CLASSIC BLAST MACHINE

2 CUFT TO 20 CUFT CAPACITY
WITH PNEUMATIC TLR REMOTE CONTROLS
O. M. 22501

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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.

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 This manual covers installation, operation, maintenance, troubleshooting, and replacement parts for Clemco blast machines raging in size from 2 cuft through 20 cuft with TLR-100/300, and TLR-100/300D pneumatic remote controls, and with standard FSV abrasive metering valve. These instructions also contain important safety information required for safe operation of the machine. The following separate instruction manual is provided for the remote control handle.

RLX control handle .....Manual No. 10574

NOTE: Separate operation instructions are included when alternate valves are provided.

The optional abrasive cutoff system (ACS) uses a pneumatically operated abrasive metering valve. Separate operating instructions are included for the metering valve when an ACS system is provided.

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 abrasive blasting must be aware of the hazards associated with abrasive blasting. The Clemco booklet ″Abrasive Blasting Safety Practices″ is included with every blast machine; it contains important safety information about abrasive blasting that may not be included in equipment operation 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 and the remote control system are shown in Figure 1. Additional components of the remote controls are shown in Figure 2. Additional parts used with optional ACS system are shown in Figure 9.

1.4.2 Blast Machine

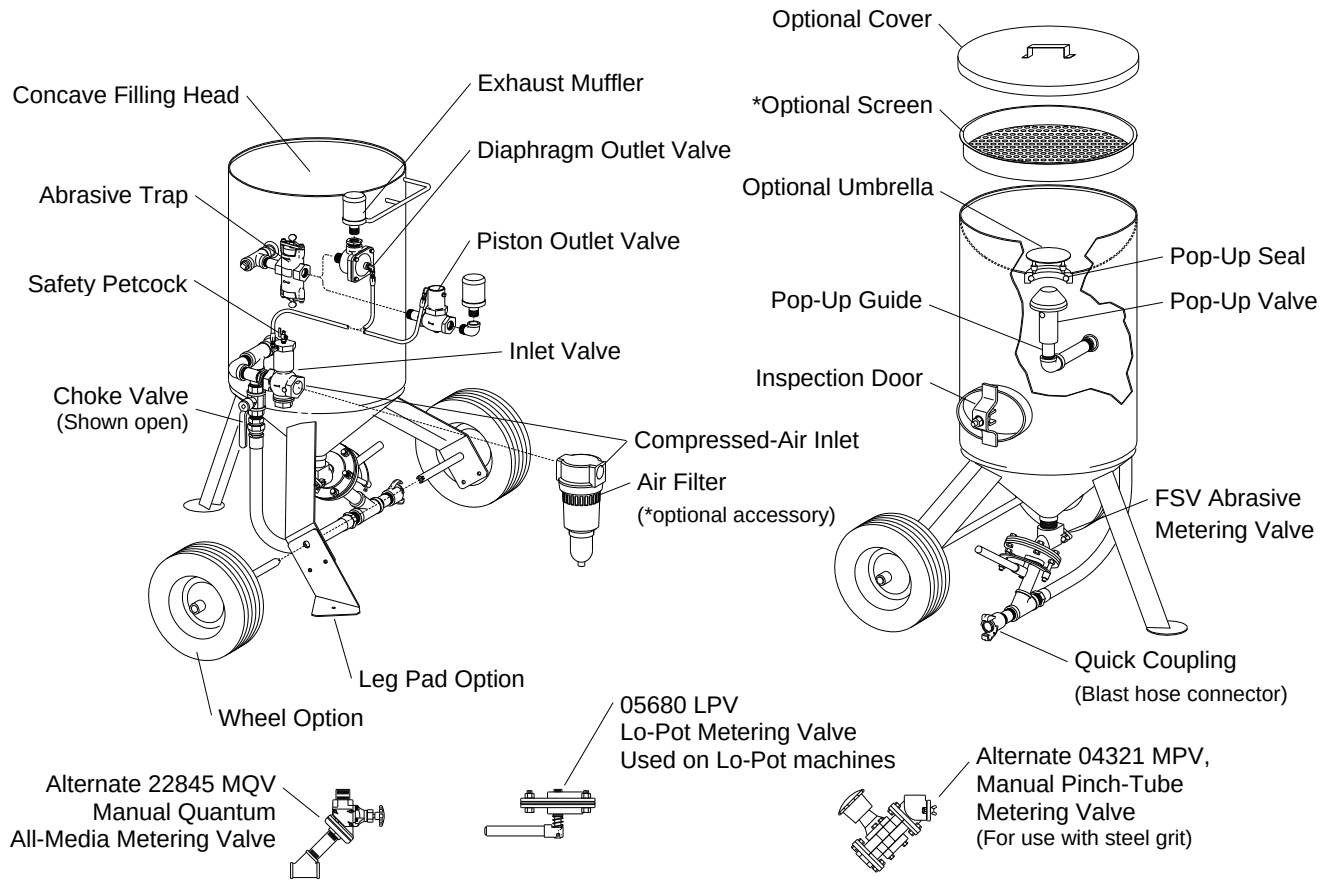
1.4.2.1 Clemco certifies its blast machines (pressure vessels) to conform to the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, Division 1. It is the owner's responsibility to maintain the integrity of the vessel in accordance with state regulations. Regulations 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 to 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 Do not exceed the maximum working pressure rating (PSI) of the blast machine. The maximum pressure rating is stamped into the ASME nameplate, which is welded to the side of the vessel.



* These accessories are included with blast machine systems.

Figure 1

⚠ 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.

1.4.2.4 OSHA does not require pressure relief valves on blast machines when air compressors supplying air to the blast machines are built to American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VIII, Division 1 and comply with OSHA regulation 29 CFR 1910.169, which refers to the 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 with maximum pressure less than or equal to the maximum allowable working pressure (MAWP) stamped on the vessel nameplate.

1.4.3 Remote Controls

⚠ 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 can occur, causing serious injury.

1.4.3.1 A remote control system is an OSHA-required safety device; it is required when an operator mans the nozzle. The remote controls allow the blast operator to pressurize the machine to start blasting and depressurize it to stop blasting.

1.4.3.2 The control handle, located near the blast nozzle, is the activator for the remote control system. When the operator intentionally or unintentionally removes handheld pressure from the control handle, the machine depressurizes and blasting stops. The remote control

system "fails to safe", which means when an interruption in the control-air circuit occurs for reasons such as a break in the line, the compressor stops running, or if the operator drops the blast hose, the remote control deactivates the blast machine and blasting stops.

1.4.3.3 Components of the TLR remote control system are shown in Figures 1 and 2. They include the inlet valve piston or diaphragm outlet valve (the piston valve is used in most applications, the diaphragm valve is recommended for use with fine mesh or aggressive abrasive), RLX control handle, 50-ft. and 5-ft. long twinline control hoses, 2 control hose unions, and an 18-inch-long interconnecting hose.

1.4.3.4 TLR remote controls are pressure-release-style systems, which control the pressurization and depressurization of the blast machine. Pressurization, which starts blasting, occurs when the control handle is pressed, and depressurization, which stops blasting, occurs when the handle is released.

⚠ WARNING

Moist air that freezes can cause blockage at the control handle or in the control lines. Blockage can cause involuntary activation of the remote controls or prevent the controls from deactivating upon release of the control handle. This situation can result in serious injury or death. If remote controls are operated in freezing or near-freezing weather, install a Clemco Antifreeze Injector, stock no. 05537, on the remote control air-supply line.

1.4.3.5 Clemco remote controls operate pneumatically on a return-air principle. A stream of control air travels from the orifice on the inlet valve, down the outbound twinline (shown shaded[1] in Figure 2) and escapes through the opening located under the control handle lever. The normally closed inlet valve remains closed, and the normally open outlet valve remains open. As long as air escapes through the handle's opening, the remote control system remains inactive. When the

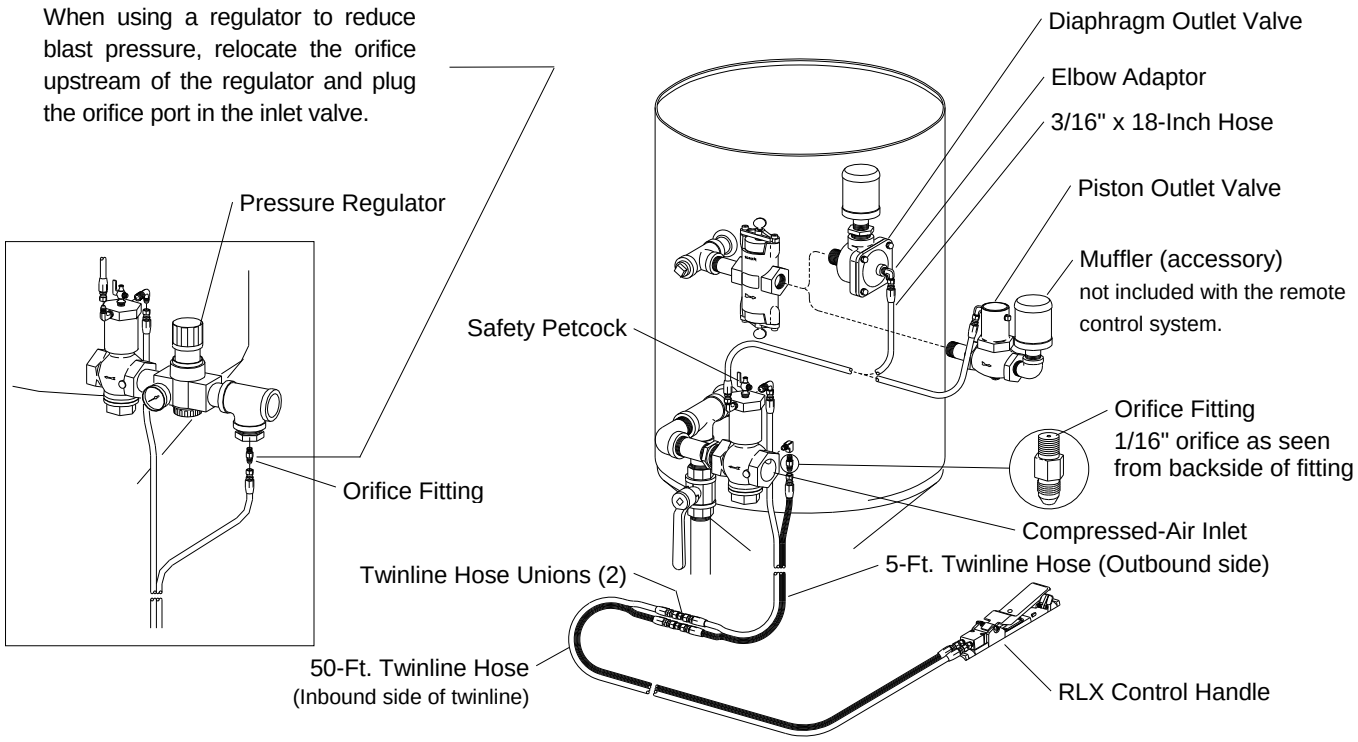


Figure 2

[1] Shading indicates the outbound line; it does not matter which side of the twinline is used for the outbound and return line

operator presses the control lever, a rubber button seals the opening, and outbound air returns through the inbound line to open the inlet valve and close the outlet valve. This action pressurizes the blast machine and begins the blasting. Releasing the handle exhausts the control air, which causes the inlet valve to close and the outlet valve to open to depressurize the blast machine and stop the blasting.

1.4.4 Abrasive Cutoff System (ACS) Option

1.4.4.1 The abrasive cutoff switch is mounted on the control handle. It closes the metering valve so that air alone without abrasive exits the nozzle. This feature is used to clear the blast hose and to blowdown the blast surface.

NOTE: The ACS feature requires a pneumatically operated abrasive metering valve. It is not available on Lo-Pot blast machines, which do not have adequate clearance for the metering valve.

1.4.4.2 Parts used with an optional ACS are shown in Figure 9. In addition to the standard remote controls, an ACS also includes a 50-ft. single-line hose, an additional 18-inch-long interconnecting hose, an RLX control handle with ACS air switch assembly, and a pneumatically operated metering valve. The metering valve supplied with the system may differ from the one shown. A separate owner's manual is supplied with an alternate metering valve.

1.4.5 Electric Control Alternate

1.4.5.1 Electric remote controls (electro-pneumatic) are recommended when the nozzle and remote control handle are farther than 100 feet from the blast machine. Pressure drop of pneumatic systems over longer distances increases response time, which prevents fast, safe operation. Contact your local Clemco Distributor for additional information.

1.5 Abrasive

⚠ WARNING

Abrasives and dust from blasting may contain toxic materials (e.g., lead paint, silica) that are hazardous to workers. Before blasting, obtain a safety data sheet (SDS) for the blast abrasive and identify all substances removed by the blasting process.

- **Silica sand (crystalline) can cause silicosis, lung cancer, and breathing problems in exposed workers.**
- **Slags can contain trace amounts of toxic metals such as arsenic, beryllium, and cadmium and have the potential to cause lung disease.**

NO DUST IS SAFE TO BREATH. DUST PRODUCED FROM ANY ABRASIVE OR FROM THE BLASTING PROCESS CAN CAUSE SERIOUS LUNG DISEASE AND DEATH WHEN INHALED. 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.

NOTE: Use only abrasives specifically manufactured for blasting that are compatible with the surface being blasted. Abrasives produced for other applications may be inconsistent in size and shape and produce an unsatisfactory finish, contain particles that could jam the abrasive metering valve, or cause irregular wear.

1.5.1 Selection of blasting abrasive can play a significant part in worker health risk, job productivity, and maintenance of the blast machine. DO NOT USE abrasives containing more than 1% crystalline (free) silica. Obtain safety data sheets (SDS) for the blasting abrasive prior to blasting, paying particular attention to worker health risks and presence of any hazardous/toxic substances.

1.5.2 Abrasive Mesh Size

1.5.2.1 The choice of abrasive mesh size depends on the desired profile, cleaning rate, nozzle orifice size, and availability of clean, dry air. Generally, larger, denser abrasives provide a deeper profile, while smaller abrasives clean faster. Most abrasive blasting is done with abrasive sizes between 16 and 80 mesh. Larger sizes may be used if the nozzle orifice is large enough to prevent particles to pass without jamming. Finer

abrasives are especially sensitive to moisture and require very dry air to prevent bridging in the metering valve.

1.5.3 Sand: Sand should never be used because of the respiratory hazards associated with abrasives containing free silica.

1.5.4 Slag: Slag abrasives are compatible with the blast machine fitted with an FSV metering valve or any of the alternate metering valves. Obtain safety data sheet (SDS) to identify hazardous substances.

1.5.5 Steel: Steel shot and steel grit may be used with machines fitted with an alternate Quantum or manual PVR pinch-tube metering valve. Alternate valves are shown in Section 8.5. Shot applications may require the use of a pneumatically operated metering valve, such as the Sentinel or Auto-Quantum, to prevent surging at startup.

1.5.6 Silicon carbide, aluminum oxide, and garnet: These are the most aggressive, high-volume abrasives used in the blasting industry. These abrasives may be used, but the service life of any equipment components which come in contact with the abrasive will be reduced. Use a nozzle lined with boron carbide with these abrasives.

1.5.7 Glass bead: Most beads are treated to ensure free-flow operation even under moderately high-humidity. Glass beads subjected to excessive moisture may be reused after thorough drying and breaking up of any clumps. Clean, dry air is a necessity. Glass bead applications may require the use of a pneumatically operated metering valve, such as the Sentinel or AQV Auto-Quantum, which can help to prevent surging at startup.

1.5.8 Lightweight media: Plastic media and most agricultural media may be used occasionally in a standard blast machine. Exclusive use of plastic, and some other lightweight media, requires a blast machine with a 60º conical bottom for continuous, uninterrupted media flow.

2.0 INITIAL SETUP

⚠ WARNING

Clemco supplies an exhaust muffler with all blast machines of 2 cuft capacity and larger. The muffler reduces exhaust noise and prevents abrasive from exhausting upward or sideways into the air. When the blast machine is depressurized, the muffler body pops up to diffuse the air and abrasive. When the machine is fully depressurized, the muffler body drops, permitting trapped abrasive to empty. For the muffler to work properly, it must be installed with the body facing up, as shown in Figure 1.

If an application requires the muffler to be removed, the exhaust piping must be plumbed to direct exhausting air in a direction that ensures no persons will be exposed to high velocity air and abrasive, which escapes when the blast machine is depressurized.

2.1 Storage Hopper

2.1.1 When a storage hopper is installed above the blast machine, an umbrella mounted above the pop-up opening is required. Refer to Section 8.5, Item 22 for optional bolt-on umbrella.

2.2 Installation of a Pressure Regulator to Reduce Blast Pressure

2.2.1 When installing a pressure regulator to reduce blast pressure below 60 psi (80 psi when using an ACS), install a tee upstream of the regulator as shown in the insert in Figure 2, relocate the orifice to the tee, and plug the orifice port in the inlet valve. This allows the pneumatic control circuit to operate at line pressure.

2.3 Setup for Multiple Blast Machines Operating From a Common Compressed-Air Supply

NOTICE

If multiple machines are operating from a common compressed-air supply and a machine is under pressure when another machine is pressurized, the sudden, increased demand for air could reverse air flow from the machine that is under pressure and contaminate the compressed-air supply with abrasive-laden air. Install check valves at the piping inlet to prevent the reversal of air.

2.3.1 Where multiple blast machines are operating from a single air source, install a ball cone check valve at the air supply on each machine. Refer to the illustration in Figure 3 to install a check valve on a blast machine.

2.3.2 If the machines are placed close together, use a receiver tank or manifold and run separate air lines from it to each machine. The check valves may be located on the receiver tank outlets if the air line goes directly to the blast machine and nowhere else.

NOTE: Do not use a swing check valve, as the swing gate may break in blast machine applications. When installing the valve, make sure the directional arrow is pointing in the direction of the air flow (toward the machine).

2.3.3 Use a Clemco ball cone check valve shown below. A smaller-size valve could restrict air movement and reduce nozzle pressure.

- TLR-100 with 1-NPT inlet valve
  use 1-1/4-NPT check valve ..... Stock No. 02088
- TLR-300, with1-1/2-NPT inlet valve
  use 1-1/2-NPT check valve ..... Stock No. 02296

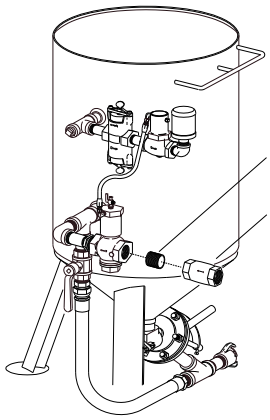


Figure 3

2.4 Install Optional Air Filter (Moisture Separator) - Figure 4

The filter is included with blast machine systems.

2.4.1 Install a compressed-air filter to the inlet valve as shown in Figure 4. It is recommended that a filter be installed at this location to remove moisture from air before it enters the machine. If problems with moisture persists after installing the filter, a dryer or aftercooler may be required in the air-supply line.

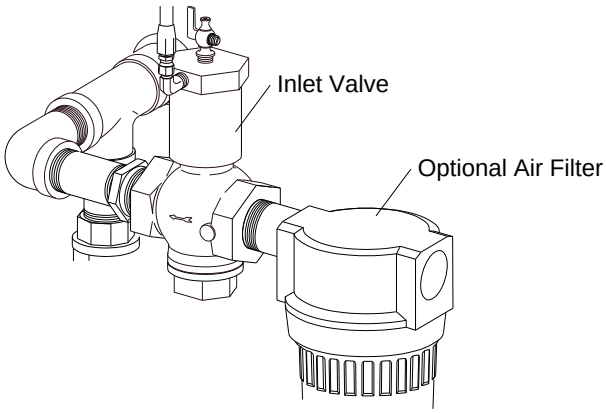


Figure 4

2.5 Compressed-Air Supply Hose Connection

2.5.1 Apply thread sealant to the male pipe threads of an air fitting that is compatible with the air supply hose fitting, as noted in Section 2.5.2, and install it onto the inlet valve or optional air filter located at the blast machine inlet, as shown in Figure 5. The style of connection shown in Figure 5 is for reference only.

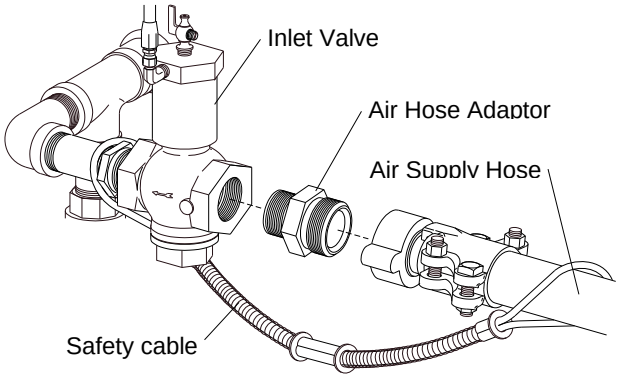


Figure 5

⚠ WARNING

Hose disconnection while under pressure can cause serious injury or death. Use safety lock pins or safety wire to lock twist-on (claw-type) couplings together and prevent accidental separation while under pressure and use safety cables to prevent hose from whipping should separation occur.

2.5.2 Attach an air line from the compressor to the hose fitting installed on the blast machine inlet. For best blasting performance, refer to the table in Figure 6 for

the minimum recommended hose size based on the nozzle orifice size. A smaller diameter hose could result in a reduction in nozzle pressure.

AIR LINE RECOMMENDATIONS
BASED ON NOZZLE SIZE

Nozzle Orifice Size	Recommended Air Supply Line
No. 3, 3/16"	3/4" ID or larger
No. 4, 1/4"	1" ID or larger
No. 5, 5/16"	1-1/4" ID or larger
No. 6, 3/8"	1-1/2" ID or larger
No. 7, 7/16"	2" ID or larger
No. 8, 1/4"	2" ID or larger

Refer to the compressed-air and abrasive consumption table in Figure 10 for approximate air consumption.

Figure 6

2.6 Blast Hose and Remote Control Hose Connections

NOTE: When installing the optional ACS feature, refer to Section 2.7 for additional instructions.

⚠ WARNING

Where two or more blast machines are used in close proximity, care must be taken when tracing and connecting control lines and blast hose. Cross connecting control hose or blast hose could lead to serious injury, death, or property damage from unintentional actuation of a blast machine. To prevent cross connecting blast hose and control hose, the hoses should be of equal lengths and the hoses and blast machine couplings clearly marked, using optional hose identification kits, stock no. 15890 for use with two blast machines, or stock no. 15891 for up to four machines. Mark each hose and corresponding connection per the instructions supplied with the kit and carefully trace and verify each connection before operating.

⚠ WARNING

Moist air that freezes can cause blockage at the control handle or in the control lines. Blockage can cause involuntary activation of the remote controls or prevent the controls from deactivating upon release of the control handle. This situation could result in serious injury or death. If remote controls are operated in freezing or near-freezing weather, install a Clemco Antifreeze Injector, stock no. 05537, on the remote control air-supply line.

NOTE: Control hoses come with reusable hose ends. Excess hose may be cut-to-fit and recoupled; refer to Section 6.10.

2.6.1 Uncoil the blast hose and lay the 50-foot twinline hose alongside it.

2.6.2 Band the control handle to the blast hose close to the nozzle holder, as shown in Figure 7, using the two nylon ties provided. After the control is firmly attached, clip the tie ends to avoid snags or interference with the operation of the control handle.

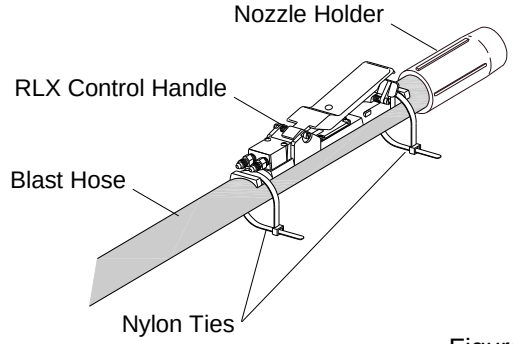


Figure 7

2.6.3 Attach the 50-foot twinline hose to the two fittings on the control handle, as shown in Figure 8. Either side of the hose can be attached to either fitting. When using the ACS option, attach the single-line hose noted in Section 2.7.

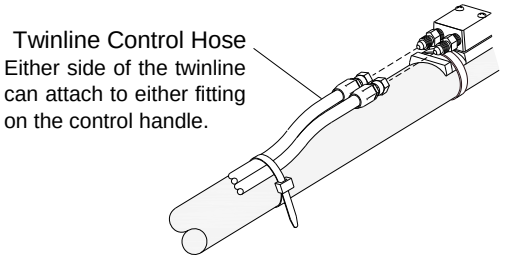


Figure 8

NOTE: When attaching Clemco twinline hose to any Clemco valves either side of the twinline hose can be attached to either twinline fitting on the valve.

2.6.4 Working backward from the control handle, band the twinline hose to the blast hose every four to six feet and as close to the couplings as possible.

2.6.5 Temporarily connect the blast hose to the quick coupling on the blast machine.

2.6.6 Attach the 5-foot twinline control hose to the inlet valve as shown in Figure 2; one side of the hose connects to the unused upper elbow, the other side to the orifice fitting.

2.6.7 Connect the two hose unions to the other end of the 5-foot hose and place the ends next to the blast-hose coupling.

2.6.8 Band the 5-foot twinline control hose, on the blast machine side of the unions, to the quick-coupling nipple.

2.6.9 Attach the 50-foot twinline hose to the unions on the 5-foot twinline.

2.6.10 Make sure that all fittings are tight. Leaks cause the system to malfunction.

NOTE: When removing the blast hose from the machine, disconnect the 50-foot twinline hose at the unions. When attaching the blast hose, make sure all twinline fittings are tight. Make sure coupling gaskets are in place and in good condition before connecting the blast hose to the blast machine. Use safety lock pins or safety wire to lock the couplings together and prevent accidental separation while under pressure, and use safety cables to prevent hose from whipping should separation occur.

2.7 Additional Setup for ACS Option - Figure 9

2.7.1 Attach the 18-inch-long hose to the fitting on the metering valve.

2.7.2 Attach the 50-foot-long single-line hose to the ACS air switch assembly located on the RLX control handle.

2.7.3 Use one of the three unions to attach the 50-foot hose to the 18-inch-long hose.

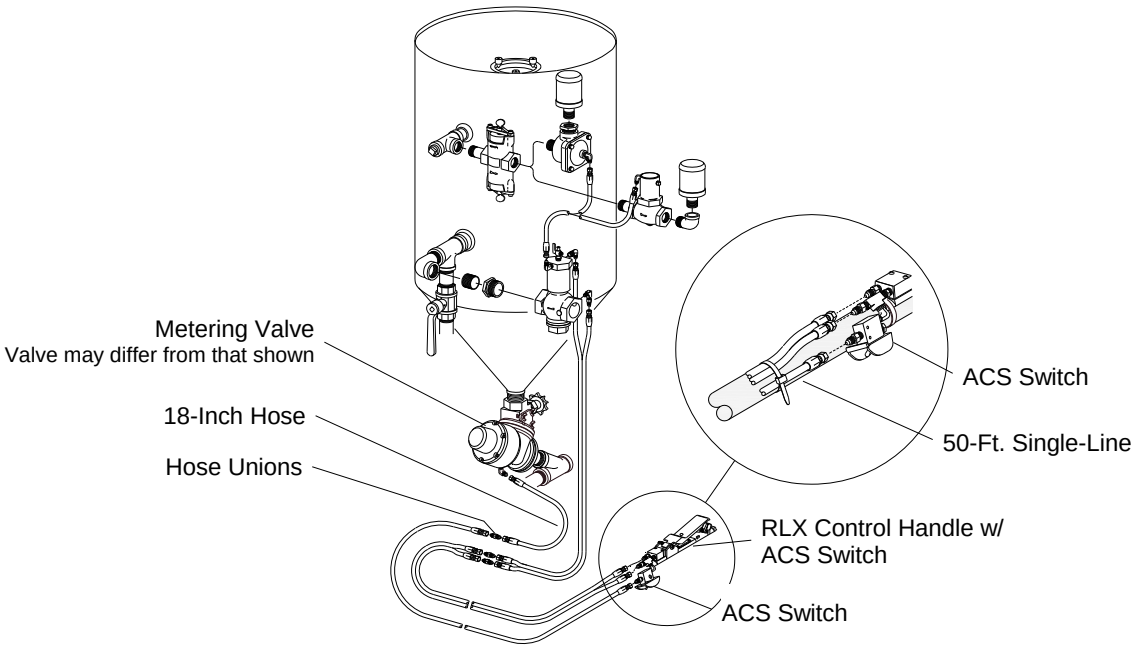


Figure 9

3.0 OPERATION

3.1 Transporting and Moving

⚠ WARNING

Failure to observe the following warnings before transporting or moving a blast machine could result in serious injury or death:

- **Always empty the blast machine before lifting or hoisting.**
- **Never hoist the machine by the handle or piping, or with a sling through the handle or piping.**
- **Always use lift equipment that is rated higher than the weight of the machine and accessories.**
- **When transporting a machine on a pallet, always securely attach the machine to a sturdy pallet.**
- **Always securely anchor the machine to the transport vehicle.**
- **Anyone using material handling equipment to move, transport, or lift the machine must be experienced, able to recognize and avoid hazards associated with handling this type of machinery, and able to safely operate the equipment.**

3.1.1 Transporting a Blast Machine

3.1.1.1 Always empty the machine before transporting. Transporting a machine containing abrasive may increase the weight to an unsafe handling limit and could cause abrasive to settle in the piping.

3.1.2 Moving a Blast Machine

⚠ WARNING

Do not manually move the machine on an incline, or on a slippery or irregular surface that can cause the operator to slip or lose balance. Sudden weight shifts when the machine is tilted on an incline, and slipping or tripping while moving the machine will cause the operator to lose control of the machine, causing severe injury and property damage.

⚠ WARNING

Never attempt to manually move a blast machine when it contains abrasive. An empty machine may be moved manually in a forward direction on level flat surfaces.

3.1.2.1 An empty machine may be moved manually on level flat surfaces by at least two people.

3.1.2.2 Slide the machine by pushing it in a forward direction toward the wheels. To avoid tripping hazards that may be out of view, do not back-up while moving the machine.

3.1.2.3 The Clemco Mule (Stock No. 20331) is designed to facilitate moving empty 2 cuft to 6 cuft capacity Clemco blast machines. Contact a Clemco Distributor for additional information.

3.2 Setup for Operation

3.2.1 Locate the compressor upwind from the blasting operation to prevent contaminated air from entering the compressor intake.

3.2.2 Attach an air line from the compressor to the air-supply hose connector installed on the blast machine inlet. For best blasting performance, use the minimum recommended hose size as noted in Section 2.5, Refer to the compressed-air and abrasive consumption table in Figure 10 for approximate air consumption.

3.2.3 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. **NOTE: <u>Spring-lock</u> pins are affixed to nylon couplings. When connecting two nylon couplings together, make sure the coupling <u>spring-lock</u> pins are at 180 degrees,** (Pins should enter the open hole of the adjoining coupling.) The lock pins prevent accidental separation of hose couplings during blasting. When connecting a nylon coupling to a metal coupling, one affixed spring-lock pin and one detached <u>lock-pin</u>, as shown in Section 8.2 is used. When connecting two metal couplings together, use two safety <u>lock</u> pins.

3.2.4 Make sure that all blast-hose couplings and compressed-air supply hose connections are secured with safety lock pins to lock the couplings together and prevent accidental separation while under pressure, and with safety cables to prevent hose from whipping should separation occur. Lock pins and safety cables are listed in Section 8.2.

⚠ WARNING

Hose disconnection while under pressure can cause serious injury or death. Use safety lock-pins or safety wire to lock twist-on (claw-type) couplings together and prevent accidental separation while under pressure, and use safety cables to prevent hose from whipping should separation occur.

3.2.5 Attach the ends of the 50-foot twinline hose to the unions previously connected to the 5-foot twinline hose. Either side of the hose can be attached to either fitting.

3.2.6 Check all fittings to make sure they are wrench-tight. Leaks will cause the system to malfunction.

3.2.7 Make sure the choke valve is open; the valve is open when the handle position is aligned with the piping, as shown in Figure 10.

3.2.8 Close the abrasive metering valve. The FSV and LPV (Lo-Pot valve) are closed when the handle is all the way to either side of center; refer to Section 4.1. The alternate MPV manual pinch-tube metering valve and Quantum metering valves are closed when the metering knob is turned fully clockwise. Manuals are provided with alternate metering valves. NOTE: it is not necessary to close the metering valve after the initial startup and adjustment per Section 4.1.

Compressed-Air and Abrasive Consumption
Consumption rates are based on abrasives that weigh 100 pounds per cubic foot

Nozzle Orifice Size (in.)	Pressure at the Nozzle (psi) 50	60	70	80	90	100	125	140	Air, Power, and Abrasive Requirements
	26	30	33	38	41	45	55	61	Air (cfm)
No. 3	150	171	196	216	238	264	319	353	Abrasive (lbs/hr)
3/16"	6	7	8	9	10	10	12	14	Compressor (hp)
	47	54	61	68	74	81	98	108	Air (cfm)
No. 4	268	312	354	408	448	494	608	676	Abrasive (lbs/hr)
1/4"	11	12	14	16	17	18	22	24	Compressor (hp)
	77	89	101	113	126	137	168	186	Air (cfm)
No. 5	468	534	604	672	740	812	982	1085	Abrasive (lbs/hr)
5/16"	18	20	23	26	28	31	37	42	Compressor (hp)
	108	126	143	161	173	196	237	263	Air (cfm)
No. 6	668	764	864	960	1052	1152	1393	1538	Abrasive (lbs/hr)
3/8"	24	28	32	36	39	44	52	59	Compressor (hp)
	147	170	194	217	240	254	314	347	Air (cfm)
No. 7	896	1032	1176	1312	1448	1584	1931	2138	Abrasive (lbs/hr)
7/16"	33	38	44	49	54	57	69	77	Compressor (hp)
	195	224	252	280	309	338	409	452	Air (cfm)
No. 8	1160	1336	1512	1680	1856	2024	2459	2718	Abrasive (lbs/hr)
1/2"	44	50	56	63	69	75	90	101	Compressor (hp)

- For nozzle sizes 3/8" to 1/2", blast machines should be equipped with 1-1/4" or larger piping and inlet valve to prevent pressure loss.
- Air requirements were measured by a flowmeter under actual 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.
- Figures show approximate compressed air and abrasive consumption when nozzles are new. Consumption will increase as the nozzle wears.

Figure 10

3.2.9 Make sure that the safety petcock located on the inlet valve is open. Open position is when the lever is aligned with the petcock, as shown in Figure 11.

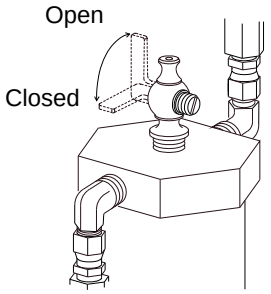
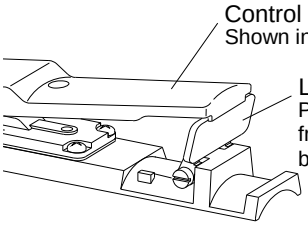


Figure 11

3.2.10 Make sure the remote control handle lever is in the up (no blast) position, as shown in Figure 12, and that the handle lever and safety lock move freely.



The lever lock must be folded down before the control handle lever can be pressed.

Figure 12

⚠ WARNING

A separate manual is supplied with the remote control handle. Do not operate the machine before reading the remote control handle operating instructions.

3.2.11 Make sure the rubber seal under the handle lever does not seal the opening on the control handle, unless the safety lever lock is intentionally folded down.

⚠ 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 could result from unintentional blasting.

3.2.12 Close the air valve on the compressor. Start the compressor, and bring it to operating temperature and pressure. The pressure must be more than 50 psi, but must not exceed the blast machine's rated pressure.

3.2.13 Slowly open the compressor air valve to pressurize the air-supply line. Listen for open lines or air leaks.

3.2.14 Load abrasive into the machine by following the instructions in Section 3.8.

3.2.15 Do not allow anyone near the blast machine except machine tenders who are appropriately attired in approved personal protective equipment as noted in Section 3.3.

⚠ WARNING

Everyone except for the blast operator or blast machine tender must stay clear of the blast machine. The machine tender or blast operator may pressurize or depressurize the machine at any time, which can cause abrasive to vent under pressure, causing dust and toxins to become airborne. Noise is produced by the sudden release of compressed air when the machine is pressurized or depressurized. These conditions can cause injury. Both the operator and machine tender must wear suitable personal protective equipment including an approved respirator, plus approved eye, face, and hearing protection.

3.3 Blasting Attire

⚠ WARNING

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 dust and noise. No dust is safe to breathe. Abrasive blasting can produce harmful dust. Failure to wear NIOSH-approved respirators could result in serious lung disease or death. The respirators must be properly fitted and maintained NIOSH-approved, type-CE supplied-air respirators approved for abrasive blasting.

During abrasive blasting, abrasive particles and dust 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 and eye protection appropriate for the job site hazards.

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

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 who may be exposed to the hazards generated by the blasting process** must wear appropriate protective gear, including abrasive-resistant clothing, leather gloves, eye and hearing protection, and a NIOSH-approved type-CE supplied-air respirator.

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

3.4 Pressurize Blast Machine to Start Blasting

3.4.1 Don all protective blasting attire per Section 3.3.

3.4.2 When the blast operator is ready to blast, the operator or the machine tender must 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 opening under the control handle lever but from nowhere else. The air escaping at the control handle is an audible signal meaning air is supplied to the blast machine, which will activate when the control handle is pressed.

3.4.3 Hold the blast hose securely and point the nozzle only toward objects intended to be blasted.

3.4.4 Fold down the safety lever lock and press the remote control handle as shown in Figure 13. Within a few seconds the pop-up valve will automatically close, and the blast machine will pressurize to start blasting.

⚠ WARNING

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

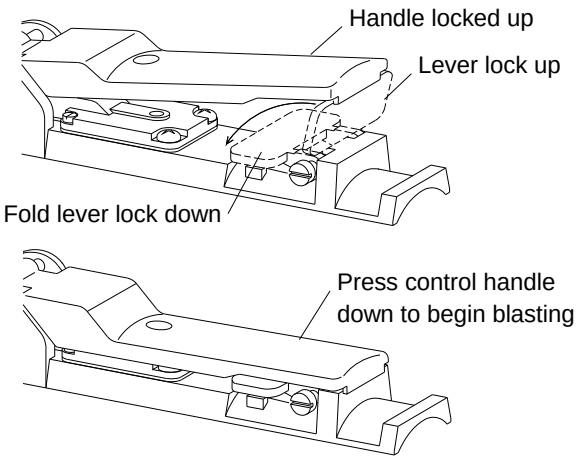


Figure 13

⚠ WARNING

OSHA requires the use of remote controls on all blast machines when an operator controls the nozzle. To comply with OSHA regulations, the remote control handle, which starts and stops the flow of air and abrasive, must be held down manually. Never 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).

3.4.5 If the abrasive metering valve is closed as instructed, only air will exit the nozzle. Adjust abrasive flow per Section 4.1.

3.5 Operation and Function of the Choke Valve Figure 14

3.5.1 Always fully open the choke valve while blasting; open is when the handle is vertical and aligned with the piping as shown in Figure 14.

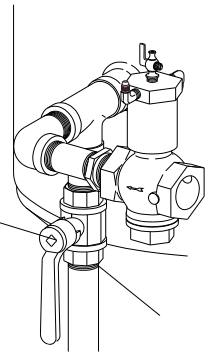


Figure 14

3.5.2 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 blockage, such as damp abrasive, or is used to rapidly empty the machine at the end of the day.

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.

3.6 Operation of the Optional Abrasive Cutoff Switch (ACS) - Figure 15

3.6.1 The ACS closes the metering valve so that air alone without abrasive exits the nozzle. Common uses for this feature are:

1. Clearing abrasive from the blast hose when blasting is finished. This is helpful in a lot of applications and necessary when the blast hose is vertical 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 blowing off or otherwise cleaning surface outside the blasting area prior to painting.

3. When wet blasting with an injector or wetblast attachment, it is used to assist in drying the surface after it is washed down.

⚠ WARNING

OSHA sets exposure limits for people and the environment. Airborne dust can 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 volume of airborne dust created by the compressed air, 29 CFR 1926 (h). The ACS is for blowing off abrasive from a blasted surface, NOT for general area cleanup.

3.6.2 The abrasive cutoff switch is situated directly behind the control handle. The switch may be flipped open or closed at any time, but will not operate the metering valve unless the control handle is pressed.

3.6.2.1 Blast Mode: Moving the ACS toggle away from the nozzle to the ON (CYL port) position sends control air to the abrasive metering valve opens the valve so that the blast machine operates normally with air and abrasive coming out the nozzle.

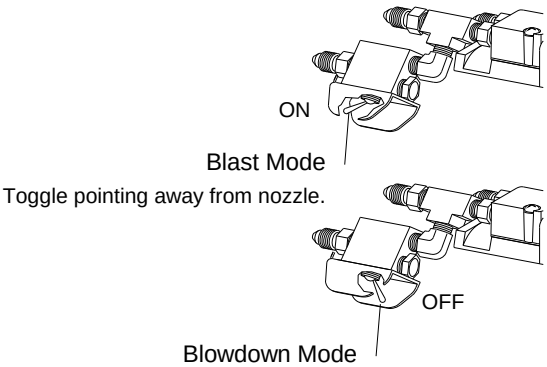


Figure 15

3.6.2.2 Blowdown Mode: Moving the ACS toggle toward the nozzle to the OFF position cuts off the control air to the abrasive metering valve, closes the valve, and stops the abrasive flow. This action allows air alone to exit the nozzle, useful for clearing the blast hose before shutting down, and blowing abrasive and water off the blasted surface.

3.7 Stop Blasting

3.7.1 To stop blasting, release the control handle lever. The inlet valve closes, 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 the safety lever lock is up to prevent 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.

3.7.4 When finished blasting, shutdown per Section 3.10.

3.8 Loading Abrasive into the Blast Machine

⚠ WARNING

When approaching an idle blast machine and before loading the blast machine with abrasive, always check to make sure the safety petcock is open. If it is closed, open it while standing back and facing away from the concave head and exhaust muffler. This step is especially important if a machine tender loads the machine with abrasive while the blast operator controls the blasting. The blast operator could pressurize the machine before the machine tender has moved away from the machine. During pressurization, abrasive could be forced out of the top of the machine and cause injury.

⚠ WARNING

Obtain safety data sheets (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) of free silica.

3.8.1 Load abrasive by pouring it into the concave head. Use a screen (screen comes with blast machine packages) placed over the filling head to prevent foreign objects from falling inside. Foreign objects will jam the machine. Abrasive flows through the filling port into the machine. Keep the abrasive level below the top of the pop-up valve to prevent abrasive from being forced up and out of the machine when it pressurizes.

3.8.2 When ready to blast, the operator or machine tender, while standing back and facing away from the concave filling head and exhaust muffler, closes the safety petcock.

3.8.3 Begin blasting or resume blasting per Section 3.4.

3.9 Emptying the Machine of Abrasive

3.9.1 Empty the machine of all abrasive when shutting down for the day. Condensation dampens abrasive and causes flow problems. When working in environments subject to extreme temperature changes or very humid conditions, condensation may develop inside the machine. Emptying the machine at the end of the workday eliminates trouble caused from moist abrasive when starting a new day's blasting. One way to avoid having to empty the machine is to load only as much abrasive as will be used during the work period. If the machine must be purged of abrasive, do the following:

3.9.2 With the blast machine OFF, turn the blast pressure to approximately 50 psi, close the choke valve, and fully open the abrasive metering.

3.9.3 To prevent wear to the nozzle holder threads, firmly attached the nozzle to the nozzle holder. Removing the nozzle is not recommended. If circumstances require the nozzle to be removed, also remove the nozzle washer. Purging the machine without a nozzle will eventually erode the thread area of the nozzle holder. Thread wear could cause a hazardous condition when the nozzle is reinstalled.

⚠ 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.

3.9.4 Point the nozzle into a drum or suitable container, or toward the direction where the abrasive is to be disposed.

3.9.5 Hold the hose securely and pressurize the machine by activating the control handle. Be prepared for severe surging and recoil of the hose.

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

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

3.10 Shutdown

3.10.1 Empty the blast machine per Section 3.9.

3.10.2 When finished emptying the machine and after cleanup is completed, remove the respirator and protective clothing outside the respirator-use area, in a clean environment where the air is safe to breathe.

3.10.3 Close the compressed-air supply valve at the compressor.

3.10.4 Drain receiver tank, filters, air filters and water collecting devices, and bleed the compressed-air supply hose.

3.10.5 Shutdown the compressor.

3.10.6 Cover the blast machine when not in use. Refer to Section 8.1 for optional cover.

4.0 ADJUSTMENTS

4.1 Adjust Abrasive Flow - Figure 16

The following instructions explain the adjustment of handle-type FSV and LPV (Lo-Pot) metering valves. Knob-type valves are adjusted by turning the knob clockwise for less abrasive or counterclockwise for more abrasive. Separate manuals are provided with alternate valves.

4.1.1 Abrasive flow is adjusted at the metering valve located at the bottom of the blast machine.

4.1.2 Begin adjustments with the metering valve closed. The FSV and LPV metering valves are closed when the handle is turned to either side of center until it hits the stops. The alternate Quantum or MPV manual pinch-tube metering valve is closed when the metering knob is turned fully clockwise.

4.1.3 While the operator is blasting, the machine tender increases abrasive flow by moving the handle toward center no more than 1/4" at a time, allowing time for the flow to stabilize before readjusting. The valve is fully open when the handle is centered.

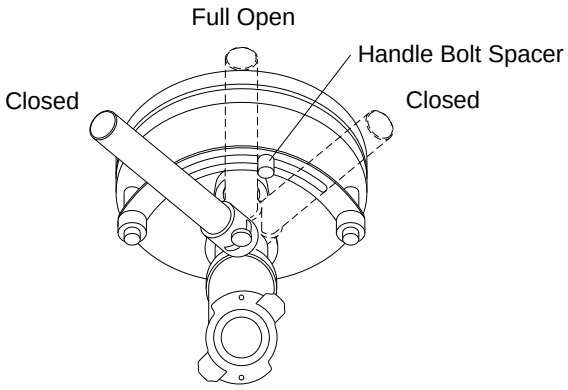


Figure 16

4.1.4 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, abrasive coming out of the nozzle should barely discolor the air when seen against a contrasting background.

4.1.5 Once the correct flow is attained, loosen the wing nut on the gauge unit and move the handle bolt spacer against the metering handle. This helps to return the setting to its original position when temporary adjustments are required.

5.0 PREVENTIVE MAINTENANCE

The following preventive maintenance instructions pertain to the blast machine and remote controls only. Read the owners manuals for the control handle and all blast accessories, and for their inspection and maintenance schedules.

5.1 Daily or More Frequent Inspection

5.1.1 With the air OFF before blasting, do 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.
- Make sure couplings are secure and lock pins and safety cables are in place.

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

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 tightly on hose, and nozzles that do not fit tightly in nozzle holders could disconnect while under pressure. Impact from objects (nozzles, couplings, hoses, or abrasive) 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:

- Inspect the blast hose for wear; squeeze the hose every three to four feet and look 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 could suddenly burst. Couplings and nozzle holders may not adequately grip worn hose, causing them to blow off under pressure. Compressed air and abrasive escaping from a burst hose, a disconnected coupling, or a nozzle holder, can cause severe injury.

- Remove the nozzle for inspection. Replace with a new nozzle if the orifice diameter is worn 1/16″ or more or if the liner is damaged.
- Make sure the nozzle washer is in good condition and in place before reattaching the nozzle.

⚠ 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 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 or missing, abrasive could erode nozzle threads.

5.2.2 After blasting inspect the following:

Note the time it takes to fully depressurize the machine after the control handle is released. When depressurizing time increases noticeably, inspect the abrasive trap per Section 6.6 and exhaust muffler per Section 6.9.

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.
- When an air filter is used, inspect the filter element and clean the bowl.

5.4 Periodic Inspection

5.4.1 The remote control system is a safety device. For safe operation and to avoid unscheduled downtime, periodically inspect the internal parts of the inlet valve, outlet valve, and abrasive trap. Inspect for wear and lubricate O-rings, pistons, springs, seals, and castings. Refer to Service Maintenance in Sections 6.3, 6.4, or 6.5; and also in Section 6.6.

5.4.2 The control handle is the actuator of the remote control system. Periodically clean around the springs, handle lever, and safety lever lock to ensure that the unit is free of abrasive and debris that may cause the handle lever or safety lever lock to bind. Refer to the RLX owner's manual for service instructions.

5.5 Lubrication

5.5.1 Once per week while the air is OFF, put one or two drops of lightweight machine oil in the inlet valve through the safety petcock. This will lubricate the piston and O-rings in the inlet and outlet valves.

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

6.1 Removing Damp Abrasive from the Blast Machine

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

6.1.2 For more difficult blockages, refer to Section 6.2 to check for obstructions in the metering valve.

6.1.2.1 With the blast machine depressurized, disconnect the blast hose and remove the gasket from the quick coupling on the machine.

6.1.2.2 Close the choke valve and fully open the abrasive metering valve.

6.1.2.3 Place the machine so that the outlet is pointed away from any objects or persons.

⚠ WARNING

The machine's outlet must be pointed away from any objects or persons. Stand clear of the path of exiting abrasive. It may come out at high velocity. Impact from exiting abrasive can cause severe injury.

6.1.2.4 Pressurize the machine to force out any damp abrasive.

6.1.2.5 When the obstruction has been removed, depressurize the machine. Remove the nozzle and nozzle washer, and reattach the hose. Open the choke valve and close the abrasive metering valve. Pressurize the machine to clear the hose.

6.1.2.6 When the hose is cleared, depressurize the machine so the nozzle and nozzle washer can be 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 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. Worn nozzle washers can cause thread erosion. A loose-fitting nozzle may eject under pressure and can cause severe injury.

6.1.2.7 Once the hose is 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, follow the instructions, per Section 3.9.

6.2.2 Make sure the machine is depressurized. Turn OFF the compressed-air supply. Lockout and tagout the air supply, and bleed the air-supply line to the blast machine.

6.2.3 Remove the metering valve cleanout cover by removing the wing nuts securing it.

6.2.4 Check the metering valve for blockage by inserting a finger into the opening and feeling for an obstruction or foreign object.

6.2.5 If the metering valve is clear, remove the blast machine inspection door and check inside 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-inspection-plate O-ring is in good condition and in place before reassembling the inspection plate.

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

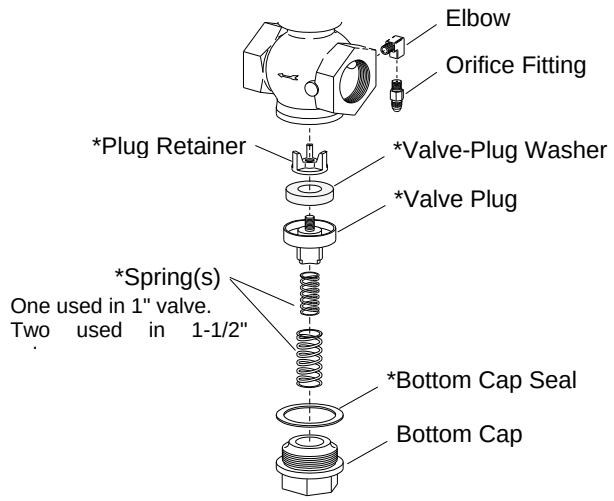
6.3 Inlet Valve

All service on the inlet valve must be done with the air OFF and the air supply locked out and tagged out. It is not necessary to remove the valve from the blast machine.

6.3.1 Bottom Section - Figure 17

6.3.1.1 Use a pipe wrench to loosen the bottom cap until it can be removed by hand.

6.3.1.2 Use care when removing the cap as the spring(s) (two are used in the 1-1/2″ inlet valve) and plug assembly could drop from the opening. Do not allow them to fall to the ground as damage to the castings could occur.



For replacement parts, refer to Sections 8.9 for 1-1/2" inlet valve part and 8.10 for 1" inlet valve parts.

*Items included in service kit.

Figure 17

6.3.1.3 Clean all parts and inspect for wear as follows:

- The small spring (only one used in 1″ valve) is approximately 1-11/16″ long. If it is rusty or compressed, replace it.

- The large spring (not used in 1″ valve) is approximately 2-1/16″ long. If it is rusty or compressed, replace it.
- 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 that it causes it to bulge.
- Look into the lower opening in the valve body. If the machined seat is worn, replace the body.
- Inspect the bottom cap seal and replace if damaged.

6.3.1.4 Remove the lower twinline hose connection and remove the orifice fitting for inspection. Clean the 1/16″ orifice and reassemble the connection.

⚠ WARNING

For proper operation, the orifice fitting must always be in place. Do not modify it or substitute another fitting. Altering the orifice fitting may cause involuntary activation of the blast machine or some other malfunction, which could result in serious injury or death.

6.3.1.5 If the top section of the valve requires service, proceed to Section 6.3.2; otherwise, refer to the illustration in Figure 17 to reassemble the valve in reverse order.

6.3.2 Top Section - Figure 18

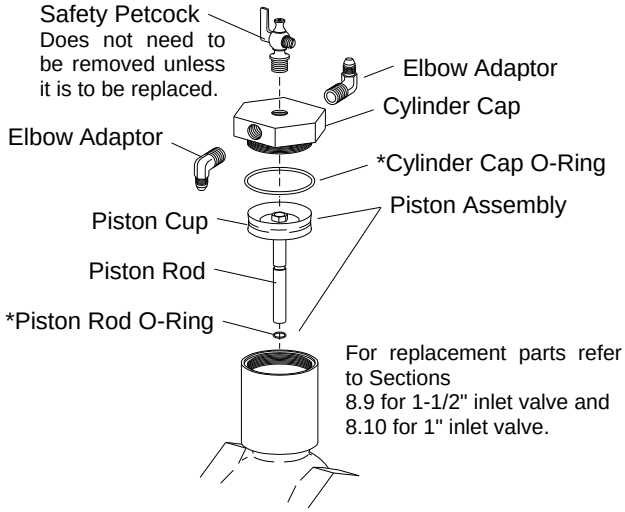
6.3.2.1 Remove the control hose and fittings from the cylinder cap to make sure they are not damaged by a wrench.

6.3.2.2 Use a pipe wrench to remove the cylinder cap.

6.3.2.3 If the bottom cap has not been removed, remove the cap and all parts in the bottom section per Section 6.3.1.

6.3.2.4 Insert a wooden hammer handle or similar object into the bottom of the valve body, push through the seat area and drive the piston rod up. Doing so will push the piston out the top of the valve body.

6.3.2.5 Inspect all items for wear and damage:
- The piston cup should fit snugly against the cylinder wall. If it does not, replace the piston assembly.
- The piston rod should be free of deep abrasion and move freely in the rod's bore. If it is badly abraded, drags in the bore, or is loose in the bore, replace the piston assembly.
- If the piston rod O-ring is flattened, replace the O-ring.
- Inspect the cylinder cap O-ring. Replace it if it is cut or if it does not fit snugly into the recess at the end of the threads.



*Items included in service kits.

Figure 18

6.3.2.6 Lubricate the cylinder wall and piston cup with lightweight machine oil or tool oil.

6.3.2.7 Install the piston into the cylinder. As the piston cup contacts the cylinder, it may be difficult to press into place. Do not pound the piston, as that could damage the cup; make sure the lower lip of the cup does not curl in or get cut. Rotating the piston while applying thumb pressure makes assembly easier.

6.3.2.8 Refer to the illustration in Figures 17 and 18 to reassemble the valve in reverse order.

6.4 Piston Outlet Valve - Figure 19

Refer to Section 6.5 to service the diaphragm outlet valve.

6.4.1 All service on the outlet valve must be done with the air OFF and the air supply locked out and tagged out. It is not necessary to remove the valve from the blast machine.

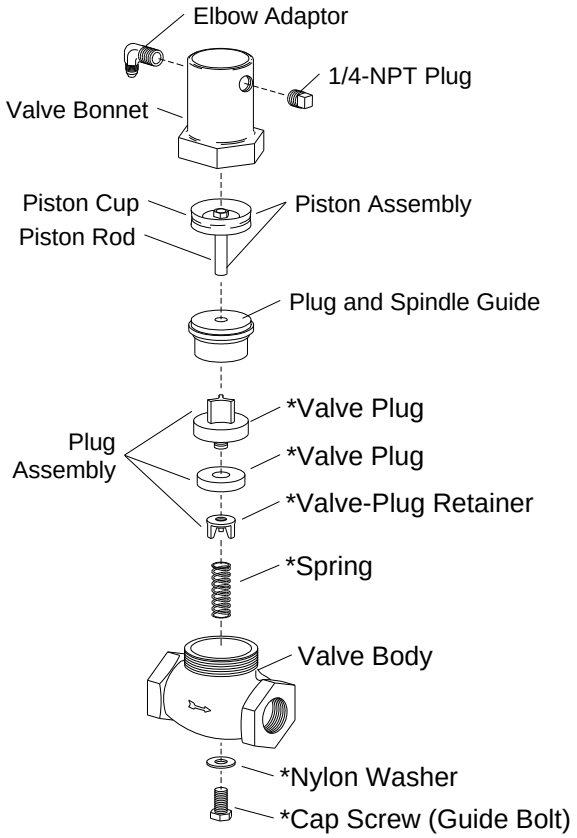
6.4.2 Remove the control hose from the valve bonnet's elbow adaptor. NOTE: The elbow adaptor and plug do not need to be removed unless they need to be replaced.

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

6.4.4 To remove the bonnet, lift it straight up until the piston rod clears the spindle guide.

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

6.4.6 Remove the piston from the bonnet by pulling the piston rod.



*Items included in service kit.
For replacement parts, refer to Section 8.11.

Figure 19

6.4.7 Inspect all parts for wear and damage as follows:

- 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 that it causes 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 abrasive worn, rusty, 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 rod should be free of deep abrasion and move freely in the spindle guide's 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 cylinder wall and piston cup with lightweight machine oil or tool oil.

6.4.9 Install the piston into the bonnet's 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 rod 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 rod 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 assembly.**

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 20

Refer to Section 6.4 to service the piston outlet valve.

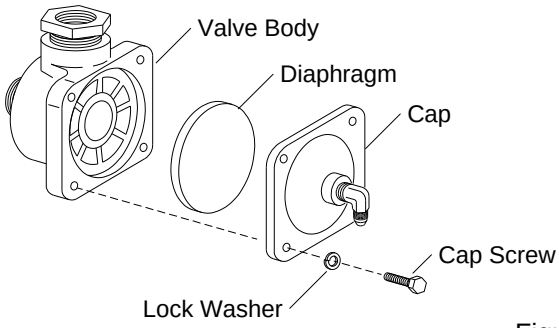


Figure 20

6.5.1 All service on the outlet valve must be done with the air OFF and the air supply locked out and tagged out. It is not necessary to remove the valve from the blast machine.

6.5.2 Remove the cap by unscrewing the four cap screws.

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

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

6.5.5 Reassemble in reverse order.

6.6 Abrasive Trap - Figure 21

⚠ WARNING

To avoid serious injury from the sudden release of compressed air, all service on the blast machine must be done with the air OFF and the air supply locked out and tagged out and the air-supply line bled.

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

6.6.1 To check the abrasive-trap screen, loosen the thumb screw on the upper lock bar, swing the lock bar off the cap, and remove the cap.

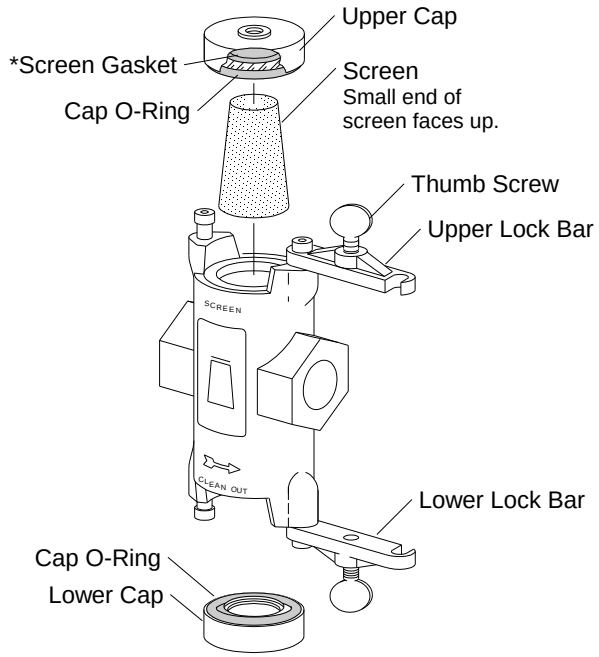
6.6.2 Remove the screen and inspect it for wear and blockage. Replace it when it is clogged or worn. Keep spare screens on hand. Do not install the screen in the trap until the bottom section of the trap is cleaned per the following instructions.

6.6.3 To clean the bottom section of the trap, loosen the thumb screw on the lower lock bar, swing the lock bar off the lower cap, and then remove the cap.

6.6.4 Empty all abrasive from the bottom and top sections.

6.6.5 Install the screen in the top section. The smaller diameter end of the screen must face up as shown in Figure 21.

6.6.6 Reassemble the upper and lower caps. NOTE: The upper and lower caps are identical except the screen gasket is glued into the upper cap. **Make sure the screen gasket is in place in the upper cap and the O-rings are in place on both caps before assembly.**



*Make sure the screen gasket is in the upper cap.

Figure 21

6.7. Replacing the Pop-Up Valve - Figure 22

⚠ WARNING

To avoid serious injury from the sudden release of compressed air, all service on the blast machine must be done with the machine depressurized, the air OFF, the air supply locked out and tagged out, and the air-supply line bled.

6.7.1 To gain access to the pop-up valve, loosen the nut on the clamp and remove the clamp and inspection door.

6.7.2 Using a small pipe wrench, unscrew the pop-up valve guide by turning it counterclockwise. Remove the pop-up valve and guide from the machine.

6.7.3 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.

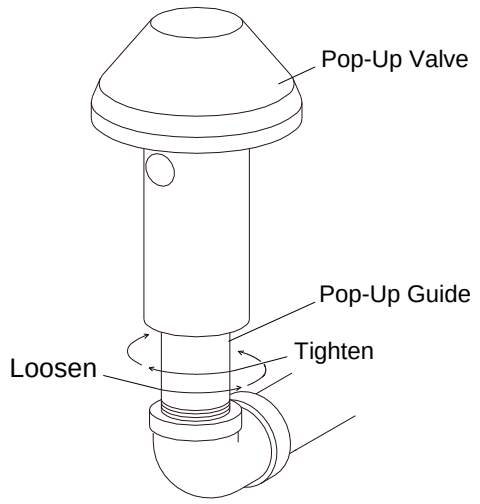


Figure 22

6.7.4 Slide the new pop-up valve over the guide and then screw the valve 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.

6.7.5 Refer to Figure 23 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.

6.7.6 Put a new gasket on the inspection door before bolting the door onto the machine.

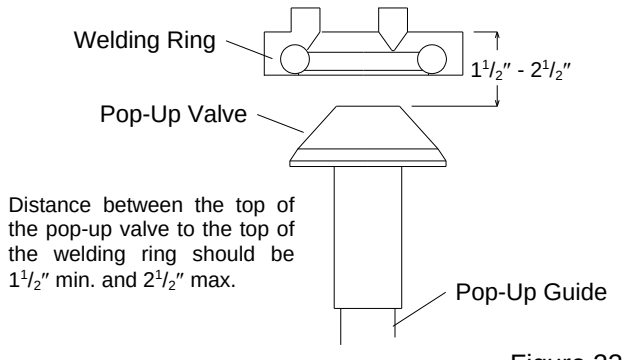


Figure 23

6.8 Replacing the Pop-Up Seal - Figure 24

⚠ WARNING

To avoid serious injury from the sudden release of compressed air, all service on the blast machine must be done with the machine depressurized, the air OFF, the air supply locked out and tagged out, and the air-supply line bled.

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 some 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 assembly and work through the inspection door opening.

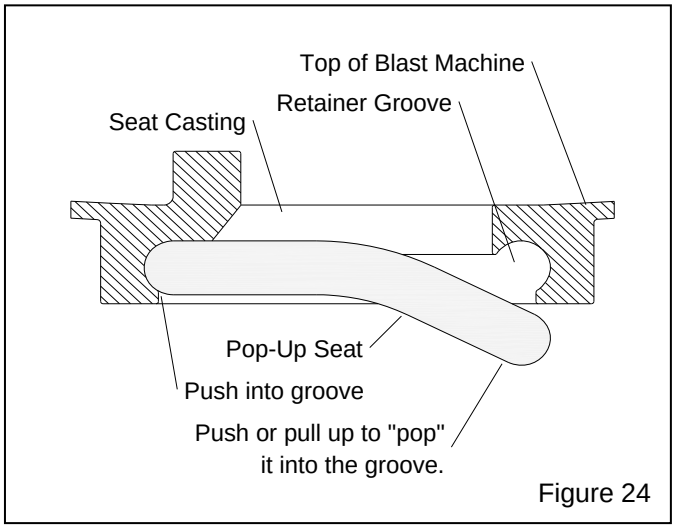


Figure 24

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 Exhaust Muffler - Figure 25

⚠ WARNING

Replace the muffler or element body as soon as blast machine depressurization time increases noticeably. Longer depressurization time indicates the porous element body is becoming clogged. If the element becomes plugged, excessive air pressure could build up inside the element and cause it to burst, resulting in injury.

6.9.1 All service on the muffler must be done with the compressed air OFF and the air supply locked out and tagged out.

6.9.2 Using a pipe wrench, unscrew the 1" pipe guide, to remove the muffler assembly from the exhaust elbow.

6.9.3 Remove the three locknuts and screws, and separate all parts.

6.9.4 Inspect for wear. Replace the cap if the urethane coating is worn. Always replace the element body.

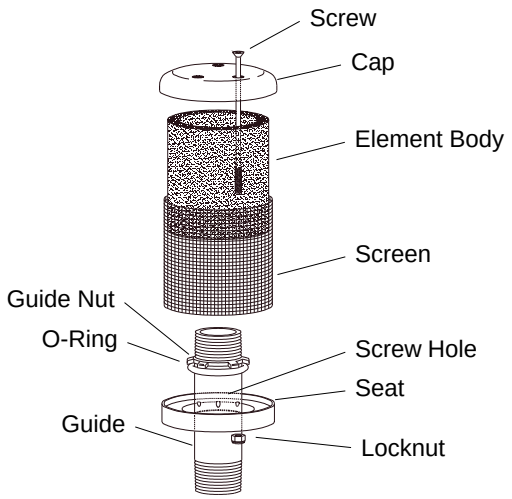


Figure 25

6.9.5 Make sure the guide nut is fastened tightly to the guide.

⚠ WARNING

Replace the guide and guide nut if the nut is not tightly fused to the guide. A loose-fitting nut could work off the guide, permitting the muffler assembly to launch under pressure and cause severe injury.

6.9.6 Clean parts to be reused, with a non-caustic solvent or detergent, and dry thoroughly.

6.9.7 Reassemble, taking care to correctly insert the screws in the seat plate. The screw holes are the three closest to the center. Refer to the illustration in Figure 25.

6.9.8 Firmly tighten the lock nuts.

6.9.9 Use a pipe wrench to attach the muffler assembly to the exhaust elbow. In its final position, the muffler must face up.

⚠ WARNING

The muffler reduces exhaust noise and prevents abrasive from exhausting upward or sideways when the blast machine is depressurized. To reduce risk of injury from abrasive carried by high velocity air, the muffler must be installed with the body facing up.

6.10 Remove and Install Reusable Control Hose Fittings - Figure 26

6.10.1 Control hoses may be shortened and cut to length as follows:

1. Remove the hose end by placing the 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 sleeve clockwise to remove from the hose.
3. Cut hose to length.
4. Lubricate inside and outside of hose with SAE 20 or equal oil.
5. Turn sleeve counterclockwise to install on hose. Do not over tighten the sleeve; stop tightening as soon as the hose bottoms out against the sleeves internal shoulder, and back it out 1/4 turn. Over tightening will cause the hose to curl inward and could cause blockage.
6. Push end of insert into sleeve and turn clockwise to tighten until the insert hex is against the sleeve.

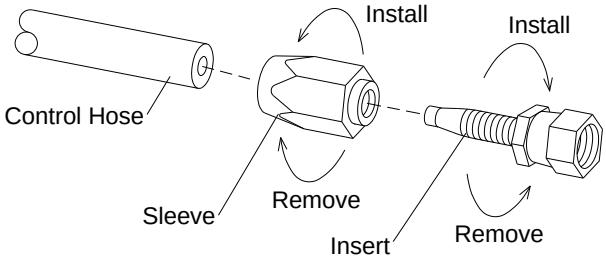


Figure 26

6.11 Control Handle

6.11.1 A separate manual is provided for the RLX control handle. Refer to Manual No. 10574.

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 when troubleshooting and before servicing the equipment. A separate manual is provided for the RLX control handle.

⚠ 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 controls require 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 Nozzle While Machine is Under Pressure

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

7.1.2 Valves maybe closed. Make sure both the abrasive metering valve and choke valve are open.

7.2 Air Only (No Abrasive) Exits Nozzle

7.2.1 Abrasive metering valve may be closed or needs adjustment. Adjust abrasive flow per Section 4.1.

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 inline with the piping.

7.3.2 Abrasive metering valve may be open too far. Adjust abrasive flow per Section 4.1.

7.4 Abrasive Surging

7.4.1 A moderate amount of abrasive surge is normal at startup. Should the flow of abrasive continue to surge, reduce the amount of abrasive in the air stream by adjusting the metering valve. Adjust abrasive flow per Section 4.1.

7.4.2 Check the abrasive trap and exhaust muffler for blockage. Slow depressurization will load the blast hose with abrasive and cause surging at startup.

7.4.3 Blast machine may be depressurizing too slowly, forcing abrasive into the blast hose. Refer to Section 7.6.

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 if so equipped, the blast machine's air filter. If problem with moisture persists, an aftercooler or air dryer may be required.

7.5.2 Abrasive may be too fine or 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 Make sure the safety petcock on the inlet valve is closed.

7.6.3 Inspect the rubber button on the control handle for wear or damage; make sure it seals the opening in the handle when the lever is pressed.

7.6.4 While the control handle lever is up, check for air escaping (from under the lever) through the opening in the handle. If no air escapes, the orifice on the inlet valve, shown enlarged 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 for and listen for air leaks anyplace on the handle. If there is a leak, it must be located and repaired. The RLX control handle is covered in Manual No. 10574.

7.6.6 Press the control handle lever and check control lines and fittings for air leaks. Once the control handle is pressed, there should be no air leaking from anyplace in the controls or blast machine. Any air leak must be located and serviced.

7.6.7 Open the safety petcock and press the control handle lever; the same volume of air should exhaust from the petcock as from the control handle before the handle lever is pressed. If it does not, check the following:

- Opening on the control handle is not sealed off.
- Air leaks in control handle.
- Line from the control handle to the upper fitting on the inlet valve is blocked.
- If a diaphragm outlet valve is used, check the diaphragm for a split or damage.

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

7.6.8 Close the safety petcock and press the control handle lever. Make sure no air escapes through the vent hole in the cylinder body of the inlet valve body. Air escaping from the vent indicates a worn piston or piston O-ring. Service the inlet valve per Section 6.3.

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

7.6.10 Compressor too small for the nozzle. Refer to the compressed air and abrasive consumption table in Figure 10 for nozzle air consumption.

7.6.11 Reduced air-supply hose or fittings between the compressor and blast machine. Refer to Section 2.5.

7.6.12 Dirty element in optional air filter. Inspect filter element.

7.6.13 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 to be emptied. Inspect the screen and empty the trap at least twice daily.

7.7.2 Exhaust muffler blocked. Inspect muffler per Section 6.9.

7.7.3 After releasing the control handle, open the safety petcock on the inlet valve:

- If the machine does depressurizes, control air remains in the control lines. Refer to Paragraphs 7.7.4, 7.7.5, 7.7.6, and 7.7.7.
- If the machine does not depressurize, the inlet valve is not fully closing or the outlet valve is not fully opening. Refer to Paragraphs 7.7.8, 7.7.9, and 7.7.10.

7.7.4 Check the pneumatic adaptor gasket on the control handle for swelling, which restricts air flow through the handle exhaust opening. The RLX control handle is covered in Manual No. 10574.

7.7.5 Inspect the exhaust opening in the control handle pneumatic adaptor; make sure it is clear of obstruction that restricts air from escaping through the opening.

7.7.6 Check for blockage in the control hose.

7.7.7 Make sure the lower fitting on the inlet valve (Page 31: Figure 33, Item 4 or Figure 34, Item 4) has not been switched for a fitting with a full-flow orifice. The orifice on the 1/8" NPT end of the fitting (the end that threads into the elbow) must be 1/16" diameter.

7.7.8 Make sure the inlet valve fully closes when the control handle is released. If it does not seal off incoming air, service the valve per Section 6.3.

7.7.9 Make sure the piston outlet fully valve opens when the control handle is released. If it does not, service the valve per Section 6.3.

7.7.10 Diaphragm in optional diaphragm outlet valve has taken a set toward the blast machine. Reverse diaphragm.

7.8 Outlet Valve Leaks Air During Blasting

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 Optional ACS Feature

7.9.1 No Abrasive When ACS Toggle is Moved to ON, Blast Mode.

7.9.1.1 Make sure the machine contains abrasive.

7.9.1.2 Make sure the metering valve is not closed.

7.9.1.3 Make sure the ACS toggle is pointing in the ON position away from the nozzle.

7.9.1.4 Check for leak or blockage in the single-line hose or fittings from the control handle to the metering valve.

7.9.1.5 Obstruction in abrasive metering valve, or valve requires service. Refer to the metering-valve manual for operation of the valve.

7.9.2 Abrasive Does Not Stop When ACS Toggle is Moved to OFF, Blowdown Mode.

7.9.2.1 Brass filter on ACS switch clogged. Inspect filter for blockage.

7.9.2.2 Metering valve requires service. Refer to the metering-valve manual for operation of the valve.

8.0 REPLACEMENT PARTS

8.1 Blast Machine Accessories

Description	Stock No.
Cover, steel for	
14" diameter machine	02334
16" diameter machine	02335
20" diameter machine	20358
24" diameter machine	02336
30" diameter machine	02337
36" diameter machine	28651
Cover, poly bag with Clemco logo for	
2 and 3 cuft machines, medium	15097
4 and 6 cuft machines, large	15143
Screen, recessed type, for	
14" diameter machine	03098
16" diameter machine	03099
20" diameter machine	20357
24" diameter machine	03100
30" diameter machine	03101
36" diameter machine	02391
Air filter, 1" NPT manual drain	22424
Air filter, 1" NPT auto drain	22425
Air filter, 1-1/2" NPT manual drain	22363
Air filter, 1-1/2" NPT auto drain	22364

8.2 Hose-Safety Accessories - Figure 27

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 27, 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

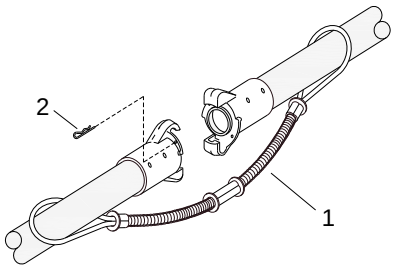


Figure 27

8.3 TLR-100/300 Remote Control Systems

Description	Stock No.
TLR-100, 1" w/ piston outlet valve	01935
TLR-300, 1-1/4" w/ piston outlet valve	01936
TLR-100D, 1" w/ diaphragm outlet valve	03449
TLR-300D, 1-1/4" w/ diaphragm outlet valve	03448
TLR-100C, 1" w/ACS and piston outlet valve	21152
TLR-300C, 1-1/4" w/ACS and piston outlet valve	21153
TLR-100DC, 1" w/ACS and dia. outlet valve	21154
TLR-300DC, 1-1/4" w/ACS and dia. outlet valve	21155

8.4 Exhaust Muffler - Figure 28

Item	Description	Stock No.
(-)	Muffler, complete	05068
1.	Screw, 8-32" x 4"	05061
2.	Cap, coated	05067
3.	Body, element	05065
4.	Screen	05060
5.	Guide w/ guide nut	22344
6.	O-ring, 1-1/4" ID	05069
7.	Seat	05062
8.	Locknut, 8-32 ss	05815

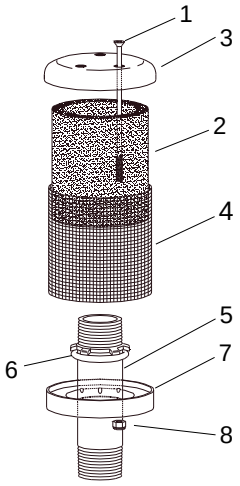


Figure 28

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8.5 Blast Machine and Accessories - Figure 29

Item	Description	Stock No.
1.	Ball valve with handle,	
	1-inch NPT	02396
	1-1/4-inch NPT	02397
2.	Handle,	
	1" ball valve,	22531
	1-1/4" ball valve	22532
3.	Pop-up valve, 4" with external sleeve	03699
4.	Internal pop-up guide, toe nipple, for	
	2 and 3 cuft, 1-1/4" x 6-1/2"	01754
	6 cuft, 1-1/4" x 6"	01753
5.	Adaptor, male NPT x male JIC	
	1" NPT	11720
	1-1/4" NPT	22529
6.	Pusher line assemblies, rubber	
	1" ID x 21" (2 cuft machine)	22508
	1" ID x 28" long (3 cuft & 6 cuft)	23673
	1-1/4" ID x 28" long (3 cuft & 6 cuft)	23674
	1-1/4" ID x 31" long (7, 10 & 20 cuft)	23675
	1" x 19" long (Lo-Pot machines)	24167
	1-1/4" x 19" long (Lo-Pot machines)	24168
7.	Coupling, 1-1/4" CF	00551
8.	Wye, 1-1/4" standard	01818
9.	Leg pad, right, for	
	2 cuft machine	20735
	3 cuft and 6 cuft machine	03654
10.	Leg pad, left, for	
	2 cuft machine	20736
	3 cuft and 6 cuft machine	03655
11.	Metering valve, FSV w/ wye	02427
12.	Gasket, CQG coupling, (package of 10)	00850
13.	Wheel and tire, 10 x 2.75, for 2 cuft	20349
14.	Axle, for	
	2 cuft for 10" wheel	20734
	3 cuft for 16" wheel	02402
	6 cuft for 16" wheel	02403
15.	Wheel and tire, 16 x 400	20427
16.	Axle and 16" wheel set for	
	3 cuft machine	02822
	6 cuft machine	02350
17.	Washer, 1" thrust	03825
18.	Retaining ring, 1"	03824
19.	Inspection door assembly, 6" x 8"	02377
20.	Gasket, 6" x 8" inspection door	02369
21.	Seat, pop-up	
	gum rubber, standard use	02325
	neoprene, for hot climates	02380
22.	Umbrella, optional, 4" bolt-on	02318
23.	Muffler, exhaust	05068
24.	Metering valve, MPV	
	manual pinch tube (alternate)	04321
25.	Metering valve, LPV	
	for Lo-Pot machines	05680
26.	Metering valve, MQV	
	manual Quantum (alternate)	22845
27.	Lock pin, coupling (package of 25)	11203

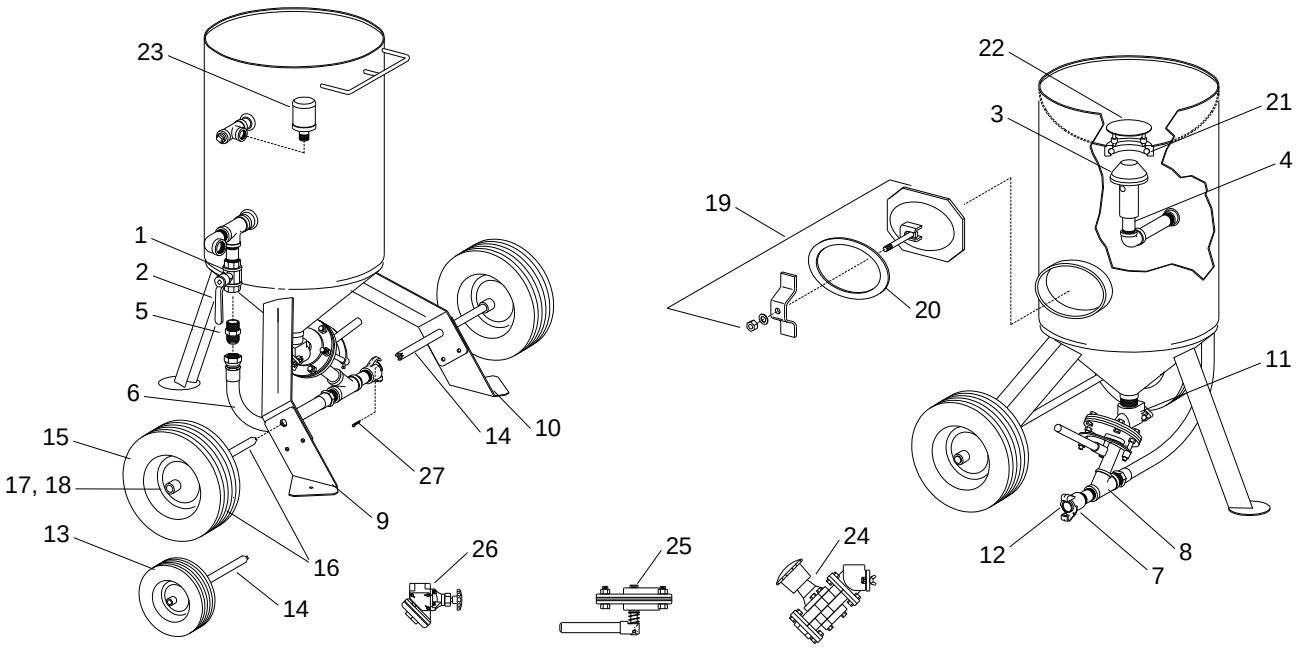

Figure 29

8.6 FSV Abrasive Metering Valve, Figure 30

Item	Description	Stock No.
(-)	Metering valve, complete	02427
1.	Upper body	02422
2.	Valve disc w/ stem	02423
3.	Gasket, rubber, 2 required	02424
4.	Disc-stainless	02425
5.	Lower body	02426
6.	Metering handle, heavy duty	20498
7.	Cap screw, 1/4-NC x 1-1/4" hex head	03054
8.	Wing nut, 1/4-NC	03113
9.	Handle bolt spacer	02431
10.	Valve handle pin	20246
11.	Gauge unit	02433
12.	Set screw, 1/4-NC x 1/2" square head	03080
13.	Spring, compression	01982
14.	Stud	02436
15.	Packing gland	02437
16.	O-ring, 7/8″ OD	21165
17.	Gasket, shaft	02439
18.	Inspection plate	02440
19.	Cap screw 5/16-NC x 1" hex head	03152
20.	Wing nut, 5/16-NC	03213
21.	O-ring	01990
22.	Nipple, heavy wall 1-1/2" x close	01791
23.	Wye, standard 1-1/4"	01818
24.	Nipple, 1-1/4" x 5"	01721
25.	Nut, 1/2-NC hex	03511
26.	Cap screw, 1/2-NC x 1-3/4" hex head	03455
27.	Washer, 1/4" flat	03116
28.	Hitch pin	20245

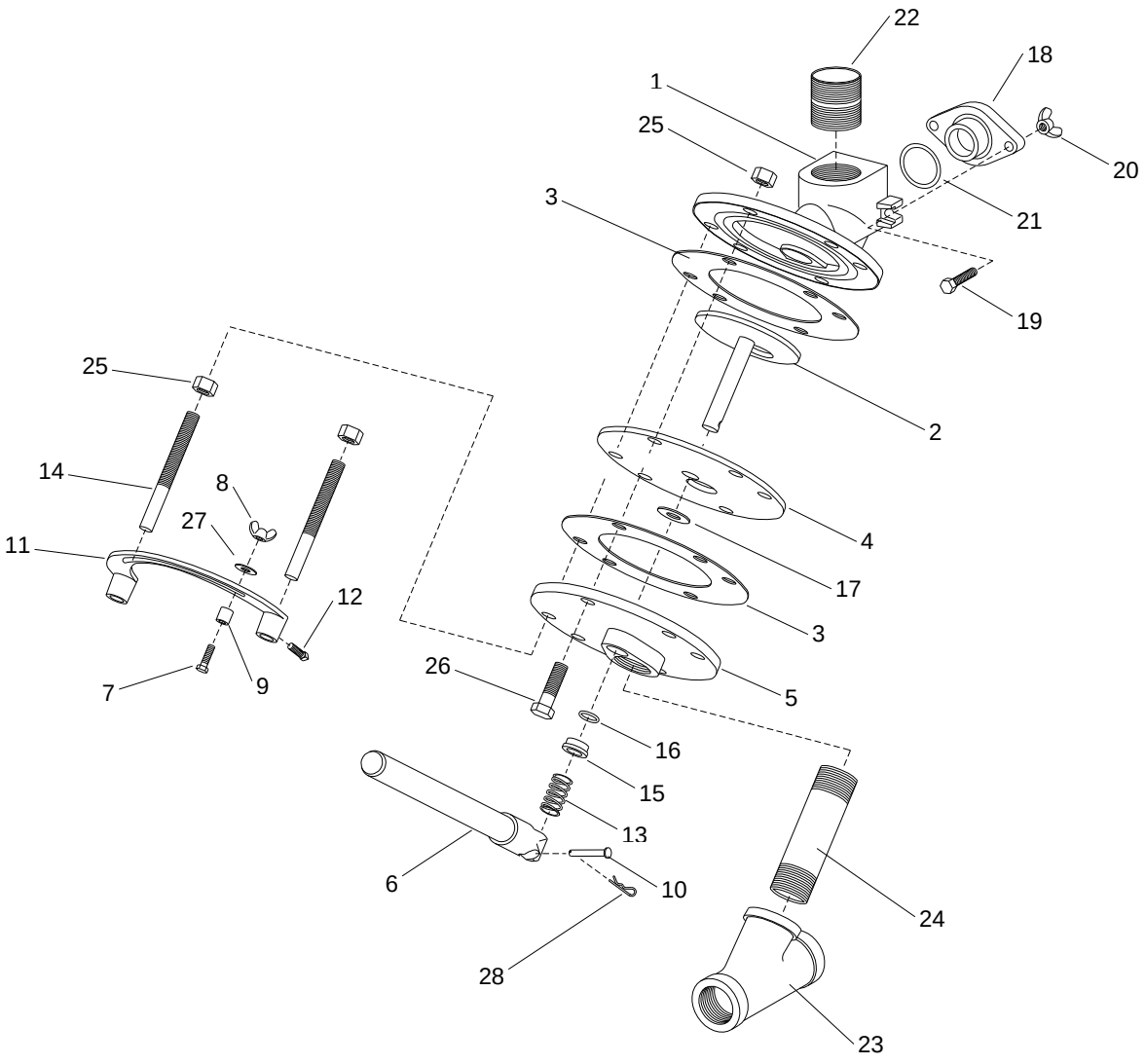

Figure 30

8.7 Remote Control System Parts, Figure 31

Item	Description	Stock No.
1.	Outlet valve, 1" piston	01967
2.	Outlet valve, 1" diaphragm	03371
3.	Inlet valve	
	1" NPT	01980
	1-1/2" NPT	01995
4.	Abrasive trap	02011
5.	RLX control handle	10565
6.	Hose, 3/16" x 18 inch, coupled	02454
7.	Hose, 5 foot twinline, coupled	01952
8.	Hose end, reusable	01943
9.	Hose, 50 foot twinline, coupled	01951
10.	Union, hose	01944
11.	Elbow, 1/4" NPT adaptor	02513

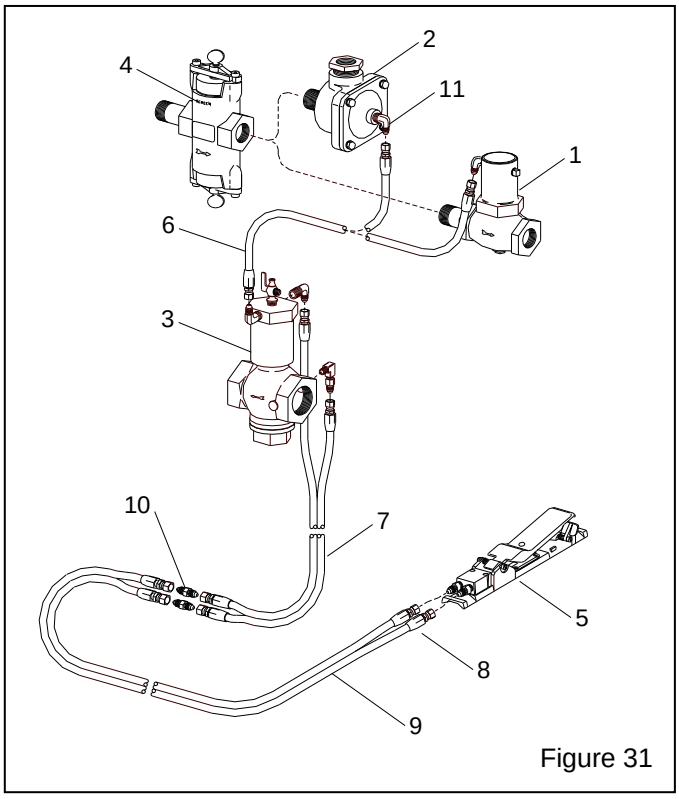

Figure 31

8.8 ACS System Replacement Parts, Figure 32

NOTE: All parts not shown are the same as those shown in Section 8.7, and Figure 31. Refer to the RLX manual for replacement parts for ACS parts. Refer to the metering valve manual for metering valve replacement parts.

Item	Description	Stock No.
1.	RLX control handle w/ ACS switch	07625
2.	Hose, 50-foot single-line, coupled	03087
3.	Hose, 3/16" x 18", coupled	02454
4.	Union, twinline hose	01944
5.	Elbow, 1/4" NPT adaptor	02513

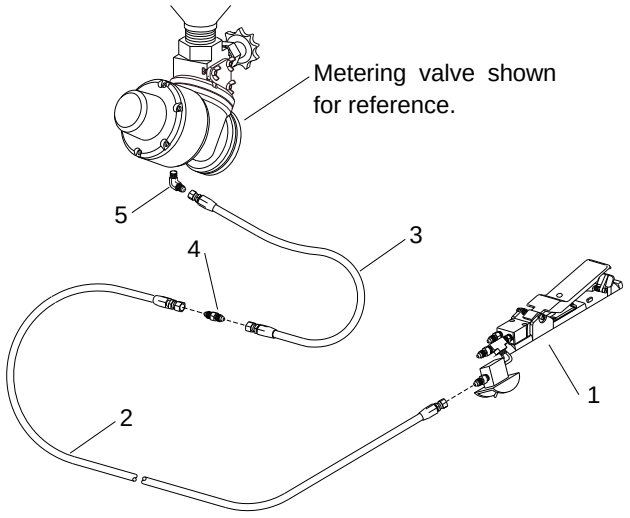

Figure 32

8.9 1-1/2" Inlet Valve, Figure 33

Item	Description	Stock No.
(-)	1-1/2" Inlet valve, complete	01995
1.	Petcock 1/4" NPT	01993
2.	Elbow, 1/4" NPT adaptor	02513
3.	Elbow, 1/8" NPT brass street	03993
4.	Adaptor 1/8" NPT with 1/16" orifice	01945
5.	Bottom cap	02001
6.*	Spring, inner, 5/8" x 1-11/16" long, (1)	01982
7.*	Gasket, bottom cap, (1)	02006
8.*	Spring, outer, (1)	02000
9.	Valve body	01996
10.	Valve plug	01999
11.*	Washer, valve plug, (2)	01998
12.*	Retainer, valve-plug washer, (1)	02002
13.*	O-ring, 7/16" OD, (1)	02008
14.	Piston and rod assembly	02003
15.*	O-ring 2-1/4" OD, (1)	02007
16.	Cylinder cap	01997
(-)	Service kit, includes items marked * quantities are shown in ( )	01927

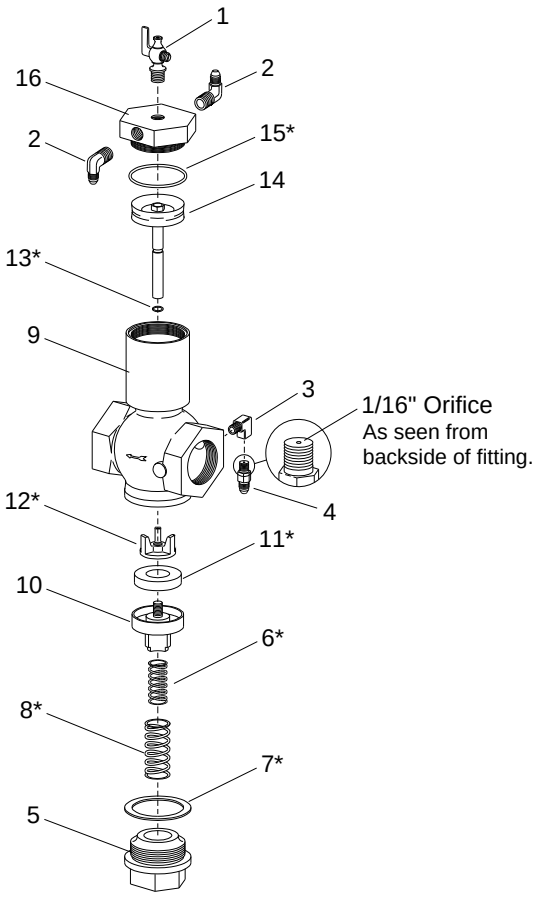

Figure 33

8.10 1" Inlet Valve, Figure 34

Item	Description	Stock No.
(-)	1" Inlet valve, complete	01980
1.	Petcock 1/4" NPT	01993
2.	Elbow, 1/8" NPT adaptor	02827
3.	Elbow, 1/8" NPT brass street	03993
4.	Adaptor 1/8" NPT with 1/16" orifice	01945
5.	Bottom cap	01985
6.*	Spring, 5/8" x 1-11/16" long, (1)	01982
7.*	Seal, bottom cap, (1)	01989
8.	Valve plug	01984
9.	Valve body	01981
10.*	Washer, valve plug, (2)	01969
11.*	Retainer, valve-plug washer, (1)	01986
12.*	O-ring 3/16" ID x 1/16", (1)	01992
13.	Piston and rod assembly	01987
14.*	O-ring 1-3/4" OD, (1)	01990
15.	Cylinder cap	01983
(-)	Service kit, includes items marked * quantities are shown in ( )	01929

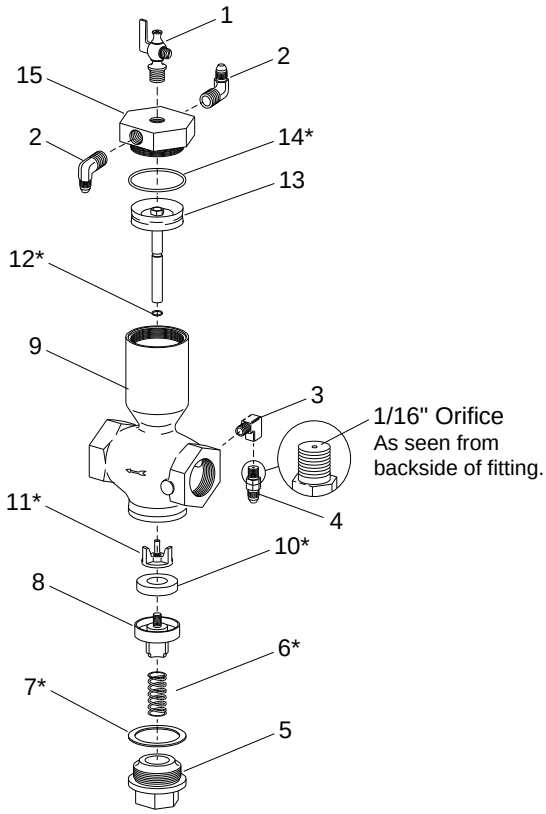

Figure 34

8.11 1" Piston Outlet Valve, Figure 35

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

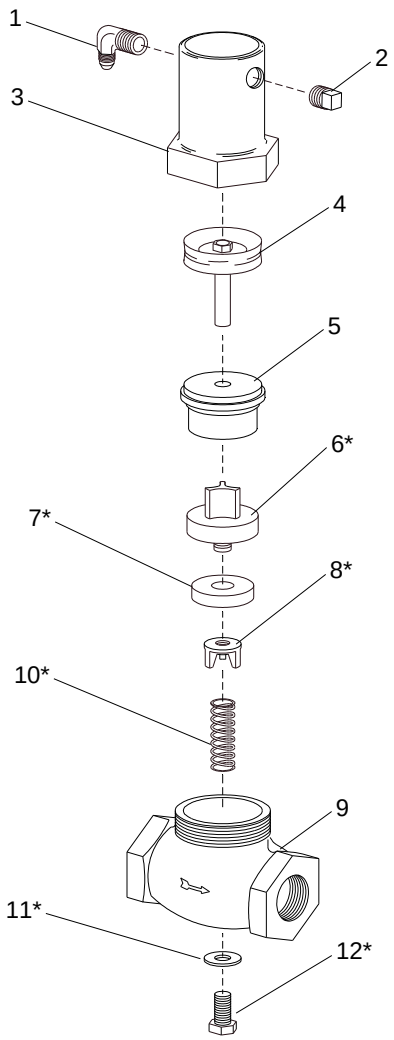

Figure 35

8.12 1" Diaphragm Outlet Valve, Figure 36

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

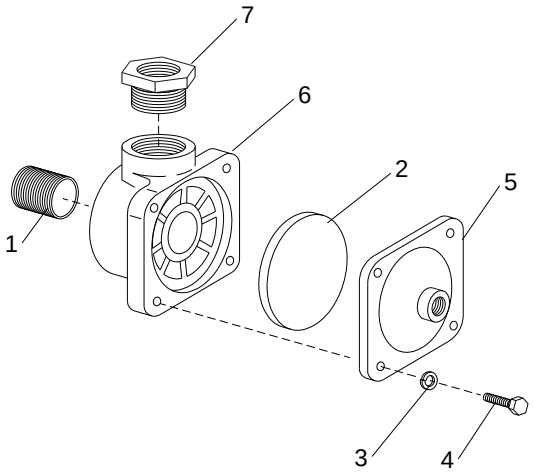

Figure 36

8.13 Abrasive Trap, Figure 37

Item	Description	Stock No.
(-)	Abrasive trap, complete	02011
1.*	Screen, (3)	02012
2.*	O-ring, (2)	02013
3.	Cap	02014
4.	Body	02015
5.	Lock bar	02016
6.	Screw, 3/8-NC x 1" thumb	03289
7.	Shoulder screw, 3/8" x 3/8"	03291
8.*	Gasket, screen, 1/8" Thick, (1)	02434
9.*	Label, "clean screen twice daily"	02129
(-)	Service kit, includes items marked * quantities are shown in ( )	01925

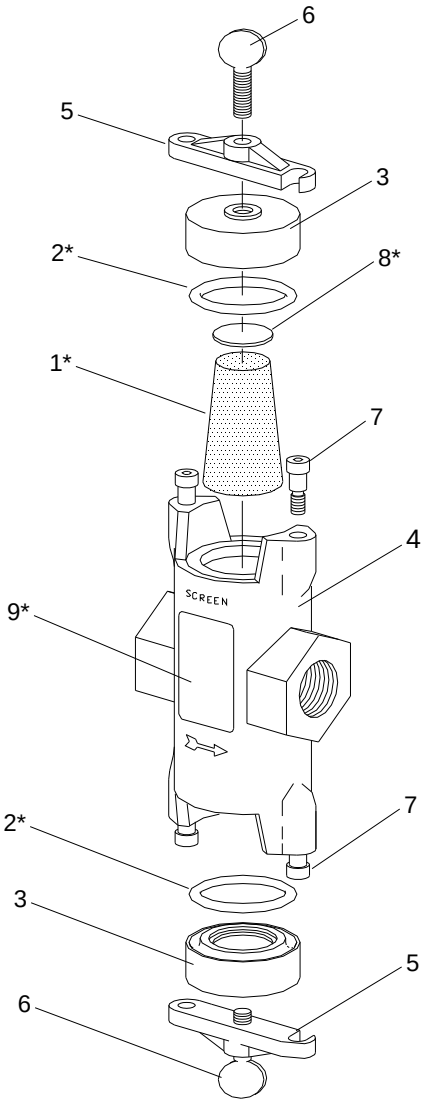

Figure 37

8.14 RLX Control Handle

Refer to RLX Control Handle Manual No. 10574 for RLX replacement parts.