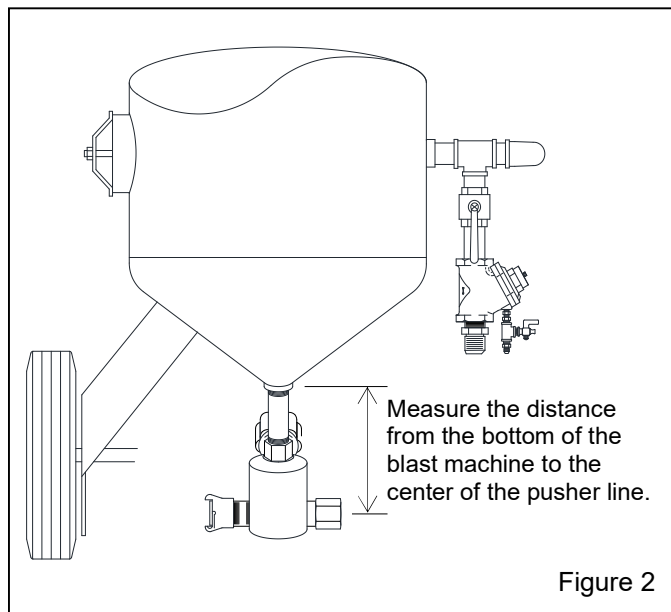


Figure 2

2.1.4 Measure the distance from the bottom the blast machine to the center of the pusher line, as shown in Figure 2. This distance could be critical when the PT Valve must be aligned to match the pusher line and blast hose couplings at fixed position, as noted in Section 2.3, Option 1, Figure 3.

2.1.5 Remove the existing metering valve from the blast machine.

2.2 Install Pipe Fittings onto PT Valve – Figure 3

Installation Notes:

To ensure airtight seals and ease assembly, apply pipe thread sealant to all male threads.

Additional fittings may be required to connect the valve to some blast machines and piping configurations.

2.2.1 Refer to Figure 1 to determine which fittings to use. Blast machine with 1-1/4" piping generally require bell reducers, 1-1/2" pipe coupling may be used to fit the valve on machines with 1-1/2" piping.

2.2.2 The PT Valve is nondirectional; air flow can enter through either end of the inset pipe. Rotate the valve at the bottom of the machine to provide the best access to the metering knob, while keeping the inset pipe aligned with the pusher line.

2.2.3 If there is enough side clearance to spin the PT valve onto the bottom of the machine with the pipe fittings attached, attach the fitting before installing the valve. If there is not enough side clearance to spin the assembled valve onto the blast machine, install the valve onto the machine and then install the pipe fittings.

2.3 Install PT Valve onto Blast Machine – Figure 3

NOTE: The illustrations show the installation onto a portable blast machine. Installation on a bulk blast machine is slightly different but the process is the same.

2.3.1 There are two options for installing the PT valve to the bottom of the blast machine. **Use option 1** when the blast hose and pusher line connections are at a fixed position and can't be moved, as with bulk blast machines. **Use option 2** when there is minimal clearance under the blast machines or when the machine connections can be at any height.

2.3.1.1 **Option 1, Figure 3:** Place the PT valve under the blast machine, so the distance between the center of the pusher line and the bottom of the blast machine are the same as noted in Paragraph 2.1.4. Measure the distance from the top of the valve to the bottom of the

blast machine (as shown in Figure 3). Add 1-1/2" and procure a 1-1/2-NPT nipple that equals the total length. Apply pipe thread sealant to the male NPT threads, screw the nipple into the top port on the PT valve, and attach the valve to the bottom of the blast machine, as shown in Figure 3. **NOTE: A 1-1/2" x 1-1/4" bushing may be required on the blast machine, depending on the vintage of the machine.**

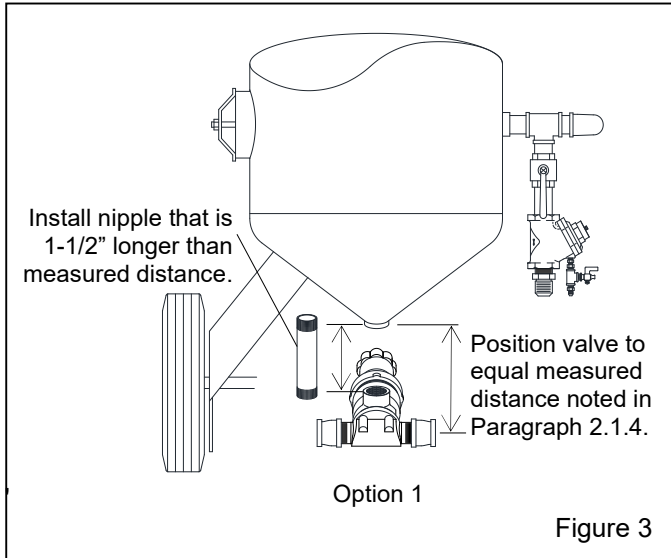


Figure 3

2.3.1.2 Option 2, Figure 4: Apply pipe thread sealant to the male threads of the 1-1/2-NPT x Close nipple, screw the nipple into the PT valve, and attach the valve to the bottom of the blast machine, as shown in Figure 4. **NOTE: If the coupling at the bottom of the blast machine is 1-1/4-NPT, an 1-1/2" x 1-1/4" bushing for the PT Valve and a 1-1/4-NPT x Close nipple to the blast machine are required.**

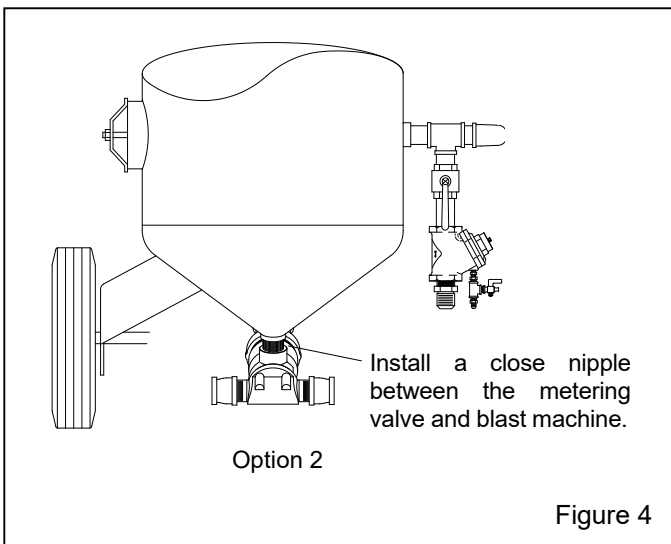


Figure 4

2.4 Connect the Pusher Line – Figure 5

2.4.1 Attach the male end of the pusher line to the 1-1/4" adaptor on the metering valve. **NOTE:** The old pusher line may be too long or too short to connect to the fittings without it stretching or kinking. Some adjustment can be done by lengthening or shortening the nipples between the side-piping tee and choke valve. **If the pusher line does not fit correctly, a shorter or longer pusher line is required.**

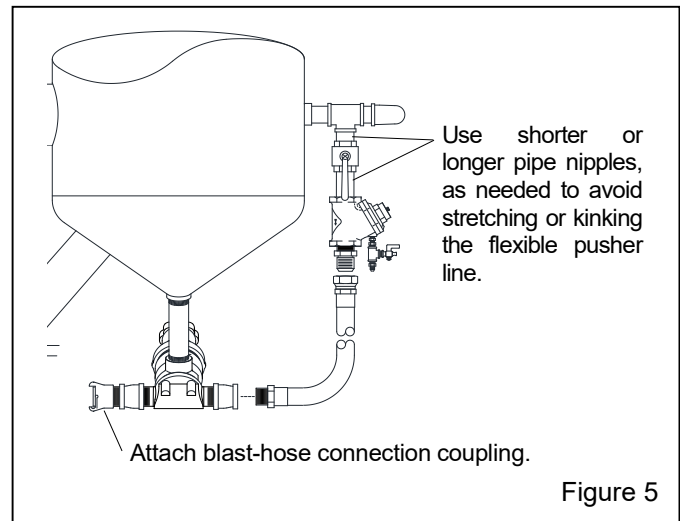


Figure 5

2.5 Attach the blast hose coupling and nipple to the PT valve.

2.6 Connect Control Hose(s) – Figure 6

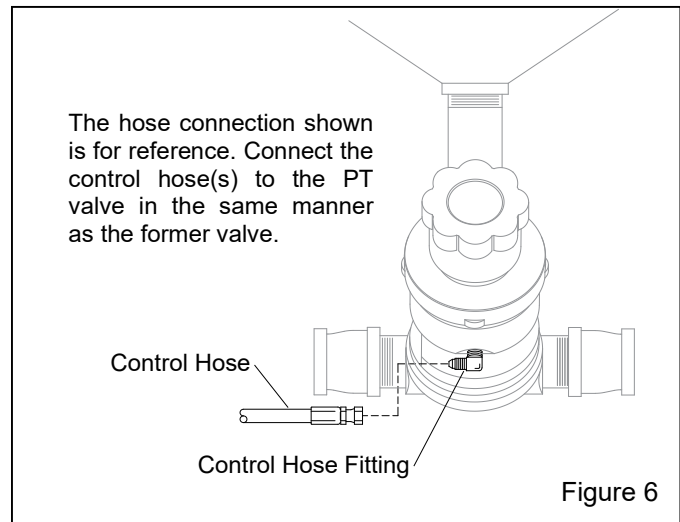


Figure 6

2.6.1 Attach fittings and connect the control hose(s) to the PT valve, as shown in Figure 6. Note that the illustration in Figure 6 is typical and shown for reference;

connect control fittings and hose(s) in the same manner as was used previous metering valve, and as noted in Paragraph 2.1.3. If necessary use the fittings from the valve the PT is replacing.

2.7 Test the machine and piping for air leaks and check the operation of the machine before filling with abrasive.

3.0 ADJUST ABRASIVE FLOW – Figure 7

3.1 Adjust abrasive flow with the machine in the **nonblast position** (blast machine depressurized or ACS switch in OFF [no-blast] position). When the machine is in operation, friction makes the knob difficult to turn. If the abrasive flow is not correct, depressurize the blast machine and readjust the flow as needed.

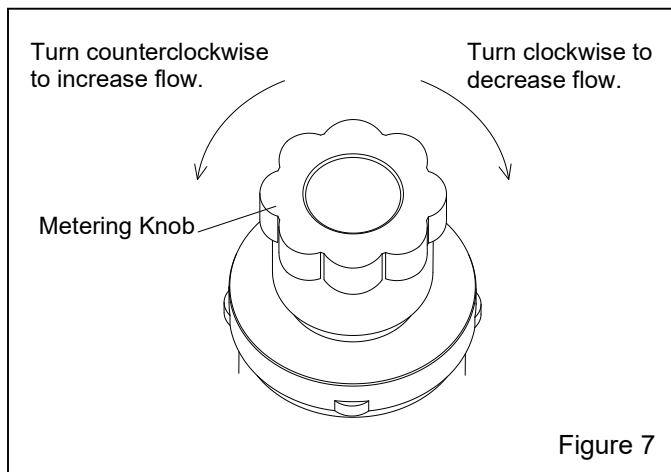


Figure 7

3.2 The valve is closed when the knob is turned fully clockwise. Increase abrasive flow by turning the knob counterclockwise and decrease abrasive flow by turning the knob clockwise, as shown in Figure 7. Begin with the knob set 2 turns from fully closed. Increase flow by turning the knob no more than 1/4 turn counterclockwise. Check flow before readjusting. Continue adjusting as described until the correct flow is attained.

3.3 Optimum abrasive flow depends on the type and size of abrasive and blasting pressure, and can best be determined by experience. Use as little abrasive as possible while maintaining the maximum cleaning rate. The air-abrasive mixture should be mainly air. As a rule, the stream of abrasive coming out of the nozzle should barely discolor the air when seen against a contrasting background.

4.0 SERVICE MAINTENANCE

⚠ WARNING

Failure to observe the following before performing any maintenance could cause serious injury or death from the sudden release of compressed air:

- **Depressurize the blast machine.**
- **Lockout (be certain the air supply is off and that it cannot be started while work is in process) and tagout (make sure the air supply is clearly marked to prevent re-starting while work is in process) the compressed-air supply.**
- **Bleed the compressed-air-supply line to the blast machine.**

4.1 Upper Segment Disassembly – Figure 8

4.1.1 Use a strap wrench or similar tool to unscrew the cylinder cap from the valve body. The springs, inner spring guide, guide seat, and piston gasket will be unattached. There is no need to remove the metering knob from the cap unless service to either is required.

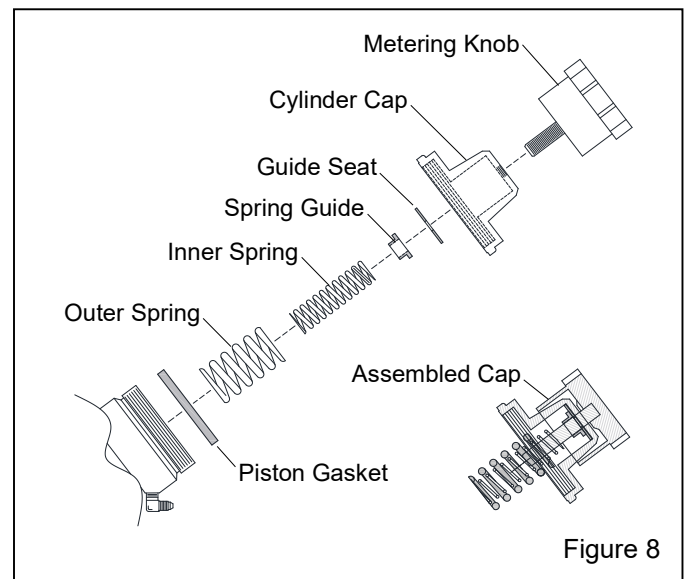


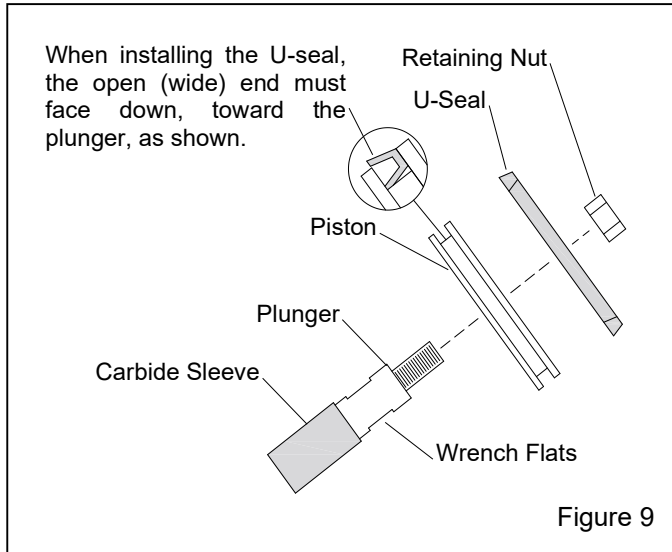
Figure 8

4.2 Piston Removal and Disassembly – Figure 9

4.2.1 Remove the cap and upper segment components, per Section 4.1.

4.2.2 Using locking pliers or a similar tool to grip the piston's retaining nut, pull to remove the piston assembly. **NOTE:** If the piston is hard to extract, remove the pipe support, per Section 4.3, and tap the plunger from the bottom to remove it from the top.

4.2.3 Unscrew the piston-retaining nut to remove the piston from the plunger. **NOTE: Wrench flats are provided on the plunger; use a wrench on the flats to prevent the plunger from turning while removing the retaining nut.**



NOTICE

Do not use a vise, pliers, or other means to hold the plunger. Marring the wide end of the plunger makes the plunger unusable; applying pressure to the carbide sleeve will crack it, making the plunger unusable.

4.2.4 Inspect the piston U-seal. Replace it if damaged, worn, or loose fitting in the cylinder.

4.2.5 If no other service is needed, replace any worn or damaged parts, and reassemble in reverse order.

4.3 Lower Segment Disassembly – Figure 10

4.3.1 Disassemble the upper segment and remove the piston assembly, per Sections 4.1 and 4.2.

4.3.2 Unscrew the four bolts holding the pipe support and remove the support.

4.3.3 Inspect the carbide metering-sleeve. If it is worn, remove it, the metering sleeve, and plunger seal from the valve body.

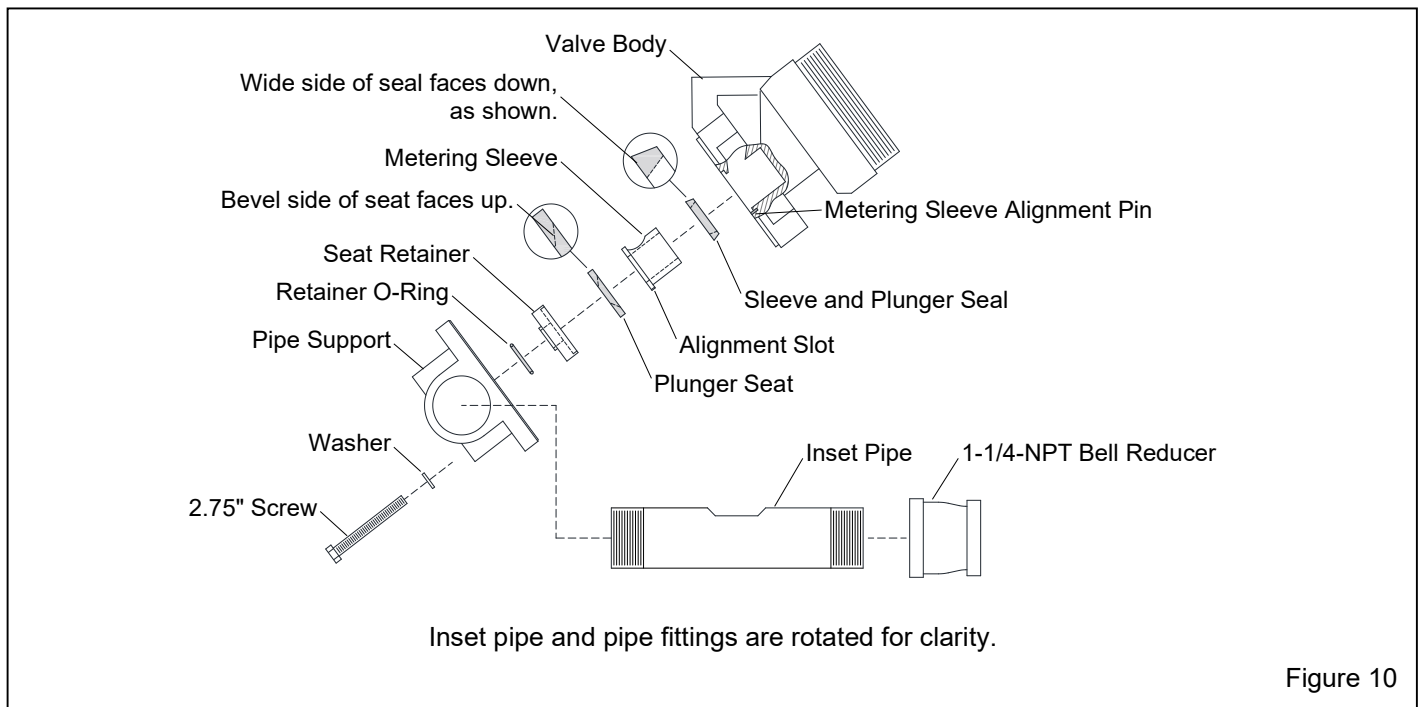
4.3.4 Remove the seat retainer, plunger seat, and O-ring from the pipe support. Inspect all items and replace any that are worn or damaged.

4.3.5 Inspect the 1-1/2" inset pipe for wear. To remove pipe, remove the fitting from one end and slide the pipe from the pipe support. Inspect all items and replace any that are worn or damaged.

4.4 Valve Reassembly

4.4.1 Inspect all items for wear and reassemble in reverse order, paying particular attention to the following:

- Refer to Figure 9. When installing the U-seal onto the piston, the open (wide) end of the seal must face down, toward the plunger.
- Refer to Figure 10. When installing the sleeve and plunger seal into the valve body, make sure the O-ring side of the seal faces down, toward the pipe support.
- When installing the metering sleeve into the valve body, align the slot in the metering sleeve with the alignment pin in the valve body. When installed correctly, the metering sleeve flange should be nearly flush with the valve body.
- Before installing the seat retainer and plunger seat into the pipe support, insert the inset pipe halfway into the pipe support. Assemble the seat retainer, O-ring, and plunger seat **NOTE: The beveled side of the plunger seat faces up when placed into the retainer, as shown in Figure 10.**
- When installing the retainer and seat assembly into the pipe support, the O-ring side of the assembly goes into the support. Slide the inset pipe in and out, and rotate it until the retainer slips inside the pipe. When correctly installed, the seat should protrude only slightly from the surface of the pipe support.
- Align the pipe support and pipe assemble with the valve body, and then secure the support assembly to body using the four bolts.
- Before inserting the piston assembly into the valve body, apply a light smear of tool oil to the inside of the cylinder. When inserting the piston assembly, make sure the open side of the U-seal does not curl up. The chamfer in the valve body makes the insertion easy.
- Reassemble the cap assembly to the valve.



5.0 TROUBLESHOOTING

5.1 No Abrasive Flow

5.1.1 Metering valve closed. Adjust abrasive flow per Section 3.0.

5.1.2 Optional ACS switch is closed. Switch is closed when the toggle is pointed toward the "EXH" port.

5.1.3 Leak or blockage in the control hose or fittings between the control unit (RLX Control Handle) and the PT valve. Make sure air pressure is reaching the control-line fitting on the PT valve.

5.1.4 Blast machine is empty. Check abrasive level.

5.1.5 Obstruction in metering valve. Clear as follows:

5.1.5.1 Fully open the control valve. (It is fully open when the metering knob is turned fully counterclockwise.) While blasting, close the choke valve to force out small obstructions or wet abrasive.

5.1.6 Air leaks through the relief hole under the metering knob. Check for leak. A leak at the vent indicates a worn or damaged piston U-seal. Service the upper segment as need, per Sections 4.1 and 4.2.

5.1.7 Abrasive bridging in the blast machine. Refer to Section 5.6.

5.2 Abrasive Flow Does Not Stop When Optional ACS Switch Is Turned to OFF

5.2.1 Control air is not exhausting from the switch. Check the exhaust muffler for blockage and check the control handle, per the control handle operations manual.

5.2.2 Worn plunger seat or plunger. Service the valve as needed, per Section 4.0.

5.2.3 Obstruction on the plunger seat. Service the valve as needed, per Section 4.0.

5.3 Abrasive Flow Decreases Shortly After Blasting Starts

5.3.1 Insufficient air supply causes control pressure to drop, in turn closing or partially closing the metering valve. Check for undersized air supply hose, and the cfm of the compressor against the cfm consumption of the nozzle. The PT valve requires approximately 80 psi to fully open.

5.3.2 Abrasive bridging in the blast machine. This is usually caused from using very fine abrasive, or from moist air. Refer to Section 5.6.

5.4 Turning Metering Knob Does Not Change Abrasive Flow

5.4.1 Inspect the seat and plunger for wear, per Sections 4.0.

5.5 Air Leaks Through Relief Hole in Cylinder Cap (under metering knob)

5.5.1 A leak at the vent indicates a worn or damaged piston U-seal. Service the upper segment as needed, per Section 4.1.

5.6 Abrasive Bridging

5.6.1 Frequent bridging or blockage in the blast machine and metering valve can be caused by damp abrasive. Blast media becomes damp from moisture in the compressed air line, from absorption from ambient air, and by blasting parts that are slightly oily (when using recycled abrasive).

5.6.2 To avoid contaminating recyclable abrasive from the workpiece, all parts should be clean and dry. If parts are oily or greasy, degrease and dry them prior to blasting.

5.6.3 Moist compressed air: Moisture in the air supply may be due to a faulty compressor that overheats, or pumps oil or moisture into the air line; an air line that is too long permitting moisture to condense on the inside; and from high humidity. Drain filters and receiver tank regularly. If the problem persists, a dryer or aftercooler may be required in the air supply line.

5.6.4 Absorption: Some abrasive tends to absorb moisture from the air, especially fine-mesh abrasive in high humidity areas. Empty abrasive from the blast machine at the end of the workday, and store it in an area protected from damp environment.

5.6.5 Condensation: When working in conditions of extreme temperature change or humidity, condensation may develop inside the machine. Condensation dampens abrasive and causes flow problems. Empty the machine of all abrasive, when shutting down for the day. This will eliminate trouble from moist abrasive the next time the machine is started.

6.0 REPLACEMENT PARTS – Figure 11

Item	Description	Stock No.
(-)	PT Metering Valve, with fittings for Contractor and Classic machines, includes item 25 and two item 26	30351
	for Big Clem bulk blast machines includes items 23, 24, and two item 26 ..	30300
1.	Knob, metering	29587
2.	Cap, cylinder	29588
3.	Gasket, piston	29589
4.	Spring, outer	29590
5.	Spring, inner	29591
6.	Nut, 1/2" NC hex	03511
7.	U-Seal, piston	29592
8.	Piston	29593
9.	Sleeve assembly rebuilt kit, includes items 10, 11, 12 & 13	29584

10.	Plunger and sleeve kit	29864
11.	Seat, plunger	29865
12.	Retainer, plunger seat	29928
13.	O-ring, seat retainer	29929
14.	Body	29930
15.	Gasket, cylinder cap	29931
16.	Seal, sleeve and plunger	29932
17.	Spring support guide	29933
18.	Pipe, 1-1/2-NPT inset	29934
19.	Support, pipe	29936
20.	Cap screw	29935
21.	Washer, 5/16" flat	03216
22.	Adaptor Elbow 1/4" NPT x 37°	02513
23.	Nipple, 1-1/4 NPT x close Schedule 80	01854
24.	Bushing 1-1/2 x 1-1/4 NPT	01805
25.	Nipple, 1-1/2 NPT x 6 in.	01794
26.	Bell reducer, 1-1/2-NPT x 1-1/4-NPT	11138

