INDUSTRIAL SINGLE CHAMBER BLAST MACHINE
With MILLENNIUM - GRITWIZARD ACS
PNEUMATIC REMOTE CONTROLS
O.M. 23404

DATE OF ISSUE: 9/01
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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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INDUSTRIAL
Blast Facilities
by Clemco Industries Corp.

1.0 INTRODUCTION

1.1 Scope of manual

1.1.1 These instructions cover the setup, operation, maintenance, troubleshooting, and replacement parts for the Clemco industrial blast machine. Components of the standard blast machine are shown in Figure 1. Some accessories may vary slightly when the machine is provided on a project (custom equipment built to user specifications). Figure 2 shows the remote-control air circuit. Refer to the blast machine drawings supplied with the project manual for specific plumbing information for the blast machine and remote controls. In addition to this manual, accessory manuals for equipment used with the blast machine are shown below. Manuals are available on our web site at www.clemcoindustries.com.

RLX Remote Control Handle 10574
GritWizard™ Abrasive Metering Valves 31199

1.1.2 This manual contains important safety information. All operators and personnel involved with the abrasive blasting 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 and 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″ is included with every blast machine. The booklet contains important safety information about abrasive blasting that may not be included in equipment operations manuals. The booklet is available in both English and Spanish; to request copies, 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.

1.3 Table of Contents

1.4 Components and Operating Principles

1.4.1 Components

1.4.1.1 The primary components of the blast machine are shown in Figure 1. They include the blast machine with remote controls and pneumatically-operated GritWizard™ Abrasive Metering Valve.

1.4.2 Blast machine

1.4.2.1 Clemco certifies that its pressure vessels (blast machines) conform to the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, Division 1. It is the owner's responsibility to maintain the integrity of the vessel in accordance with state regulations. Regulations may include regular inspection and hydrostatic testing as described in National Board inspection code and jurisdictional regulations and/or laws.

⚠ WARNING

Welding, grinding, or drilling on the blast machine could weaken the vessel. Compressed-air pressure can cause a weakened blast machine to rupture, resulting in death or serious injury. Welding, grinding, or drilling on the vessel, without a National Board ″R″ stamp voids the Clemco ASME certification.

1.4.2.2 All welding repairs done on the vessel must be performed by certified welders at shops holding a National Board ″R″ Stamp. Welding performed by any welder not properly qualified per the ASME code, voids the Clemco ASME certification.

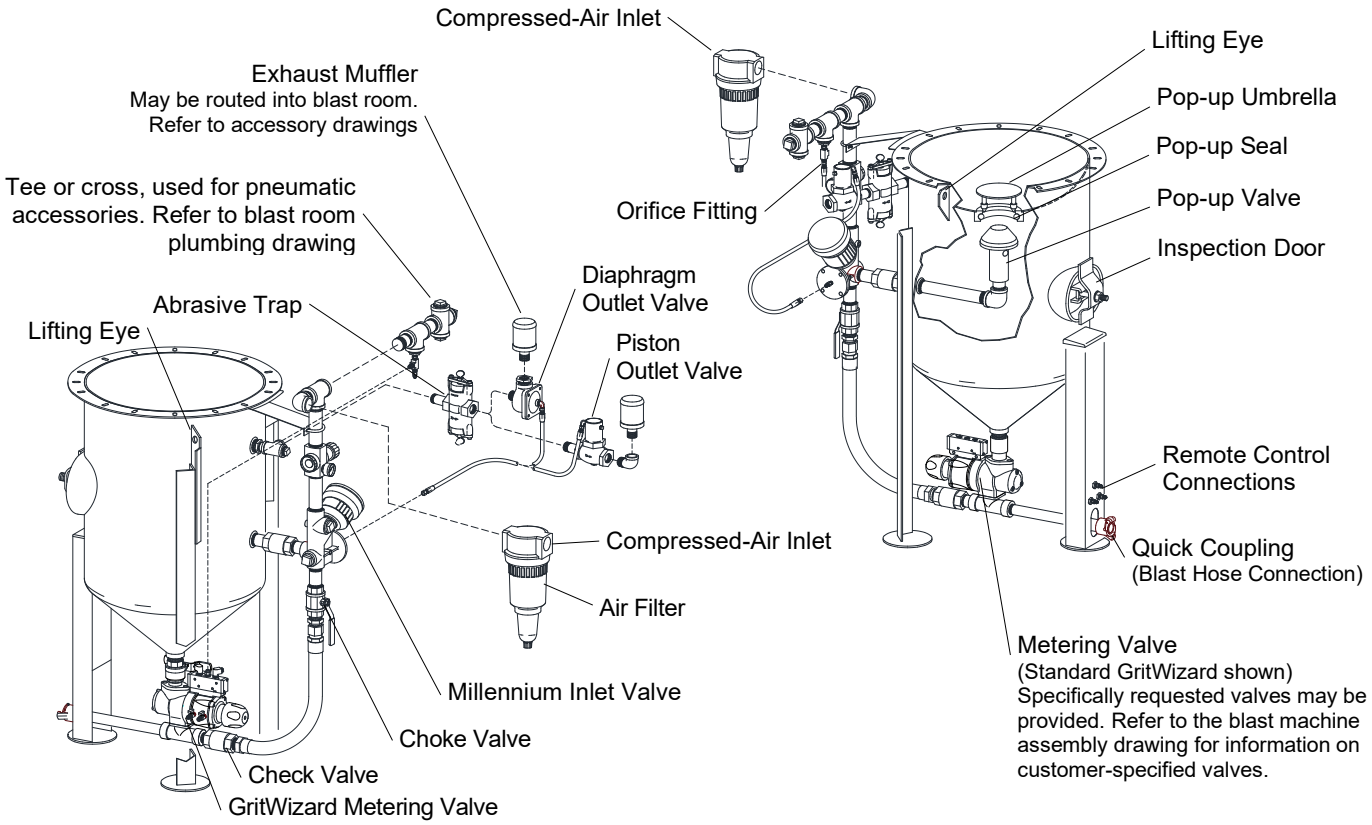
1.4.2.3 This blast machine is rated for a maximum of 150 psi (pounds per square inch); do not exceed the rated pressure.

⚠ WARNING

Excessive compressed-air pressure can cause a blast machine to rupture. To prevent serious injury or death, do not exceed the rated pressure of the blast machine vessel.

1.4.2.4 Use lifting eyes or a pallet when placing the machine. Do not use a sling around the cart handles or piping.

1.4.2.5 The blast machine is equipped with remote controls that allow the operator to start and stop blasting at the nozzle.



Some items are moved or rotated for clarity

Figure 1

1.4.2.6 OSHA does not require pressure-relief valves on blast machines when air compressors supplying air to the blast machines are built to ASME [1] specifications and comply with OSHA [2] regulations. ASME Manual section VIII, Division 1, UG-125, paragraph A90 (g) states that pressure relief valves or protective devices **"...need not be installed directly on a pressure vessel when the source of pressure is external to the vessel and is under such positive control that the pressure in the vessel cannot exceed the maximum allowable working pressure at the operating temperature..."**. OSHA regulation 1910.169 refers to the above ASME code when describing the necessity of pressure relief valves on compressed-air equipment. **DO NOT** operate blast machines with air compressors that are not equipped with properly functioning pressure relief valves.

[1] American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, 1989

[2] Occupational Safety and Health Administration, 29 CFR 1910, Subpart M - Compressed Gas and Compressed-Air Equipment.

1.4.3 Remote controls

1.4.3.1 The components of the remote control system are shown in Figures 1 and 2. The remote system includes the Millennium inlet valve with blast room doors interlock solenoid, GritWizard Abrasive Metering Valve, diaphragm outlet valve (for use with fine or aggressive abrasive) or a piston outlet valve (for use with coarse or non-aggressive abrasive), RLX Control Handle with abrasive cut-off switch (ACS), 50 ft twinline control hose, 50 ft single-line control hose, and all necessary interconnecting control hoses and fittings.

⚠ WARNING

Never modify or substitute remote control parts. Parts from other manufacturers are not compatible with Clemco equipment. If ANY part of the remote control system is altered, involuntary activation could occur, causing serious injury

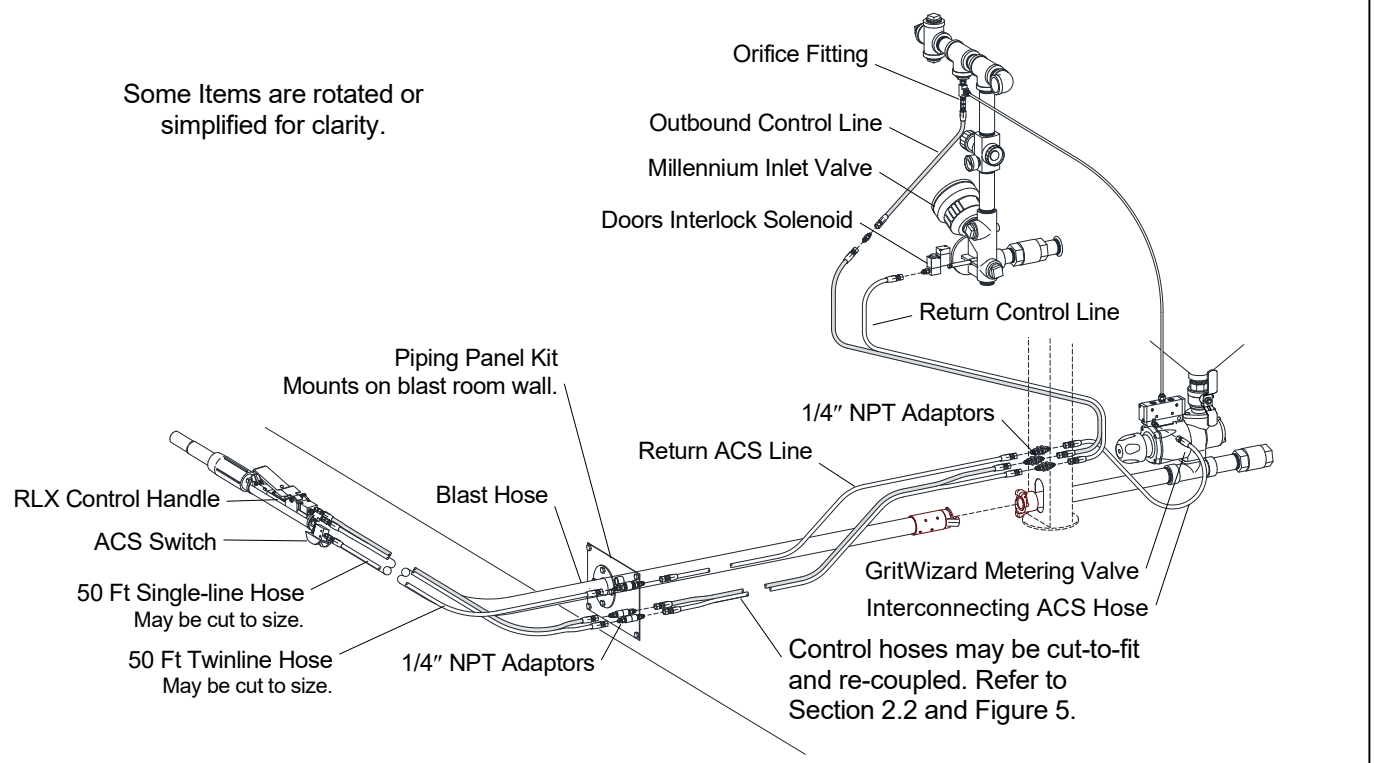


Figure 2

1.4.3.2 The remote control system is an OSHA-required safety device; it is required when an operator mans the nozzle. The control handle, located near the blast nozzle, is the activator of the remote control system. Standard remote controls are pressure-release-style, which control the pressurization and depressurization of the blast machine. Pressurization, which starts the blasting, occurs when the control handle is pressed. Depressurization, which stops blasting, occurs when the handle is released. When the operator intentionally or unintentionally removes hand-held pressure from the control handle, the machine depressurizes, stopping air and abrasive flow through the nozzle. The remote control system "fails to safe", which means any interruption in the control-air circuit, such as an open blast room door, a break in the line, the compressor stops running, or the operator drops the blast hose, deactivates the blast machine.

1.4.3.3 Remote controls operate pneumatically on the return-air principle (Refer to Figure 2). A stream of air travels from the orifice fitting, down the outbound twinline (shown shaded in Figure 2) and escapes through an opening located under the control handle lever. As long as air escapes through the opening, the remote control system remains inactive. When the lever is pressed, the opening is sealed, and air from the outbound line returns through the return line, through interlock solenoid to open the Millennium inlet valve, and close the outlet valve. This pressurizes the blast machine and begins the blasting. Releasing the handle exhausts the control air, which closes the inlet valve, and opens the outlet valve to depressurize the machine and stops the blasting.

1.4.3.4 Air escaping from the control handle when it is in the up position indicates that the system is under pressure. Any actuation of the control handle will start the blasting.

1.4.4 Abrasive cutoff (ACS)

1.4.4.1 The abrasive cut-off switch is mounted on the control handle. The operator uses the switch to close the abrasive valve independently of the air valve, so air without abrasive exits the nozzle.

1.4.5 Electric remote-control option

1.4.5.1 Electric remote controls (electro-pneumatic) are available. Contact your local distributor of Clemco products for more information.

2.0 SETUP

2.1 Blast Hose and Control Hose Connections

2.1.1 Push the nozzle holder end of the blast hose through the piping panel, as shown in Figure 2.

2.1.2 Make sure the coupling gaskets are in place (and in good condition) before connecting the blast hose to the quick coupling on the blast machine. When connecting the hose, make sure the coupling spring lock pins are at 180 degrees (pins should enter the unused hole of the adjoining coupling). The spring lock pins help prevent accidental separation of hose couplings during blasting.

⚠ WARNING

Hose disconnection while under pressure can cause serious injury or death. Use safety lock pins and safety cables on all coupling connections to help prevent hose couplings from accidental disconnection.

2.1.3 Locate the six 1/4" NPT twinline adaptors, packaged in the accessory box. Screw the adaptors tightly into both ends of the 1/4" NPT (lower) couplings on the blast room piping panel, and on both ends of one of the upper couplings.

2.1.4 Attach the interconnecting twinline hose to the Millennium valve and 1/4" NPT adaptors on the piping panel. Either side of the hose can be attached to either fitting. Ref. Figure 3.

2.1.5 Attach the single interconnecting ACS hose from the upper fitting on the piping panel, and the GritWizard Metering Valve. Refer to Figure 2.

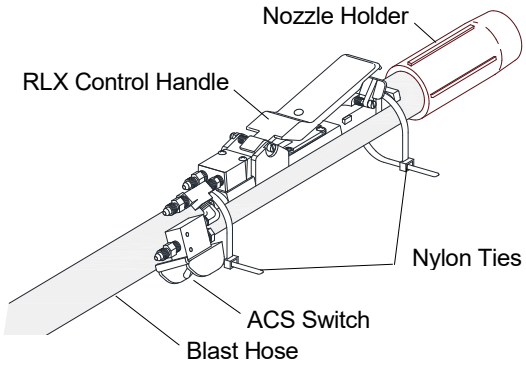


Figure 3

2.1.6 Uncoil the blast hose, and lay the 50 ft twinline hose and 50 ft single-line hose alongside it. Hoses should be of equal length.

2.1.7 Band the control handle to the blast hose at a comfortable location behind the nozzle holder, as shown in Figure 3. Use the two nylon ties provided or similar means to secure the control handle to the hose. Once the control is firmly attached, clip the tie ends so they do not snag the operator's clothing or interfere with the operation of the control handle.

2.1.8 Attach the 50 ft twinline hose to the two fittings on the control handle, as shown in Figure 4. Either side of the hose can be attached to either fitting.

2.1.9 Attach the 50 ft single-line control hose to the fitting on the ACS Switch mounted on the control handle, as shown.

2.1.10 Working from the control handle back, band the twinline and single-line hoses to the blast hose, as shown in Figure 4, every 4 to 6 feet and as close to the couplings as possible.

2.1.11 Attach the ends of the 50 ft twinline hose to the adaptors on the piping panel. Either side of the hose can be attached to either fitting. Make sure all fittings are tight; leaks will cause the system to malfunction.

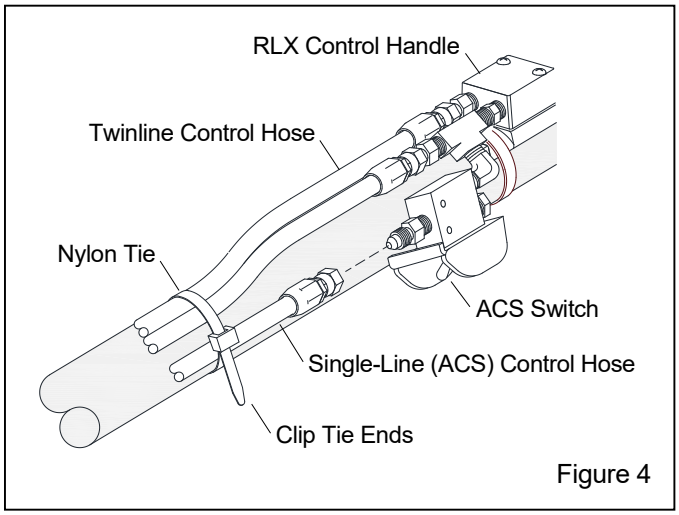


Figure 4

2.1.12 Place the nozzle washer in the nozzle holder, and screw the nozzle into the holder. The nozzle must seat tightly against the nozzle washer.

2.2 Cutting Control Hose and Reusing Hose Fittings – Figure 5

NOTE: Control hoses may be shortened by removing the reusable hose ends as follows, ref. Figure 5:

1. Place the hose-end sleeve in a vise or use a backup wrench on the sleeve to prevent it from turning. Unscrew the insert by turning it counterclockwise.
2. Turn the sleeve clockwise to remove from the hose.

3. Cut hose to length.
4. Turn sleeve counterclockwise to install on hose. Do not over-tighten the sleeve, stop tighten as soon as the hose bottoms against the sleeves internal shoulder. Over tightening will cause the hose to curl inward and could cause blockage.
5. Push end of insert into sleeve, and turn clockwise to tighten until the insert hex is against the sleeve.

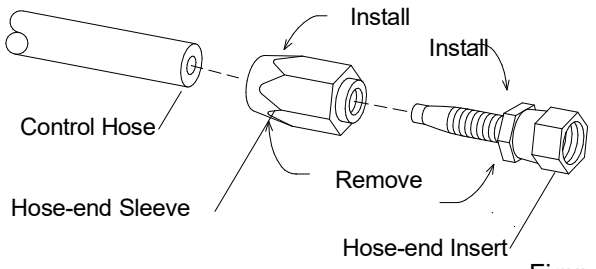


Figure 5

2.3 Compressed-Air Requirements

2.3.1 Compressed-air requirements depend on the size of nozzle and the number of operating stations used at a given time. Refer to the table in Figure 6, which show the approximate compressed air consumed for each recommended nozzle size. It shows cfm consumed when the nozzle is new and when it is considered worn. A nozzle is considered worn when the orifice is 1/16" larger than its original size. Add or multiply the air requirements by the size and number of nozzles used. Refer to a compress-air supplier for the recommend compressor size based on the consumption.

2.4 Compressed-Air Supply Line

2.4.1 Install an air-supply line to the blast machine inlet. The compressed-air line should contain an isolation valve near the machine, to enable depressurization for service.

2.4.2 A short section of air hose will make installation and service easier than using all hard pipe. Install an air fitting, that is compatible with the hose, to the air filter at the blast machine inlet.

2.4.3 For best blasting performance, use 1-1/4" ID or larger air line when using up to a 5/16" orifice (No. 5) nozzle, 1-1/2" or larger when using up to a 3/8" (No. 6) nozzle, and 2" or larger when using up to a 1/2" (No. 8) nozzle.

Compressed-Air and Abrasive Consumption

Nozzle Orifice Size (in.)	Air Pressure at the Nozzle										
	80 PSI		90 PSI		100 PSI		125 PSI		140 PSI		
	*New	Worn	New	Worn	New	Worn	New	Worn	New	Worn	
No. 4 1/4"	68	113	74	126	81	137	98	168	110	188	Air (cfm)
	4.08	9.6	4.5	7.4	4.8	8.1	6.1	9.8	6.8	11.0	Abrasive (cuft/hr)
	16	36	17	28	18	39	22	37	25	41	Compressor (hp)
No. 5 5/16"	113	161	126	173	137	196	168	237	188	265	Air (cfm)
	6.7	9.6	7.4	10.5	8.1	11.5	9.8	13.9	11.0	15.6	Abrasive (cuft/hr)
	26	36	28	39	31	44	37	52	41	58	Compressor (hp)
No. 6 3/8"	161	217	173	240	196	254	237	314	265	352	Air (cfm)
	9.6	13.1	10.5	14.5	11.5	15.8	13.9	19.3	15.6	21.6	Abrasive (cuft/hr)
	36	49	39	54	44	57	52	69	58	77	Compressor (hp)
No. 7 7/16"	217	280	240	309	254	338	314	409	352	458	Air (cfm)
	13.1	16.8	14.5	18.6	15.8	20.2	19.3	24.6	21.6	27.5	Abrasive (cuft/hr)
	49	63	54	69	57	75	69	90	77	101	Compressor (hp)
No. 8 1/2"	280	452	309	504	338	548	409	598	458	646	Air (cfm)
	16.8	26.9	18.6	29.7	20.2	32.5	24.6	35.2	27.5	38.0	Abrasive (cuft/hr)
	63	101	69	112	75	122	90	133	101	144	Compressor (hp)

* Figures show approximate compressed-air and abrasive consumption when nozzles are new and when worn. Consumption gradually increases as the nozzle wears. A nozzle is considered worn when the orifice is 1/16" larger than its original size.

- Air requirements are under blasting conditions, and are therefore lower than figures for air alone, with no abrasive.
- Horsepower requirements are based on 4.5 cfm per horsepower.
- Figures are for reference only and may vary for different working conditions. Several variables, including metering valve adjustments, can affect abrasive flow.

Figure 6

3.0 OPERATION

3.1 Initial Tests

3.1.1 Make sure that all blast hose and compressed-air hose connections are secure, and that coupling lock pins are in place.

3.1.2 Close the compressed air line isolation-valve.

3.1.3 Slowly pressurize the air-supply line to the isolation valve. Listen for any open lines or leaks.

3.1.4 Open the safety petcock on the Millennium valve. It is open when the lever is in-line with the petcock, as shown in Figure 7.

⚠ WARNING

To prevent severe injury from accidental activation of the blast machine, open the safety petcock when the blast machine is not in use. Opening the petcock prevents unintentional blasting. The control handle cannot activate the machine when the petcock is open.

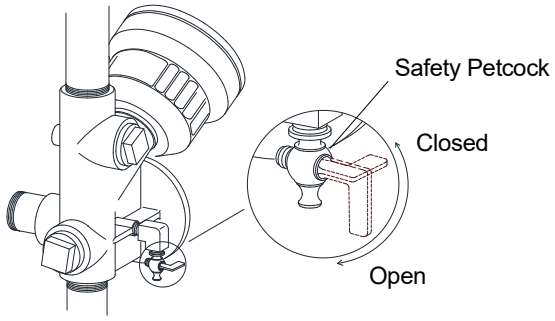


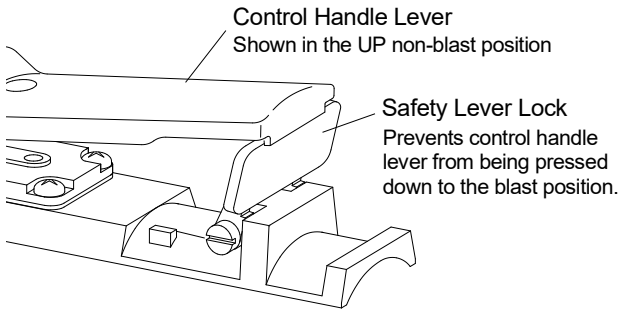
Figure 7

3.1.5 Make sure that the control handle lever is in the up (no blast) position, as shown in Figure 8, and that the handle lever and safety lock move freely.

⚠ WARNING

Malfunctioning control handles can cause unintentional actuation of a blast machine, or prevent a machine from deactivating upon release. Malfunctioning control handles must be taken out of service immediately and repaired or replaced. Serious injury or death can result from unintentional blasting.

3.1.6 Make sure that the handle lever does not seal the opening on the control handle unless the safety lever lock is folded down.



The lever lock must prevent the handle from being pressed down to the blast position.

Figure 8

3.1.7 Slowly open the compressed air isolation valve. Listen for leaks. The only air escaping from system should be from the petcock and control handle.

3.1.8 Close the safety petcock. Closing the petcock prepares the machine for remote operation and activation by the control handle. Air should be heard escaping from the orifice under the control handle lever but nowhere else. The noise from air escaping at the control handle is an audible signal that means air is supplied to the blast machine, which will activate if the control handle is pressed.

3.1.9 Have another person hold the blast hose securely, and, while pointing the nozzle in a safe direction, fold down the safety lever lock and depress the remote control handle, as shown if Figure 9. Within a few seconds, the pop-up valve automatically closes, and the blast machine will pressurize to start blasting. **NOTE: If the blast room is equipped with door interlocks, the blast room doors must be closed before the machine will pressurize.**

⚠ CAUTION

Be prepared for the recoil from the blast hose. Blasting should begin within a few seconds after pressing the control handle lever.

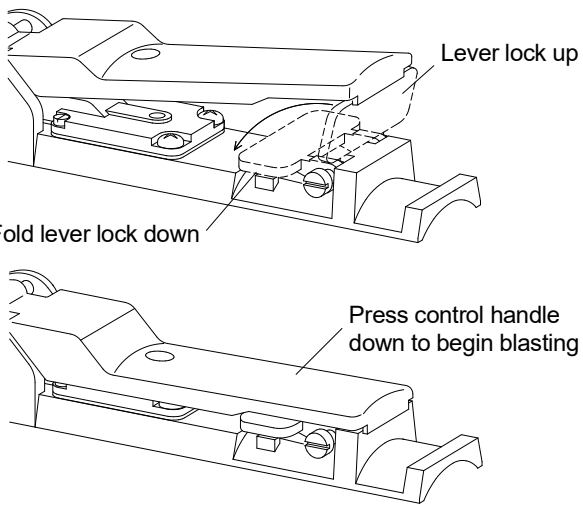


Figure 9

3.1.10 Make sure the machine functions correctly, and check all hoses and piping for leaks.

3.1.11 When satisfied that the machine and all accessory equipment functions correctly, load abrasive into the system by following the instructions recommended for the recovery process.

3.2 Routine Start-up

3.2.1 Make sure the choke valve is open (handle in-line with the valve and piping).

3.2.2 Close the GritWizard Abrasive Metering Valve. Closed position is when the knob is turned fully clockwise. Refer to Section 4.1.

3.2.3 Pressurize the breathing air-supply line, and adjust pressure on the CPF Filter outlet to the pressure stated in the respirator manual.

3.2.4 Closing the petcock prepares the machine for remote operation and activation by the control handle. Air should be heard escaping from the orifice under the control handle lever but nowhere else. The noise from air escaping at the control handle is an audible signal that air is supplied to the blast machine, which activate if the control handle is pressed.

3.3 Personal Protective Equipment – Blasting Attire

⚠ WARNING

All dust is hazardous to breath. Before blasting, test the coating and substrate for toxic materials, such as lead or other heavy metals, or asbestos. These hazards require special measures to protect the operators and the environment.

Obtain a safety data sheet (SDS) for the blast abrasive to identify hazardous substances. Silica sand (crystalline) can cause silicosis, lung cancer, and breathing problems in exposed workers. Slag abrasives may contain trace amounts of toxic metals such as arsenic, beryllium, and cadmium. Any abrasive dust has potential to cause lung disease.

Abrasive blasting operations can create high levels of harmful dust and noise. No dust is safe to breathe. Failure to wear NIOSH-approved respirators can result in serious lung disease or death. The respirators must be properly fitted and maintained. Use only NIOSH-approved, Type-CE supplied-air respirators approved for abrasive blasting.

Loud noise generated by the use of compressed air can cause hearing damage. Everyone in the blasting area must wear approved hearing protection.

During abrasive blasting, abrasive and dust particles in the area around the blast machine and blast nozzle become airborne. Everyone working in the vicinity of abrasive blasting must wear properly maintained, NIOSH-approved, respiratory protection, eye protection, and hearing protection appropriate for the job site hazards.

It is the employer's responsibility to train employees to identify hazardous substances and to provide suitable policies, procedures, monitoring, recordkeeping, and personal protective equipment.

3.3.1 Operators and **anyone else exposed to the hazards generated by the blasting process** must wear appropriate protective gear, including abrasive-resistant clothing and gloves, eye and hearing protection, and a NIOSH-approved, Type-CE supplied-air respirator.

3.3.2 Don protective attire outside the blast area in a clean nonhazardous environment, free of contaminants, and where the air is safe to breathe.

3.3.3 When finished blasting and after cleanup is completed, remove the respirator and protective clothing outside the respirator-use area in a clean environment.

3.4 Pressurize Blast Machine to Start Blasting

3.4.1 Don all protective blasting, per Section 4.8

3.4.2 Hold the blast hose securely and point the nozzle only at objects intended to be blasted.

3.4.3 Fold down the safety lever lock and depress the remote control handle, as shown in Figure 9. Within a few seconds the pop-up valve automatically closes, and the blast machine pressurizes to start blasting.

⚠ CAUTION

Be prepared for the recoil from the blast hose. Blasting should begin within a few seconds after pressing the control handle lever.

⚠ WARNING

OSHA requires the use of remote controls on all blast machines. To comply with OSHA regulations, the remote control handle, which starts and stops the flow of air and abrasive, must be held down manually. Do not tie down the control handle lever or attempt to bypass any part of the remote control system. Doing so will defeat the purpose of the fail-to-safe feature of the remote control. Serious injury or death could result from uncontrolled blasting. Ref. 29 CFR 1910.244 (b).

3.4.4 Adjust abrasive flow per Section 4.1.

3.5 Operation of Abrasive Cut-Off Switch (ACS)

3.5.1 The ACS serves two purposes:

1. Clearing abrasive from the blast hose when blasting is finished. This is helpful in many applications and necessary when blasting vertically, to prevent abrasive from collecting in low spots in the blast hose, eliminating excessive abrasive slugging at startup.

2. Blowing abrasive off the blasted surface. NOTE: Small amounts of residual abrasive may exit the nozzle with the air, requiring additional blowing off or otherwise cleaning the surface outside the blasting area prior to painting.

⚠ WARNING

People and the environment tolerate only a limited amount of toxic materials. OSHA limits these exposure levels. Airborne dust could increase the exposure levels beyond permissible limits. OSHA prohibits blowing with compressed air as a cleaning method for lead based paint dust or other hazardous dust, unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air, 29 CFR 1926 (h). The ACS is for blowing abrasive off the blasted surface, NOT as a general area clean–up tool.

3.5.2 The abrasive cut-off switch is situated directly behind the control handle, as shown in Figure 10. The switch may be flipped ON or OFF at any time, but will not operate the metering valve unless the control handle is pressed.

3.5.2.1 Blast Mode: Moving the ACS toggle to point away from the nozzle, to the ON ("CYL" port) position, sends control-air to the abrasive metering valve to open the valve, which enables the blast machine to operate normally, with air and abrasive coming out the nozzle.

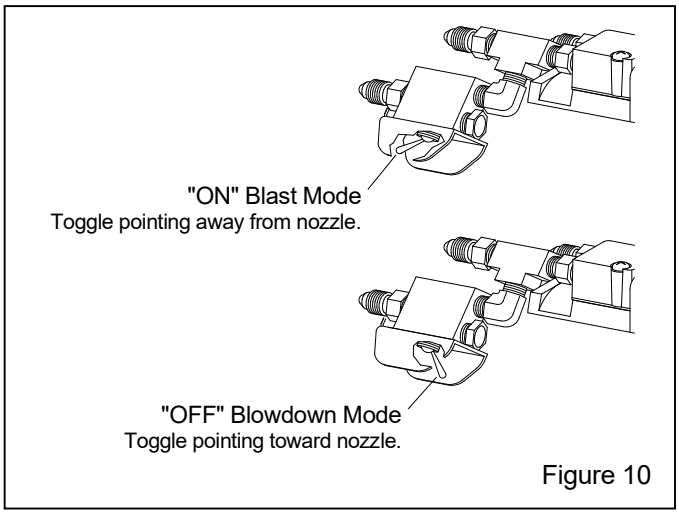


Figure 10

3.5.2.2 Blow-Down Mode: Moving the ACS toggle to point toward the nozzle, to the OFF position, cuts off control-air to the abrasive metering valve to close the valve and stop the abrasive flow. This action allows air alone to exit the nozzle, useful for clearing the blast hose before shutting down, and for blowing abrasive off the blasted surface.

3.6 Operation and Function of the Choke Valve Figure 11

3.6.1 Always blast with the choke valve fully open, open is when the handle is vertical and aligned with the piping, as shown in Figure 11.

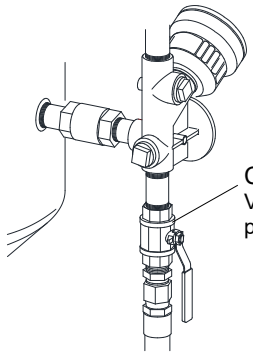


Figure 11

3.6.2 Closing the choke valve while blasting lowers pressure in the pusher line from the pressure in the vessel. Closing the valve forces abrasive through the metering valve to clear minor blockages, such as damp abrasive

3.6.3 To clear minor blockages, while blasting close the choke valve a second or two and then reopen it. Repeat the procedure if necessary.

3.6.4 To rapidly empty abrasive from the machine, while blasting close the choke valve Be prepared for severe surging and recoil of the hose. Open the choke valve when the machine is empty.

NOTICE

Do not blast with choke valve closed or partially closed. Prolonged blasting with the choke valve partially closed will accelerate wear on the metering valve.

3.7 Stop Blasting

3.7.1 To stop blasting, release the control handle lever. The outlet valve opens, and the blast machine depressurizes. The pop-up valve automatically drops when air is expelled from the machine and pressure equalizes.

3.7.2 When the control handle lever is released, the safety lever lock will flip up to lock the handle lever in the up (no blast) position. Make sure that the safety lever lock is up, and that it prevents the handle lever from engaging.

3.7.3 Always open the safety petcock during work breaks and before filling the blast machine. Opening the petcock prevents unintentional blasting.

3.8 Loading Abrasive into the Blast Machine

⚠ WARNING

Obtain a safety data sheet (SDS) for the blast abrasive. Abrasive blasting with sands containing crystalline (free) silica can lead to serious or fatal respiratory disease. As NIOSH recommends, do not use abrasives containing more than trace amounts (more than one percent) free silica.

3.8.1 The blast machine is part of a blast and recovery system. Load abrasive into the system by following the instructions recommended for the recovery process.

3.9 Emptying the Machine of Abrasive

3.9.1 With the blast machine OFF, turn the blast pressure to approximately 40-50 psi, close the choke valve, as noted in Section 3.6, and set the abrasive metering valve to full open.

3.9.2 To prevent rapid wear of the nozzle holder threads, the nozzle should be firmly attached to the nozzle holder. Removal of the nozzle is not recommended. Purging the machine without a nozzle in place will erode the thread area of the nozzle holder, which could cause a hazardous condition when the nozzle is reattached.

⚠ WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. A loose fitting nozzle may eject under pressure and can cause severe injury. Check the threads for wear, and make sure the nozzle holder securely holds the nozzle. The nozzle washer must also be inspected for wear. When nozzle washers are worn, abrasive could erode nozzle threads.

3.9.3 Point the nozzle into a drum or suitable storage or disposal container or in the direction the abrasive is to be disposed.

3.9.4 Hold the hose securely (do not leave the hose unattended), and pressurize the machine by activating

the control handle. Be prepared for surging, or recoil of the hose, which can be severe.

3.9.5 When the machine is empty, release the control handle lever, open the safety petcock, and open the choke valve.

3.9.6 If the nozzle was removed, thoroughly inspect the nozzle holder threads for wear before installing the nozzle washer and attaching the nozzle.

3.10 Shutdown

3.10.1 Close the compressor-air supply valve.

3.10.2 Drain receiver tank, moisture separators (filters), and water collecting devices, and bleed the compressed-air supply hose.

3.10.3 Shutdown the compressor.

4.0 ADJUSTMENTS

4.1 Adjust Abrasive Flow – Figure 12

4.1.1 The valve is closed when the knob is fully clockwise. Increase abrasive flow by turning the knob counterclockwise and decrease abrasive flow by turning the knob clockwise, as shown in Figure 12. Begin with the knob set two 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.

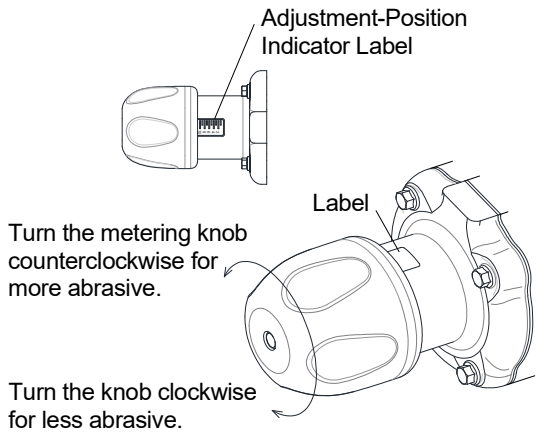


Figure 12

4.1.2 The indicator label behind the knob shows how far the metering valve is open, as the knob is turned in or out it moves over the label. The position of the knob over the label allows the operator to reset the valve to the same position when it is temporarily changed.

4.1.3 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.

5.0 PREVENTIVE MAINTENANCE

5.1 Daily or More Frequent Inspection and Maintenance

5.1.1 With the air OFF, before blasting, inspect the following:

- Empty the abrasive trap and clean the abrasive trap screen. Do this at least twice a day, or more often if the machine is frequently cycled. Failure to clean the abrasive trap on a regular basis is a major cause of system malfunction. Refer to Section 6.6.
- Check to make sure that couplings are secure and lock pins and safety cables are in place.
- Make sure the nozzle washer is in place and not worn.

⚠ WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. Make sure the threads are not worn, and that the nozzle holder securely grips the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers can cause thread erosion, resulting in disconnection from the holder when under pressure, causing severe injury.

- Inspect the RLX Control Handle; look for the following:
  - The control handle lever must not seal the opening on the control unless the safety lever lock is folded down.
  - The control **handle lever** must return to the UP position when released.
  - The **safety lever lock** must return to the UP position when the handle lever is released.
  - Both the handle lever and safety lever lock must move freely with no drag or binding.

⚠ WARNING

Malfunctioning control handles can cause unintentional actuation of a blast machine, and also prevent a machine from deactivating upon release. Malfunctioning control handles must be taken out of service immediately and repaired or replaced. Serious injury or death can result from unintentional blasting. Refer to the RLX operations manual for service instructions.

5.1.2 During blasting, do the following:

- Check the control handle for leaks.
- Inspect all couplings and coupling gaskets for leaks.
- Check the blast machine for leaks. If leaks are found around the pop-up valve, inspection door, pipefittings ports on the side of the machine or at the bottom of the cone, stop blasting immediately and repair or replace worn parts.

NOTICE

If leaks are allowed to continue, abrasive erosion can cause extensive or irreparable damage to the blast machine.

- Check all external piping, control hoses, and valves for leaks. If leaks are found, stop blasting and repair.
- Inspect blast hose, couplings, and nozzle holders for leaks. At the first sign of a leak, stop blasting and repair or replace worn parts.

⚠ WARNING

Leaks around couplings and nozzle holders indicate worn or loose-fitting parts. Nozzle holders and couplings that do not fit tight on hose, and nozzles that do not fit tight in nozzle holders could disconnect while under pressure. Impact from nozzles, couplings, hoses, or abrasive, from parts disconnected by pressure during operation can cause severe injury.

5.2 Weekly Inspection

5.2.1 With the air OFF, before blasting, do the following:

- Remove the nozzle for inspection. Replace if the orifice diameter is worn 1/16″ or more, or if the liner is cracked.
- If the optional compressed-air filter is used, inspect the filter element, and clean the bowl.
- Inspect the blast hose for wear, squeeze the hose every three to four feet, looking for soft spots. Soft spots mean the hose is worn. Replace the blast hose before the tube wears as far as the fabric plies.

⚠ WARNING

Worn blast hose can suddenly burst while under blast pressure. Couplings and nozzle holders will not safely grip worn hose, and can blow off under pressure. Compressed air and abrasive escaping from a burst hose, or hose whipping from a disconnected coupling can cause severe injury.

5.2.2 During blasting, do the following:

- Inspect all control hoses and valves for leaks. If leaks are found, stop blasting and repair.
- Note the time it takes to fully depressurize the machine after the control handle is released. When depressurizing time increases noticeably, inspect the exhaust muffler.

5.3 Monthly Inspection

5.3.1 With the air OFF, before blasting, do the following:

- Check the pop-up valve's urethane coating for cracks and grooves. Replace the pop-up valve at the first sign of wear, per Section 6.7.
- Inspect the rubber pop-up seal, and replace at the first sign of wear, drying, or cracking, per Section 6.8.
- Inspect exhaust muffler for blockage and wear.

5.4 Periodic Inspection

5.4.1 Remote control valves: For safety and to prevent unnecessary downtime, periodically inspect the internal parts of the inlet and outlet valves, and abrasive trap. Inspect for wear and lubrication on O-rings, pistons, springs, seals, and castings. See Service Maintenance in Sections 6.3, 6.4 or 6.5, and 6.6.

5.4.2 RLX Control Handle: Periodically clean around the springs, handle lever, and lever lock to ensure that the unit is free of abrasive and debris that may cause the handle lever or lever lock to bind. Refer to the RLX Operations Manual No. 10574, for inspection and maintenance instructions.

6.0 SERVICE MAINTENANCE

⚠ WARNING

To avoid serious injury from the sudden release of compressed air, observe the following before performing any maintenance.

- **Depressurize the blast machine.**
- **Turn OFF the compressed-air supply.**
- **Lockout and tagout the compressed-air supply.**
- **Bleed the air supply-line to the blast machine.**

6.1 Removing Damp Abrasive from Blast Machine

6.1.1 To clear a minor blockage caused by damp abrasive, during operation, rapidly open and close the choke valve several times.

6.1.2 For more difficult blockages, proceed as follows: See Section 6.2 to check obstructions in metering valve.

6.1.2.1 With the blast machine depressurized, close the choke valve and fully open the abrasive metering valve. Remove the nozzle and nozzle washer. Pressurize the machine to force out any damp abrasive. When the hose is cleared, depressurize the machine and attach the nozzle washer and nozzle.

⚠ WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. Make sure the threads are not worn, and that the nozzle holder securely holds the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers can cause thread erosion. A loose fitting nozzle may eject under pressure and can cause severe injury.

6.1.2.2 With the hose cleared, start the machine using normal procedures.

6.2 Clearing Obstructions in the Abrasive Metering Valve and Blast Machine

6.2.1 If the nature of the obstruction permits emptying the machine of abrasive, do so by following the instructions in Section 3.9.

6.2.2 Turn OFF the compressed-air supply. Lockout and tagout the air supply, and bleed the air supply.

6.2.3 Remove the metering valve inspection.

6.2.4 Check the metering valve for blockage by inserting fingers into the opening to feel for an obstruction or foreign object.

6.2.5 If the metering valve is clear, remove the blast machine inspection door, and check for foreign objects.

6.2.6 Make sure the inspection door gasket is in good condition and in place before re-bolting the door onto the machine.

6.2.7 Make sure the abrasive metering valve's cleanout-cover O-ring is in good condition and in place before reassembling the cover.

6.2.8 Check to make sure all inspection doors are secure before starting the air supply.

6.3 Millennium Inlet Valve – Ref. Figure 13

NOTE: Two service kits are available for the Millennium inlet segment. To prevent unnecessary downtime, both kits should be kept on-hand. Replace all the seals provided in the seal service kit whenever the valve is opened. Use the plunger tip kit when replacing the plunger tip.

6.3.1 Unscrew the six socket head screws to remove the cylinder cap, cylinder cap gasket, and spring.

6.3.2 Remove the cylinder sleeve by screwing two 1/4-NC screws into the holes in the end of the sleeve and by pulling the screws to remove the sleeve from the body. If the sleeve is too tight to remove by hand, use a puller. Remove the screws after the sleeve is removed.

6.3.3 To remove the piston, screw a 1/4-NC screw into the center of the socket head screw, grip the screw, and pull out. If the piston is too tight to remove by hand, use a puller. Remove the screw after the piston is removed.

6.3.4 It is not necessary to separate the plunger from the piston unless the metal of either part is scored. To remove the plunger, insert a rod through the hole in the lower part of the plunger and hold the rod to prevent the plunger from turning, while using a 5/16" hex key to remove the socket screw from inside the piston.

6.3.5 If the plunger tip is worn, use a 3/16″ hex key to remove the button screw, washer and tip.

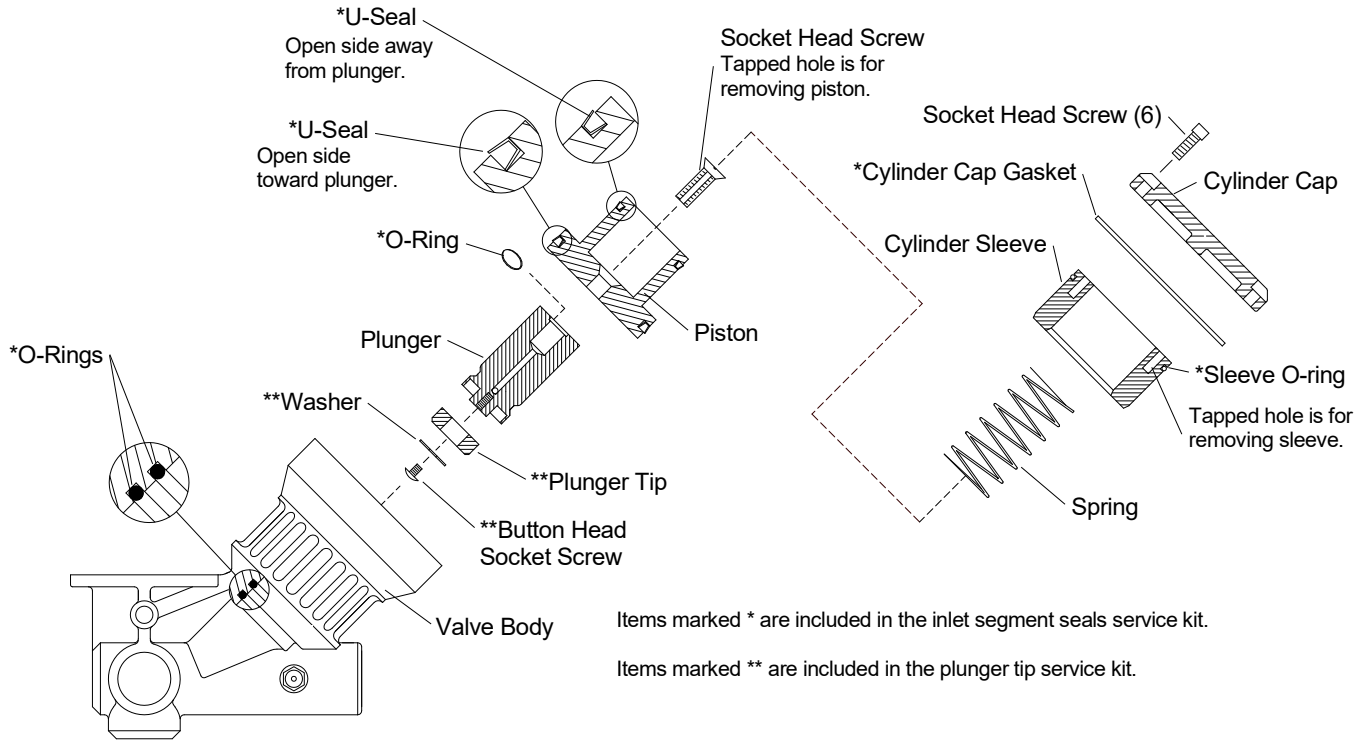


Figure 13

6.3.6 Clean all items and inspect for wear. Replace all seals and O-rings (they are included in the service kit), and replace all worn or damaged parts.

- Inspect the plunger tip. Replace the tip if worn or damaged.
- Inspect the machined plunger seat in the valve body for wear. The body must be replaced if the seat is worn.

6.3.7 If the plunger and piston were separated, as noted in paragraph 6.3.4, apply removable thread sealant to the socket head screw, and reassemble the parts using a new O-ring supplied with the service kit.

6.3.8 Lubricate the O-rings and all u-seals with a silicone-based lubricant.

6.3.9 Replace both O-rings in the valve body.

6.3.10 Place the u-seals into the grooves on the piston, the open side of the large seal faces the plunger, and the open side of the small one faces away from the plunger, as shown in Figure 13.

6.3.11 Install the plunger and piston assembly into the body. Use care, making sure the open side of the large (lower) u-seal does not fold back during assembly. Tucking the lip of the seal in, while applying pressure to the piston eases assembly.

6.3.12 Place the O-ring on the cylinder sleeve, and insert the sleeve (O-ring end faces up) into the body, making sure the open side of the small (upper), piston u-seal does not fold back during assembly.

6.3.13 Install the spring, cylinder cap gasket, and cylinder cap.

6.3.14 Tighten the six socket head screws in sequence to secure the cap.

6.4 Piston Outlet Valve (standard) – Figure 14
Refer to Section 6.5 for the optional diaphragm outlet valve.

6.4.1 All service on the outlet valve must be done with the compressed air OFF and the air supply locked-out and tagged-out.

6.4.2 Remove the control hose from the adaptor elbow.

6.4.3 Use a large wrench to loosen the bonnet from the valve body, until it can be removed by hand.

6.4.4 As the bonnet is removed, lift it straight up until the piston stem clears the plug and spindle guide.

6.4.5 Remove the spindle guide, plug assembly, and spring from the valve body.

6.4.6 Remove the piston from the bonnet, by pulling the piston stem.

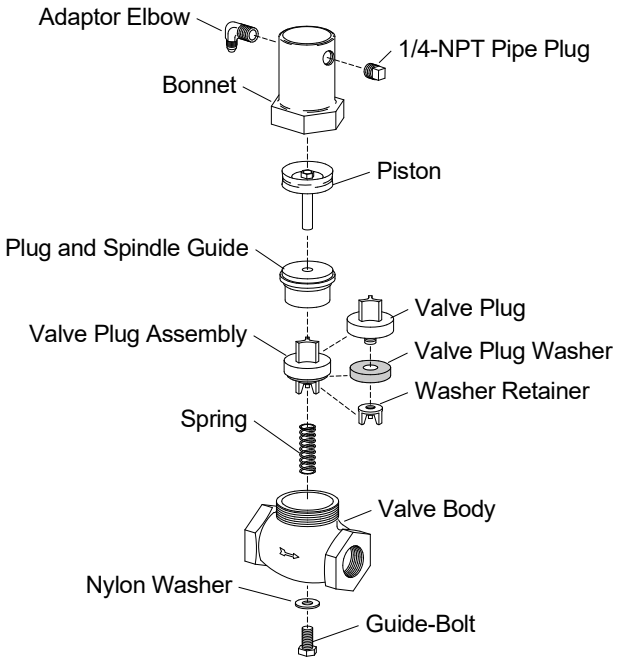


Figure 14

6.4.7 Inspect all parts for wear and damage:

- Inspect the valve plug washer, valve plug, and plug retainer for damage. Replace all damaged parts. When reassembling the valve plug assembly, tighten the retainer enough to compress the washer, but not so tight to cause it to bulge.
- Examine the body casting for wear. If the body or the machined seat is worn, replace the body.
- Examine the spring guide-bolt and nylon washer. If either is worn, replace both.
- The spring is approximately 1-5/8" long; if it is worn, rusted or compressed, replace it.
- The piston cup should fit snugly against the bonnet's cylinder wall. If it does not, replace the piston assembly.
- The piston stem should be free of deep abrasion and move freely in the spindle bore. If it is badly abraded, drags in the bore, or is loose in the bore, replace the piston assembly.

6.4.8 Lubricate the bonnet's cylinder wall and piston cup with lightweight machine oil, pneumatic tool oil, or equivalent.

6.4.9 Install the piston into the bonnet cylinder; cocking the piston so it enters the bonnet at a slight angle, and rotating it while applying pressure makes assembly easier. Do not push the piston fully into the bonnet; the stem should be flush with the opening.

6.4.10 Place the spring over the guide-bolt, and place the plug assembly (retainer down) on the spring.

6.4.11 Place the spindle in the body. The large opening faces down, and fits over the plug fins. The spindle shoulder will not rest on the valve body due to the force of the spring.

6.4.12 To assemble the bonnet to the valve body, first insert the piston stem into the spindle guide hole. While keeping the bonnet, spindle, and body aligned, screw the bonnet onto the body. If all parts are correctly aligned, the body will screw-on hand tight until it is seated. **NOTE: If the bonnet does not screw on hand tight, do not force it. Recheck alignment and repeat.**

6.4.13 After the bonnet is fully seated on the body, tighten the assembly with a wrench.

6.4.14 Attach the control hose to the fitting on the bonnet.

6.5 Diaphragm Outlet Valve – Figure 15

Refer to Section 6.4 for the piston outlet valve.

6.5.1 All service must be done with the compressed air OFF and the air supply locked-out and tagged-out.

6.5.2 Remove the four cap screws that secure the cap.

6.5.3 Remove the diaphragm and inspect it for damage. Replace as necessary.

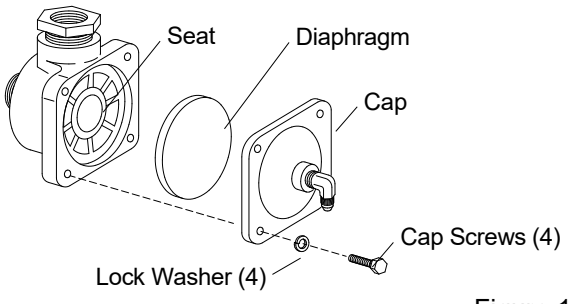


Figure 15

6.5.4 Inspect the seat area in the body. If worn, replace the body.

6.5.5 Reassemble in reverse order.

6.6 Abrasive Trap – Figure 16

NOTE: A service kit is available for the abrasive trap. To prevent unscheduled downtime, always keep a kit on-hand.

6.6.1 All service on the abrasive trap must be done with the compressed air OFF and the air supply locked-out and tagged-out.

6.6.2 Clean the abrasive trap screen and trap at least twice a day. NOTE: Failure to clean the abrasive trap on a regular basis is a major cause of system malfunction.

6.6.3 To check the abrasive trap screen, loosen the top thumbscrew and swing the lock bar off the cap, and remove the cap, as shown in Figure 16.

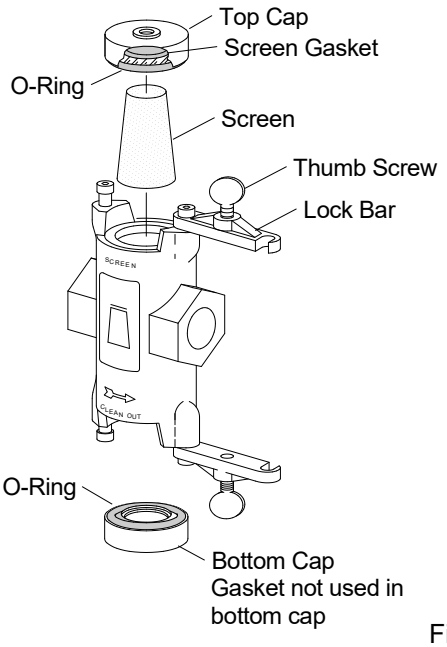


Figure 16

6.6.4 Remove the screen and inspect it for wear and blockage. Replace it when it is clogged or worn. Keep spare screens on hand. Do not install the screen in the trap until the bottom section of the trap is cleaned per the following instructions.

6.6.5 To clean the bottom section of the trap, loosen the bottom thumbscrew, and swing the lock bar off the bottom cap, and then remove the cap.

6.6.6 Empty all abrasive from the bottom and top sections.

6.6.7 Install the screen in the top section. The small end of the screen must face up.

6.6.8 Reassemble the top and bottom caps. Make sure the O-rings are in place on the caps before assembly, and the screen gasket is in place in the top cap.

6.7 Replacing the Pop-Up Valve

6.7.1 Empty the machine of abrasive, as described in Section 3.9.

6.7.2 Depressurize the blast machine, and lockout and tagout the air supply.

⚠ WARNING

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

- **Depressurize the blast machine.**
- **Lockout and tagout the compressed-air supply.**
- **Bleed the air supply line to the blast machine.**

6.7.3 To gain access to the pop-up valve, remove the inspection door plate as follows:

1. Loosen the inspection door clamp nut enough to slide the clamp bolt from behind the bolt bracket and then remove the clamp and bolt assembly, as shown in Figure 17.

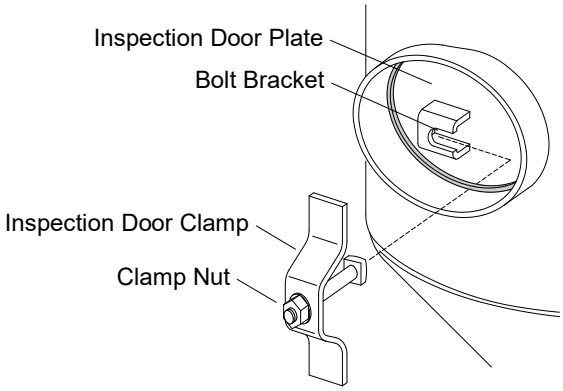


Figure 17

2. Push the inspection door plate into the blast machine and rotate it so it can be removed through the inspection door. If the plate is stuck to the inspection hole ring, rap the plate with a rubber mallet or similar tool to loosen it.

6.7.4 Replace the door gasket if it is cracked, dry, or otherwise damaged. Use rubber based glue to adhere the gasket to the inspection-door plate. Allow the adhesive to cure before bolting the plate onto the machine.

6.7.5 Use a short pipe wrench to unscrew the pop-up valve guide from the elbow by turning it counterclockwise, as shown in Figure 18. Remove the pop-up valve and guide from the machine.

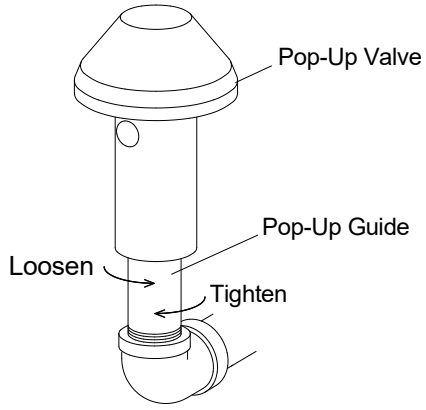


Figure 18

6.7.6 While the pop-up valve is out, check alignment as follows: Screw a 1-1/4" nipple that is at least 12" long into the elbow in place of the pop-up guide. Check the alignment through the pop-up filling port. The nipple should be close to the center of the port. If it is not, adjust the horizontal pipe. A misaligned pop-up valve could result in early valve failure or abrasive leakage when the machine is pressurized or depressurized.

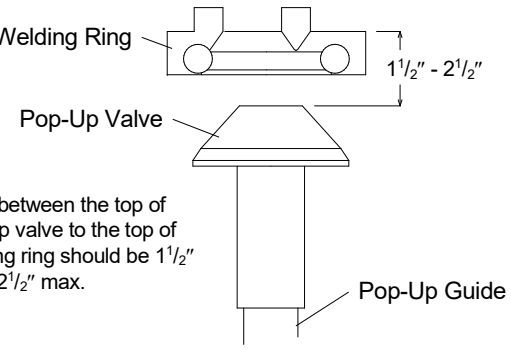


Figure 19

6.7.7 Slide the new pop-up valve over the guide and then screw the guide (with the pop-up valve on it) into position inside the machine. Tighten the guide wrench-snug, but not wrench-tight. Over-tightening the guide will make it difficult to remove the next time the pop-up valve needs replacement.

6.7.8 Refer to Figure 19 to check the pop-up height. If the pop-up sits too low, misalignment could occur when the pop-up comes up against the seal. If the pop-up sits too high, it will take longer for abrasive to flow through the opening when filling. Adjust the height by replacing the guide with one that is longer or shorter.

6.7.9 Bolt the plate onto the machine.

6.8 Replacing the Pop-Up Seal – Figure 20

6.8.1 Remove the old seal by using a finger, screwdriver, or similar object to work the seal out of the retainer groove. If for any reason replacement cannot be made from the top of the machine, observe the warning at the beginning of this section, and empty the machine and bleed the air supply line. Remove the inspection door plate and work through the inspection door opening.

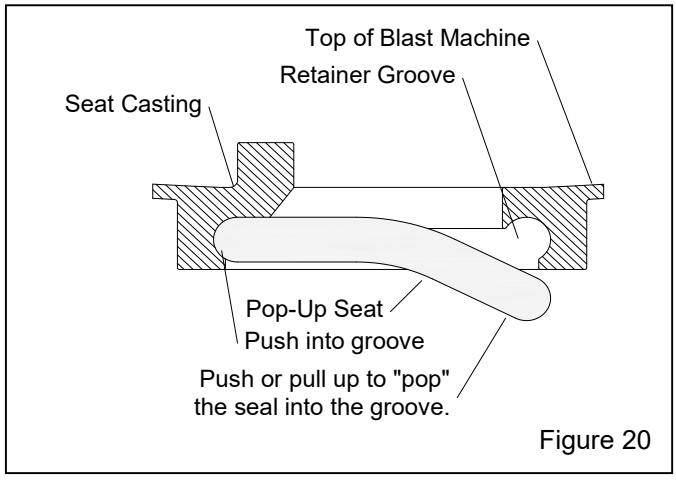


Figure 20

6.8.2 Push the new seal all the way through the port and then fit it into the retaining groove. For the last few inches, pull up on the seal and allow it to pop into position.

6.9 Using Tube-Lock Fittings – Figure 21

⚠ WARNING

Failure to observe the following procedure before performing any maintenance can cause injury from the sudden release of trapped compressed air.

- **Lockout and tagout the compressed-air supply.**
- **Bleed all compressed air-supply lines.**

6.9.1 To remove the tubing from tube-lock fittings, push the retaining collar toward the fitting, which releases the tubing so it can be easily removed by pulling it out. Do not

force it; only a slight pull on the tubing is required if the retaining collar is pushed in correctly.

6.9.2 Reconnect the tubing by inserting it through the collar until it seats. Tug on the tubing to make sure it is tight.

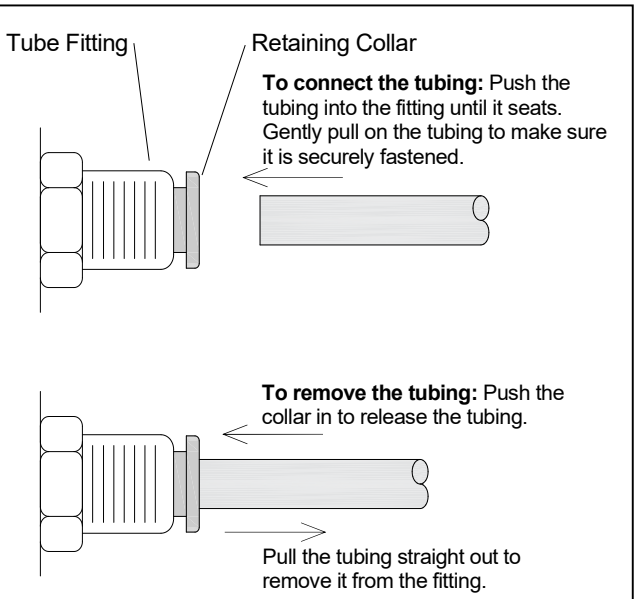


Figure 21

6.10 GritWizard Abrasive Metering Valve

6.10.1 Refer to the GritWizard Abrasive Metering Valve Operations Manual, No. 31199 for service instructions.

6.11 RLX Control Handle

6.11 Refer to the RLX Control-Handle Operations Manual. No. 10574 for service instructions.

7.0 TROUBLESHOOTING

NOTE: This section only identifies conditions and problems in the blast machine and remote control system. Always refer to the appropriate section of this manual, or manuals for accessory equipment, before servicing the equipment.

⚠ WARNING

To avoid serious injury, observe the following when troubleshooting the machine and remote controls.

- **Turn OFF the compressed air, and lockout and tagout the air supply.**
- **When checking the controls requires air, always enlist the aid of another person to operate the control handle while holding the nozzle securely and pointing it in a safe direction.**
- **Never strap the remote control handle lever down in the operating position.**

7.1 Neither abrasive nor air exits the nozzle while the machine is under pressure

7.1.1 Depressurize the blast machine. After the pop-up valve has dropped, remove the nozzle, and check it for obstruction.

7.1.2 Make sure that both the abrasive metering valve and choke valve are open.

7.2 Air only (no abrasive) exits the nozzle

7.2.1 Abrasive metering valve may be closed or needs adjustment. Refer to Section 4.1 to adjust abrasive flow.

7.2.2 Blast machine may be empty.

7.2.3 Abrasive may be damp. Refer to Section 6.1 to clear damp abrasive.

7.2.4 Check the abrasive metering valve for obstructions, per Section 6.2.

7.3 Heavy abrasive flow

7.3.1 Make sure the choke valve is open. The valve is open when the handle is in-line with the piping.

7.3.2 Abrasive metering valve may be open too far. Refer to Section 4.1 to adjust abrasive flow.

7.4 Abrasive surging

7.4.1 A certain amount of abrasive surge is normal at start-up. Should the flow of abrasive continue to surge, reduce the amount of abrasive in the air stream by adjusting the metering valve, per Section 4.1.

7.4.2 Check the abrasive trap and exhaust muffler for blockage. Slow depressurization loads the blast hose with abrasive, and causes surging at start-up. See Section 7.7.

7.5 Intermittent abrasive flow

7.5.1 Moisture in the blast machine or in the air supply. Drain moisture from the compressor's receiver tank, and the blast machine's filter. If moisture in the air is a recurring problem, a dryer or aftercooler may be required in the air-supply line.

7.5.2 Abrasive may be worn from recycling. Replace abrasive.

7.6 Blast machine does not pressurize

7.6.1 Make sure the compressor is ON and all air-supply valves to the machine are open.

7.6.2 Check to make sure that the safety petcock on the inlet valve is closed.

7.6.3 Check the rubber button on the control handle for wear or damage, and make sure the opening on the control handle seals when the handle is pressed.

7.6.4 Check for air escaping through the opening under the control handle lever. If no air is escaping, the orifice fitting (shown in Figure 2) is blocked, or the line from the orifice to the control handle is blocked and must be cleared.

7.6.5 Press the control handle lever. Feel and listen for air leaks anywhere on the handle. No air should escape when the handle lever is pressed. If there is a leak, it must be located and repaired.

7.6.6 Check control lines and fittings for leaks.

7.6.7 Open the safety petcock, and press the control handle lever; air should come out of the petcock. If it does not, check the following:

- The opening on the control handle is not being sealed off.
- The control handle leaks.
- The line from the control handle to the upper fitting on the inlet valve is blocked.
- The door interlock solenoid is not open. Make sure blast room doors are closed.

If air does come out, the Millennium inlet valve is not functioning. Turn OFF the compressed-air supply and service the valve per Section 6.3.

7.6.8 Close the safety petcock, and press the control handle lever. Make sure that no air escapes through the vent holes on the inlet valve body. Air escaping from either of the two vent hole indicates worn seals in the inlet valve. Refer to Section 6.3 to service the valve.

7.6.9 Inlet valve malfunctioning. Inspect internal parts for wear and lubrication. See Section 6.3.

7.6.10 Insufficient-size air-supply hose or reduced-size fittings between the compressor and blast machine. Refer to Section 2.2.

7.6.11 Dirty filter element in compressed-air filter. Inspect filter element.

7.6.12 Pop-up valve stuck, or internal piping worn or out of alignment. Inspect internal piping.

7.7 Blast machine does not depressurize, or depressurizes too slowly

7.7.1 Abrasive trap screen blocked, or abrasive trap needs cleaning. Clean the trap at least twice daily.

7.7.2 Exhaust muffler blocked.

7.7.3 Check the pneumatic adaptor gasket on the control handle for swelling, restricting air flow.

7.7.4 Check for blockage in the control hose.

7.7.5 Check the orifice fitting on the inlet plumbing, (Item 17 in Figure 24). The back side must have a .052" orifice.

7.7.6 Remote control valves malfunctioning. Inspect the inlet and outlet valves, per Section 6.3 and 6.4 or 6.5.

7.7.7 Diaphragm in the optional diaphragm outlet valve has hole in it. Inspect diaphragm per Section 6.5.

7.8 Outlet valve does not seal

7.8.1 Outlet valve requires service. For piston outlet valve refer to Section 6.4, for diaphragm outlet valve refer to Section 6.5.

7.9 RLX Control Handle – Refer to RLX Manual No. 10574 to troubleshoot the RLX Control Handle.

7.10 GritWizard Metering Valve – Refer to Manual No. 31199 to troubleshoot the GritWizard Abrasive Metering Valve.

8.0 ACCESSORIES AND REPLACEMENT PARTS

8.1 Hose-Safety Accessories – Figure 22

NOTE: Spring-lock pins are affixed to nylon couplings. When connecting two nylon coupling together, make sure the coupling lock pins are at 180 degrees (Pins should enter the open hole of the adjoining coupling.) One lock pin, as shown in Figure 22, is used when connecting a nylon coupling to a metal coupling, and two lock pins are used when connecting two metal couplings together.

Item	Description	Stock No.
1.	Safety cable	
	for 1-1/2" to 3" OD hose	15013
	for 1-1/2" to 4" OD hose	27405
2.	Lock pin, coupling (package of 25)	11203

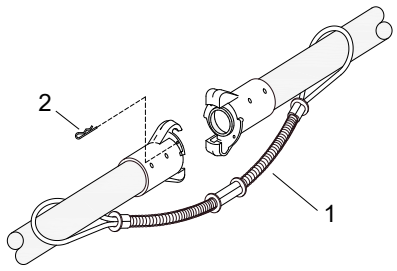


Figure 22

8.2 Blast Machine – Figure 23

Item	Description	Stock No.
1.	Ball valve, 1-1/4" with handle	02397
2.	Handle, 1-1/4" ball valve	22532
3.	Coupling, 1-1/4" CF w/16.5" nipple	24197
4.	Metering valve assembly, GritWizard, 1-1/4" with ball valve	31172
5.	Inspection door assembly, 6" x 8"	02377
6.	Gasket, inspection door, 6" x 8"	02369
7.	Seal, pop-up valve	02325
8.	Pop-up valve, 4", with external sleeve	03699
9.	Millennium inlet valve	23620
10.	Cap, owner's manual storage tube	21517
11.	Air filter, 1-1/2" automatic drain	01282
12.	Gasket, CQG, package of 10	00850
13.	Internal pop-up guide, 1-1/4" x 6" toe	01753
14.	Plumbing support assembly	27002
15.	Pressure regulator w/gauge, 1-1/2"	01906
16.	Check valve, 1-1/4″	02088
17.	Pusher line, coupled, 1-1/4" x 28 in.	23674
18.	Adaptor, 1-1/4" male NPT x male JIC	22529
19.	U-bolt w/nuts	13854
20.	Nipple, 1-1/4" NPT x 16.5" schedule 40	21739

Refer to the plumbing drawing supplied with project (custom) blast machines for all other parts.

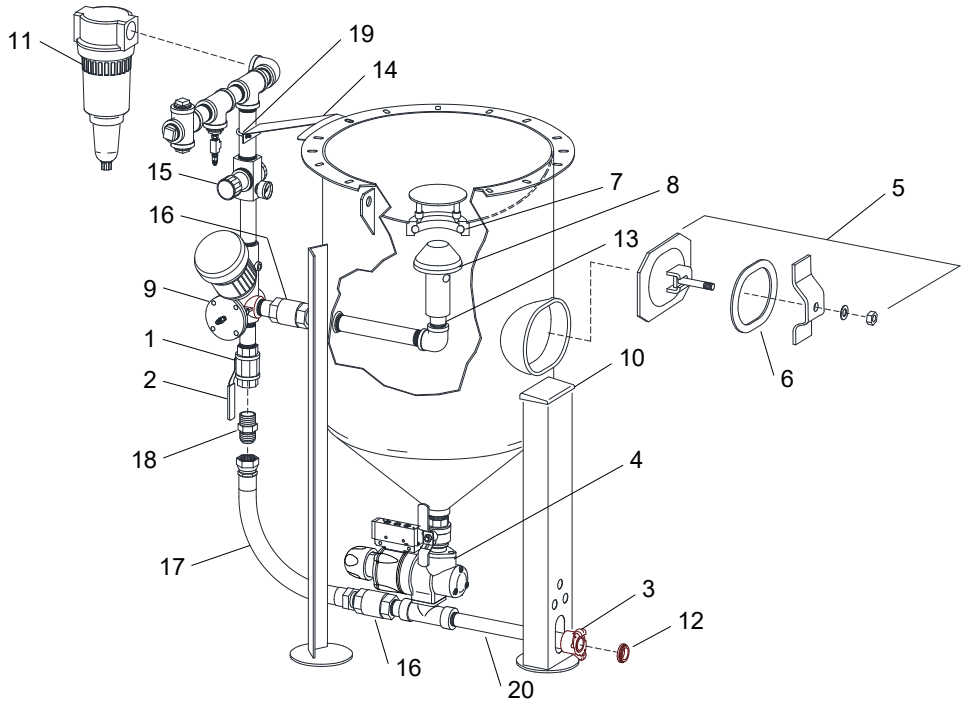


Figure 23

8.3 Remote Control System Parts – Figure 24

Item	Description	Stock No.
1.	Millennium inlet valve	23620
2.	RLX II Control handle with ACS	07625
3.	Abrasive trap (option)	02011
4.	Piston outlet valve (standard)	01967
5.	Diaphragm outlet valve (option)	03371
6.	Metering valve assembly, GritWizard, 1-1/4" with ball valve	31172
7.	Hose, 50 ft twinline, coupled.	01951
8.	Hose, 3/16" x 50 ft single, coupled	03087
9.	Hose, 25 ft twinline, coupled cut to required length	02128
10.	Hose, 3/16" x 25 ft coupled. cut to required length	21757
11.	Hose, 3/16" x 18 in coupled	02454
12.	Tee, 1/4" NPT Male-F-F, brass	20847
13.	Adaptor, 1/4" NPT elbow	02513
14.	Adaptor, 1/4" NPT straight	02494
15.	Tie, nylon	02195
16.	Fitting, 1/4" NPT bulkhead	05605
17.	Adaptor, 1/8" NPT w/.052" orifice	20429
18.	Hose, 4 ft twinline, coupled	21619
19.	Hose, 3/16" x 36 in coupled	02498
20.	Union, 3/16" hose	01944
21.	Solenoid, 3-way door interlocks	20739
22.	Adaptor, 1/8" NPT straight	01940
23.	Muffler, blast machine exhaust	05068
24.	Tubing, 1/4" OD poly, 3 ft required	12480
25.	Bushing, 1/4" NPT x 1/8" NPT brass	02010
26.	Fitting, 1/4" NPT x 1/4" OD tube	11737
27.	Hose assembly, remote mount exhaust	19189
28.	Piping panel kit, blast room	22288

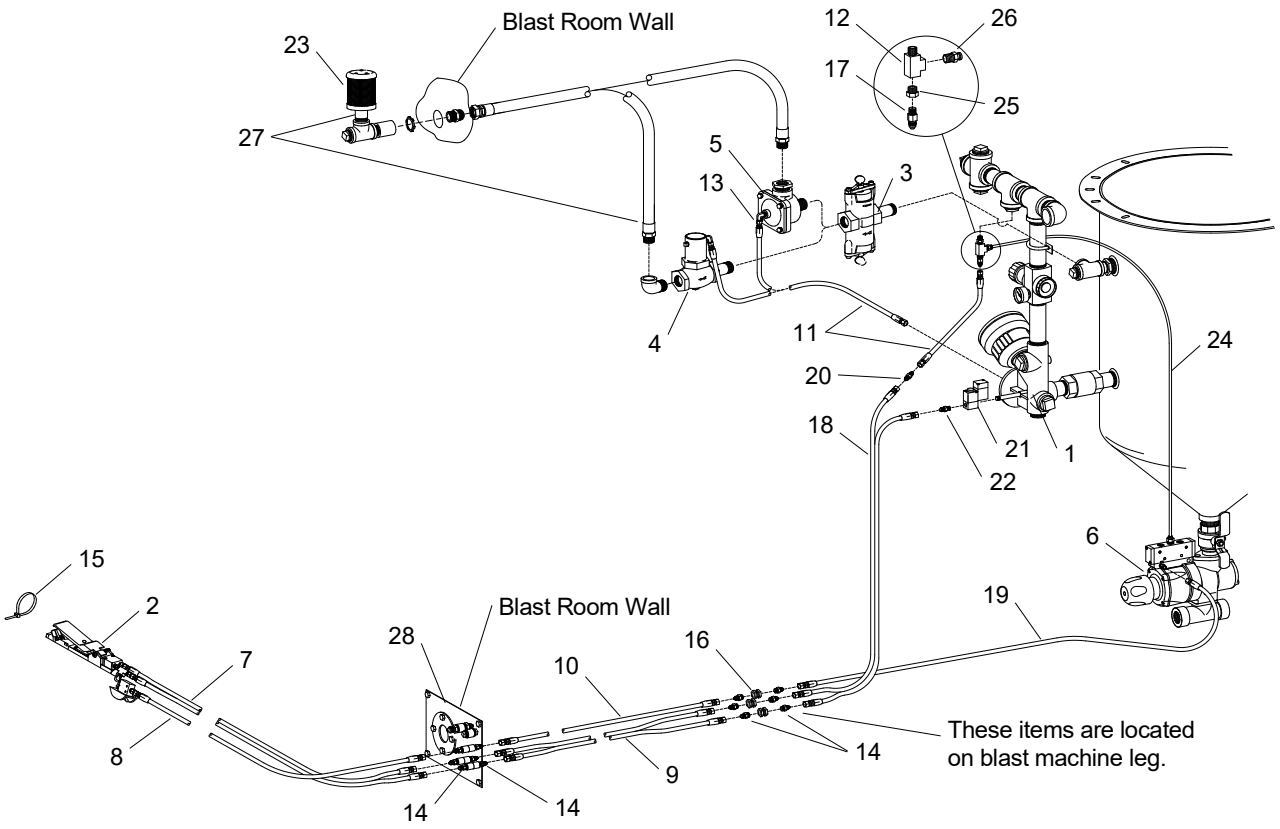


Figure 24

8.4 Blast Room Piping Panel Kit – Figure 25

Item	Description	Stock No.
(-)	Piping panel kit, blast room	22288
1.	Plate, piping panel	22279
2.	Ring, hose inlet	06229
3.	Gasket, hose inlet	06230
4.	Screw, 3/8-NC x 1" hex head cap	03252
5.	Screw, 3/8-NC x 1-1/4" hex head cap	03253
6.	Washer, 3/8 flat	03317
7.	Washer, 3/8 lock	03318
8.	Nut, 3/8-NC hex	03311
9.	Adaptor, 1/4-NPT x male JIC	02494
10.	Adaptor, 3/8-NPT x male SAE	00022
11.	Plug, 3/8-NPT	01740
12.	Gasket, 3/16" x 1" strip, per ft Specify feet required, 3 feet used	00186

Alpha connections shown are for:
- A Breathing-air line
- B Twinline control hose
- C ACS control hose
- D Hand-held blow off

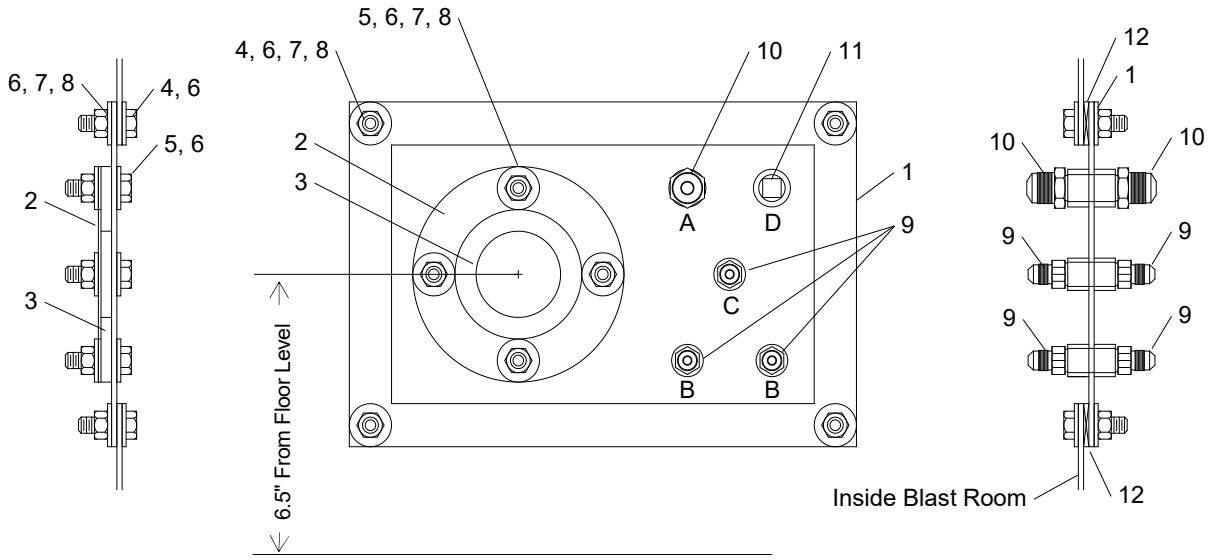


Figure 25

8.5 Remote Mount Exhaust Assembly – Figure 26

Item	Description	Stock No.
(-)	Hose assembly, remote mount exhaust	19189
1.	Plug, 1" NPT	01761
2.	Tee, 1" NPT	01789
3.	Nipple, 1" NPT x close	01701
4.	Coupling, 1" NPT pipe	01830
5.	Nut, 1" NPT lock	11917
6	Adaptor, 1" NPT x 1" JIC	11720
7.	Hose assembly, (for safety, when hose wears replace 19189 assembly)	

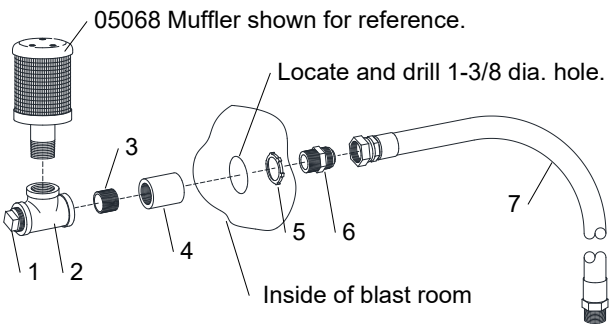


Figure 26

8.6 Millennium Valve, Inlet Segment – Figure 27

Item	Description	Stock No.
*	Service kit, inlet seals (Figure 27a)	22856
**	Service kit, plunger tip (Figure 27b)	22898
(-)	Millennium inlet valve	23620
1.	Plunger	22600
2.	Dual piston	22602
3.	Spring, 4" long	22604
4	Screw, socket, w/internal threads	22650
5.	Sleeve, cylinder	22603
6.	Screw, 5/16-NC x 1-1/4", socket head	22611
7.	Body, inlet valve	21338
8.	Cap, cylinder	21339
9.	Plug, 1-1/2" NPT	02477
10.	Nipple, 1/4" NPT hex	02808
11.	Elbow, 1/4" NPT 90° female	06373
12.	Petcock, 1/4" NPT	01993
13.	Plug, 1/4" NPT	01950
14.	Adaptor, 1/4" NPT	02494
15.	Plug, 1-1/4" NPT	01762
16.	Plate, remote outlet adaptor	23597
17.	Gasket, adaptor plate	23261

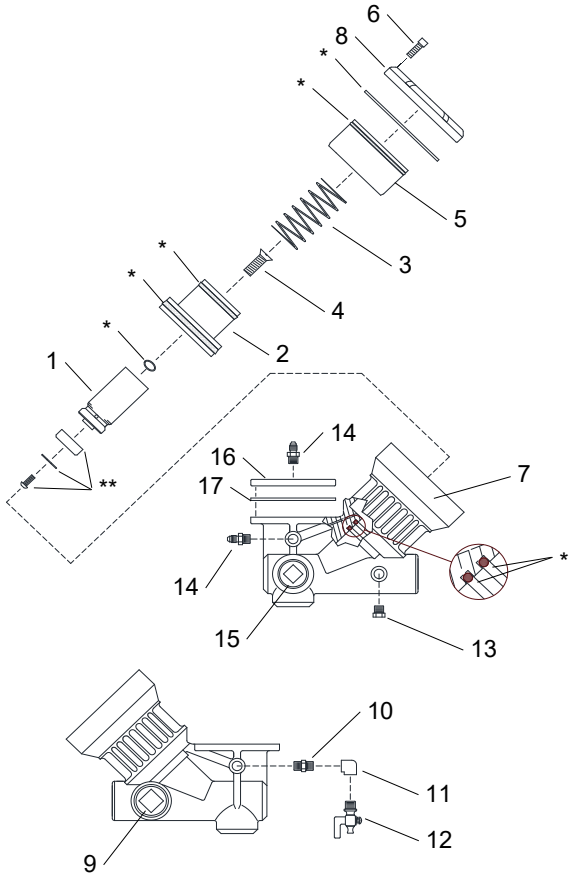


Figure 27

22856 SERVICE KIT
MILLENNIUM INLET SEGMENT SEALS

Refer to owner's manual for service instruction.

Item	Qty	Description
1.	2	O-ring, 2-1/8" OD, nominal
2.	1	U-seal, dual piston lower, 3-1/2" ID
3.	1	U-seal, dual piston upper, 2-3/8" ID
4.	1	O-ring, 4-1/8" OD, nominal
5.	1	O-ring, 31/64" ID, nominal
6.	1	Gasket, cylinder cap

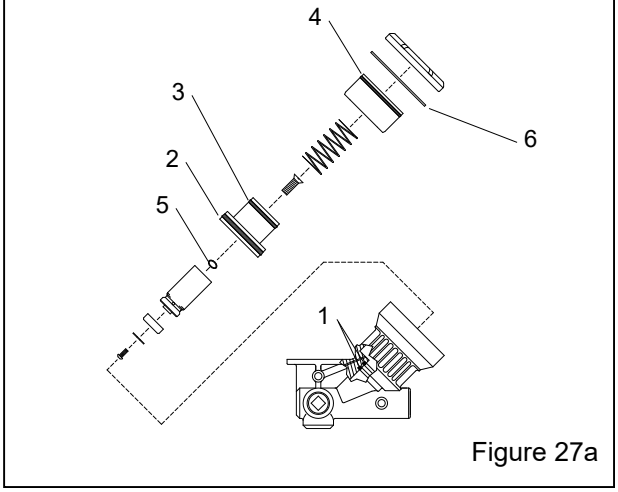


Figure 27a

22898 SERVICE KIT
MILLENNIUM PLUNGER TIP

Refer to owner's manual for service instruction.

Item	Qty	Description
1.	1	Screw, 5/16-NC button head
2.	1	Washer, plunger tip
3.	1	Tip, replaceable plunger

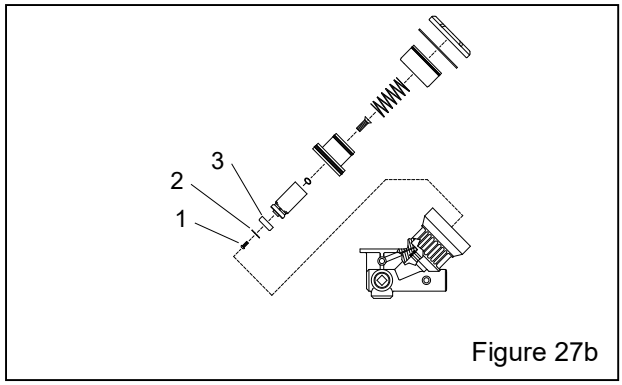


Figure 27b

8.7 1" Piston Outlet Valve – Figure 28

Item	Description	Stock No.
(-)	1" Piston outlet valve, complete	01967
1.	Elbow, 1/4" NPT adaptor	02513
2.	Plug, 1/4" NPT	01950
3.	Bonnet	01970
4.	Piston and rod assembly	01976
5.	Plug and spindle guide	01971
6.*	Valve plug, (1)	01972
7.*	Washer, valve plug, (2)	01969
8.*	Retainer, valve plug washer, (1)	01986
9.	Valve body	01968
10.*	Spring, 7/16" x 1-5/8" long (1)	01974
11.*	Nylon washer	01979
12.*	Cap screw, 3/8-NC x 3/4"	03251
(-)	Service kit, includes items marked *, quantities are shown in ( )	01928

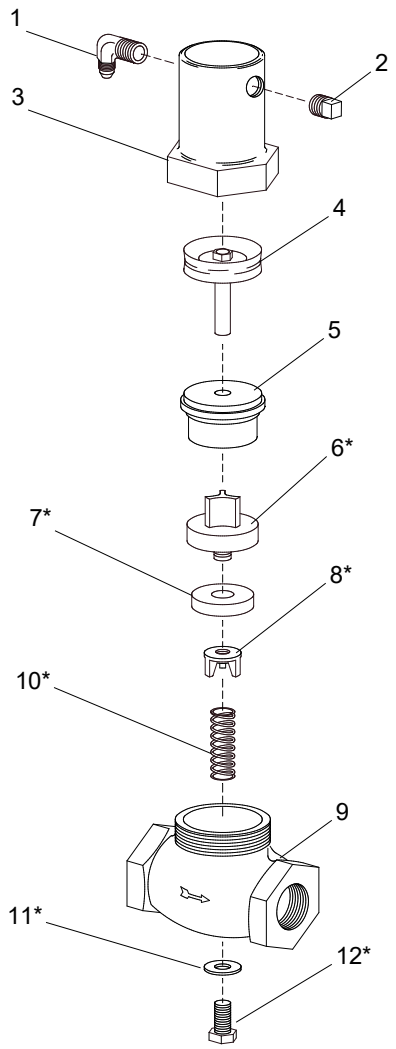


Figure 28

8.8 1" Diaphragm Outlet Valve – Figure 29

Item	Description	Stock No.
(-)	1" Diaphragm outlet valve, complete	03371
1.	Nipple, 1" x close	01701
2.	Diaphragm	06149
3.	Lockwasher, 1/4"	03117
4.	Cap screw, 1/4-NC x 1" hh	03053
5.	Cap, diaphragm outlet	03393
6.	Body, diaphragm outlet	06135
7.	Bushing, 1-1/4" x 1" NPT	01804

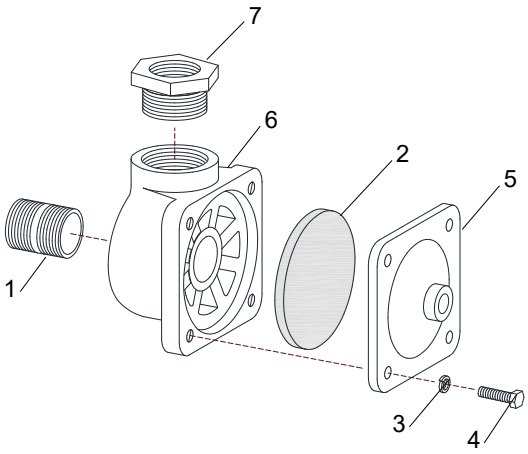


Figure 29

8.9 Abrasive Trap – Figure 30

Item	Description	Stock No.
(-)	Abrasive trap	02011
*	Service kit, abrasive trap (Figure 30a)	01925
1.	Cap	02014
2.	Body	02015
3.	Lock bar	02016
4.	Screw, 3/8-NC x 1" thumb	03289
5.	Shoulder screw, 3/8" x 3/8"	03291

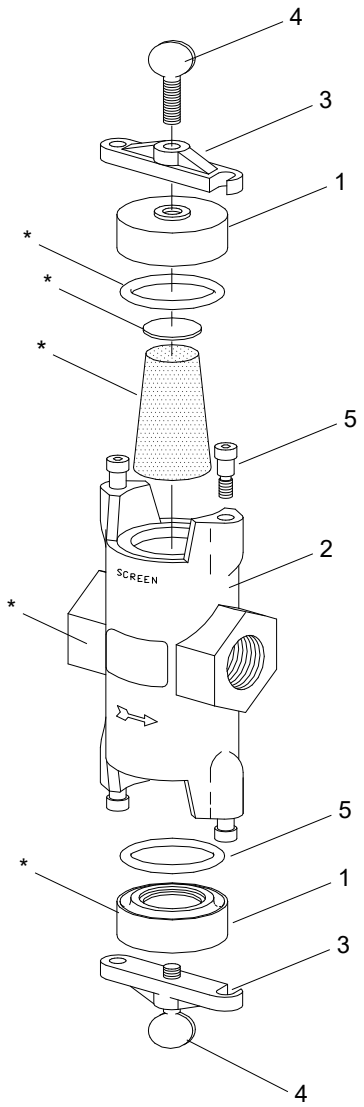


Figure 30

01925 SERVICE KIT
ABRASIVE TRAP

Item	Qty	Description
1.	3	Screen
2.	2	O-ring
3.	1	Gasket, screen, 1/8" thick
4.	1	Decal, "clean screen"

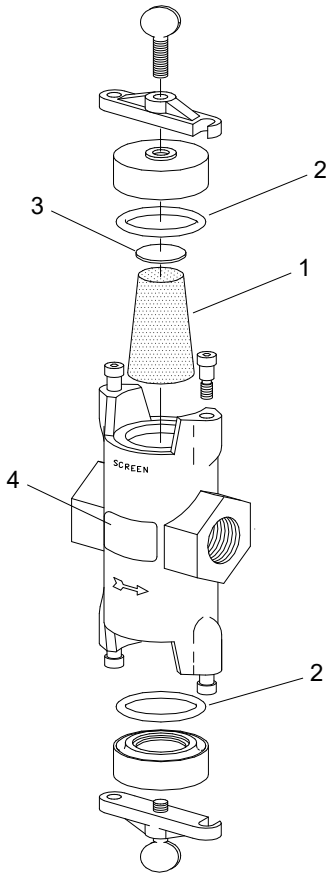


Figure 30a