PHX-150

Dry Ice Cleaning System

U S E R ' S G U I D E

PHOENIX
UNLIMITED LLC

PHOENIX UNLIMITED LLC

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SYSTEM I.D.

This User's Guide is printed for use with the following dry ice cleaning system:

Model: PHX-150

Part Number: _____

Serial Number: _____

Manufacturing Date: _____

It is recommended that the above information be kept in a safe place. Have it readily available when utilizing the services of the manufacturer with regards to technical support, service, parts, etc.

The written material herein contains proprietary information intended for the sole use of the original owner. It may not be duplicated or disclosed to other parties.

Inspected By: _____ Date: _____

Phoenix Unlimited LLC Equipment Warranty

Phoenix Unlimited LLC (the Company) warrants that the Equipment it manufactures and delivers hereunder will be free of defects in material and workmanship for a period of twelve months or 2000 hours of operation from the date of shipment, whichever occurs first. Upon written request, Phoenix Unlimited shall, at its option, correct any nonconformity by suitable repair to such Equipment, or furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labor performed by the Purchaser or others without the Company's prior written approval. The effects of corrosion, erosion and normal wear and tear, are specifically excluded from warranty.

Correction by the Company of nonconformities whether patent or latent, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of the Company for such nonconformities, whether based on contract, warranty, negligence, indemnity, or strict liability with respect to or arising out of such Equipment.

The Purchaser shall not operate Equipment which is considered to be defective without first notifying the Company in writing of its intention to do so. Any such use of Equipment will be at the Purchaser's sole risk and liability and will void warranty coverage.

Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser.

The Company makes no other warranty or representation of any kind whatsoever, expressed or implied, except that of title, and all implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed.

INTRODUCTION

Congratulations on choosing the new ***PHX-150*** dry ice cleaning system for your industrial cleaning needs. Its' unique design and variable logic control make it the perfect choice for a wide range of applications, and in any type of environment. Using rice-sized dry ice pellets, this versatile blasting machine not only handles your tough cleaning jobs; it cuts your overhead costs in the process. Smart design, powerful, and portability too… an industrial piece of equipment that will last for many years to come!

You are now ready to learn how to use your new ***PHX-150***.

Before you attempt to operate the equipment, we recommend that you take the time to fully familiarize yourself with the contents of this User's Guide. The information contained in this guide can save invaluable time by helping you gain a clear understanding of the installation, safety, operation, and maintenance procedures.

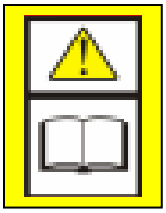
Note: *Pay particular attention to the sections on "Safety Precautions and Warnings", outlined on the following two pages.*

Once you are comfortable with the information provided, you will be ready to say goodbye to old-fashioned methods of cleaning and begin using your new dry ice blaster. With proper equipment care, you will soon see that the ***PHX-150*** is one tool you cannot be without.

If you have questions concerning the installation, operation, or information contained in this User's Guide, please contact 'Phoenix Unlimited LLC' at: (909) 278-2229. Customer support and technical assistance is always available.

Enjoy!

SAFETY PRECAUTIONS AND WARNINGS

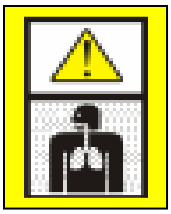


User's Guide Information

Dry ice cleaning equipment should not be operated without proper training and the consent of your direct supervisor or management. The information contained in the User's Guide will provide all the tools necessary for proper operation, safety, maintenance, and troubleshooting of the equipment. Read and understand the contents of this guide before using or servicing your machine.

Equipment Usage

Your new cleaning system was designed for use in an industrial environment. Proper safety precautions should be practiced, observed, and monitored at all times. Be especially careful when blasting around materials that can shatter. Dry ice blasting adapts to many types of applications, but the high velocity pellets can cause damage to fragile items or substrates of low integrity. Remember NEVER to direct the blast stream at yourself or others.



Asphyxiation Hazard

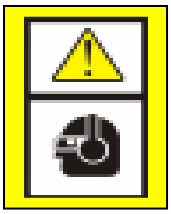
Sublimation of dry ice creates CO_2 gas. This gas is 40% heavier than air, and thus displaces oxygen in low-lying areas and enclosed spaces. When blasting, always have adequate ventilation in and around your workspace. Contaminated compressed air (or nitrogen) used as a propellant may greatly increase respiratory risk. A "High CO_2" sensor/monitor with indicators is a worthwhile investment and can help prevent accidental asphyxiation.

Noise

Blasting equipment generates a high velocity air flow from the nozzle. This air flow creates friction as it passes through normal static air, resulting in high decibel noise levels. Though these levels can be controlled somewhat by altering pressures and flow rates, ear protection is required in all blasting situations. Additional noise factors include the object being cleaned, distance from the targeted material, media quantity being used (ice rate), and acoustic surroundings. If you are unsure about blasting in an area around you or fellow co-workers, consult with your safety director for advice and/or safety parameters before beginning work.

Emergency Stop Mechanisms

Your unit is equipped with an Arm/Disarm switch located in the center of the control panel. Under normal use, this switch acts as a convenient way to quickly interrupt power to your PHX-150. However, the true designated E-STOP is the full-flow valve (bright yellow with a red handle) located on the air system manifold under the control panel. This valve must be closed before attempting maintenance work or repairs. A 5/16" hole is provided in the handle to accommodate your company lockout procedures, if applicable. Raise the locking tab to re-open the valve.



Protective Gear

Before beginning work, make sure you have the proper protective gear for the job. This includes the basics: Ear plugs or muffs (or both), eye protection, gloves, long sleeves, long pants, and safety shoes. Dependant upon specialized cleaning jobs, you may also need other protective items such as: self-contained breathing apparatus, respirator, grounding straps, skin protectors, jumpsuit, special clothing, or other equipment as deemed necessary by your company's safety regulations.

Ergonomics

The training process for using your new PHX-150 is relatively easy, but there will still be a "learning curve" where technique and experience is concerned. The operator should understand that high velocity air exits the gun barrel. Upon triggering the gun, the operator will experience a small reactive thrust, which increases or decreases depending on pressure settings and air flow. Operator fatigue may also be an issue, relating to blasting angles, pressure settings, dwell times, work area, temperatures, physical conditioning, and time on duty. Do not exceed allowable limits as set by company policy and safety personnel.

High Velocity Particles

High velocity particles exiting the gun may cause serious injury. Never aim the gun at yourself or others. The ice is sometimes difficult to see in the blast stream. However, never use your hand, foot, or any other body part to check pellet flow. Do not blast delicate or fragile items or equipment parts (i.e. glass or plastic gauge faces). Damage may occur.

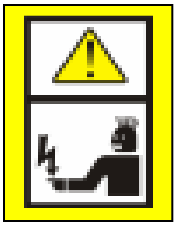
Moving Parts

Though the moving parts inside your PHX-150 are minimal, they are critical components and serious injury may occur if safety parameters are not adhered to. Your machine incorporates an auger that turns, feeding dry ice pellets into the delivery system. A safety sensor is activated to immediately stop the auger from turning anytime the pellet screen is removed. Do not attempt to override this sensor. The auger drive motor and chain are shielded by a protective guard and should never be operated without the guard in place. Do not attempt to operate the airlock assembly while detached from unit. Always follow shut-down procedures before attempting any periodic maintenance or repairs.

Burn Hazard

Dry ice is extremely cold, -109°F (-78°C). Do not allow skin to directly contact dry ice or the outside of the PHX-150 hopper while it is loaded with dry ice. Doing so may cause severe deep tissue burns. Always wear heavy-duty insulated gloves and long sleeved clothing for protection when handling dry ice or cold equipment during use.

Static Discharge



The gun of the PHX-150 is grounded through the blast hose to the frame, then through the special conductive front wheels; therefore any significant amount of static discharge is uncommon. Still, the possibility exists that minor static discharges can occur pending weather conditions, the travel of high velocity ice particles, etc. If static discharge is experienced, wear the grounding wrist strap supplied with your unit. Also, you may wish to add an additional wire from the machine to a good earth ground, AND ground the item that you are blasting.

Caution: Static discharge may ignite flammables. Be aware of your surroundings!

Lower Limit Blast Pressure

The PHX-150 utilizes an additional regulator that maintains the blast pressure at 45 psi, even though it is turned all the way down. When conducting function tests while the unit is energized, take the necessary precautions to insure that the blast gun is secured and pointed in a safe direction.

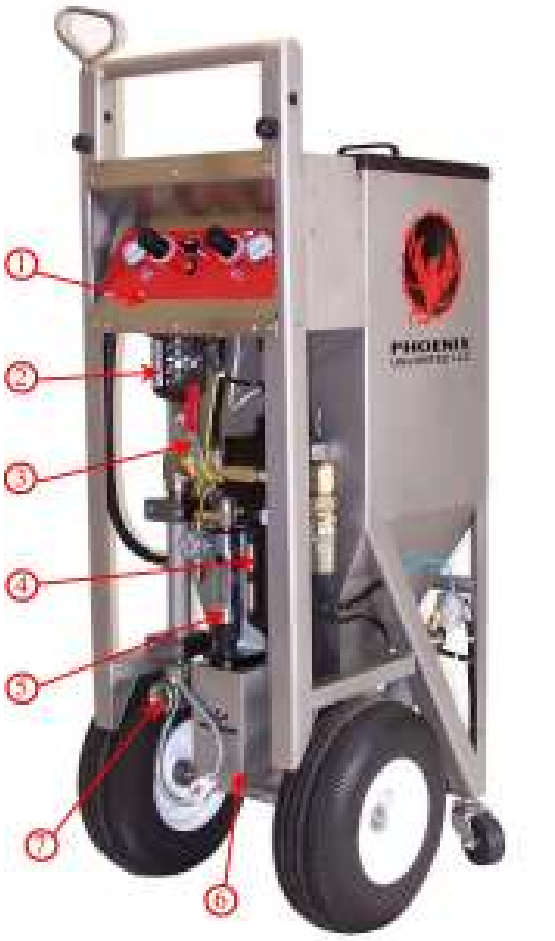
Logic Control Stored Air Hazard

The control circuitry of this machine may trap air in and between associated components. Vent unit before any maintenance or service is performed to prevent accidental release of trapped air.

Lock Out/Tag Out Precaution

Do not perform any type of service to this equipment until all lock out/tag out procedures have been followed according to your company's safety regulation guidelines. As mentioned previously (page 6), a lock out hole (5/16") is provided in the E-Stop valve handle if required.

KEY COMPONENT IDENTIFICATION



1	Control Panel
2	Lubricator
3	E-Stop Valve
4	Separator/Regulator
5	Ratchet Motor
6	Auger Drive/Chain Guard
7	Air Supply Inlet
8	Airlock Assembly
9	Vibrator Assembly

CONTROL PANEL/WARNING LABEL

1	Read User's Guide Information
2	Asphyxiation Hazard
3	Wear Proper Protective Gear
4	High Velocity Particles
5	Burn Hazard
6	Static Discharge
7	Equipment I.D. Tag

1	Ice Rate Gauge
2	Ice Rate Regulator
3	Arm/Disarm Switch
4	Pressure Indicator
5	Blast Air Regulator
6	Blast Air Gauge

OPERATING INSTRUCTIONS

This User's Guide is the best tool available during the initialization of your new PHX-150 Dry Ice Cleaning System. It contains all the information necessary for the proper installation, safety, operation, maintenance and troubleshooting right at your fingertips. Familiarize yourself with its' contents before operating this equipment.

CONNECTING THE AIR SUPPLY

Since the PHX-150 is an "all pneumatic" design, it is critical that only clean, dry air be supplied to the unit. Air containing excess amounts of moisture, oil, rust, or other contaminants may clog filters and damage the logic control and internal components. A good desiccant or refrigerant dryer should be installed between your compressor and the PHX-150. The dew point should not exceed +40°F/+4.4°C. Good air quality will save you time for repairs and increase the life of the unit.

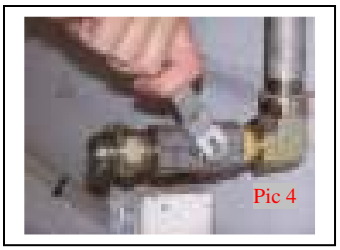
1. Install a 1" JIC/NPT male fitting into the supply inlet of the PHX-150. Be careful with other types of common connectors as they often have gaskets or other restrictive material, which prevent full air flow. This can drastically reduce your unit performance level. (pic 1)
2. Install the whip check over the end of the 1" air supply hose. (pic 2)
3. Connect air supply hose to the JIC fitting and extend the whip check as far down the hose as possible. (pic 3)
4. Wearing hearing protection, blow down the air source at the drop to remove any accumulated moisture. This helps to insure equipment performance. (pic 4)
5. Connect the air supply hose to the air source. (pic 5)

Caution! Maximum air pressure supplied to the PHX-150 should never exceed 125 psi!


Pic 1


Pic 2


Pic 3


Pic 4


Pic 5

CONNECTING THE BLAST GUN

1. Use 1¼" and 1½" wrenches to connect the gun to the end of the blast hose with the shorter length trigger lines. Do not over-tighten. (pic 1)
2. Connect the respective trigger lines (different sizes) to the gun, pushing firmly into the quick-connect fittings. (pic 2)
3. Install the nozzle by a) twisting threaded retainer to completely 'open' position; b) place nozzle into end of blast gun; c) tighten retainer to secure the nozzle. Improper seating of the nozzle in the gun may result in air leakage. (pics 3, 4, 5)
4. Using the 1½" wrench, connect the remaining end of the blast hose to the front of the PHX-150. (pic 6)
5. Connect the two trigger lines to the unit, pushing firmly until seated. Failure to attach trigger lines will result in the non-functioning of the unit. (pic 7)
6. If necessary, ground the item you are blasting.

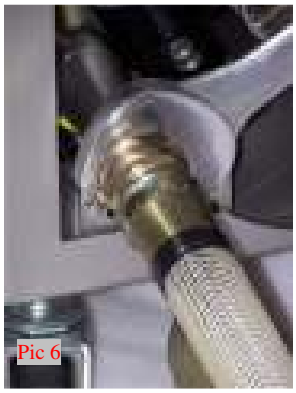

Pic 1


Pic 2


Pic 3


Pic 4


Pic 5


Pic 6


Pic 7

LOADING DRY ICE

1. Before you begin loading dry ice, it is important that you have the protective gear previously mentioned in the "Safety Precautions and Warnings" section (page 6). This includes basic items such as earplugs or muffs (or both), eye protection, heavy-duty gloves, long sleeves, long pants, and safety shoes. (pic 1)
2. Remove the lid from the hopper. (pic 2)
3. Use a sturdy scoop or similar device to load dry ice pellets into the hopper. (pic 3) Be careful not to inhale concentrated CO_2 gas during the loading process, as it will temporarily rob you of oxygen. If overexposed, get fresh air immediately. Signs of overexposure include dizziness, cold sweats, headaches, nausea, and heavy breathing.
4. Replace the lid on the hopper. This will prevent airborne contaminants from inadvertently falling through the pellet screen to the ice and ultimately ending up on the surface you are cleaning. (pic 4)


Pic 1


Pic 2

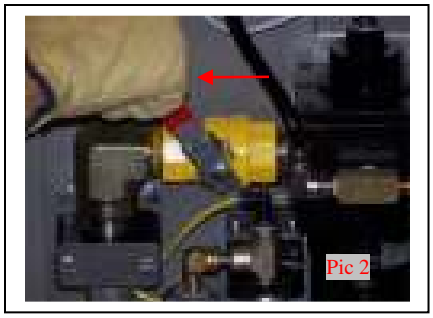

Pic 3


Pic 4

SETTING THE PANEL CONTROLS

Applying Air to the Unit

1. Slowly open the main air supply valve (source). (pic1)
2. With the gun pointed in a safe direction, slowly open the E-Stop valve on the PHX-150. (pic 2)



Setting the Panel Controls

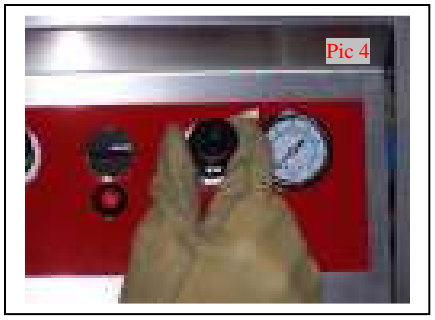
1. Pull the 'Ice Rate' knob outwards to unlock it. (pic 1)
2. Turn the control clockwise until the gauge reaches the desired pressure. If unsure, start at about 25 psi, then adjust the rate up or down as necessary for your particular blasting application. (pic 2) ***Note: Trigger on gun must be pulled in order for gauge to read!***
3. Push the knob in to lock the ice rate. (pic 3)

SETTING THE PANEL CONTROLS (cont.)

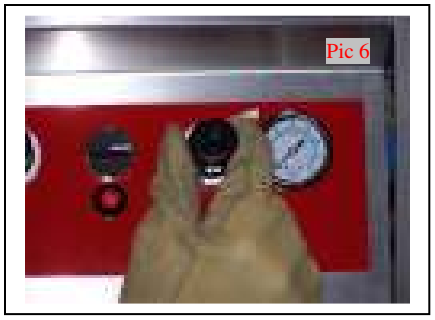
4. Next set the blast pressure. Pull the 'blast pressure' knob outwards to unlock it. (pic 4)
5. Turn the knob clockwise until desired pressure is reached. The PHX-150 has a blast pressure range from 45 psi to 125 psi. Satisfactory results are generally achieved in the 80-100 psi range for most applications. If you are unsure or concerned about damage to the item being blasted, start at a lower blast pressure and increase it gradually until the optimum performance level is achieved. (pic 5)
6. Push the knob in to lock the blast rate. (pic 6)

Note: The PHX-150 utilizes an additional regulator that maintains the blast pressure at 45 psi, even if the control panel knob is turned all the way down. This prevents "freeze-ups" in the airlock assembly, which will occur if ice continually feeds without sufficient pressure to propel it to the gun.

7. Turn the Arm/Disarm switch clockwise to arm the PHX-150. The indicator will turn green, and the momentary switch will return to the center position. (pic 7)
8. Point the gun at the target or in a safe direction. Push upwards on the safety catch to release and pull the trigger to initialize blasting. (pic 8)


Pic 4


Pic 5


Pic 6


Pic 7


Pic 8

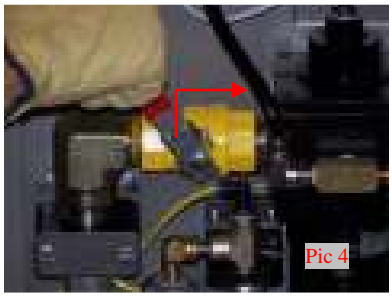
TEMPORARY SHUTDOWN

1. When blasting is complete, release the trigger and wait for airflow to stop. (There is a short delay while residual ice is purged from the blast hose. Keep gun pointed at the target until air stops flowing!) (pic 1)
2. Turn the Arm/Disarm switch counter-clockwise. The indicator will turn red, and the momentary switch will return to the center position. (pic 2)
3. Close the air supply valve **at the source.** ***Important! Failure to disconnect the source end of the air supply first may create potential "air entrapment" or "hose whip" hazards!*** (pic 3)
4. Vent remaining air from the machine and supply hose by closing the E-Stop valve approximately halfway. (pic 4)
5. After the air stops flowing, you may fully close the E-Stop valve. (pic 5)
6. If moving the unit to another location for blasting, disconnect the supply hose at the source and wrap around the machine handle for quick transport. It is not necessary to disconnect the hose from the unit unless storing overnight or long term. (pic 6)


Pic 1


Pic 2


Pic 3


Pic 4


Pic 5


Pic 6

OVERNIGHT / LONG TERM SHUTDOWN

1. If you won't be blasting again soon, release the trigger and wait for airflow to stop. (There is a short delay while residual ice is purged from the blast hose. Keep gun pointed at the target until air stops flowing!) (pic 1)
2. Turn the Arm/Disarm switch counter-clockwise. The indicator will turn red and the momentary switch will return to the center position. (pic 2)
3. Remove any unused ice from the hopper with a scoop and return it to the storage container.
4. Turn the Arm/Disarm switch clockwise. Indicator will turn green. (pic 3)
5. Pull the trigger and expel remaining pellets through the gun. (pic 4)
6. Follow steps 2-6 on page 15 to complete the shutdown procedure, then store unit. (text box)


Pic 1


Pic 2


Pic 3


Pic 4

FOLLOW STEPS

2-6 ON PAGE 15

TO COMPLETE

MAINTENANCE

CAUTION! Do not attempt to perform any maintenance or service on your PHX-150 unless safety guidelines and lock out/tag out procedures have been satisfactorily met!

DAILY PREVENTIVE MAINTENANCE

Before starting the machine each day/shift, a quick preventive maintenance inspection should be performed to ensure that your unit operates problem-free now and in the future.

1. Check the separator sight glass for accumulated moisture or remove the canister to inspect the filter for contamination. Clean canister if needed. (See page 18 for filter replacement procedure). (pic 1)
2. Visually inspect lubricator to confirm fluid level is adequate. (pic 2)
3. Inspect hose assembly for cracks or leaks. Replace if necessary. (pic 3)


Pic 1


Pic 2


Pic 3

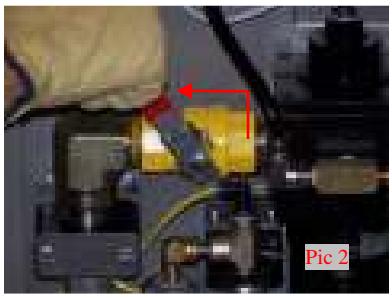
AS NEEDED MAINTENANCE

Emptying the Separator

The PHX-150 features an “auto-drain” in the separator to relieve excess moisture during normal use. This can also be performed manually if desired. To do this:

1. Slowly open the main air supply valve. (pic 1)
2. Slowly open the E-Stop valve of the PHX-150. (pic 2)
3. Located at the bottom of the separator, use a small tool and press the internal relieving pin upwards, allowing moisture to be expelled under pressure. (pic 3)


Pic 1

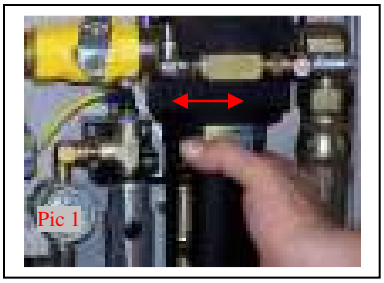

Pic 2


Pic 3

Changing the Separator Filter

To ensure that your dry ice cleaning system operates correctly and continues to provide reliable performance levels, the separator needs to be inspected regularly. Poor filtering leads to excessive moisture being passed into the control system, airlock, blast gun, and ultimately to the targeted surface. A discolored filter element should be replaced. Follow this simple procedure:

1. Press locking tab on separator canister and turn in either direction to disengage. (pic 1)
2. Lower the canister to expose filter element. (Empty any accumulated moisture in canister before reinstalling). (pic 2)
3. Remove element retainer umbrella by turning counter-clockwise. (pic 3)
4. Remove old filter element, pulling straight down and away. (pic 4)
5. Install new element by reversing steps 1-4.


Pic 1


Pic 2

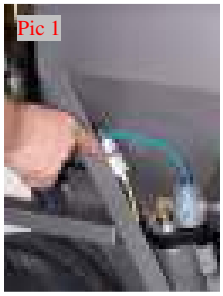

Pic 3

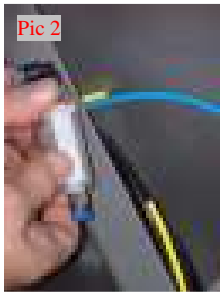

Pic 4

Changing the Inline Filter Element (Trigger Line)

If the unit is ready to blast (Arm/Disarm indicator is green), but does not start when the trigger is pulled, it may indicate the need to change the trigger line inline filter element. To perform this:

1. Locate the filter housing on inner leg of the PHX-150 near the trigger connectors. (pic1)
2. Disconnect the tubing from filter housing push fittings (both ends), then remove filter housing from unit. (pic 2)
3. Using two ¾" wrenches, remove the cap from the filter housing to expose the sintered bronze filter element. (pic 3)
4. Remove filter element**. *Important: Remember proper configuration of internal spring in relation to the element. Improper installation will result in the non-operation of the unit.*** (pic 4)
5. Install new filter element and housing by reversing steps 2-4.


Pic 1

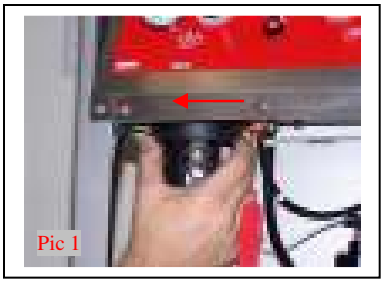

Pic 2


Pic 3


Pic 4

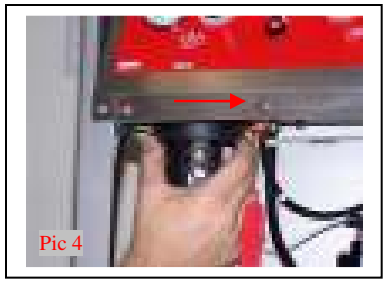
Changing / Adding 10W Oil

1. Turn the lubricator retaining ring counter-clockwise by hand, then lower the bowl/housing away from suction wick. (pic 1)
2. Add 10W tool oil (or equivalent) until level with fill line. (pic 2)
3. Be sure that the O-ring is properly seated in the top of the lubricator bowl. (pic 3)
4. Reinstall the bowl/housing into place. Hand tighten only. Do not over tighten. (pic 4)


Pic 1


Pic 2


Pic 3


Pic 4

Checking / Adjusting the Drive Chain Tension

1. Use a 5/32" hex key wrench to loosen two screws located at the top of the motor/chain guard. Do not remove the screws. (pic 1)
2. Gently tilt the unit forward and remove third screw located at the bottom of the guard. (pic 2)
3. Remove the chain guard to reveal drive chain. (pic 3)
4. Apply pressure to mid-span point. Movement should not be more than 3/32". (pic 4)
5. If tension adjustment is necessary, loosen the two upper hex screws on the motor mounting plate. (pic 5)
6. Locate the drive chain adjustment screw at the very top of the motor mounting plate. (pic 6)

(continued)


Pic 1


Pic 2


Pic 3


Pic 4

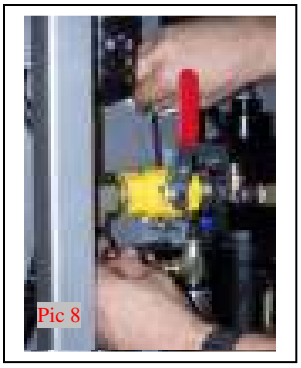

Pic 5


Pic 6

Checking / Adjusting the Drive Chain Tension (cont.)

7. Use a 7/16” box wrench to loosen the adjustment screw retaining nut by turning counter-clockwise. (pic 7)
8. Hold the retaining nut in position and use a 3/16” hex key wrench to adjust the screw (clockwise to increase tension, counter-clockwise to relieve) until proper tension is achieved. (pic 8)
9. Tighten the retaining nut to lock the adjustment screw into place. (pic 9)
10. Tighten the two upper hex screws on the motor mounting plate. (pic 10)
11. Verify that the auger directional switch on motor ratchet is rotated fully clockwise. (pic 11)
12. Install the motor/chain guard into position. (pic 12)
13. Tighten the three screws that secure the guard into place. (pic 13)


Pic 7

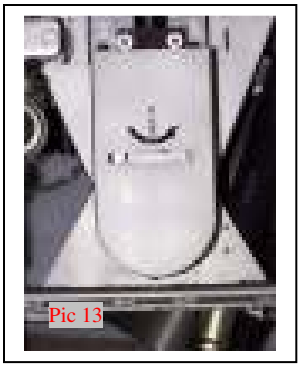

Pic 8


Pic 9


Pic 10


Pic 11


Pic 12


Pic 13

PERIODIC MAINTENANCE

CAUTION! Do not attempt to perform any maintenance or service on your PHX-150 unless safety guidelines and lock out/tag out procedures have been satisfactorily met!

Replacing Airlock Critical Components

Diminished performance or a noticeable drop in blast pressure at the gun may indicate a worn or damaged component in the airlock. Most airlock problems are typically caused by a foreign object (airborne or otherwise) falling through the hopper pellet screen, mixing with the dry ice pellets, and becoming lodged inside the airlock or doing damage as it passes through to the blast hose and gun**.** ***(Note: You can avoid unnecessary expense and repairs by replacing the hopper lid after filling with ice and prior to blasting.)*** In order to properly inspect or replace the critical components, the airlock assembly must be removed from the unit. To do this:

1. Remove air supply hose from the PHX-150. Also remove the gun and blast hose assembly if attached. (pic 1)
2. To avoid spillage, remove the lubricator bowl/housing and set aside. (pic 2)
3. Carefully place the unit flat on the ground with the control panel facing down. (pic 3)
4. Detach the inlet blast air hose coupling from airlock assembly inlet. (pic 4)
5. Remove the airlock motor air supply line from the push fitting. (pic 5)
6. Remove the large cotter pin from the airlock retaining latches. (pic 6)

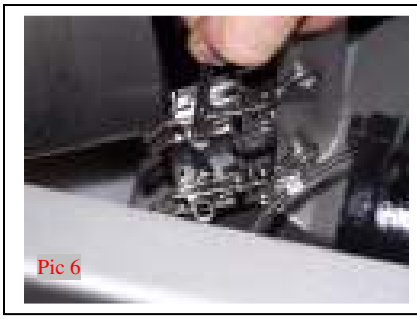

Pic 1


Pic 2


Pic 3


Pic 4


Pic 5


Pic 6

Replacing Airlock Critical Components (cont.)

7. Open airlock retaining latches. (pic 7)
8. Remove complete airlock assembly from unit and move it to a workbench. (pic 8)
9. Use a 3/16" hex key wrench to remove six housing bolts from bottom of airlock assembly. (pic 9)
10. Separate the housing and set bottom half aside. (pic 10)


Pic 7


Pic 8


Pic 9


Pic 10

Rotor:

11. Carefully remove the rotor from the spline and inspect. Replace if damaged. Before installation of new rotor, clean and inspect the pads, motor, spline and internal walls of the housing for damage. If all parts are good, install the new rotor onto the spline. (pic 11)
12. Reinstall airlock assembly onto the PHX-150 by reversing steps 1-10. (text box)


Pic 11

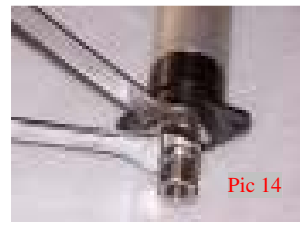
REINSTALL AIRLOCK ASSY. BY REVERSING STEPS 1-10

Airlock Motor / Spline:

13. While the housing is disassembled, inspect the motor and spline. If replacement is necessary, the motor will need to be removed from the housing. (pic 12)
14. Use a ¼" hex key wrench to remove the two mounting screws, then remove the motor assembly from the mounting block. (pic 13)
15. Use two 13/16" wrenches (1 tappet) to remove the spline from the motor and install new one. *(Note: Don't forget the spacer ring between the motor jam nut and the spline!)* (pic 14)
16. Reinstall airlock assembly by reversing steps 1-11. (text box)


Pic 12


Pic 13


Pic 14

REINSTALL AIRLOCK ASSY. BY REVERSING STEPS 1-11

Replacing Airlock Critical Components (cont.)

Airlock Pads:

17. While the housing is disassembled, inspect the airlock pads (2) located in each half of the housing. If damaged, they must be replaced. (pic 15)
18. Remove the pads from the housing. (pic 16)
19. Inspect the O-rings on both pads. Replace if worn or damaged. Before installing new O-rings (or re-using existing ones), apply a thin coat of Dow-Corning 33 lubricant. (pic 17)
20. Make sure that O-rings are seated properly in the pads. (pic 18)
21. Carefully install the pads into the airlock housing. Fully installed, they will be flush with the housing walls, with no part of the O-rings showing. (pic 19)
22. Reinstall airlock assembly onto the PHX-150 by reversing steps 1-11. (text box)


Pic 15


Pic 16


Pic 17


Pic 18


Pic 19

REINSTALL AIRLOCK ASSY. BY REVERSING STEPS 1-11

TROUBLESHOOTING

Symptom	Item Check	Corrective Measure
The PHX-150 will not start.	Air supply valve is not opened.	Open the air supply valve (E-Stop valve).
	The unit is not armed (indicator will be red).	Turn Arm/Disarm switch clockwise (indicator should turn green).
	Pellet screen is not properly installed.	Make sure pellet screen fully engages safety interlock switch when installed.
	Loose or kinked tubing in control panel.	Check for loose or kinked tubes behind panel. Reconnect if necessary.
	Trigger lines improperly connected.	Check trigger lines at machine and at the gun.
	Trigger valve failure.	Check trigger valve for contamination. Clean or replace as necessary. Correct cause of contamination.
	Inline filter plugged (trigger return line).	Check filter and replace element if necessary.
	Contamination in the trigger lines.	Blow out trigger lines. Correct cause of contamination.
The PHX-150 starts, but no ice comes out.	There is no dry ice in the hopper.	Load fresh dry ice into the hopper.
	Ice rate is set too low.	Turn Ice rate regulator clockwise to increase.
	Possible ice bridging inside the hopper.	With pellet screen in place, use poker to break up the bridge. This symptom is generally caused by poor ice quality and high humidity areas.
	Water ice accumulation in hopper.	Water ice forms in high humidity areas or when ice is left in the hopper for long periods of time. Clean and dry the hopper thoroughly before refilling.
	Blast gun or hose plugged.	Decrease blast pressure to 45 psi. Remove blast hose from unit. With trigger lines still attached, trigger the unit to clear ice from the discharge outlet. Reattach hose and remove nozzle from gun. Trigger again to clear ice from hose and gun. Reattach nozzle.
	Incorrect auger rotation. (Auger should turn counterclockwise when viewed from the rear of the unit).	Remove motor/chain guard and turn selector switch on ratchet motor to reverse direction.
	Airlock is not turning.	See section on “Airlock does not turn”- next page.

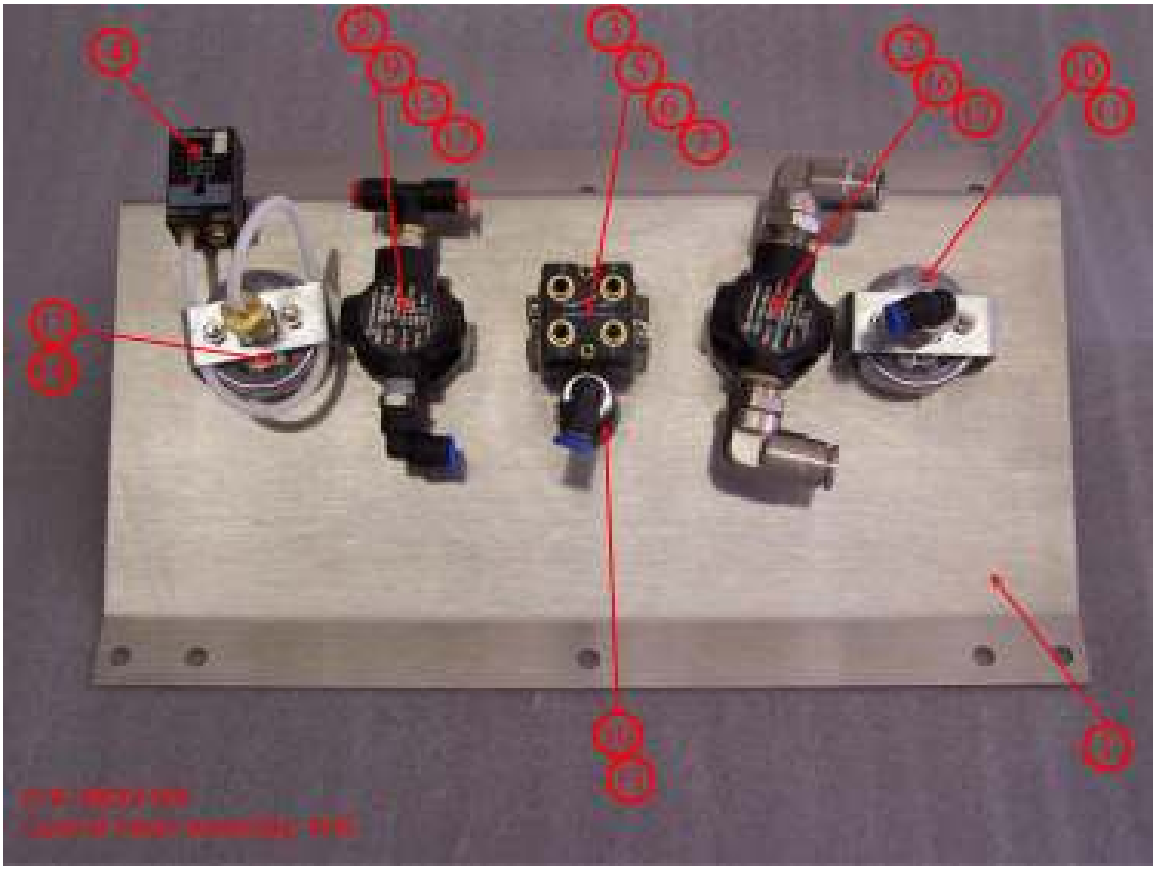
TROUBLESHOOTING (cont.)

Symtom	Item Check	Corrective Measure
Pellets stop flowing after a period of blasting.	There is no dry ice left in the hopper.	Load dry ice into hopper.
	Pellets have bridged over auger inside hopper.	With pellet screen in place, use poker to break up the bridge. Poor ice quality and high humidity generally cause this problem.
	Blast hose or gun plugged.	Decrease blast pressure to 45 psi. Remove blast hose from unit. With trigger lines still attached, trigger the unit to clear ice from the discharge outlet. Reattach hose and remove nozzle from gun. Trigger again to clear ice from hose and gun. Reattach nozzle.
	Auger not turning.	See section "Auger does not turn" below.
	Airlock not turning.	See section "Airlock does not turn" below.
Blast gun plugs repeatedly.	Ice rate set too high.	Decrease ice rate.
	Possible water ice accumulation inside gun.	Defrost, clean, and dry the gun. Check incoming air supply for cause of contamination and correct.
Auger does not turn.	Ice rate set too low.	Increase ice rate.
	Incorrect drive chain tension.	Check and adjust chain tension. (pages 19-20)
	Loss of air supply to the drive motor.	Check supply air to the drive motor input. If needed, contact Phoenix Unlimited for support.
	Supply air is too low.	Make sure supply air is at least 75 psi through a 1" unrestricted line.
Airlock does not turn.	Loss of air supply to the airlock motor.	Check supply air to the airlock motor input. If needed, contact Phoenix Unlimited for support.
	Exhaust muffler is plugged.	Remove, disassemble, clean, and reinstall.
	Excessive contamination of the airlock.	Remove airlock, clean or replace parts.(pages 21-23)
Blast pressure and/or ice rate drops quickly when trigger is pulled.	Air supply line is less than 1" or there is a restriction smaller than 1" between the unit and the compressor.	Check supply to verify a 1" unrestricted line from the unit to the compressor. Distances over 100 feet may even be of larger diameter.
Blast pressure and/or ice rate drops slowly when trigger is pulled.	Indicates an undersized compressor.	If the pressure drop has a significant adverse effect on cleaning performance, a larger compressor may be required.

P/N 30000-001
PHX-150 Dry Ice Cleaning System

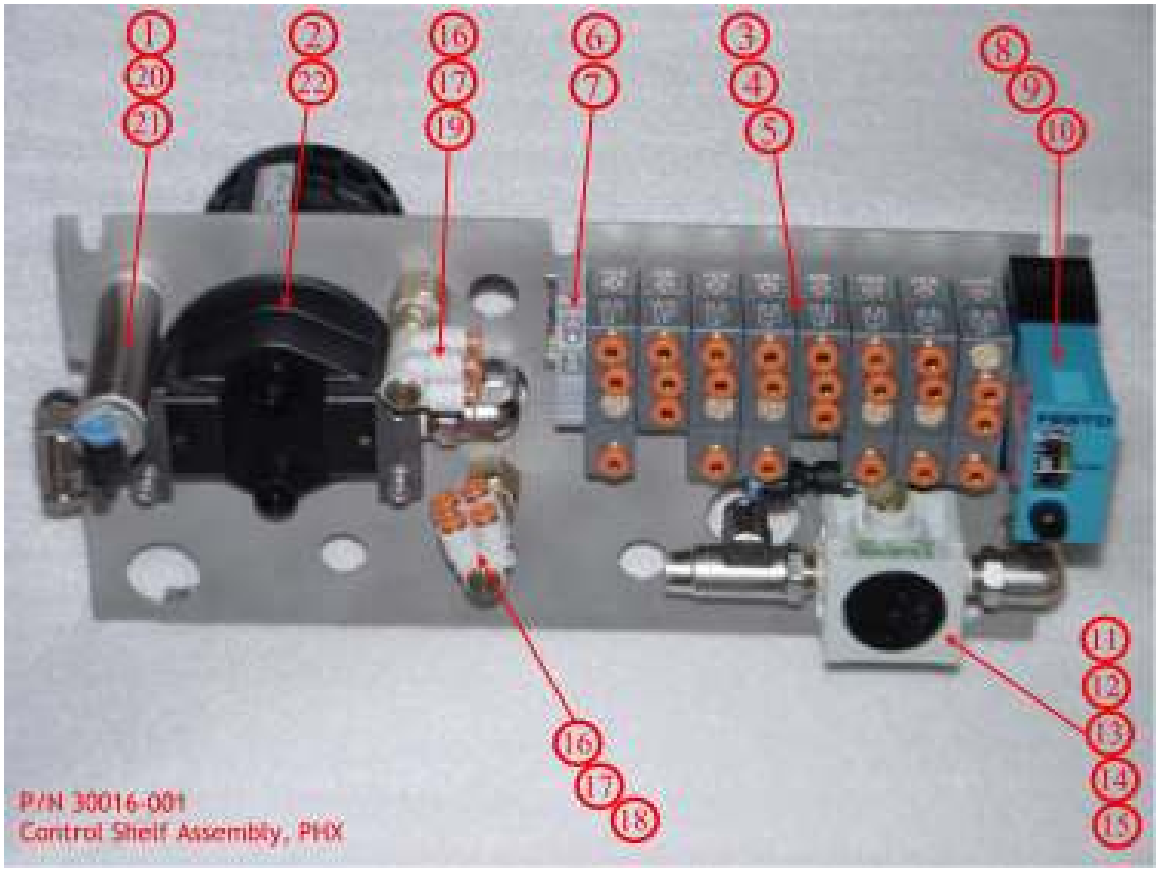
ITEM	P/N	DESCRIPTION	QTY
1	30025-002	Frame,Complete,PHX-150	1
2	30082-001	Lid Assy.,Plastic,PHX	1
3	30002-001	Screen,Pellet,PHX	1
4	30089-001	Poker Assy.,PHX	1
5	30003-001	ValveAssy.,Safety Screen	1
6	30029-001	Control Panal Assembly,PHX-150	1
7	30016-001	Control Shelf Assembly	1
8	30024-001	Air System Assembly,PHX-150	1
9	50061-001	Hose Whip Check	1
10	20013-012	Wheel,12"Dia.	2
11	20009-004	Caster, Conductive	2
12	30017-001	Airlock Assembly,PHX-150	1
13	30006-001	Drive assembly, Auger	1
14	30049-001	Hose Assembly,Airlock Supply	1
15	20011-K35	Bumper,Recessed	2
16	30004-001	Auger,PHX	1
17	30005-001	Bearing,UHMW	1

P/N 30000-001
PHX-150 DRY ICE CLEANING SYSTEM



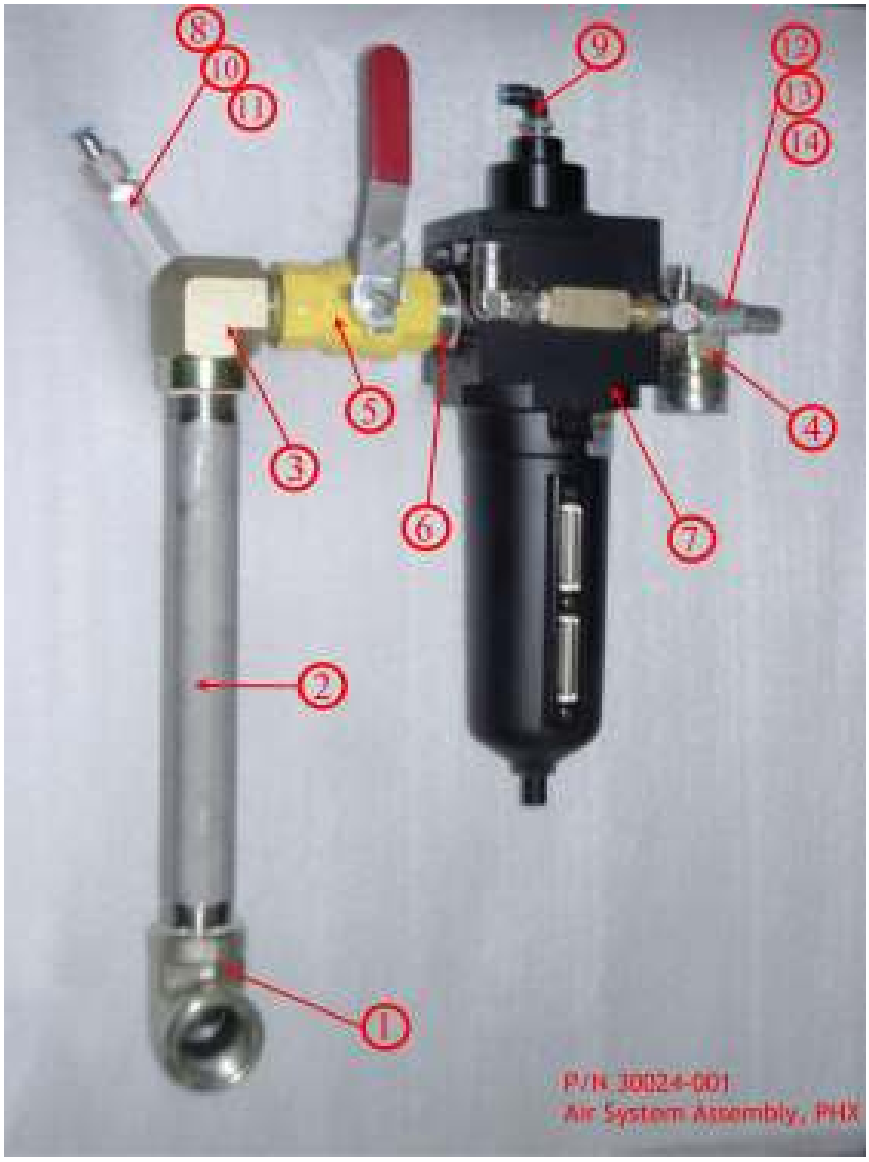
ITEM	P/N	DESCRIPTION	QTY
1	30030-001	Panel,PHX-150	1
2	30032-001	Regulator, Auger Quick Strat	1
3	50006-007	Selector,3 Position,Momentary	1
4	50007-001	Logic Element,"OR"	1
5	50012-015	Mounting Ring for Valve Bodies	1
6	50013-003	Valve Body,Normally Non Passing	1
7	50013-006	Valve Body,Normally Passing	1
8	50016-002	Elbow,Male,5/32T x 1/8"NPT	1
9	50017-002	Tee,Male Swivel,5/32T x 1/8"NPT	1
10	50018-001	Elbow,female,5/32T x 1/8"NPT	2
11	50025-100	Gauge, 1.5",100 PSIG	1
12	50025-160	Gauge, 1.5",160 PSIG	1
13	50027-212	Indicator,Pressure,1/8" NPT	1
14	50034-001	Connector,Female,Barbed,5/32T x 1/4"NPT Brass	1
15	50051-001	Regulator, Relieving,1/4"	1
16	50057-628	Elbow,Male,3/8T x 1/4"NPT	2
17	50069-001	Nut,Regulator	2

P/N 30029-001
Control Panel Assembly,PHX-150



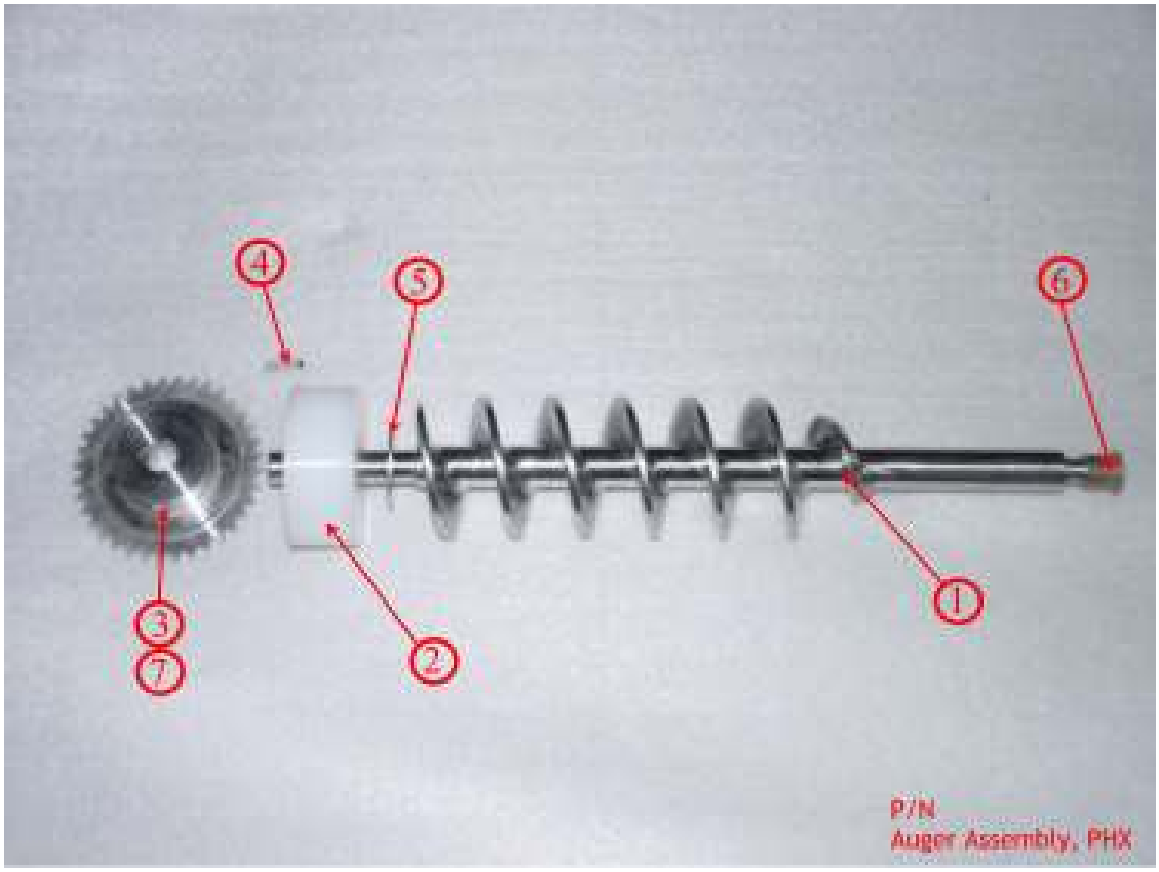
ITEM	P/N	DESCRIPTION	QTY
1	50026-001	Air Reservoir	1
2	50028-001	Lubricator	1
3	50023-001	Logic Element,OR	2
4	50023-003	Logic Element,NOT	1
5	50023-004	Logic Element,YES	5
6	40003-003	Din Rail	7"
7	40002-K12	End Section	1
8	50050-001	Timer,Pneumatic	1
9	50050-002	Base,Timer	1
10	50050-003	Din Mount,Timer	1
11	50044-001	Regulator,1/4"NPT	1
12	50057-628	Elbow,Male,Swivel,3/8T x 1/4"NPT	1
13	50055-628	Tee,Male Run,Swivel,3/8T x 1/4"NPT	1
14	50037-001	Elbow,Street,1/8"NPT,Brass	1
15	50019-002	Y,Male,5/32T x 1/8"NPT	2
16	50030-002	Elbow,4 Way,5/32T x1/4"NPT	2
17	50003-001	Reducer,1/4"NPT x 1/8"NPT, Brass	2
18	50029-004	Bulkhead,Female,1/4T x 1/4"NPT	1
19	50029-002	Bulkhead,Female,5/32T x 1/4"NPT	1
20	50021-002	Speed Controller	1
21	50016-002	Elbow,Male,5/32T x 18"NPT	1
22	50057-638	Elbow,Male,Swivel,3/8T x 3/8"NPT	2

P/N 30016-001
Control She lf Assembly, PHX-150



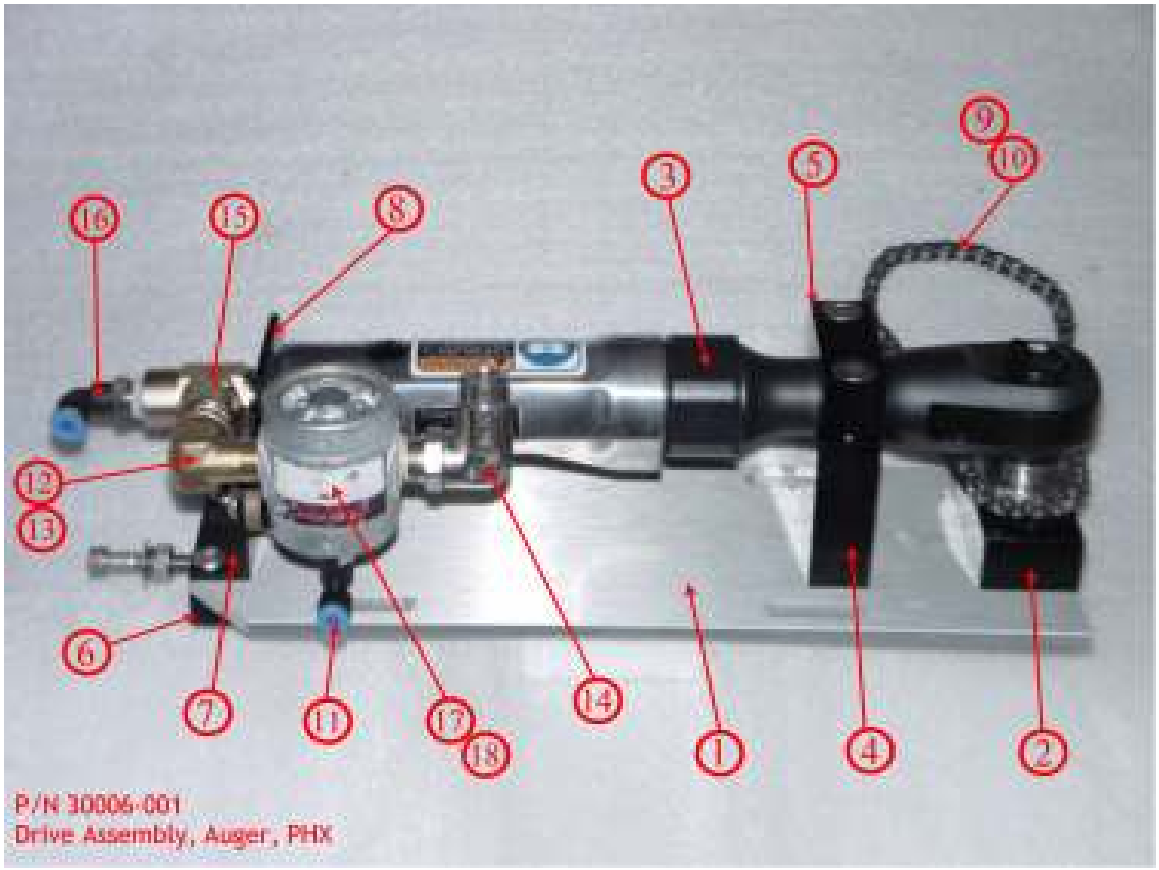
ITEM	P/N	DESCRIPTION	QTY
1	50009-007	Elbow,1"NPT	1
2	50043-105	Nipple,Pipe,1"NPT x 10.5", SS	1
3	30087-001	Elbow,Street,1”NPT,Modified	1
4	50039-016	Elbow,1"NPT x 1"JIC	1
5	50042-016	Valve,Ball,Vented,1"NPT	1
6	50060-221	Nipple,Pipe,1"NPT x 1.5", SS	1
7	30060-001	Filter/Regulator Assembly	1
8	50066-002	Connector,Female,5/32T x 1/4"NPT	1
9	50016-003	Elbow,Male,5/32T x 1/4"NPT	1
10	50067-002	Filter,In-Line,1/4"NPT	1
11	50004-002	Elbow,Male,1/4"NPT,Brass	1
12	50057-628	Elbow,Male,Swivel,3/8T x 1/4"NPT	1
13	50005-004	Tee,Male Branch,Short,1/4"NPT	1
14	50052-218	Regulator,Fitting,1/8"NPT	1

P/N 30024-001
Air System Assembly, PHX-150



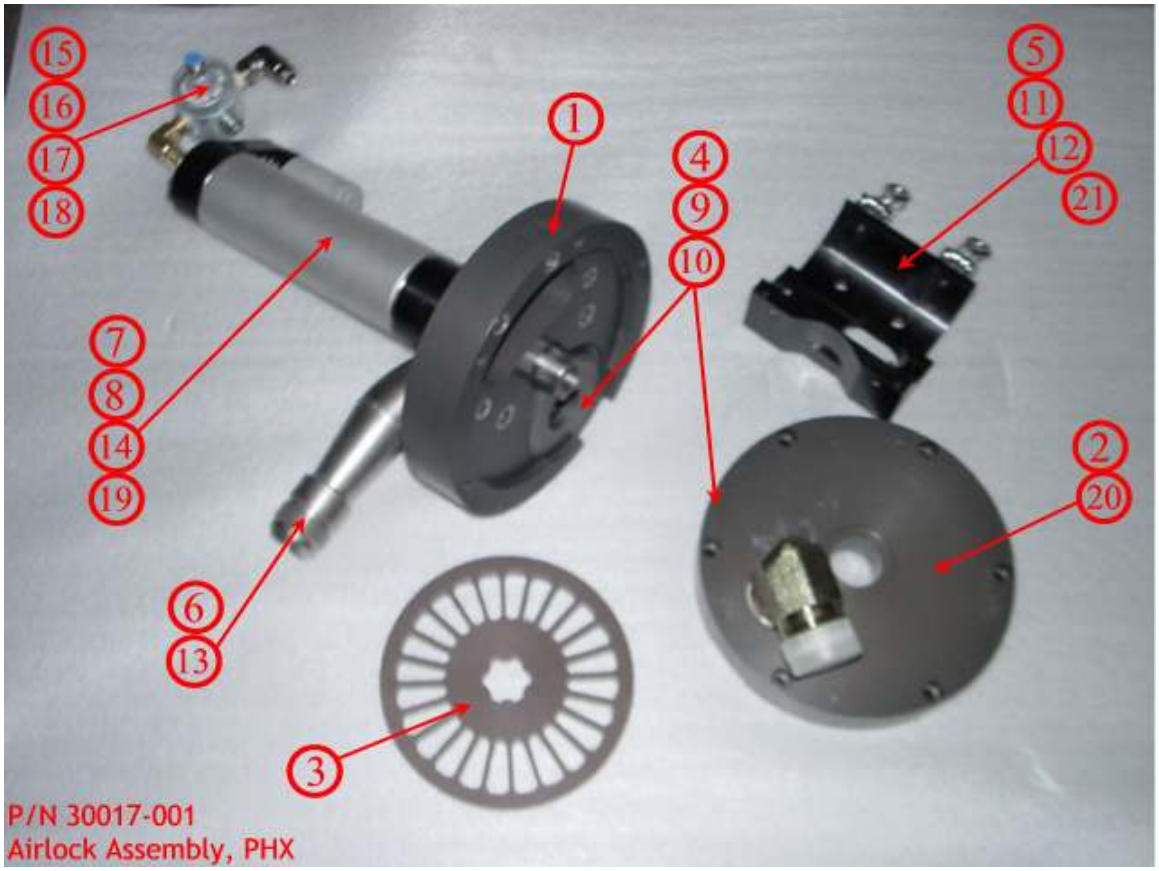
ITEM	P/N	DESCRIPTION	QTY
1	30004-001	Auger, PHX	1
2	30005-001	Bearing,UHMW	1
3	30035-001	Sprocket,Auger,PHX	1
4	30090-001	Key,Auger,PHX	1
5	10019-017	Flatwasher,1/2" x 1 1/4"OD,SS	1
6	20004-008	Bearing,Flanged,Bronze	1
7	10006-240	Screw,Set,Cup Point,10-24 x 3/8	1

Auger,PHX-150



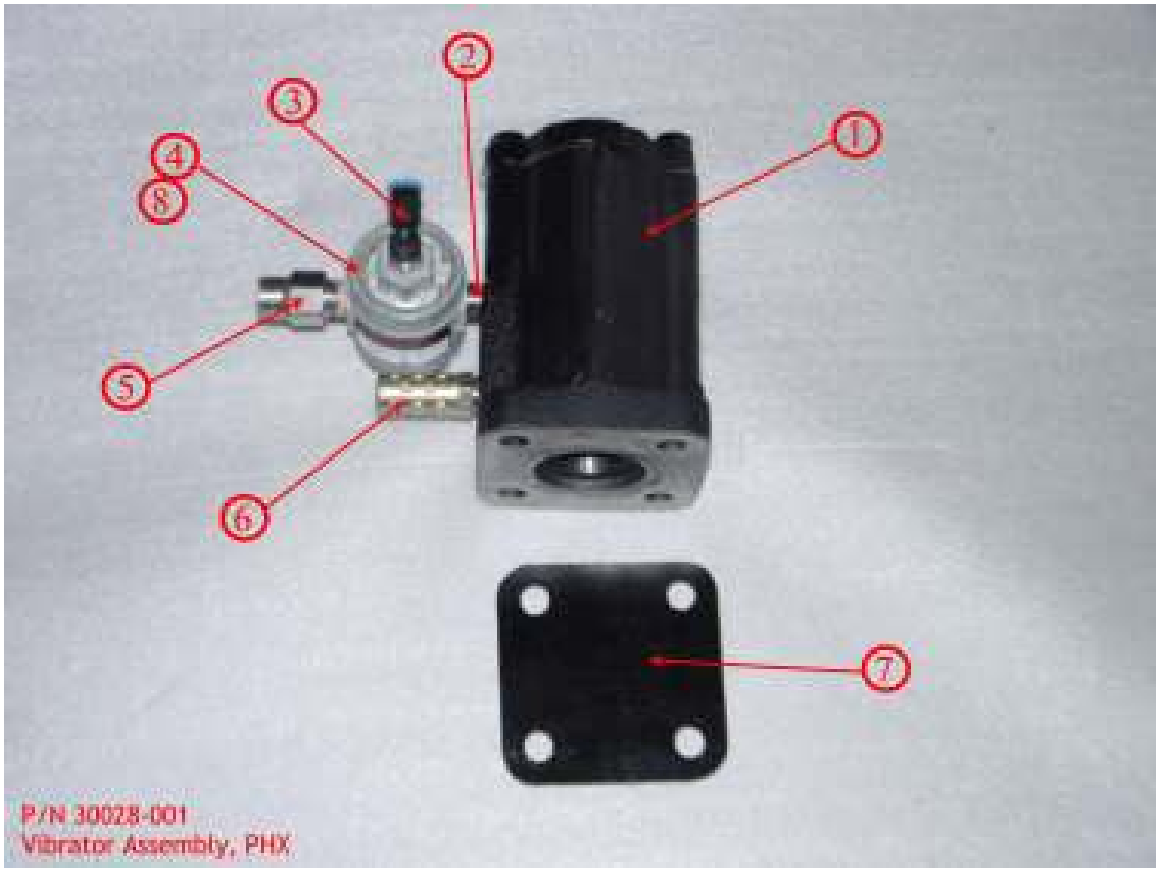
ITEM	P/N	DESCRIPTION	QTY
1	30010-001	Plate,Motor Mount	1
2	30006-002	Bearing and Sprocket Assembly	1
3	30088-001	Ratchet Assembly	1
4	30008-001	Support Block,Auger Drive	1
5	30007-001	Clamp,Support Block,Auger Drive	1
6	30009-001	Tension Block,Auger Drive	1
7	30011-001	Bracket,Auger Drive	1
8	30012-001	Adjustment Plate,Auger Drive	1
9	20006-001	Chain,Drive	1
10	20006-002	Link,Chain	1
11	50016-002	Elbow,Male,5/32 x 1/8"NPT	1
12	50001-005	Elbow,Street,1/4"NPT,Brass	1
13	50060-131	Nipple,Pipe,SS,1/4"NPT	1
14	50057-628	Elbow,Male,Swivel,3/8T x 1/4"NPT	1
15	50040-002	Tee,Street,1/4"NPT	1
16	50016-003	Elbow,Male,5/32 x 1/4"NPT	1
17	50053-001	Valve,Poppet,1/4"NPT	1
18	50002-004	Pipe Plug,1/4"NPT	1

P/N 30006-001
Drive Assembly, Auger,PHX-150



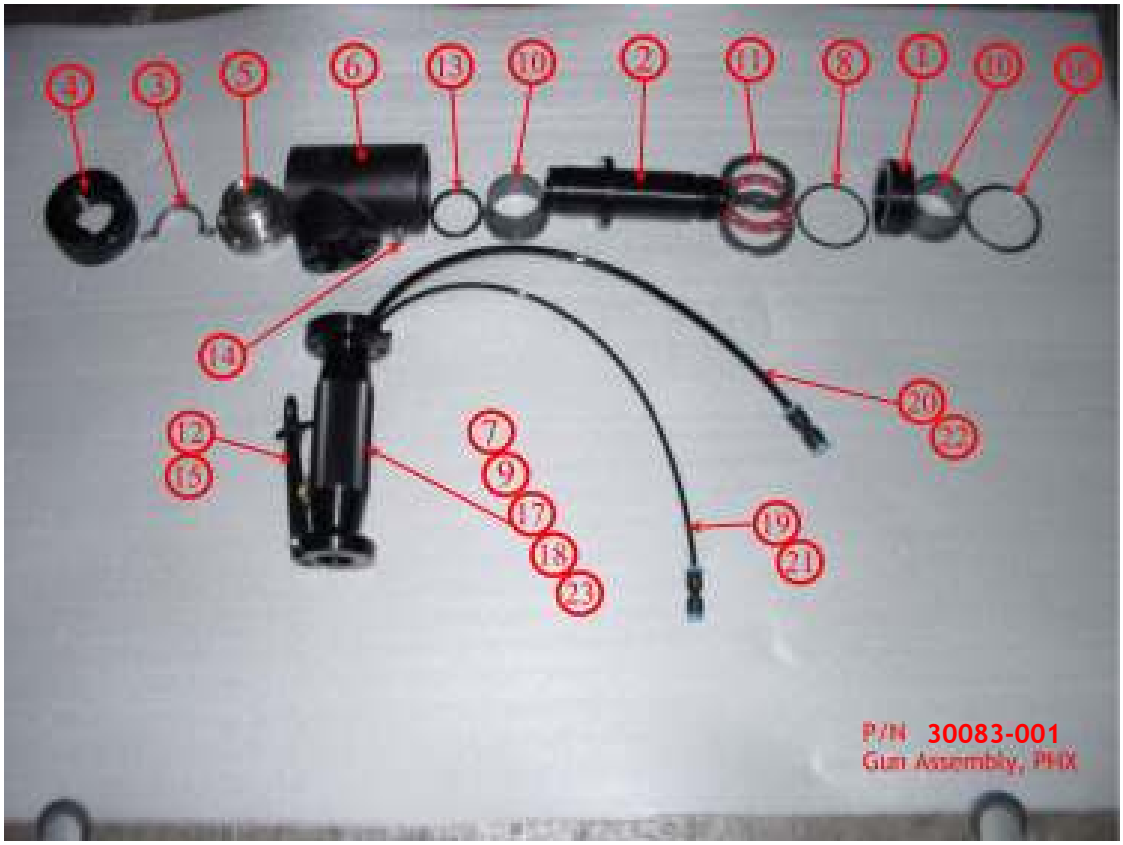
ITEM	P/N	DESCRIPTION	QTY
1	30019-001	Airlock Housing, Inlet Side	1
2	30018-001	Airlock Housing, Outlet Side	1
3	30022-001	Rotor, Airlock	1
4	30034-001	Pad, Airlock Sealing	2
5	30021-001	Saddle, Airlock Mount	1
6	30036-001	Discharge Tube	1
7	30023-001	Shaft, Airlock Drive	1
8	30068-001	Motor Adapter, Airlock	1
9	10013-035	O-Ring	2
10	10011-327	Quad-Ring	2
11	10014-T11	Eyebolt	2
12	20010-A41	Latch, Draw	2
13	10013-222	O-Ring	1
14	50047-100	Motor, Airlock	1
15	50053-001	Valve, Poppet	1
16	50004-002	Elbow,Male,1/4"NPT	1
17	50057-628	Elbow,Male,Swivel,3/8T x 1/4"NPT	1
18	50015-002	Connector,Male,5/32T x 1/8"NPT	1
19	30020-001	Spacer, Airlock Motor	1
20	50039-016	Elbow,1"NPT x 1"JIC	1
21	10025-B10	Dowel Pin	2

P/N 30017-001
Airlock Assembly, PHX-150



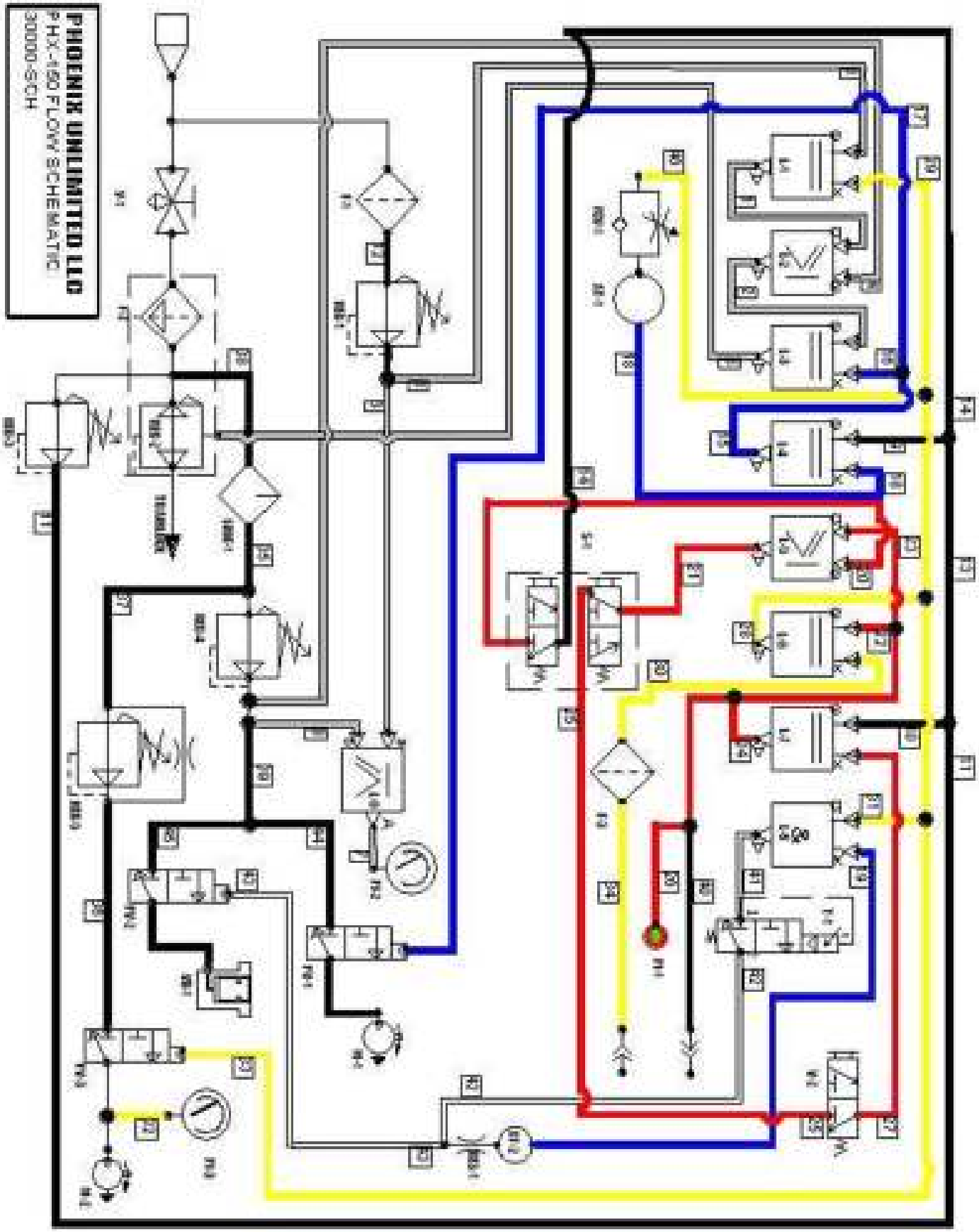
ITEM	P/N	DESCRIPTION	QTY
1	50063-003	Vibrator,Impact	1
2	50060-131	Nipple,Pipe,SS,1/4"NPT	1
3	50016-002	Elbow,Male,5/32T x 1/8"NPT	1
4	50053-001	Valve,Poppet,1/4"NPT	1
5	50056-628	Connector,Male,3/8T x 1/4"NPT	1
6	50059-002	Muffler,Exhaust,1/4"NPT	1
7	30031-001	Pad,Vibrator,PHX	1
8	50002-Z04	Pipe Plug,1/4"NPT	1

P/N 30028-001
Vibrator Assembly,PHX-150



ITEM	P/N	DESCRIPTION	QTY
1	30051-001	Retaining Coller,Gun,PHX	1
2	30052-001	Shaft,Ice,Gun,PHX	1
3	30053-001	Cap, Nozzle Retainer	1
4	30054-001	Retainer,Cap	1
5	30055-001	Outlet,Gun	1
6	30056-001	Gun Body	1
7	30057-001	Handle,Gun	1
8	30067-001	Shim,Gun	1
9	30086-001	Trigger Valve Assembly	1
10	20008-001	Bearing,Flanged,I-Glide	2
11	20002-001	Bearing,Thrust,Gun	1
12	20001-001	Trigger Lever	1
13	10030-219	O-Ring, Double Seal,Viton	1
14	10007-H06	Screw,Button Head Socket	1
15	10028-006	Spring, Torsion	1
16	10029-034	Retaining Ring, Spiral	1
17	50014-002	Connector,Barbed,10-32 x 1/4T	1
18	50014-001	Connector,Barbed,10-32 x 5/32T	1
19	50022-2BK	Tubing,Polyurethane,5/32	2
20	50070-4BK	Tubing,Polyurethane,1/4" x 1/8"ID	2
21	50065-001	Union,5/32T	1
22	50065-003	Union,1/4T	1
23	30091-001	Gasket,Gun Handle	1

P/N 30083-001
Gun Assembly,PHX-150


PHOENIX UNLIMITED LLC
PHX-150 FLOW SCHEMATIC
3000D-SCH

PHX-150 FLOW SCHEMATIC COMPONENT REFERENCE

REFERENCE	DESCRIPTION	FUNCTION	PART #
L-1 L-3 L-4 L-6 L-7	LOGIC ELEMENT-YES	CONTROL SYSTEM	50023-004
L-2 L-5	LOGIC ELEMENT-OR	CONTROL SYSTEM	50023-001
L-8	LOGIC ELEMENT-NOT	CONTROL SYSTEM	50023-003
T-1	TIMER	VIBRATOR CONTROL	50050-001
V-1 V-2	BALL VALVE, RELIEVING LEVER OPERATED VALVEN	E-STOP PELLET SCREEN	50042-016 30003-002
FCV-1	FLOW CONTROL VALVE	PURGE DELAY	50021-002
AT-1 AT-2	AIR TANK AIR TANK	PURGE DELAY VIBRATOR CONTROL	50026-001 50026-002
S-1	SELECTOR SWITCH	SYSTEM ARM	SEE PANEL
F-1 F-2 F-3	FILTER FILTER FILTER	BLAST PILOT MAIN TRIGGER	50067-002 30060-001 50067-001
PI-1	PRESSURE INDICATOR	SYSTEM ARM	50027-212
RES-1	RESTRICTOR	VIBRATOR CONTROL	50036-001
REG-1 REG-2 REG-3 REG-4 REG-5	REGULATOR, PILOT REGULATOR, CUSTOM REGULATOR, MICRO REGULATOR REGULATOR, CUSTOM	BLAST AIR BLAST AIR CONTROL SYSTEM AIRLOCK/PURGE ICE FEED RATE	50051-001 30060-001 50052-218 50044-001 30032-001
LUBE-1	LUBRICATOR	MOTORS	50028-001
L-9	LOGIC ELEMENT-OR	CONTROL SYSTEM	50007-001
PV-1 PV-2 PV-3	POPPET VALVE	AIRLOCK MOTOR VIBRATOR AUGER	50053-001
M-1 M-2	MOTOR	AIRLOCK AUGER	50047-100 30088-001

30000-SCH.DOC

RECOMMENDED SPARE PARTS

Preventive Maintenance (Class I)

Part#	Description	Qty.
50067-00E	Element, Inline Filter, sintered bronze	5
50067-001	Filter, Inline, 1/8" NPT	1
50067-002	Filter, Inline, ¼" NPT	1
50008-E01	Element Kit, 40 Micron (for 50008-001)	2

Repair (Class II)

Part#	Description	Qty.
30032-001	Regulator, Ice Rate, ¼" NPT	1
50051-001	Regulator, Pilot, Blast Air	1
50036-001	Restrictor, Inline, Brass	1
50053-001	Valve, Poppet, ¼" NPT	1
50046-001	Valve, 3-Way, Finger Actuator	1
50028-004	Rebuild Kit, Lubrication (for 50028-001)	1
50027-212	Indicator, Pressure, 1/8" NPT (Rotowink)	1
50045-2BK	Tubing Nylon 11, 5/32" SPC	50 ft.
50045 4BK	Tubing Nylon 11, ¼" Black	50 ft.
30086-001	Trigger Valve Assembly	1
30022-001	Rotor, Airlock, PHX-150	1

Critical Downtime (Class III)

Part#	Description	Qty.
50047-100	Motor, Airlock, PHX-150	1
50013-003	Valve Body, Normally Non-Passing	1
50013-006	Valve Body, Normally Passing	1
50007-001	Logic Element, "OR"	1
50044-001	Regulator, ¼" NPT	1
50023-001	Logic Element, "OR", (Metal Work)	1
50023-003	Logic Element, "NOT", (Metal Work)	1
50023-004	Logic Element, "YES", (Metal Work)	1
50021-002	Speed Controller	1
30088-001	Ratchet Assembly, PHX-150	1
30081-001	Chain Assembly	1
30006-002	Bearing and Sprocket Assembly	1
30034-001	Pad, Airlock, PHX-150	2
10013-035	O-ring, Silicone (for 30034-001)	2
10011-327	Quad-Ring, Silicone (for 30034-001)	2
30092-001	Hose Assembly, 25', Blast, PHX-150	1

SPECIFICATIONS

Dimensions:	14” x 18.5” x 45.75” (W x L x H) (36cm x 43cm x 116cm)
Dry Weight:	140 lbs. (63.5 kg)
Hopper Capacity:	Over 100 lbs. (45.5 kg) of pellets
Ice Consumption Range:	3 lbs. – 7 lbs. (1.4 kg – 3.2 kg) / min.
Supply Air Pressure Range:	70 psi – 125 psi (4.8 bar – 8.6 bar)
Air Consumption Range:	100 CFM – 250 CFM
Blast Pressure Range:	50 psi – 125 psi (2.8 bar – 8.6 bar)
Inlet Air Temperature:	175°F (79°C) maximum
Inlet Air Connection:	1” NPT

Customer Support:
(909) 278-2229

PHOENIX
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