ULTRAVAC® 225

Vacuum Chamber Packaging Machine

UltraSource®

Owner's Manual

860982 • Revision Z • 07/2020

EQUIPMENT AND SUPPLIES
FOR THE MEAT AND FOOD INDUSTRY

TABLE OF CONTENTS

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ULTRASOURCE LLC

Ultravac® 225

Vacuum Chamber Packaging Machine
Owner's Manual

Introduction

Congratulations on your Ultravac® 225 vacuum packaging machine purchase. This machine was designed to provide years of trouble free operation and to help in the packaging of your quality food products.

Please read this owner's manual to gain the maximum benefits of your vacuum packaging machine and its different components.

A note about cleaning: Given all the various ways equipment is used in different environments, we recommend the owner consult sanitation experts on how to properly clean each piece of machinery in their plant and to do bacterial testing to insure that the equipment is cleaned properly.

For Sales, Call:
Phone 816.753.2150 • Fax 816.753.4976
Toll-Free 800.777.5624

For Replacement Parts, Call:
Phone 816.753.2150 • Fax 816.561.2854
Toll-Free 800.777.5624

For Operational Supplies, Call:
Phone 816.841.3000 • Fax 816.753.4976
Toll-Free 888.997.6824

For Technical Support, Call:
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General

This owner's manual contains information pertinent to your Ultravac® 225. Basic instructions and maintenance information is provided. Please read carefully. Failure to do so could result in bodily injury and/or damage to the equipment.

Receiving Problems: As in all cases, before signing the bill of lading, be sure all items have been received as listed and there is no damage in shipment. If needed, a claim must be made immediately to the local truck line office and noted on the bill of lading.

Please fill in the information from the bill of lading and the product identification tag.

Model No. _____

Serial No. _____

Ship Date: _____

Owner: _____

Location: _____

Electrical service size for your Ultravac® 225 (check one):

_____ 110 Volt, Single phase, 60 Hz

_____ 230 Volt, Single phase, 50/60 Hz

Please fill in the serial numbers from the pump identification tag:

Serial No. _____

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Specifications

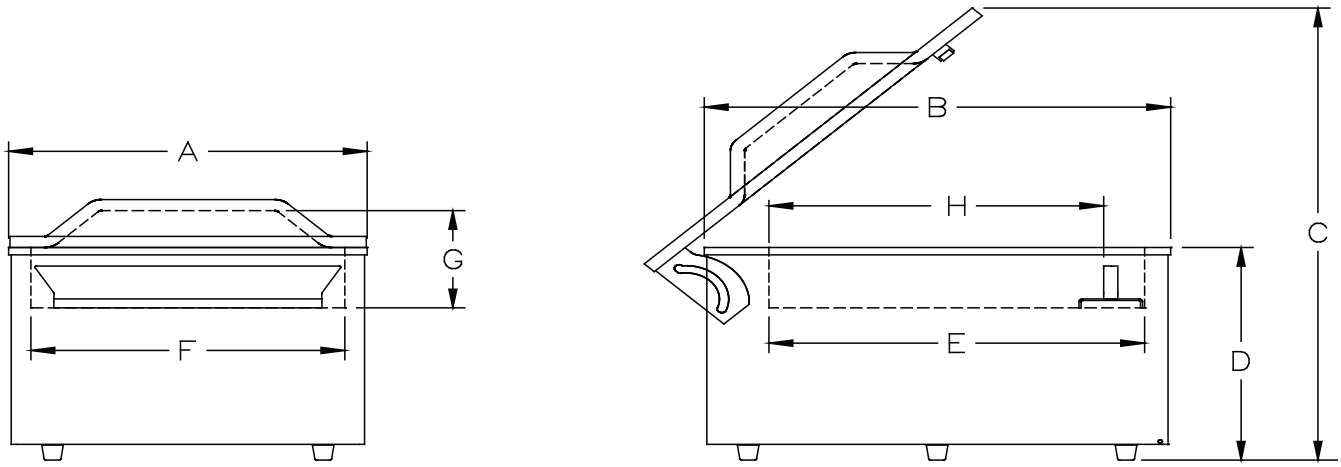

Figure 0.1

Length (A):	483mm (19-in.)
Width (B):	625mm (24.625-in.)
Maximum Height (C):	826mm (32.5-in.)
Working Height (D):	365mm (14.375-in.)
Seal Bar Length:	406mm (16-in.)
Chamber Length (E):	505mm (19.875-in.)
Chamber Width (F):	422mm (16.625-in.)
Chamber Height (G):	171mm (6.75-in.)
Between Seal Bar and Back of Chamber (H):	451mm (17.75-in.)
Between Seal Bars (double seal bar option):	416mm (16.375-in.)
Vacuum Pump:	25m³/h (15cfm) 0.95kW (1.25-hp)
Net Weight:	81-kg, 178-lbs.
Electrical Connection:	See Power Requirements in Section 2
Capacity:	20-30 seconds per cycle

Product Safety

The procedures and guidelines herein must be followed precisely to avoid problems that can result in property damage, personal injury, or death. If you have any questions related to this information, please contact UltraSource Technical Service at 800.777.5624.

⚠ DANGER Hazardous voltage.
Disconnect and lockout power before servicing machine or cleaning. Do not remove panels unless power has been disconnected, locked out, and tagged out at risk of electric shock hazard.

⚠ DANGER Hazardous voltage.
Improper connection of the equipment-grounding conductor can result in a risk of electric shock.

⚠ WARNING

Read and understand owner's manual before using this machine. Failure to follow operating instructions could result in personal injury or damage to equipment.

⚠ WARNING Explosion hazard.
Do not use a gas with an oxygen content greater than 25% with gas flush option.

⚠ CAUTION Tip over hazard.
Only let the front foot of the chassis hang over the edge of the table.

⚠ CAUTION Cleaning agents.
Do not get the cleaning agents in eyes, on skin, or on clothing. Always wear rubber gloves, goggles, and protective clothing when contact is likely. Consult product manufacturer for specific details.

Signal words used in classification of potential hazards are defined as follows:

DANGER**:** Indicates an imminently hazardous situation, which, if not avoided, may result in death or serious injury.

WARNING**:** Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION**:** Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. Caution also indicates actions that may cause property damage.

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Food Safety

While this machine is often used for food packaging and vacuum cooking, there are inherent risks associated with this packaging technique that could cause serious illness or death to the consumer of the food product. If you are using this machine for a food application, you must consult with a reputable food technologist or specialist in vacuum/modified atmosphere packaging (M.A.P.) to review the safety of your application.

Gas Flush

In order to ensure proper shelf life of the food product packaged in this machine, you must contact a reputable food technologist or specialist in vacuum/modified atmosphere packaging (M.A.P.) to review and develop the appropriate gas mixture for your package, and you must perform quality control and gas analysis on your finished M.A.P. packages.

General Safety Guidelines

Obvious safety guidelines should be observed.

- Be sure to turn off power to your packaging machine before any maintenance work is performed.
- Follow approved Lockout/Tagout procedures.
- Place machine on a flat, stable surface.
- Do not place tools, parts, or other objects on or inside machine while operating.

Startup

Unpacking

1. Carefully remove crate from the skid.
2. Remove machine from skid.
3. Wipe down outside of the machine.

Power Requirements

The owner must supply the correct single phase power source in accordance with the National Electric Code. The machine is rated at 110 volt, 60 Hz, 15 amps; or 220 volt, 50 Hz, 7 amps. Do not use an extension cord to connect the machine to the wall outlet.

Grounding Instructions

The Ultravac® 225 must be grounded. In the event of malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. The unit is equipped with an equipment-grounding conductor cord and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠ DANGER Hazardous voltage.
Improper connection of the equipment-grounding conductor can result in a risk of electric shock.

The equipment-grounding conductor outer surface is green with or without yellow stripes. If repair or replacement of the cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal. Check with a qualified electrician or UltraSource Technical Service technician if the grounding instructions are not completely understood, or if there is doubt as to whether the unit is properly grounded. Do not modify the plug provided with the unit – if it will not fit the outlet; have a proper outlet installed by a qualified electrician.

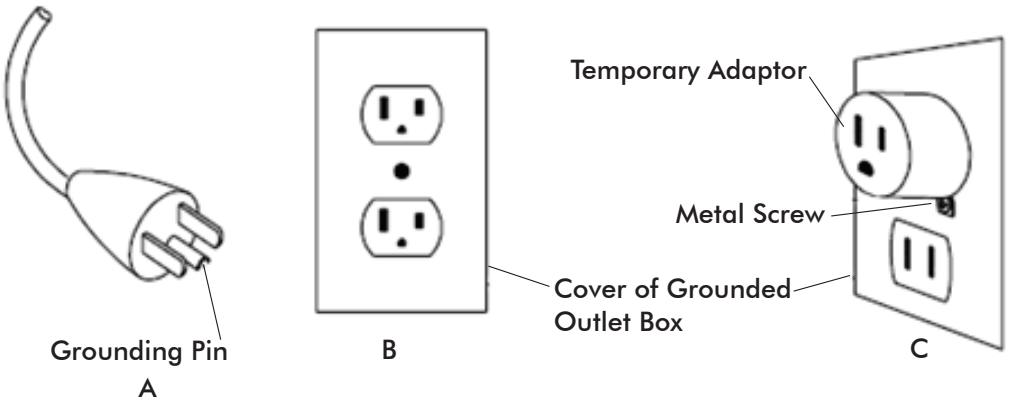

Figure 2.1

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Grounding Instructions

For 110 Volt Units

This unit is for use on a nominal 110V circuit, and has a factory equipped grounding plug (see Figure 2.1A on page 2.1). A temporary adaptor (see Figure 2.1C on page 2.1), may be used to connect this plug to a two-pole receptacle (see Figure 2.1C on page 2.1) if a properly grounded outlet is not available. The temporary adaptor should be used only until a properly grounded outlet (see Figure 2.1B on page 2.1) can be installed by a qualified electrician. The green rigid ear extending from the adaptor must be held in place by the metal screw on a properly grounded outlet box cover.

For 220 Volt Units

This unit is for use on a nominal circuit having a rating more than 110V; or is rated more than 15 amps and used on a nominal 110V circuit, and has a factory equipped grounding plug. No adapter should be used with this unit. If the unit must be reconnected for use on a different type of electric circuit, the reconnection should be made by qualified service personnel; and after the reconnection, the appliance should comply with all local codes and ordinances.

Figure 2.1

Vacuum Pump

It is essential to check the oil level daily prior to first use and to change the oil after every 500 hours or three months of operation, whichever comes first. The oil should be clear enough to see through. If the oil is milky, change the oil immediately. Read the oil level with the machine turned off. Oil may be added until the level reaches the MAX level shown in the sight glass on the pump. Refer to the pump manual supplied with the machine for details on changing the oil.

NOTE: ALL ULTRAVAC CHAMBER MACHINES ARE SHIPPED WITH OIL IN THE PUMP. ALTHOUGH, THE FACTORY RECOMMENDS CHECKING THE OIL LEVEL PRIOR TO FIRST USE!

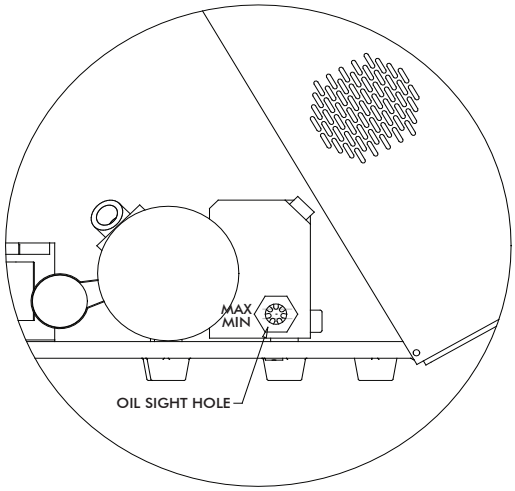

Figure 2.2

Gas Flush Connection

The owner must supply a suitable regulator with a range of 0 to 60 p.s.i. We recommend using food-grade flexible hose with a 1/4-in. I.D. and a maximum length of 15-ft. Maximum regulator pressure is 20 p.s.i.

⚠ DANGER OXYGEN ENRICHED USE

ULTRASOURCE TRAY SEALING AND VACUUM CHAMBER MACHINES ARE NOT DESIGNED FOR USE WITH OXYGEN ENRICHED PROCESS GASES. ANY APPLICATION THAT REQUIRES A PROCESS GAS CONTAINING 25% OR MORE OXYGEN SHOULD CONTACT UltraSource Technical Service AT 800.777.5624 AS RETROFIT OPTIONS ARE REQUIRED.

RUNNING THIS MACHINE WITH AN OXYGEN ENRICHED PROCESS GAS WITHOUT THE
NECESSARY RETROFIT KIT COULD CAUSE SEVERE INJURY, DAMAGE, OR DEATH.

ULTRASOURCE TRAY SEALING AND VACUUM CHAMBER MACHINES THAT ARE RETROFITTED WITH THE NECESSARY KIT WILL HAVE A DECAL ABOVE OR BESIDE THE GAS SUPPLY CONNECTION INDICATING THE MACHINE'S READINESS TO RUN OXYGEN ENRICHED PROCESS GASES.

Checking Vacuum Pump Rotation

Caution: Check oil level of pump before starting pump (please refer to pump manual). To check the direction of the pump rotation, briefly engage the "POWER ON" switch and observe the motor fan at the end of the pump. The fan should rotate as indicated by the arrow on the fan cover. To correct the rotation, switch any two phases in the plug.

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Operation

Placement of Product

For best sealing results, it is important to:

- Check the pump oil level **daily.**
- Select a pouch that fits the product.
- Carefully load the product into the pouch.
- Keep the product and the product residue away from the seal area of the pouch.
- Place the product as far into the pouch as possible.
- Maintain an equal amount of the product above and below the seal bar (see Figure 3.1 below on use of filler plates).
- Use Filler Plates for raising the height of the product.
- Lay the pouch flat on the seal area, keeping the pouch free of wrinkles.
- Place the pouch so that the open end is inside the chamber when the lid is closed.

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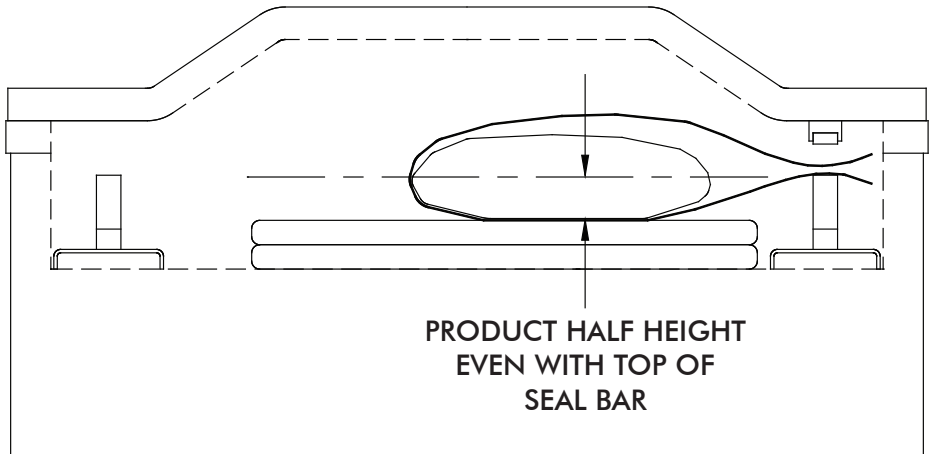

Figure 3.1

Operation with Analog Control Panel

The analog control panel is shown below, figure 3.2.

The range for timed vacuum is 0 to 55 seconds and is controlled by the Vacuum Potentiometer. We suggest an initial setting of “3” on the dial.

Seal impulse is the length of time the seal bar is turned on and can range from 0 to 2 seconds. The impulse time is controlled by the Seal Potentiometer. UltraSource recommends an initial setting of “6” on the potentiometer. This setting will vary according to the thickness of the pouch. Thinner pouches will require a lower setting while thicker pouches will require a higher setting.

Experiment with both settings to achieve the best results.

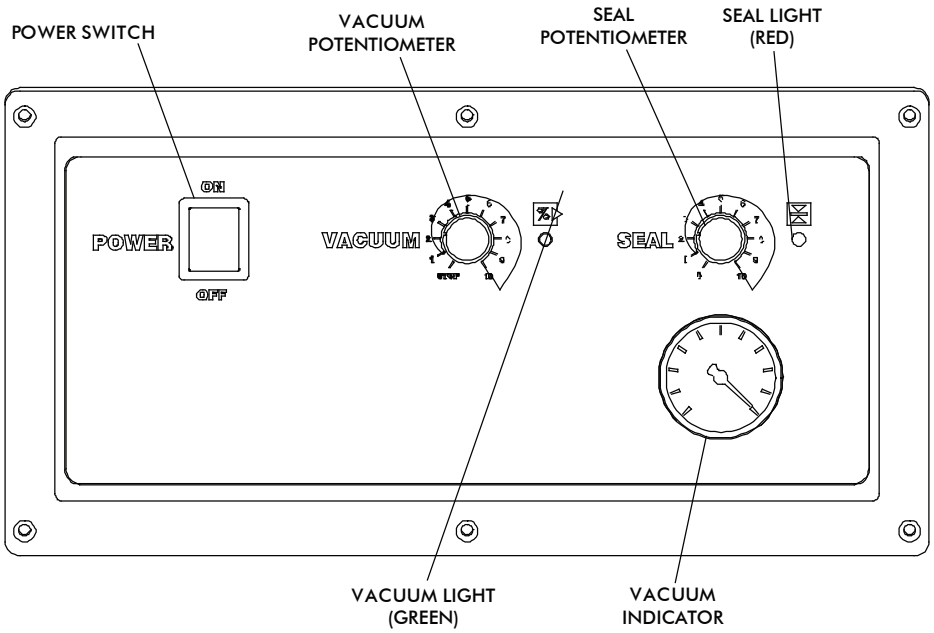

Figure 3.2

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Operation with Digital Control Panel

The embedded microprocessor controls each sequence of the packaging operation. Settings for the vacuum, gas, and sealing are entered as parameters through the keypad. This allows the user to custom program every step of the packaging process. The precise vacuum and gas pressures are controlled by a pressure based sensor. The vacuum pressure, gas pressure, and seal time are displayed on a large 16-character LCD backlit readout, which is easily readable in all lighting conditions. As each sequence is performed, the real-time pressure level or cycle time is displayed.

The digital front panel can save up to ten pre-programmed routines, which can be retrieved at any time for specific packaging applications. With the supervisor security feature turned on, these programs cannot be inadvertently changed.

The VACPLUS option allows the operator to run the pump from 0 to 20 seconds after the set vacuum level is achieved.

The Gas Flush option allows the operator to introduce an inert gas into the chamber after the vacuum stage. This option can be used as a filler to prevent crushing of the product after sealing, as a means to prolong shelf life or as a means to maintain desirable product appearance.

The digital front panel has an auto stop, which will automatically seal if the preset vacuum is not reached. This feature decreases the cycle time and optimizes the vacuum level of each product.

The digital front panel, which includes the keypad, illuminated display, and microprocessor, uses sealed components and is conformal coated in a moisture-proof coating. The digital front panel meets or exceeds the requirements of NEMA 4. The front of the digital display is sealed and flush for easy cleaning.

The digital control has both pulsed vacuum and pulsed venting options for fragile product.

The digital control has a maintenance screen for testing valves and a special loop option for multiple vacuum/gas cycles before sealing.

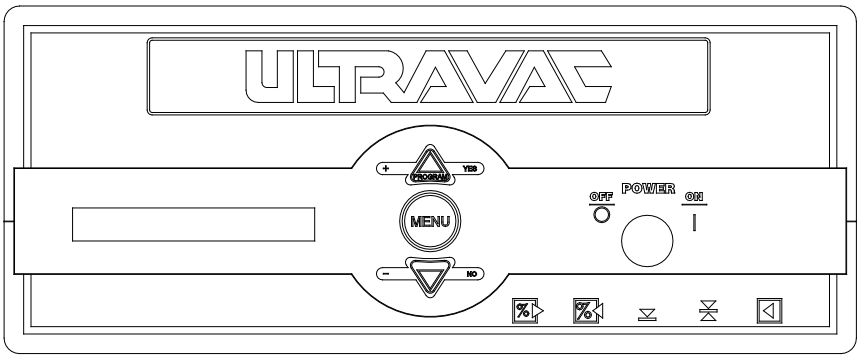
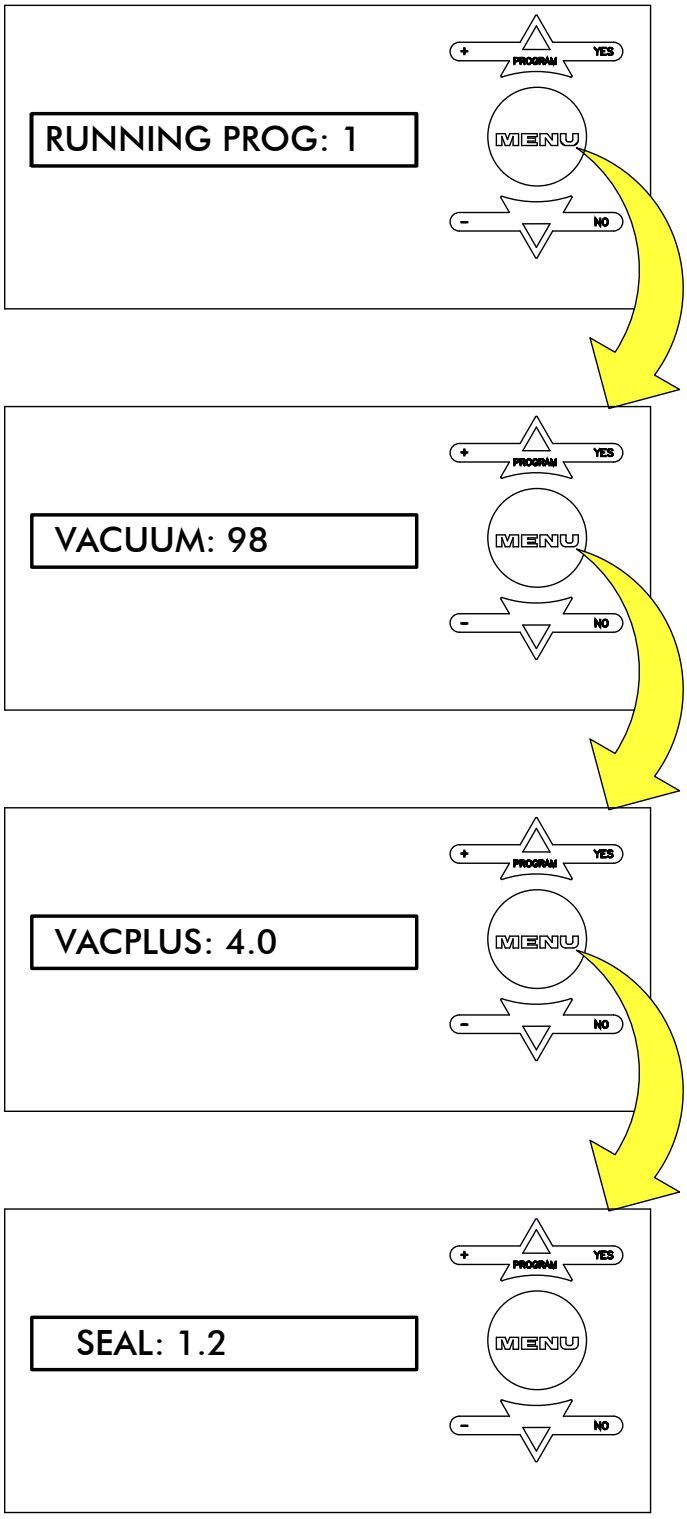


Figure 3.3

Operator Menu on Digital Panel

NOTE: If the supervisor has set security on, these settings cannot be changed.



This is the Main Menu screen. When the machine starts up, the last program that ran will be the current program shown in the window. To set the operating parameters for the program shown, press the MENU key.

VACUUM is set to % vacuum using the UP and DOWN Arrow Keys.
The range is 30% to 99%.
Press the MENU key.

VACPLUS may be set from 0 to 20 seconds. A setting greater than 0 allows the pump to continue evacuating the chamber (for the specified number of seconds) after the pressure in the chamber has reached the % vacuum set in the vacuum menu.
Press the MENU key.

The SEAL setting is in seconds. Use the UP and DOWN arrow keys to change the seal time. The range is 0 to 2 seconds.
Press the MENU key.

Figure 3.4

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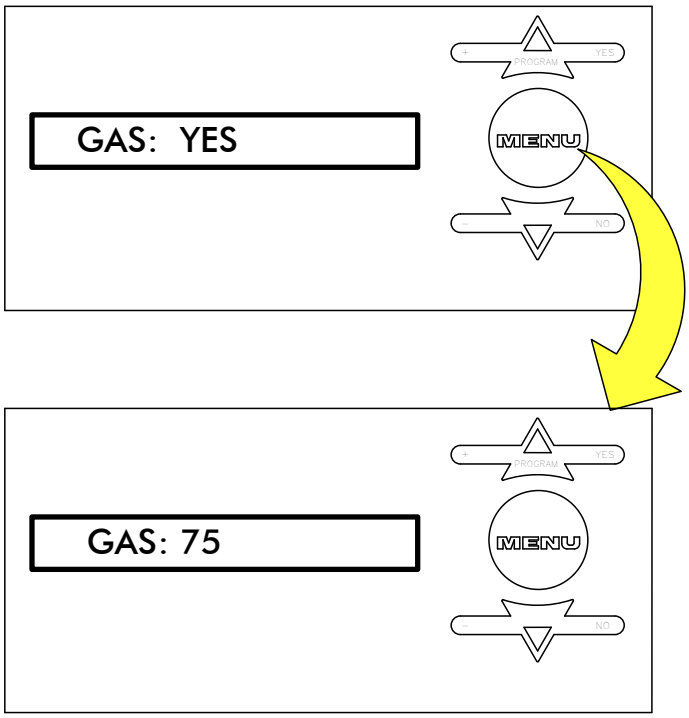
Operator Menu on Digital Panel (continued)



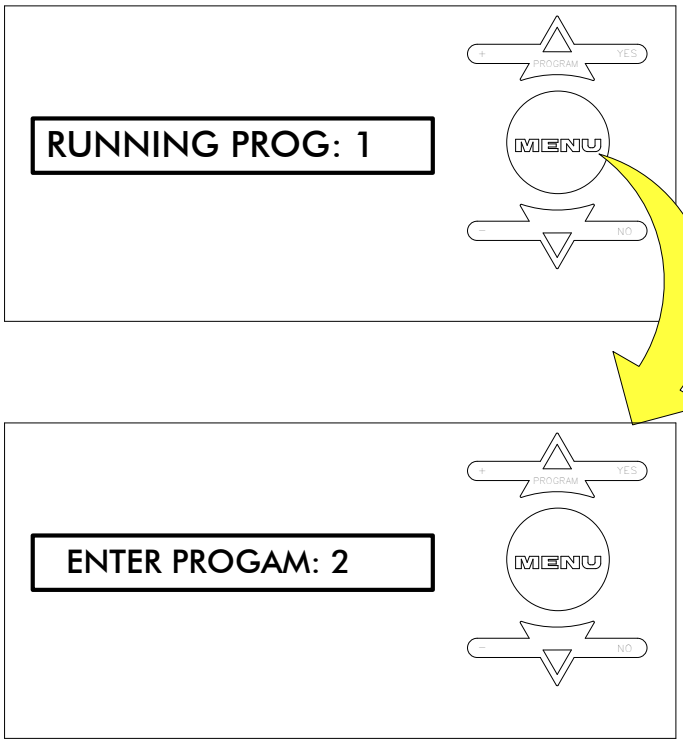
If the machine is equipped with the GAS option, it can be turned on or off by pressing the UP or DOWN arrow keys. Press the MENU key.

GAS is set to % gas using the UP and DOWN arrow keys. This value also corresponds to the vacuum reading inside the chamber. It is recommended to use pulse vent when gas flushing to a low % vacuum. The range is 98% to 30%. Press the MENU key.

Figure 3.5

⚠ WARNING Explosion hazard.
Do not use a gas with an oxygen content greater than 25% with gas flush option.

Selecting a New Program



From the Main Menu, use the UP and DOWN arrow keys to select a new program.

Press the UP arrow key to switch to Program 2 (or any of the ten programs)

New parameters may be set for vacuum, seal time, and gas for Program 2 (following the procedure described in the previous example) or simply close the lid on the machine and run Program 2.

Figure 3.6

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Operation with Touch Screen

The touch screen control panel allows the user more options than the digital control panel. The embedded microprocessor controls each sequence of the packaging operation. Settings for the vacuum, gas, and sealing are entered as parameters through the keypad. This allows the user to custom program every step of the packaging process. The precise vacuum and gas pressures are controlled by a pressure based sensor. The vacuum pressure, gas pressure, and seal time are displayed on a large 4.3" LCD touch screen, which can be read easily in all lighting conditions. As each sequence is performed, the real-time pressure level or cycle time is displayed.

The touch screen panel can save up to 99 pre-programmed routines, which can be retrieved at any time for specific packaging applications. [With the supervisor security feature turned on, these programs cannot be inadvertently changed.]

The VACPLUS option allows the operator to run the pump from .1 to 6 seconds after the set vacuum level is achieved.

The Gas Flush option allows the operator to introduce an inert gas into the chamber after the vacuum stage. This option can be used as a filler to prevent crushing of the product after sealing, as a means to prolong shelf life or as a means to maintain desirable product appearance.

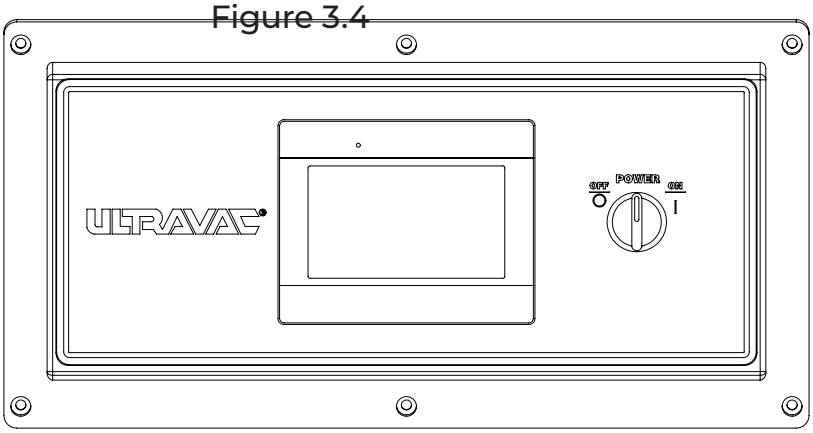
The touch screen panel has an auto stop, which will automatically seal if the preset vacuum is not reached. This feature decreases the cycle time and optimizes the vacuum level of each product.

The touch screen panel meets or exceeds the requirements of NEMA 4. The front of the touch screen is sealed and flush mounted for easy cleaning.

The touch screen has both pulsed vacuum and pulsed venting options for fragile product.

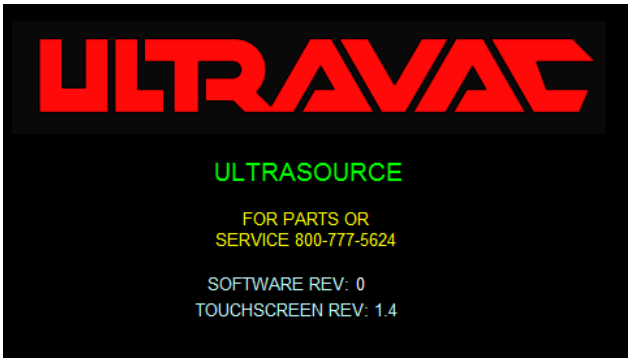
The touch screen has a maintenance screen for testing valves and a special loop option for multiple vacuum/gas cycles before sealing.

Figure 3.4

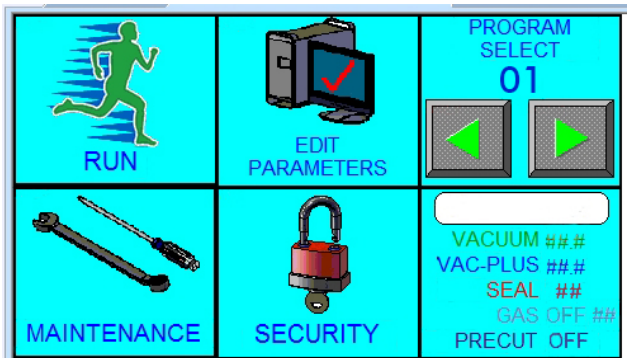


Operation with Touch Screen (continued)

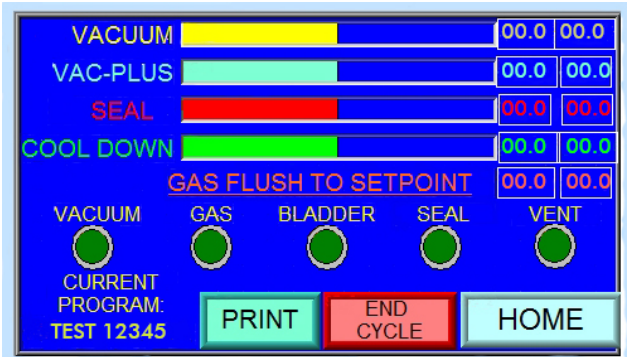
NOTE: If the supervisor has set security on, program settings cannot be changed.



This is the splash screen. When the machine starts up, this screen will display for a period of time during bootup. Once the bootup sequence has been completed, the screen will automatically change to the Main Menu.



This is the Main Menu. This screen allows access to all of the other functions of the machine. A program can be selected from this menu, and run from this menu. Maintenance, Security, and Program Parameters can also be edited from this menu if the correct level of access is used.



This is the RUN Screen. This screen shows the status of the program that is currently being run, as well as the name of that program.

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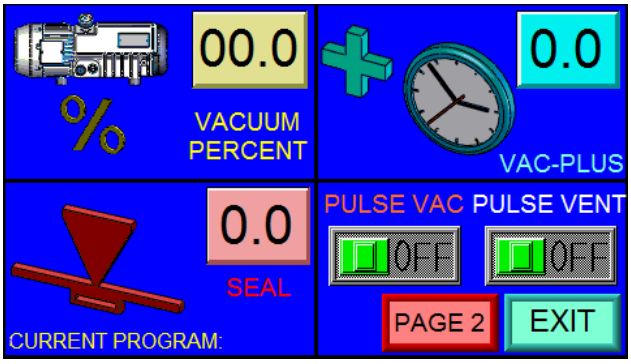
Operation with Touch Screen (continued)

NOTE: If the supervisor has set security on, program settings cannot be changed. Some options may not apply to every machine.



This is the Edit Parameters screen. Every program consists of multiple parameters. These parameters are defined on the Edit Parameters screen for each saved program.

VACUUM PERCENT:
This defines the percentage of vacuum to achieve prior to sealing. The range is 30% to 99%.

VAC-PLUS:

This may be set from 0 to 20 seconds. A setting greater than 0 allows the pump to continue evacuating the chamber (for the specified number of seconds) after the pressure in the chamber has reached the % vacuum set in the vacuum menu.

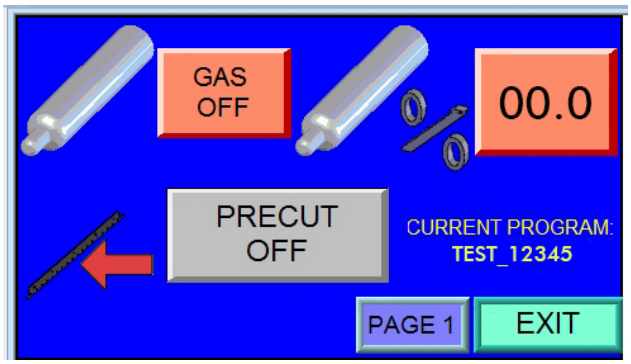
SEAL TIME:
The seal time setting is in seconds. The range is 0 to 2 seconds.

PULSE VAC:
Pulse Vac allows for a more controlled vacuuming process. Rather than simply opening the vacuum valve for a continuous vacuum, the valve is opened and closed repeatedly until the chamber reaches the set “Pulse Vac” vacuum level as defined in the “Maintenance” screen.

PULSE VENT:
Pulse Vent allows for a more controlled venting process. Rather than simply opening up the valve for a continuous vent the valve is opened and closed repeatedly until the chamber vents back to the “Pulse Vent” pressure setting as defined in the “Maintenance” screen.

Operation with Touch Screen (continued)

NOTE: If the supervisor has set security on, program settings cannot be changed. Some options may not apply to every machine.



GAS OFF:
The Gas state button tells whether Gas Flushing is turned on or off. Enable Gas by turning this button to the ON position.

GAS %:

Gas is set to % gas by pressing the value button on the touch screen and directly editing the value using the provided keypad. This value also corresponds to the vacuum reading inside the chamber. It is recommended to use pulse vent when gas flushing to a low % vacuum. The range is 0.1% to 99%.

PRECUT OFF:

If equipped, This activates or deactivates the Precut knife option

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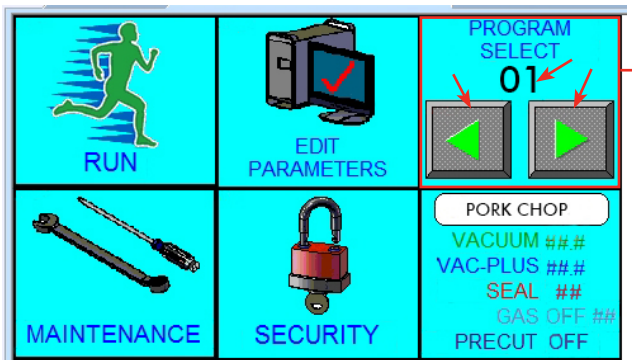
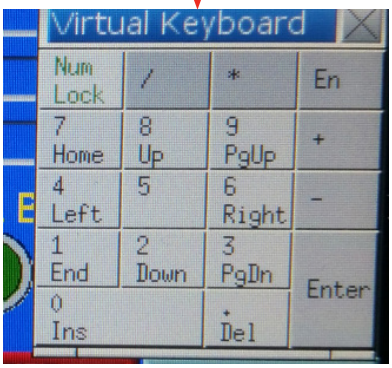
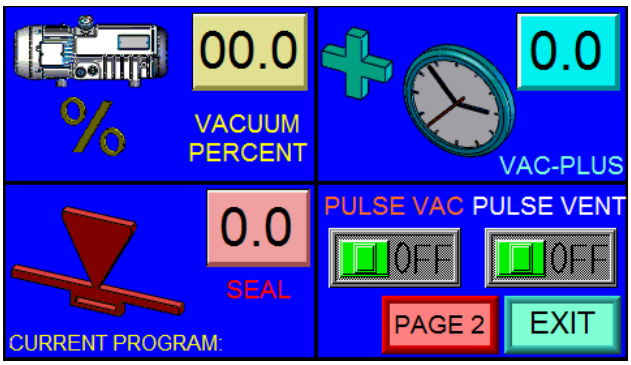
Operation with Touch Screen (continued)

NOTE: If the supervisor has set security on, program settings cannot be changed. Some options may not apply to every machine.





Program selection:
The Program Select feature has 99 different user definable presets. To set a program number, use the left and right arrows, or press on the program select number to bring up a keypad for number selection.. Once the program number you desire has been selected, press on the White box to pull up the keyboard screen, enter a name for your program (up to 9 characters) and press enter. You will be returned to the main menu.



Press Edit Parameters. From the Edit Parameters screen, enter the desired settings for your product requirements. When finished, press Exit. Your parameters are now saved to the program number you selected.

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Sealing with Air-Assist

If your machine is equipped with regulators for air-assisted sealing, set the air pressure regulator to 20 p.s.i. increasing to a maximum of 40 p.s.i. While a good seal can be obtained without air-assist, use air-assist when:

- Using shrink pouches
- Packaging a product that easily contaminates the seal area of the pouch
- Trying to overlap pouches
- Wrinkles cannot be avoided in the seal area
- Using the Double Seam Seal Option

Gas Flush Option

Gas flushing is the introduction of an inert gas into the chamber after the vacuum stage is finished. Gas can be used as a filler to prevent crushing of the product after sealing as a means to prolong shelf life, or as a means to maintain desirable product appearance. Commonly used gasses include nitrogen, carbon dioxide, or a mixture of both. Consult your local gas supplier to select the proper gas for your product.

⚠ WARNING Explosion hazard.
Do not use a gas with an oxygen content greater than 25% with gas flush option.

Double Seam Seal Option

All machines are equipped with standard seal bars having a single seal element per seal bar. The double seam seal bars have two seal elements per seal bar. We recommend using air-assisted sealing with this option to achieve best results.

Maintenance

Prior to Cleaning

Every environment and application is different; therefore, UltraSource cannot provide cleaning instructions to guarantee microbiological sanitation. UltraSource requests that the owner of this machine consult with sanitation experts to review the unit working in their particular environment to develop a robust cleaning schedule and methodology, followed by bacterial testing to ensure satisfactory cleaning procedures are followed.

Cleaning Recommendations

Before cleaning the machine, turn power off; disconnect the main power, and lockout the connection.

⚠ DANGER Hazardous voltage.
Disconnect and lockout power before servicing machine or cleaning. Do not remove panels unless power has been disconnected and locked out at risk of electric shock hazard.

Check with the detergent and sanitizer manufacturers that their products are compatible with the listed materials.

⚠ CAUTION Cleaning agents.
Do not get the cleaning agents in eyes, on skin, or on clothing. Always wear rubber gloves, goggles, and protective clothing when contact is likely. Consult product manufacturer for specific details.

Never hose down the machine. Damage caused by hosing or high pressure washing is not covered under warranty.

1. **Filler Plates:** Remove filler plates. The filler plates are made from polyethylene. Clean, sanitize, and dry. High pressure water spray can be used on the filler plates.
2. **Lid and Backup Strip:** The lid is constructed of acrylic. Use only nonabrasive soap and water. Do not use window sprays or kitchen scouring compounds. The backup strip is made of silicone. Clean, sanitize, and dry.
3. **Seal Bars:** Remove the seal bars by first lifting them up off of the guide rods. Remove the wire connectors from the adapter clips on the seal bar and remove the seal bar from the machine. The seal bars are made of aluminum and phenolic. Clean, sanitize, and dry.
4. **Chamber and Base:** The chamber is made of 304 stainless steel and the base is made from polyurethane. Clean, sanitize, and dry, including under the seal bar bladder.
5. Clean under the machine.
6. Reinstall the seal bar.
7. Use bacteriological testing to insure cleaning process.

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Vacuum Pump Maintenance

Consult the pump manufacturer's manual provided with the machine for detailed information.

Seal Bar Maintenance

The following illustrations show replacement of the seal elements for the seal bars.

Step 1.

Remove the seal bars from the machine. Pull off the Teflon® tape strip and discard. Clean off any remaining Teflon® tape adhesive using acetone or an equivalent solvent.

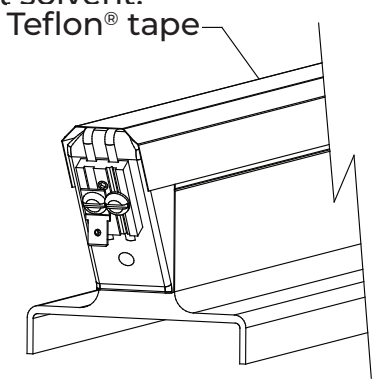

Figure 4.1

Step 2.

Using a 2mm Allen wrench, loosen the set screws for the cut-off wire and the seal element on both ends of the seal bar and discard.

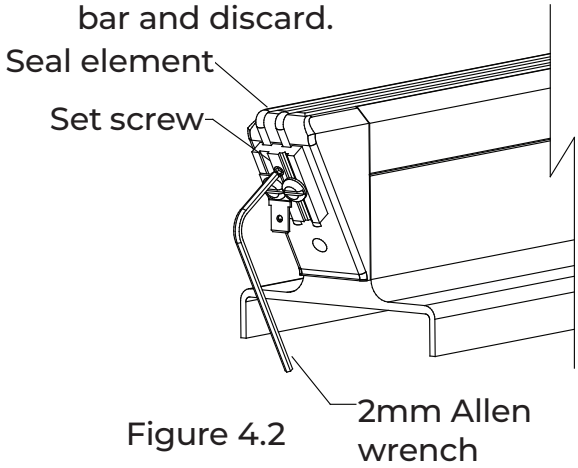

Figure 4.2

Step 3.

Using the tightening tool, tighten the seal bar wire by turning the tightening tool counter clockwise. Once the seal bar wire is tight, retighten the screws on the retention block. Once complete, apply a new Teflon® tape strip.

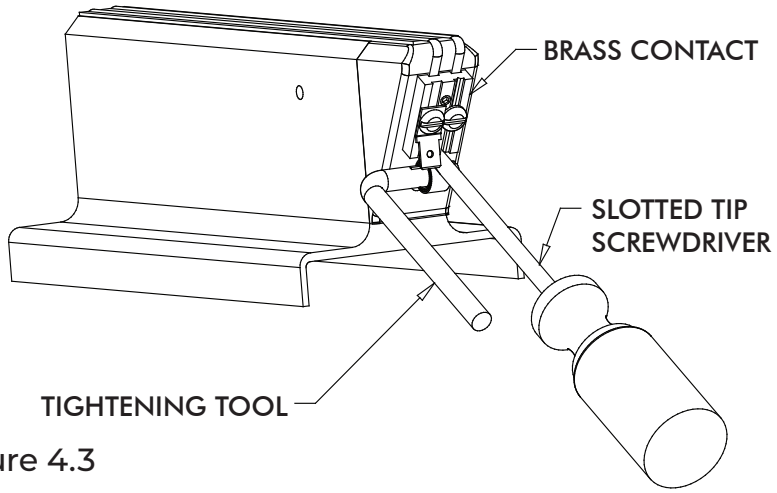

Figure 4.3

Reading the Indicators

If your machine is controlled by a digital control module (with touch pad), this design aids in troubleshooting. The digital panel has indicator lights mounted on the front below the ON/OFF switch. The indicator lights correspond to the operating devices and should turn on and off in the following sequence when the machine lid is closed:

1. Vacuum Pump [C-1]
2. Gas Flush Valve [SOL-3] (optional)
3. Seal Bladder Valve [SOL-2]
   (stays on until completion of cycle)
4. Seal Impulse Contactor [C-2]
5. Ventilation Valve [SOL-1]

The device should be operating when the light is illuminated. If the lights illuminate in the proper sequence, but there is still a problem, look for the problem in the operating device itself. If the lights do not sequence properly, look for a problem in the control module.

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Troubleshooting

Problem	Indications	Remedy
Machine will not start	Green power “ON” light not lit when switch is turned on	Make sure that the power requirements match those given on the nameplate. Also, check fuse F-2; replace if blown.
	Vacuum pump does not run	Make sure that the power requirements match those given on the nameplate
No vacuum	When lid is closed, indicator light (VAC) is “OFF” on the control module	Check lid switches LS-1 for proper adjustment
	Vacuum not pulling lid down	Check intake screen in vacuum pump hose barb for blockage, pieces of bags, labels, bone, etc.
	Longer vacuum cycle times	Check intake screen in vacuum pump hose barb for blockage. Check oil level.
No gas flush (optional)	If indicator light (GAS) is lit	Check for proper gas pressure going into gas inlet
		Check for proper operation of gas flush valve (SOL-3)
	If indicator light (GAS) is not lit	Check gas flush potentiometer on analog control module or possible defective digital control panel
Chamber not venting (lid will not open)	Lid will not open and red indicator light “VENT” on control module is lit	Check ventilation valve SOL-1 for proper operation
	“VENT” indicator light is not lit	Check cool down potentiometer on analog control module or possible defective digital control panel
NOTE: Lid can be released by pulling the hose off of the vacuum gauge to remove product.		

Please contact UltraSource Technical Service at 1.800.777.5624 for Touchscreen troubleshooting procedures

Troubleshooting (continued)

Problem	Indications	Remedy
Improper or no sealing	Seal bladder light on control module is lit, but the seal bar does not go up	Check to make sure that the regulator knob is turned fully clockwise or, if air-assist is used, set to the recommended pressure
		Check seal bladder valve SOL-2 for proper operation
	The seal bar is not heating up even though the red seal light on the front panel comes on	Check seal bar connection points and clips for corrosion and proper tension
	The red seal light on the front panel either does not light for the proper length of time (½ to 1 second) or does not light at all	Check for broken seal element
		Check seal bar fuse F-1 located on the analog or digital panel. If the machine is 110VAC with two seal bars, F-1 is located on the chassis.
		Make sure the seal impulse potentiometer is set high enough or check for possible defective digital control panel

NOTE: For proper sealing, three things must occur:

1. The seal bar must place adequate pressure between the seal bar and the backup strip.
2. The seal element must heat up sufficiently to fuse the pouch.
3. The pouch must be allowed to cool for a time to ensure a good “set.”

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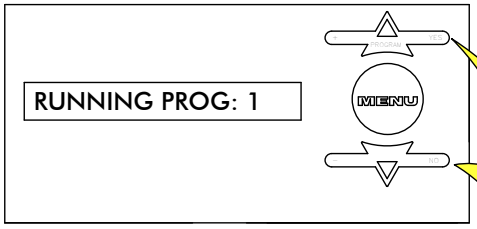
Supervisor Menu on Digital Panel

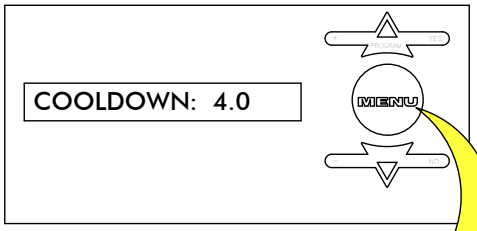
Untrained personnel should not alter any setting in the supervisor menu.



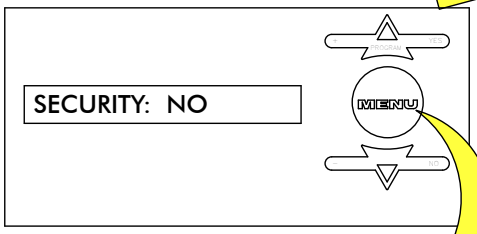
This is the Main Menu screen. When the machine starts up, the last program that was run will be the current program shown in the window.

Press and hold down both arrow keys for at least three seconds to enter the supervisor menu.

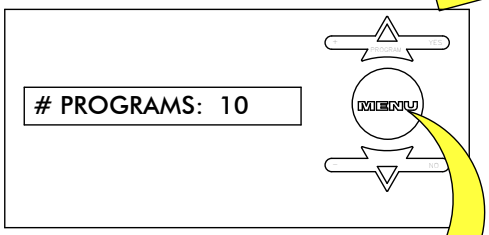
The following are parameters that can only be set in the supervisor menu.



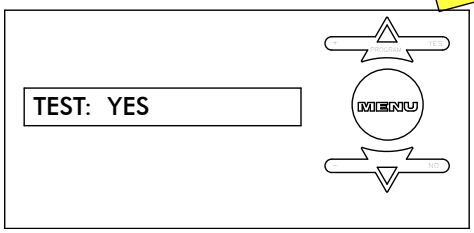
COOLDOWN is the time that the machine waits after sealing the bag/pouch before the seal bars retract. This allows time for the actual seal to cool down and take set. The range is 1 to 8 seconds.
Press the MENU key.



SECURITY can be turned on by selecting “YES.” If security is on, the operator menu will be read only and the operator will not be able to change any settings.
Press the MENU key.



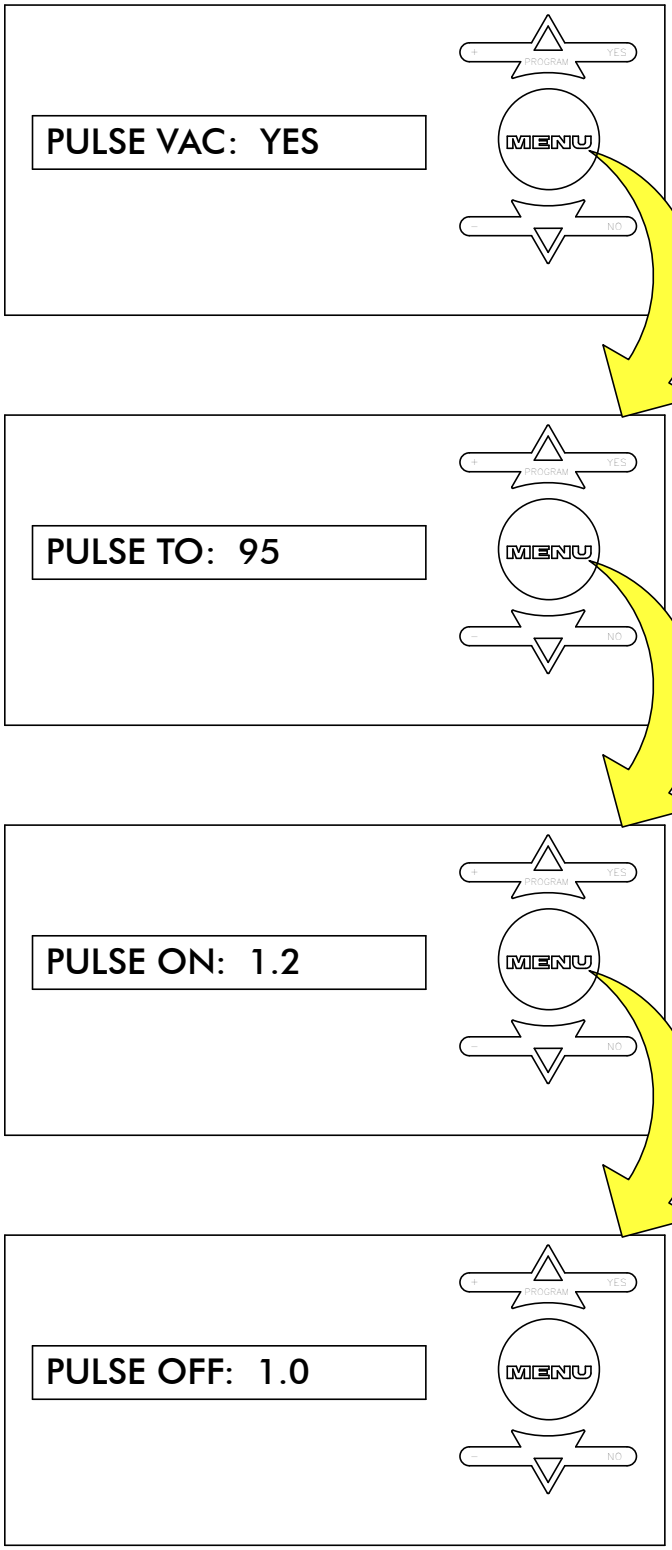
This specifies the maximum number of programs that may be saved in memory. Each program may have its own set of unique parameters. The range is 1 to 10.
Press the MENU key.



If TEST is set to “YES” (using the UP arrow key), the vacuum and vent valve may be operated manually. The UP arrow key activates the vacuum valve, the DOWN arrow key activates the vent valve, and pressing both at the same time turns them both off. As you activate either valve the vacuum pressure is displayed.
Press the MENU key.

Figure 4.4

Supervisor Menu on Digital Panel (continued)



PULSE VAC allows for a more controlled vacuuming process. Rather than simply opening the vacuum valve for a continuous vacuum, the valve is opened and closed repeatedly until the chamber reaches the set “Pulse Vac” vacuum level.
Press the MENU key.

The % vacuum reached by pulsing the vacuum valve before the vacuum valve opens completely to full evacuate the chamber. The range is 99% to 20%.
Press the MENU key.

The vacuum valve is turned on during the vacuum cycle in seconds. The range is 0 to 3 seconds.
Press the MENU key.

The vacuum valve is turned off during the vacuum cycle in seconds. The range is 0 to 3 seconds.
Press the MENU key.

Figure 4.5

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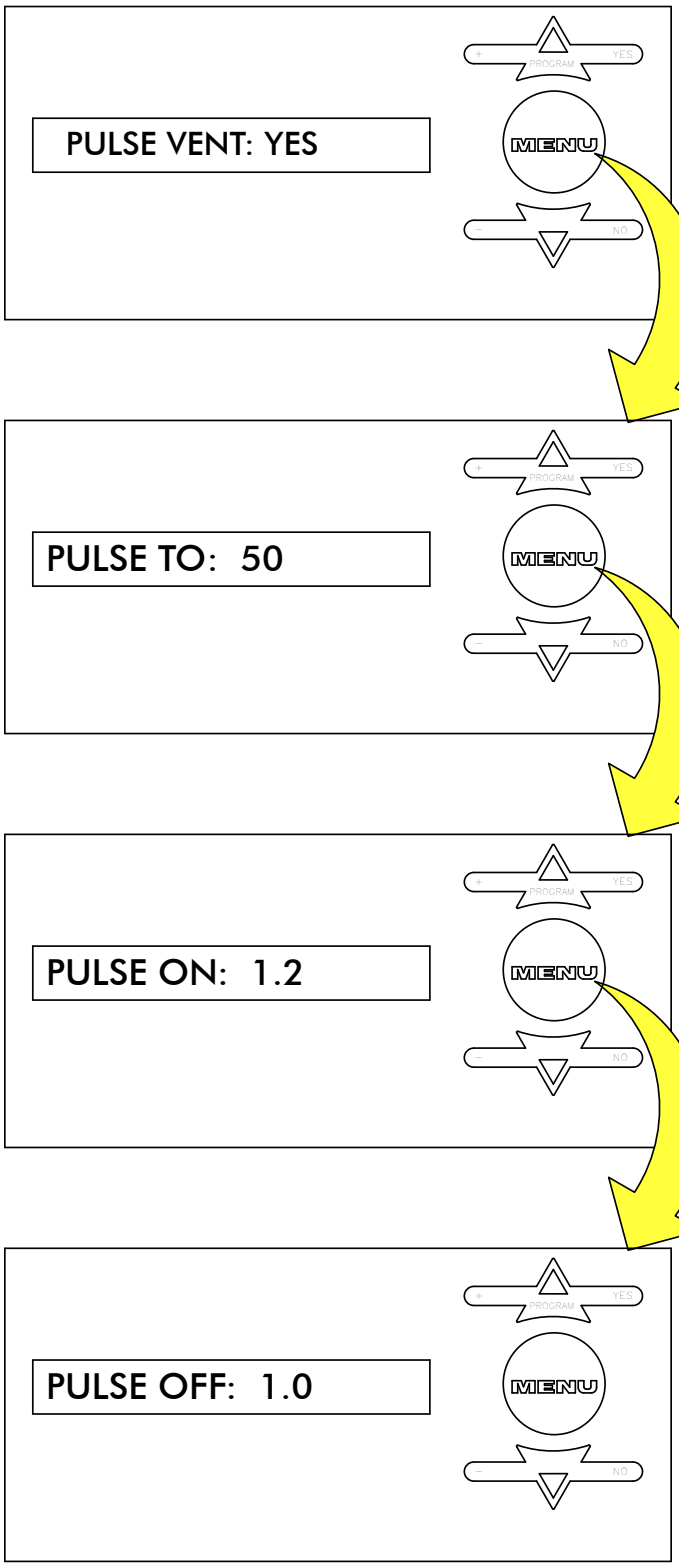
Supervisor Menu on Digital Panel (continued)



PULSE VENT allows for a more controlled venting process. Rather than simply opening up the valve for a continuous vent, the valve is opened and closed repeatedly until the chamber vents back to the “Pulse Vent” pressure setting .
Press the MENU key.

The % vacuum reached by pulsing the vent valve before the vent valve opens completely to fully vent the chamber. The range is 90% to 30%.
Press the MENU key.

The vent valve is turned on during the vent cycle in seconds. The range is 0 to 3 seconds.
Press the MENU key.

The vent valve is turned off during the vent cycle in seconds. The range is 0 to 3 seconds.
Press the MENU key.

Figure 4.6

Supervisor Menu on Digital Panel (continued)

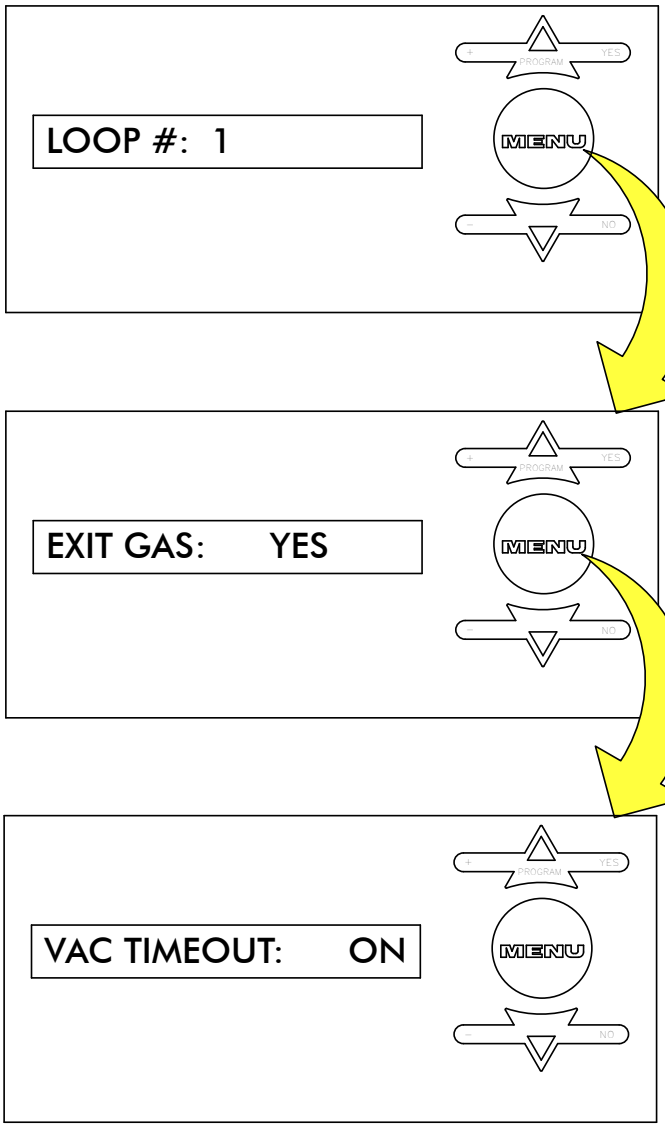


Figure 4.8

If the machine is equipped with the loop option, this is the number of vacuum/ gas cycles the control will perform prior to the seal and vent. The range is 1 to 5 cycles. The default is 1.
Press the MENU key.

If the loop # is set greater than 1, the control can be set to exit the loop on either the last gas cycle or the last vacuum cycle prior to sealing. The DOWN arrow key indicates “NO” and the UP arrow key indicates “YES.”
Press the MENU key.

VAC TIMEOUT is an option that is turned ON or OFF. If set OFF, default, the machine will time out if the preset vacuum is not reached in 6 seconds, and the machine will complete the cycle. If set ON and the machine does not reach the preset vacuum in thirty seconds, then the panels will display VAC ERROR and vent the chamber without sealing.

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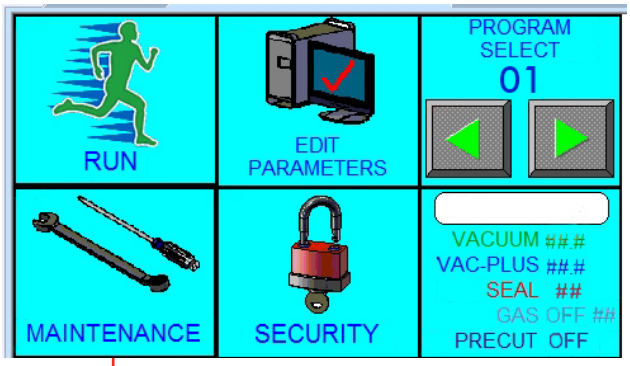
Supervisor Menu with Touch Screen

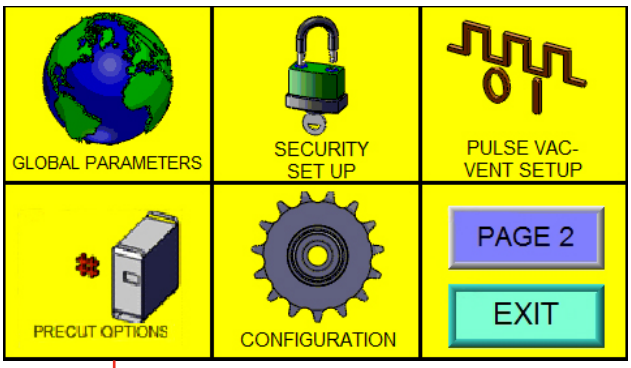
NOTE: If the supervisor has set security on, program settings cannot be changed.



This is the Main Menu. This screen allows access to all of the other functions of the machine. The supervisory menu can be accessed by entering the required maintenance password in Security, and then pressing the Maintenance button.

Default Maintenance Password is listed in the security setup section of this manual.

This is the primary Maintenance menu. This allows access to all of the various supervisory and maintenance related screens.

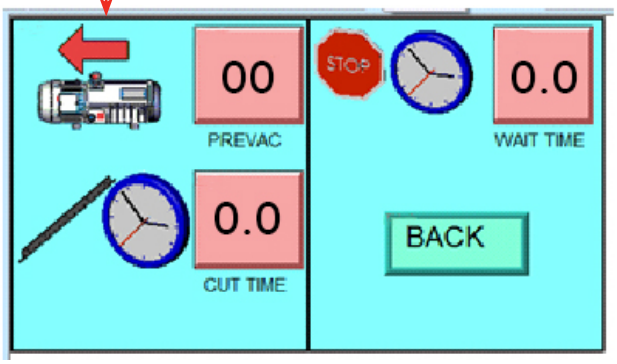


Global Parameters consist of machine specific global parameters such as Vacuum Time Out limits, Cool Down times, and Language Selection.

Security Setup allows the default passwords to be changed, and allows the supervisor to restrict the editing of program parameters to Maintenance level supervisors or to allow anyone using the machine to make these changes.

Pulse Vac-Vent Setup allows the supervisor to configure the behavior of the Pulse Vac and Pulse Vent operations if being used.

Configuration is a factory configuration menu that allows the touch screen to be properly configured for operation on a specifically equipped machine. These settings should NEVER be changed in the field unless instructed to do so by an UltraSource Technical Service technician.



Precut Options: If the machine is equipped with the PRECUT option, selecting this icon allows the parameters to be set. See precut and looping options for details

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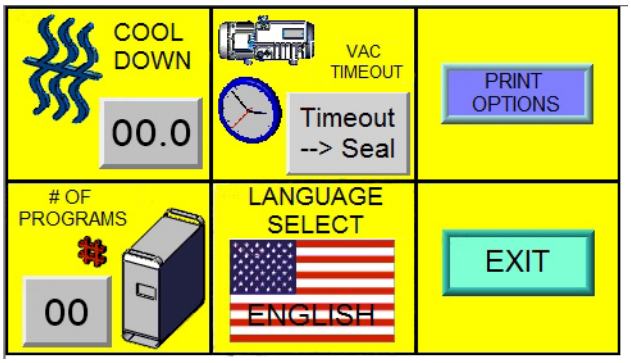
Supervisor Menu with Touch Screen (continued)

Global Parameters



Cool Down: This parameter determines how long the cool down period is in each cycle. This can be set by pressing the value button and changing the value using the provided keypad. The range for this value is 0 to 10.

Vac Timeout: The Vacuum Timeout parameter determines how the machine behaves if the Vacuum Timeout is reached before the cycle completes.

Timeout --> Seal: This will cause the machine to seal the package immediately if a Vacuum Timeout fault occurs.

Timeout --> Vent: This will cause the machine to stop the vacuum process, vent the chamber and leave the package unsealed.

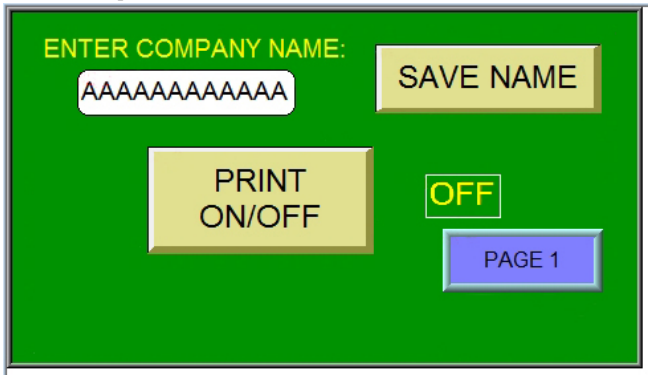
Print Options: This is used to enable/ disable the printer function.

# of Programs: This parameter defines the number of programs that can be stored. The range for this value is 1 to 99.

Language Select: This allows the user to select a different operating language for the touch screen. The machine is equipped with four base languages including English, French, German and Spanish. The language can be selected simply by pressing the flag like button and cycling through the options. Press Exit when done and this will save your changes.

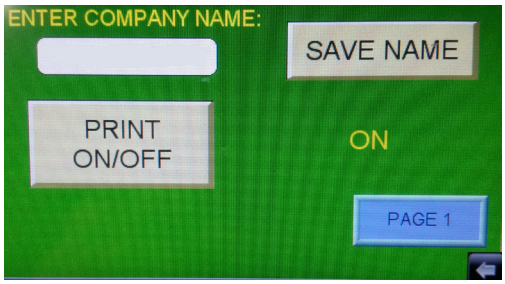
Supervisor Menu with Touch Screen (continued)

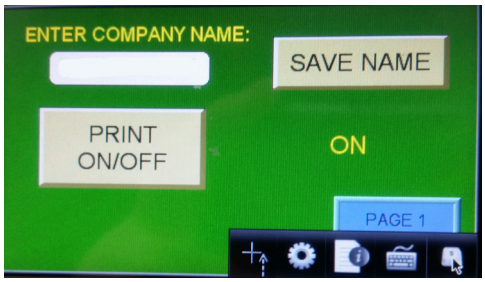
Print Options

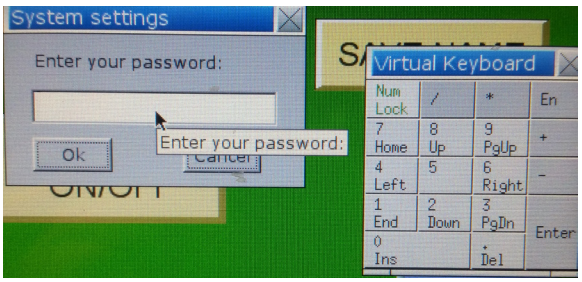


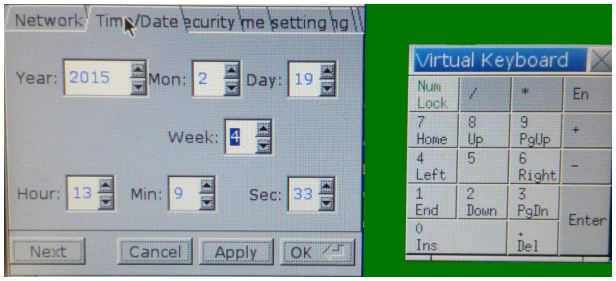
Following the selection of Print Options in Global parameters, this screen will appear. Enabling or disabling the printer feature is done by selecting the Print ON/OFF button.

The Company name field contains up to 12 characters. This field may be used for any text, such as Lot Number, for any given product run. Enter desired text, and press Save name.









ULTRASOURCE 02/19/2015 10:00 AM 1: PORK CHOP SEAL 1.0 SEC VAC 99.0 PCT	ULTRASOURCE 02/19/2015 10:00 AM 1: PORK CHOP SEAL 1.0 SEC VAC 99.0 PCT

The default time is set to CST (GMT-6:00). You will need a pencil eraser to perform this operation. Press the arrow key in the lower RH corner and the Icon group will appear to the left. Press the Gear Icon and the virtual keypad will appear. Press the number 1 six times, and press enter. The System settings screen will appear, and you will be in the network settings tab, which does not apply to these machines. Please note the time is formatted as a 24 hour clock!!! Select the Time/Date tab at the top of the system settings screen, and using your eraser adjust the time and date. When finished, press apply, and press OK. The time and date have now been saved.

The remaining tabs SHOULD NOT be used! Changes to these features should only be performed or under direction of a trained UltraSource Service technician!

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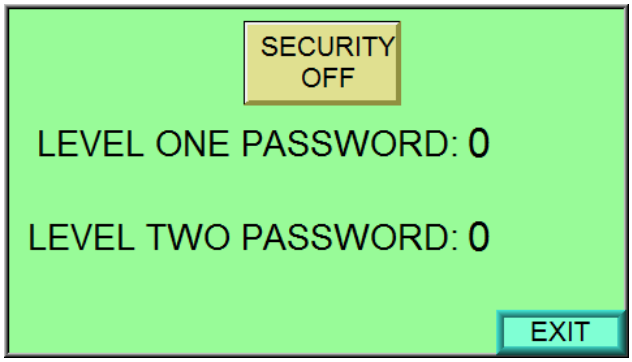
Supervisor Menu with Touch Screen (continued)

Security Setup



The security setup screen allows the maintenance supervisor to enable a certain level of security and to change the default passwords assigned to the machine.

The default passwords are as follows:

Level One: 456
Level Two: 789

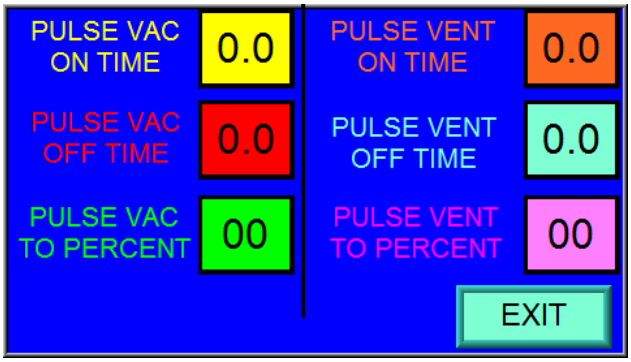
Turning Security On in this menu will restrict the editing of program parameters to those with a value Level One password. The Maintenance menu will always remain secured by the Level Two password.

If Security is set to Security Off (as shown in the corresponding image to the left), running program parameters will be editable by anyone.

Changing the default passwords can be done by setting the new password in this screen. Keep in mind that these passwords are NOT recoverable should they be forgotten.

Supervisor Menu with Touch Screen (continued)

Pulse Vac and Pulse Vent Setup



Pulse Vac and Pulse Vent Setup allows the maintenance supervisor to configure the appropriate Pulse Vac and Vent limits.

Pulse Vac On Time:
This value determines how long each pulse is fired during a Pulse Vac operation.

Pulse Vac Off Time:
This value determines how long each pulse is in the off position during a Pulse Vac operation.

Pulse Vac to Percent:
This value determines the final desired vacuum percentage to be reached during a Pulse Vac operation.

Pulse Vent On Time:
This value determines how long each pulse is fired during a Pulse Vent operation.

Pulse Vent Off Time:
This value determines how long each pulse is in the off position during a Pulse Vent operation.

Pulse Vent to Percent:
This value determines the final desired vacuum percentage to be reached during a Pulse Vent operation.

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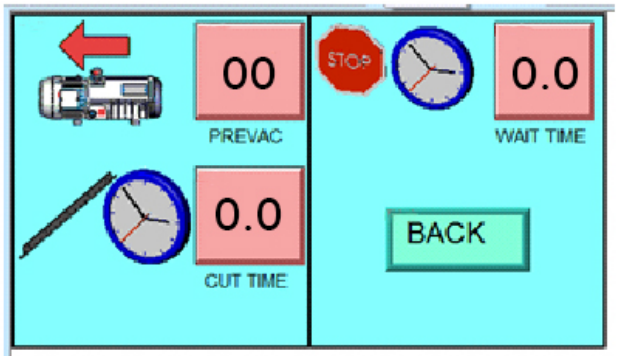
Supervisor Menu with Touch Screen (continued)

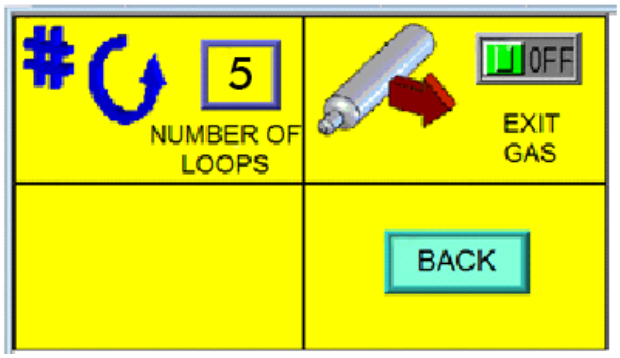
Precut and Looping options



Prevac - 0-99% of vacuum before slits are cut in the bag. Default 25%

Cut time - Amount of time allotted for the cut cycle, 0.1 - 9 seconds Default 1.5 seconds

Wait time - Amount of time from Cut cycle finish to Vacuum cycle startup 0.1 - 9 seconds, Default 4 seconds.



If the machine is equipped with the loop option, this is the number of vacuum/gas cycles the control will perform prior to the seal and vent. The range is 1 to 5 cycles. The default is 1.

If the loop # is set to greater than 1, the control can be set to exit the loop on either the last gas cycle or the last vacuum cycle prior to sealing.

Opening Chamber Machine

1. Turn the power switch to the “OFF” position and disconnect the power cord from the wall receptacle.

⚠ DANGER Hazardous voltage.
Disconnect and lockout power before servicing machine or cleaning. Do not open the machine’s service area unless power has been disconnected and locked out at risk of electric shock hazard.

2. Remove the filler plates and seal bar from inside the machine.
3. Remove the lower right- and lower left-hand screws located on the outside rear of the machine’s stainless steel cabinet. Lifting on the back edge of the basin, tilt the top of the machine forward onto the table. Support the face of the machine with a 3” to 4” block of wood to prevent smashing, breaking, or other damage to the control panel.

Changing Vacuum Pump Oil

1. Open the machine (see above).
2. A trough and hole are located toward the front of the machine, between the pump and front edge of the chassis. Slide the machine over to the edge of the table with the hole over the edge of the table. Position an oil collection pan underneath this hole.

⚠ CAUTION Tip Over Hazard.
Only let the front foot of the chassis hang over the edge of the table.

3. Loosen and remove the Oil Filler Cap with a 1¼-in. open end wrench.
4. Loosen the Oil Drain Plug located to the front and lower middle on the pump with a 1¼-in. open end wrench. Remove the plug slowly to control the flow of oil.
5. With the oil drained, replace the Oil Drain Plug and wipe any excess oil out of the trough in the chassis.
6. Fill the pump with oil until the level is between the minimum and maximum lines on the Oil Sight Glass. Replace the Oil Filler Cap.
7. Tilt the machine back down onto the chassis. Plug the power cord back into the wall receptacle.
8. Cycle the machine a couple of times, unplug, and tilt the machine up to check the Oil Level. Add oil if necessary. Tilt the machine back down and replace the two screws in the rear of the machine.

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Replacing Power Cord

1. Turn the power switch to the “OFF” position and disconnect the power cord from the wall receptacle.

⚠ DANGER Hazardous voltage.
Disconnect and lockout power before servicing machine or cleaning. Do not open the service area of the machine unless power has been disconnected and locked out at risk of electric shock hazard.

2. Open the machine as described in “Opening Chamber Machine” on page 4.15.

3. Loosen the cord grip nut on the rear of the machine. Remove the cord from the cable clamps on the bottom of the chamber. Disconnect the cord from the control panel.

4. Route the new power cord through the cord grip on the rear and through the cable clamps on the bottom of the chamber.

5. Connect the new power cord to the control panel as shown in the table below.

Connect to Terminal	110 Volt Wire Color	Connect to Terminal	220 Volt Wire Color
Terminal 8	Green (Ground)	Ground Stud	Green/Yellow
Terminal 7	White	Terminal L1	Brown
Terminal 6	Black	Terminal L2	Blue

Maintenance Log

A maintenance log is a journal of all maintenance performed. Each entry includes a date, maintenance performed (details about the type of work done), and technician (who performed the maintenance). The maintenance log is also a place where a schedule is kept for further maintenance.

A maintenance log will clearly show oil changes, daily inspections, Teflon® tape replacement, and so on. A master copy has been provided on page 4.18, please create a copy and store in the back of this owner's manual.

Service Log

A service log is a journal of all service work performed. Each entry includes a date, service provided (details about the type of service), and technician (who performed the service).

A service log will clearly show training provided, frequent wear items, and so on. A master copy has been provided on page 4.19, please create a copy and store in the back of this owner's manual.

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Maintenance Log

Date	Maintenance Performed	Technician

Service Log

Date	Service Provided	Technician

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SCHEMATICS

Designation and Function of Controls

The following designations are found on the Electrical Diagrams:

Limit Switches:

LS-1	Chamber Cycle Start Switch

Contactors and Relays:

C-1	Vacuum Pump Contactor (for 220VAC)

Overloads and Fusing:

OL-1	Vacuum Pump Motor Overload
F-1	Seal Bar Fuse
F-3	Control Power Fuse

Control Modules:

MCC	Master Control Circuit Board

Transformers:

T-1	Seal Impulse Transformer

Motors:

M-1	Vacuum Pump

Potentiometers:

POT-1	Vacuum Time Potentiometer
POT-2	Sealing Impulse Potentiometer

Solenoid Valves:

SOL-1	Ventilation Solenoid Valve
SOL-2	Seal Bladder Solenoid Valve
SOL-3	Gas Flush Solenoid Valve

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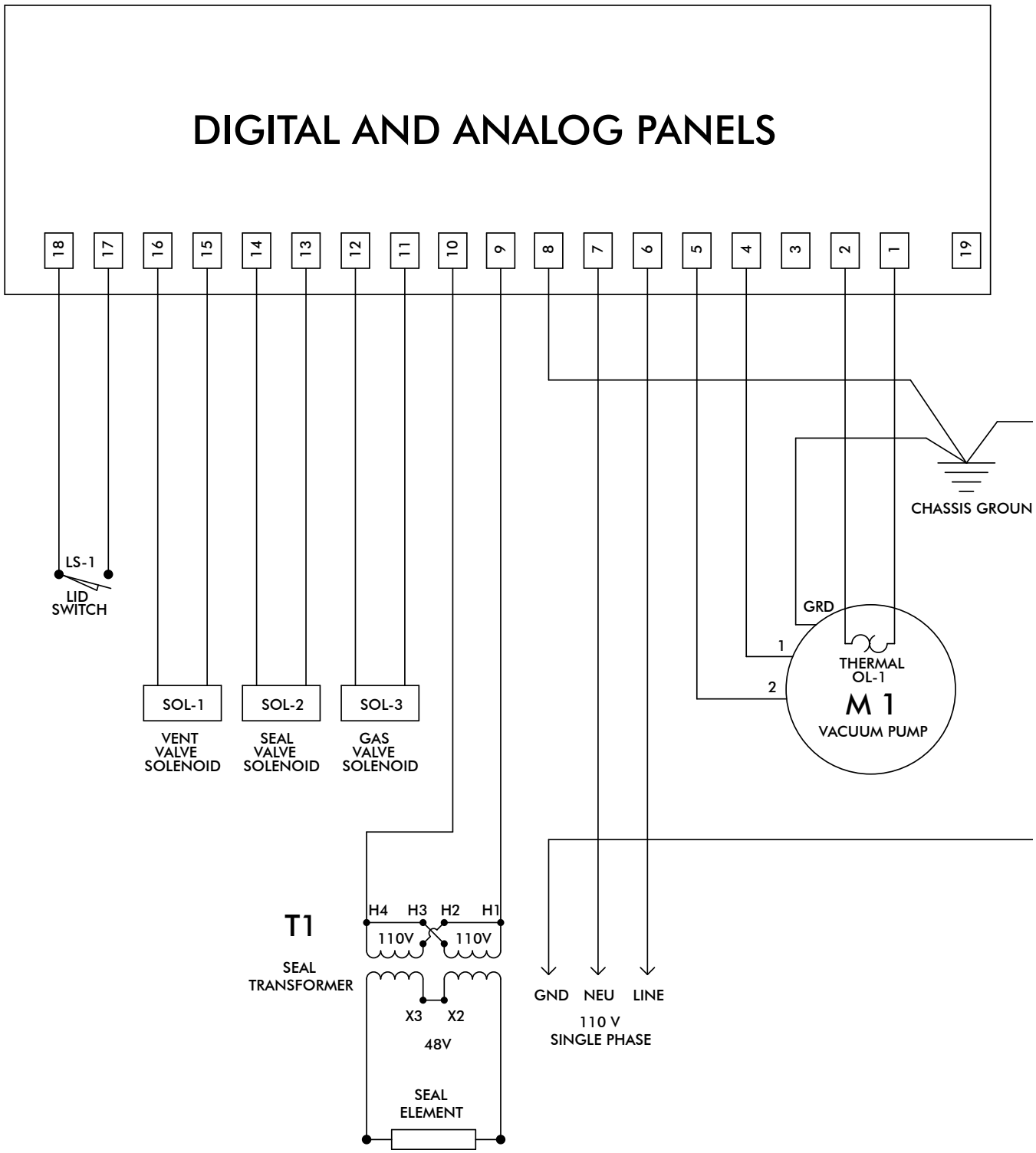
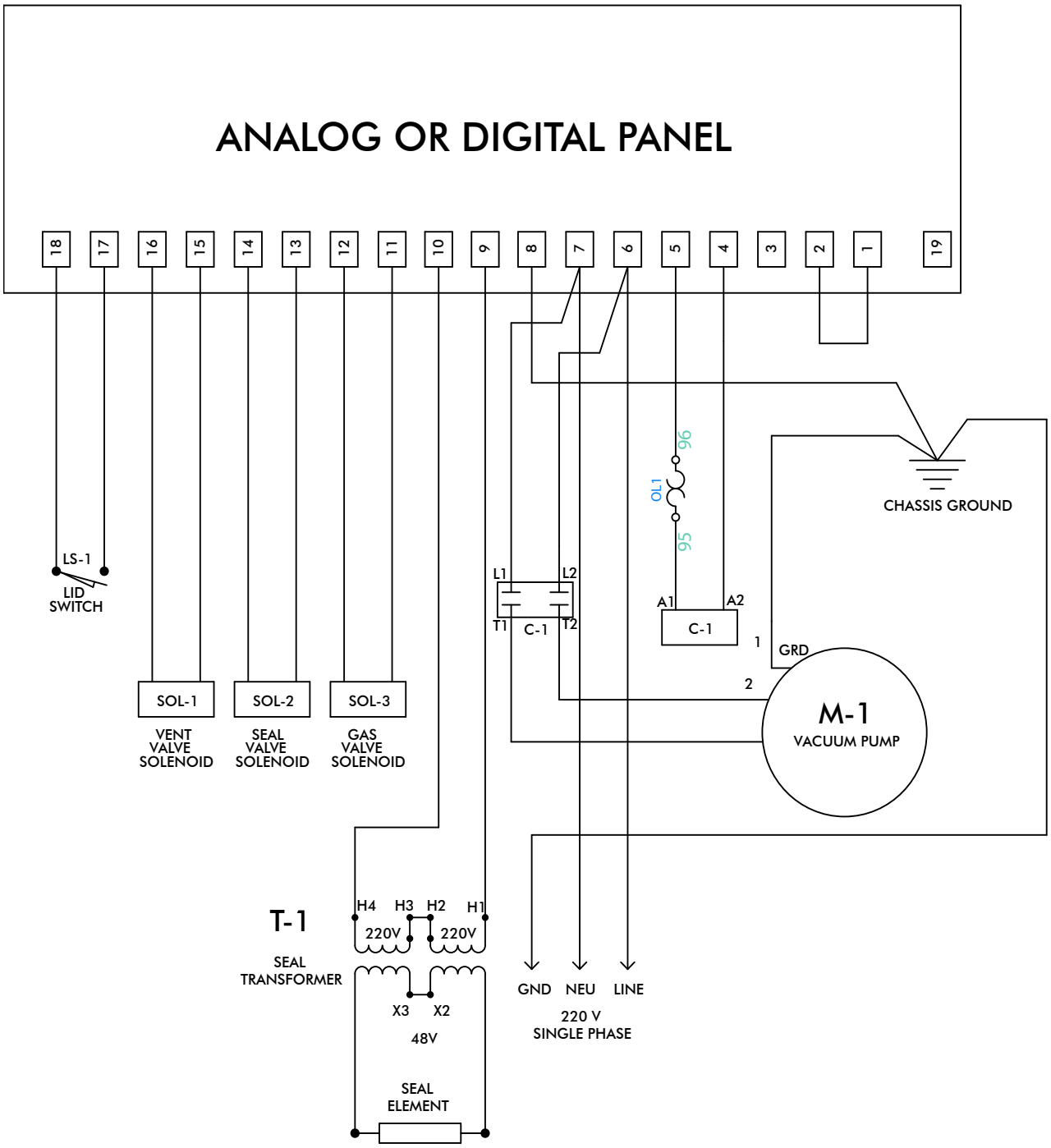
110 Volt, Single Phase
Digital Control Panel



220 Volt, Single Phase
Digital Control Panel



Notes: On Digital Panel only:
1.) Remove Omron RELAY, CR7.
2.)ADD JUMPER TO JJ3.

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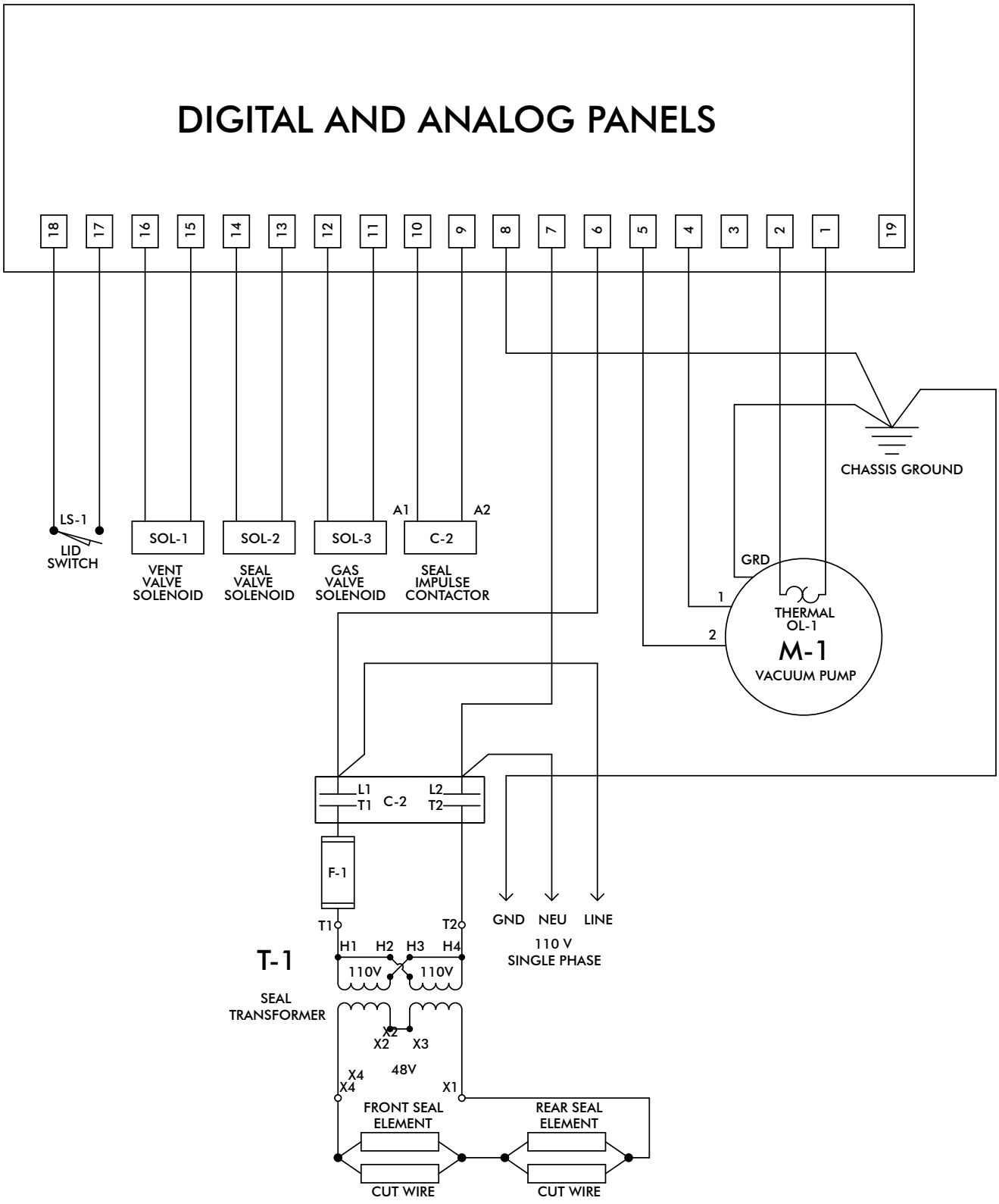
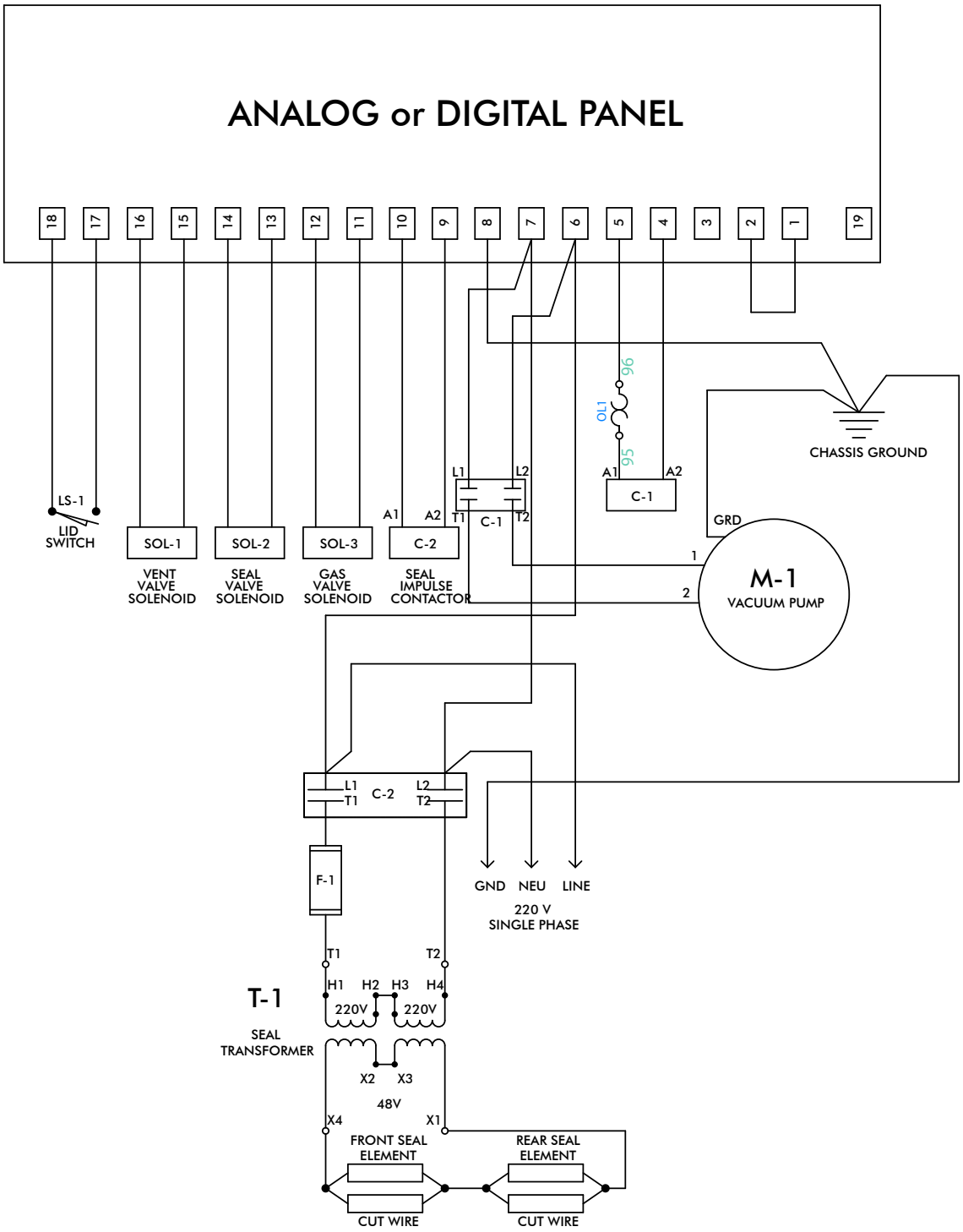
110 Volt, Double Seal Bar
Digital Control Panel



220 Volt, Double Seal Bar
Digital Control Panel



Notes: On Digital Panel only:
1.) Remove Omron RELAY, CR7.
2.)ADD JUMPER TO JJ3.

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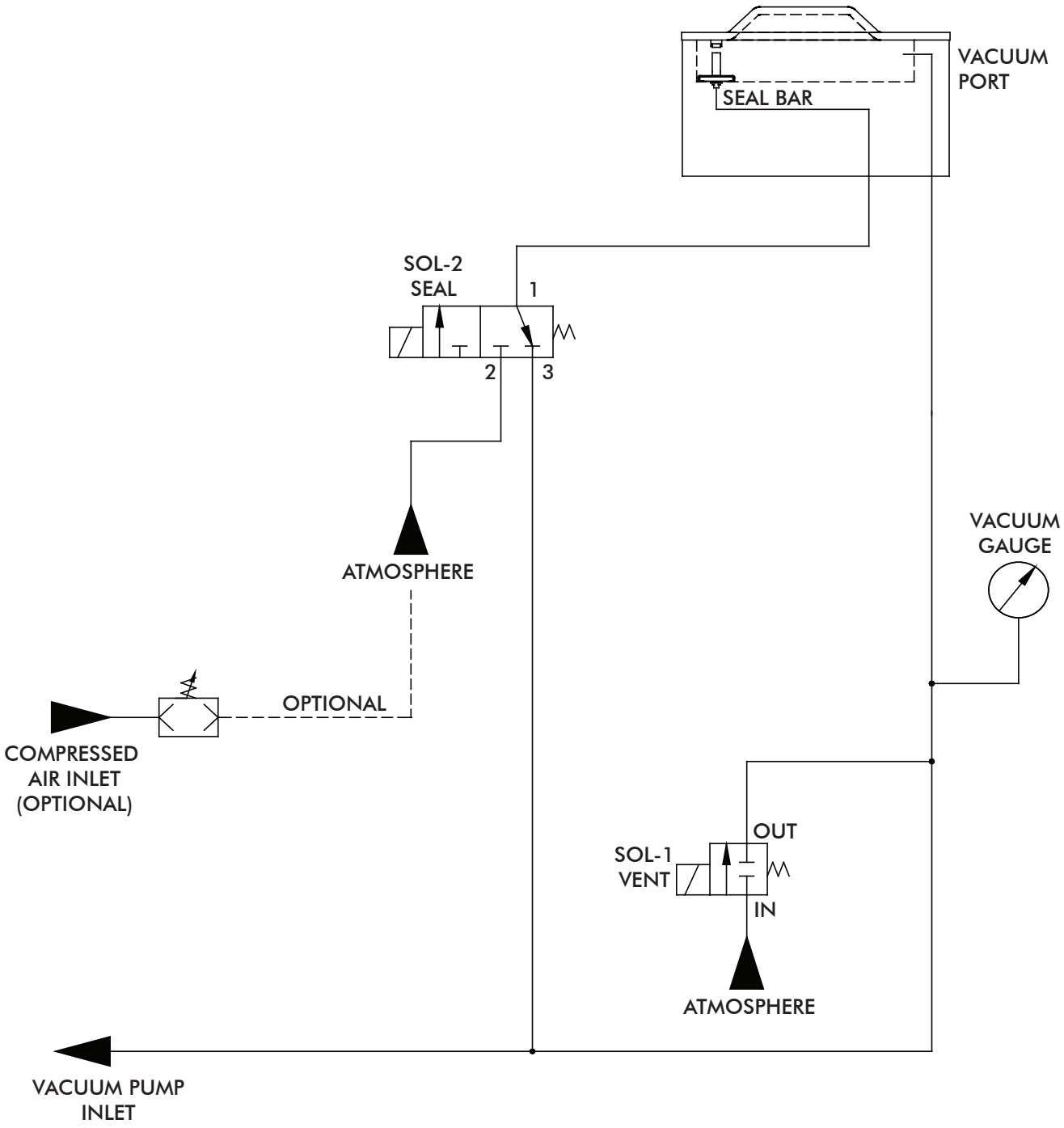
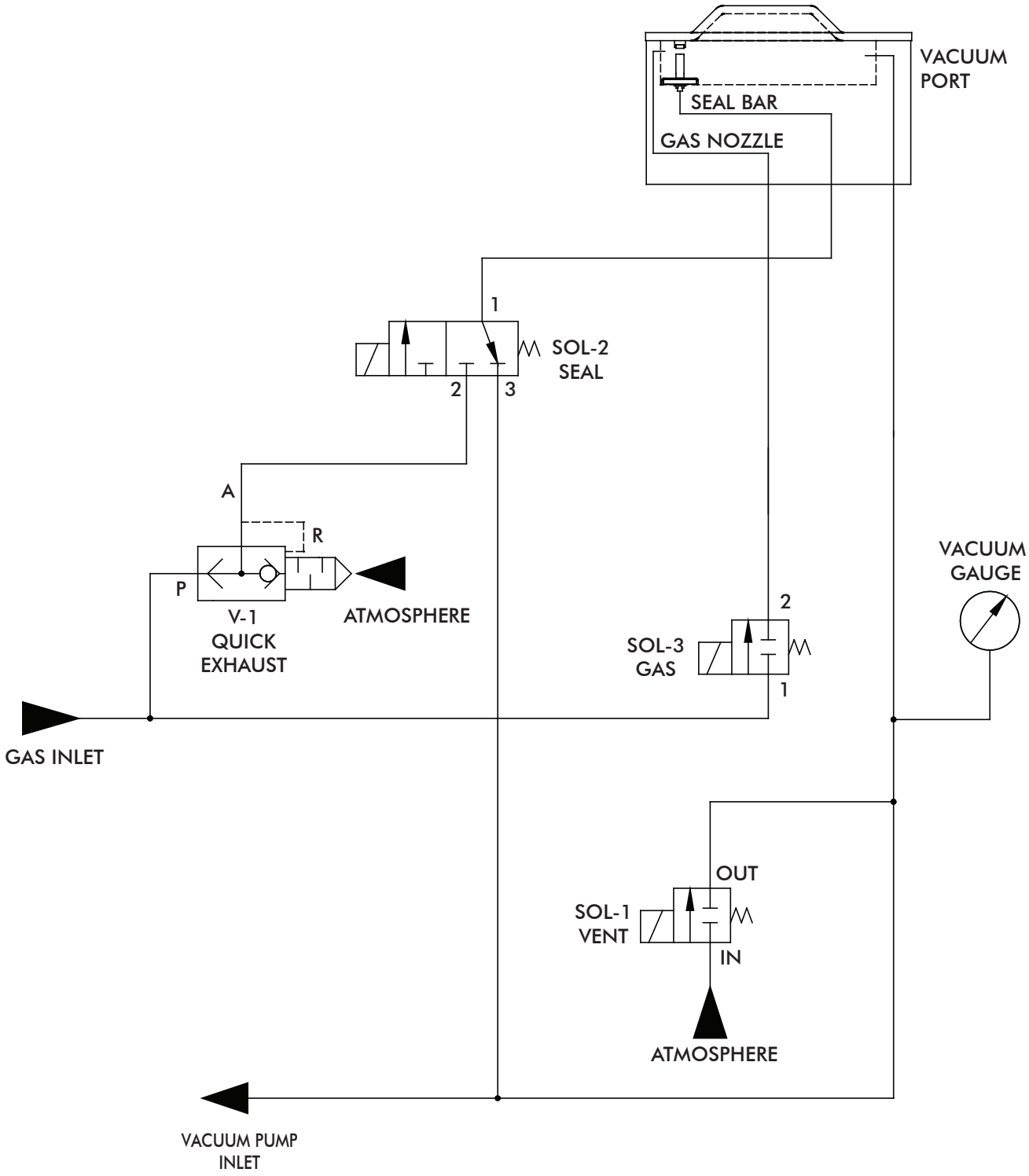
Non-Gas Flush Pneumatic Diagram



Gas Flush Pneumatic Diagram



PARTS

Recommended Spare Parts

Qty.	Part No.	Description
5 ea	860034	Seal Bar Element
1 ea	861033	Seal Bladder Assembly
10 ft	840170	Teflon® Tape
2 ea	863081	Seal Bar Contact Kit (Double Seam Seal)
2 ea	863088	Seal Bar Contact Kit (Single Seam Seal)
3 ft	860950	Backup Strip
1 ea	860976	Lid Switch
1 ea	884801	Vacuum Pump Filter Kit
Kit (884801) includes:		
1 qt	884750	Vacuum Pump 15W ND Oil
1 ea	884361	Vacuum Pump Exhaust Filter
Select your machine's configuration:		
4 ft	860035	Seal Bar Cut Wire
7 ft	840063	Lid Gasket (for black molded lid)
7 ft	860220	Lid Gasket (for clear acrylic lid)
1 ea	903028	Double Seam Seal Bar Assembly
1 ea	861047	Single Seam Seal Bar Assembly
1 ea	861031	Single Seam Seal with Cut Wire Seal Bar Assembly

For 110 Volt Machines:		
5 ea	861192	Fuse, MDA 8A (for single seam seal)
1 ea	861181	Assembly, Valve, without gas **OR**
1 ea	861182	Assembly, Valve, with gas
For 220 Volt Machines:		
5 ea	860045	Fuse, MDA 10A (for double seam seal or cut wire) **OR**
5 ea	860046	Fuse, MDA 5A (for single seam seal)
1 ea	861183	Assembly, Valve, without gas **OR**
1 ea	861184	Assembly, Valve, with gas

For specific system replacement parts,
contact a parts representative for further assistance:
Phone 816.753.2150 • Fax 816.561.2854
Toll-Free 800.777.5624

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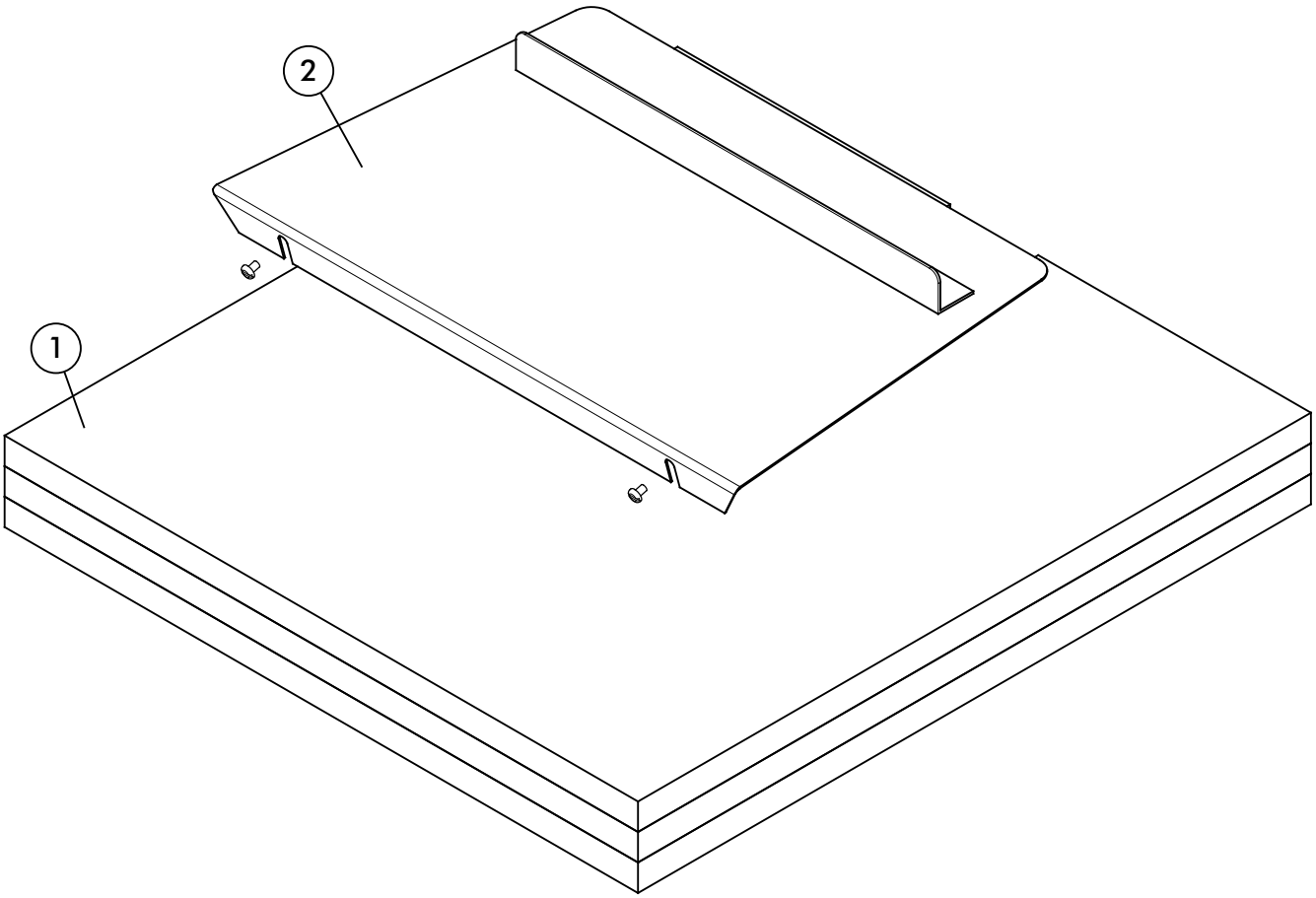
Accessories

Parts List

Item	Part No.	Description
1	860944	Filler Plate Set
2	860690	Kit, Product Tray (optional)
Kit (860690) includes:		
	840051	Stainless Steel Product Tray
	840124	Magnetic Stop for Product Tray
	860270	Bolt, M4x12 Cheese Head
3	900100	Product Loader (optional, not shown)
4	901101	Table with one shelf (optional, not shown)

Accessories

Diagram



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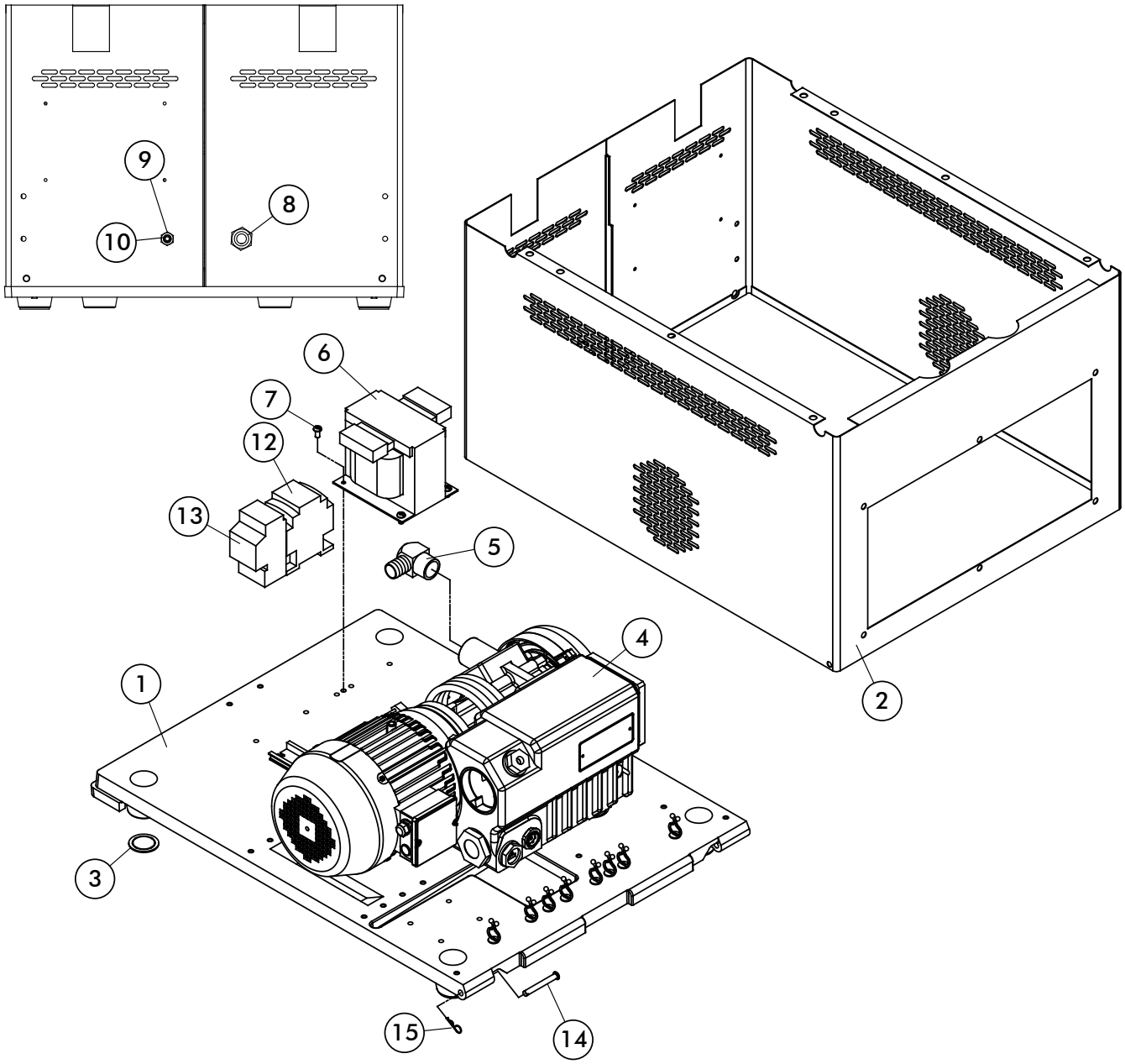
Pump and Chassis

Parts List

Item	Part No.	Description
1	861242	Pump Chassis
2		Skirt (reference only)
3	860742	Non-skid Foot Pad
4	900023	Vacuum Pump, 110V, Single Phase
	900022	Vacuum Pump, 220V, Single Phase
5	860395	Hose Barb, 3/4-in. NPT, 90°
6	860941	Sealing Transformer, [T-1] (Single Seam Seal Bar)
	860043	Sealing Transformer, [T-1] (Double Seam Seal / Cut Wire)
7	866716	Screw, M5x10 Slotted Panhead
8	866604	Cord Grip, PG13.5
9	860291	Brass Hex Nut, 3/8-in.-24
10	860109	Fitting, Dual Hose Barb
11	860375	Power Cord, 110V, Single Phase (not shown)
	860376	Power Cord, 220V, Single Phase (not shown)
12	861202	Contactor (for 220V machines)
13	860798	Overload (for 220V machines)
14	860953	Clevis Pin, STD 1/4 x 2
15	860957	Cotter Pin, STD 3/16 x 1/4 Hairpin
NSF Approved Foot Kit (860308) includes:		
		Foot, 4-in. Flange with Pad (4)
		Foot, Silicon Pad (4)
		Decal, ETL/NSF (1)

Pump and Chassis

Diagram



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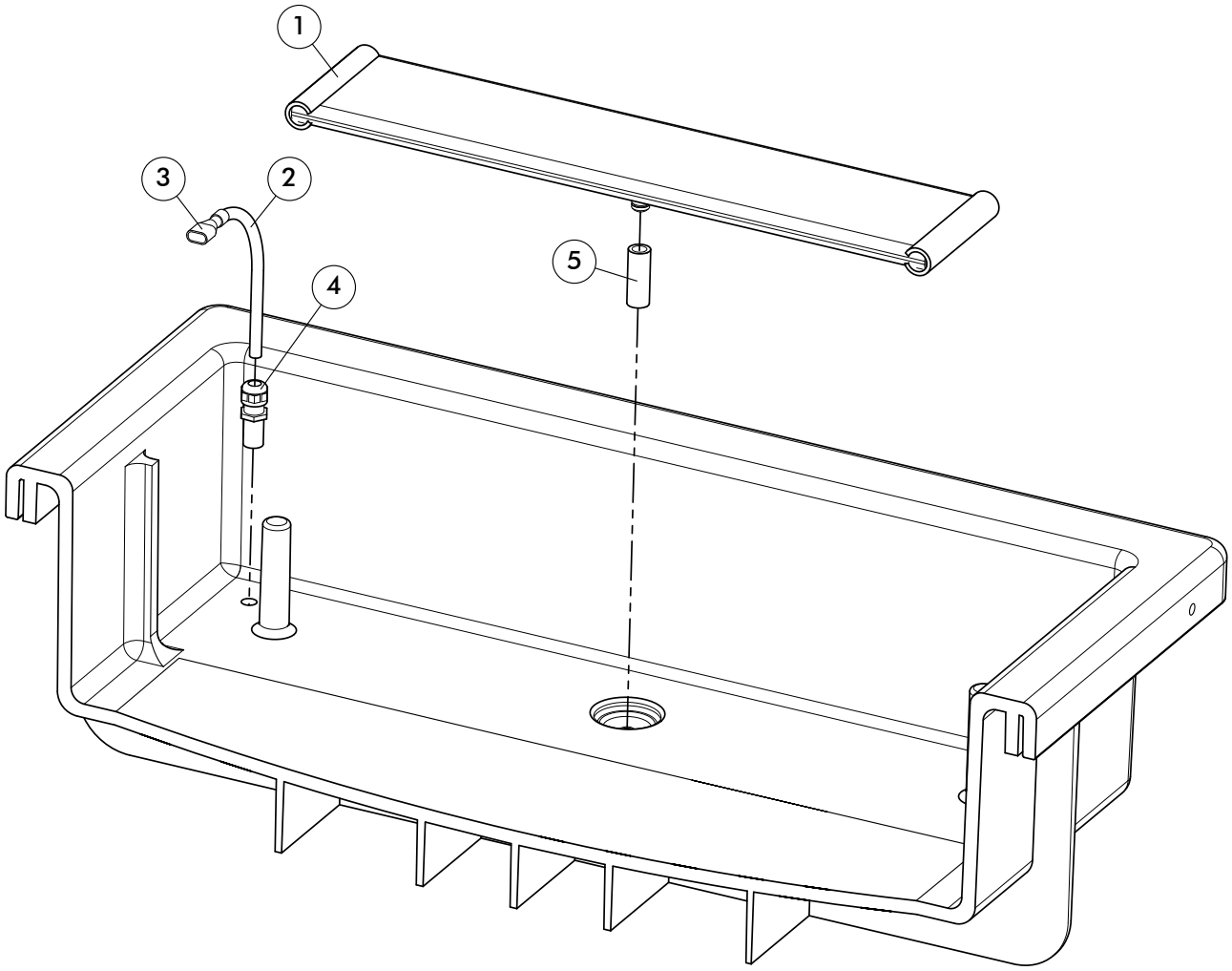
Bladder and Seal Wire Components

Parts List and Diagram

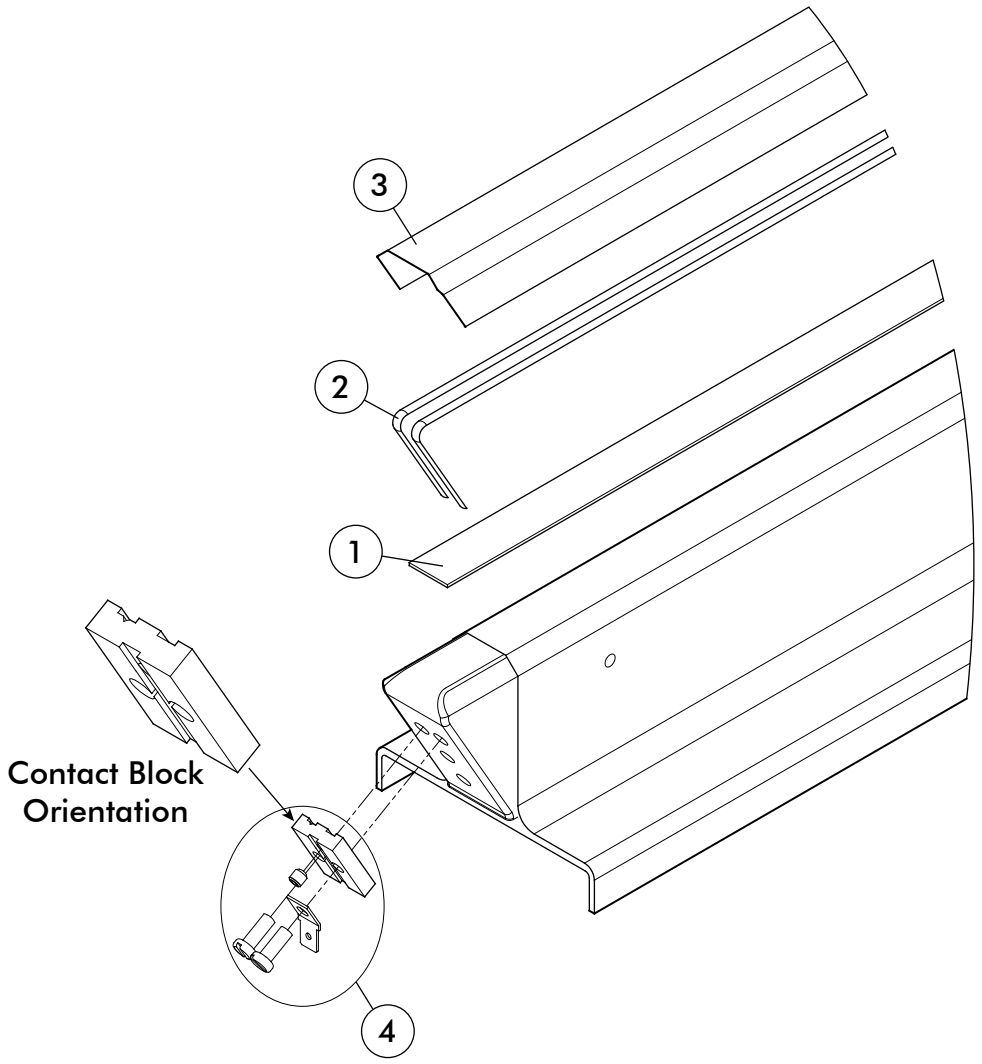
Item	Part No.	Description
1	861033	Seal Bladder Assembly
2		Seal Bar Wire (See Seal Bar Wire Assemblies)
Seal Bar Wire Assemblies (Orientation: facing machine control panel):		
	862077	Long - 56-in. on Left-Hand Side
	862076	Short - 39-in. on Right-Hand Side
3		Connector, Female Spade (See Seal Bar Wire Assemblies)
4	860397	Cord Grip, 8mm Nickel Plated
5	860954	Hose, 1/4-in. Blue (1-in. required)



Double Seam Seal Bar

Parts List and Diagram

Item	Part No.	Description
	903028	Double Seam Seal Bar Complete
1	860973	Fiberglass Insulator Strip
2	860034	Sealing Element
3	860170	Teflon® Tape (2-ft. required)
4	863081	Seal Bar Contact Kit
Kit (863081) includes:		
	860033	Brass Electrical Contact
	860278	Screw, M4x4 SHSS
	860091	Seal Bar Spade
	860246	Screw, M4x12 Cheesehead



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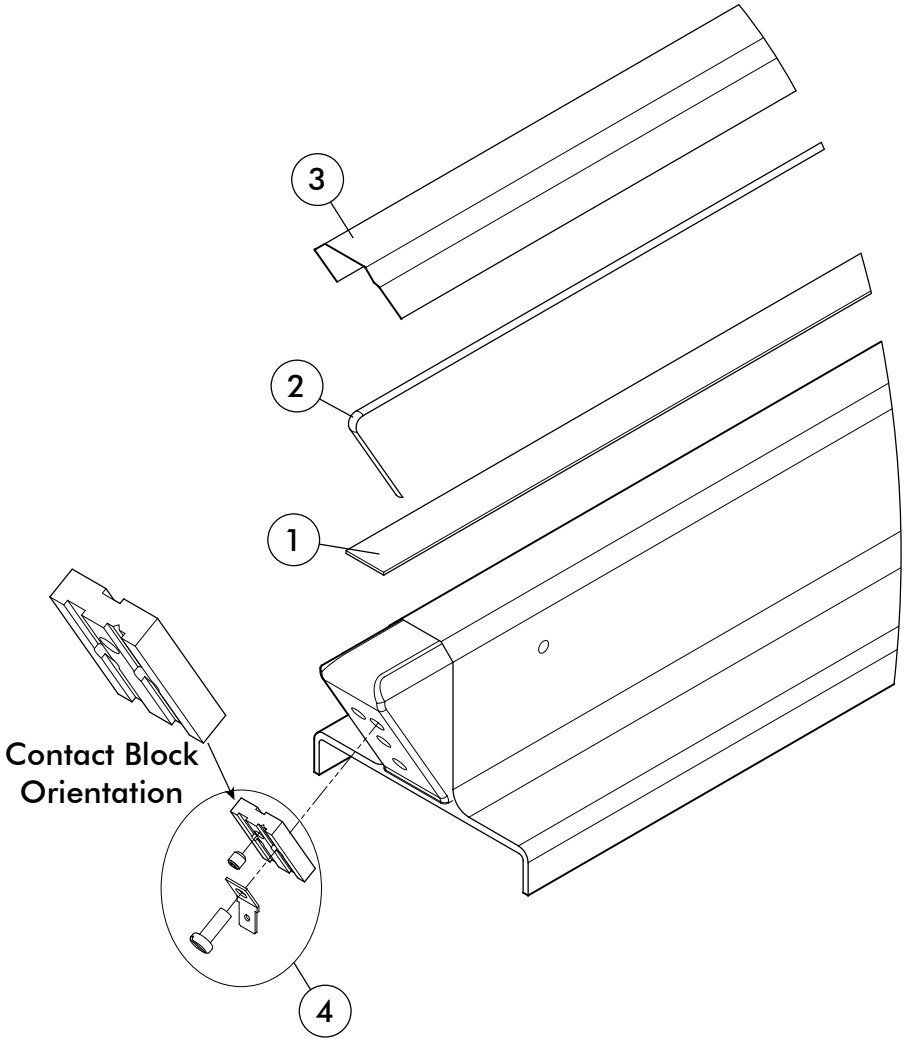
Single Seam Seal Bar

Parts List and Diagram

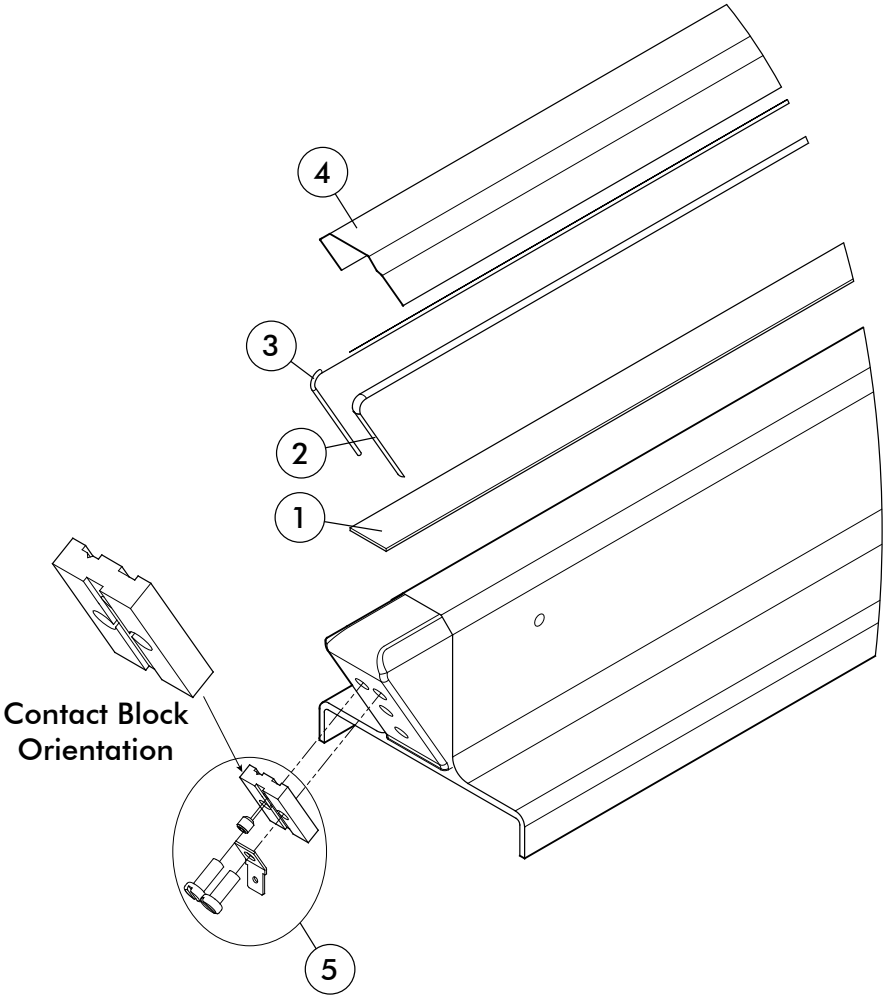
Item	Part No.	Description
	861047	Single Seam Seal Bar Complete
1	860973	Fiberglass Insulator Strip
2	860034	Sealing Element
3	860170	Teflon® Tape (2-ft. required)
4	863088	Seal Contact Kit
Kit (863081) includes:		
	860033	Brass Electrical Contact
	860278	Screw, M4x4 SHSS
	860091	Seal Bar Spade
	860246	Screw, M4x12 Cheesehead



Single Seam with Cut Wire Seal Bar

Parts List and Diagram

Item	Part No.	Description
	861031	Single Seam with Cut Wire Seal Bar Complete
1	860973	Fiberglass Insulator Strip
2	860034	Sealing Element
3	860035	Seal Bar Cut Wire (2-ft. required)
4	860170	Teflon® Tape (2-ft. required)
5	863088	Seal Bar Contact Kit
Kit (863081) includes:		
	860033	Brass Electrical Contact
	860278	Screw, M4x4 SHSS
	860091	Seal Bar Spade
	860246	Screw, M4x12 Cheesehead



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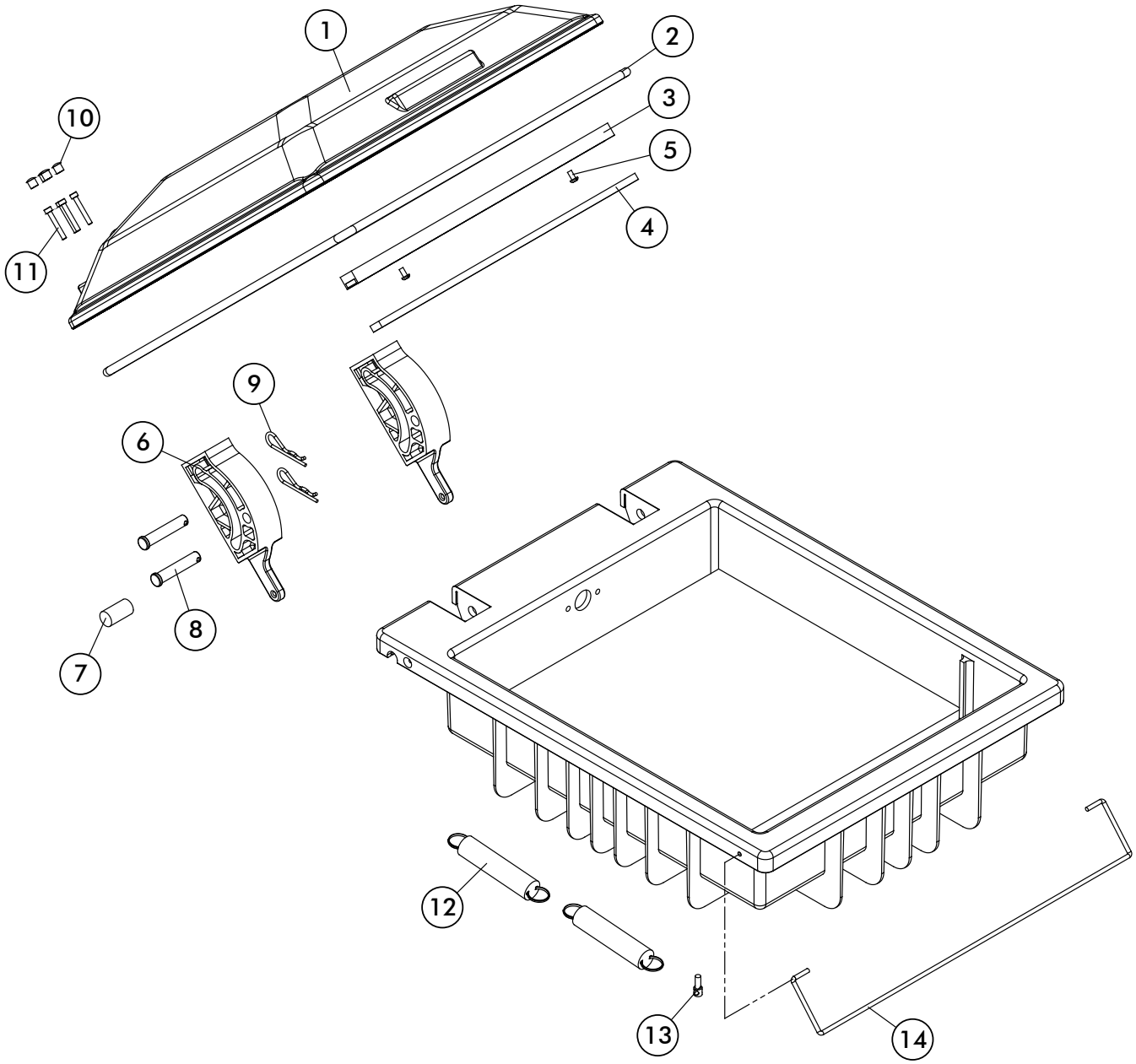
Lid and Hinge System

Parts List

Item	Part No.	Description
1	861049	Black Molded Lid Assembly Complete
Assembly (861049) includes:		
2	840063	Lid Gasket (7-ft. required)
3	860968	Channel for Backup Strip
4	860950	Seal Bar Backup Strip (17-in. required)
5	866728	Bolt, M5x16 SHCS, SS
6	860169	Hinge Block with Extension Assembly
Assembly (860169) includes:		
		Lid Hinge Block with Extension
		Insert, M5
7	860978	Lid Damper
8	860942	Clevis Pin, 1/2-in. diameter
9	860949	Hairpin Cotter
10	860704	Dome Plug
11	866832	Screw, M5x35 Socket Head
12	860945	Extension Spring, Black
13	860972	Stud, Extension Spring
14	860960	Lid Hold Down Rod
15	860120	Lid Shim (not shown)
Optional Clear Acrylic Lid Parts:		
1	860004	Clear Acrylic Lid (not shown)
2	860220	Lid Gasket (7-ft. required)
7	860286	Screw, M5x40 Hex Head
12	860946	Extension Spring, Yellow

Lid and Hinge System

Diagram



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Gas Flush Components

Parts List

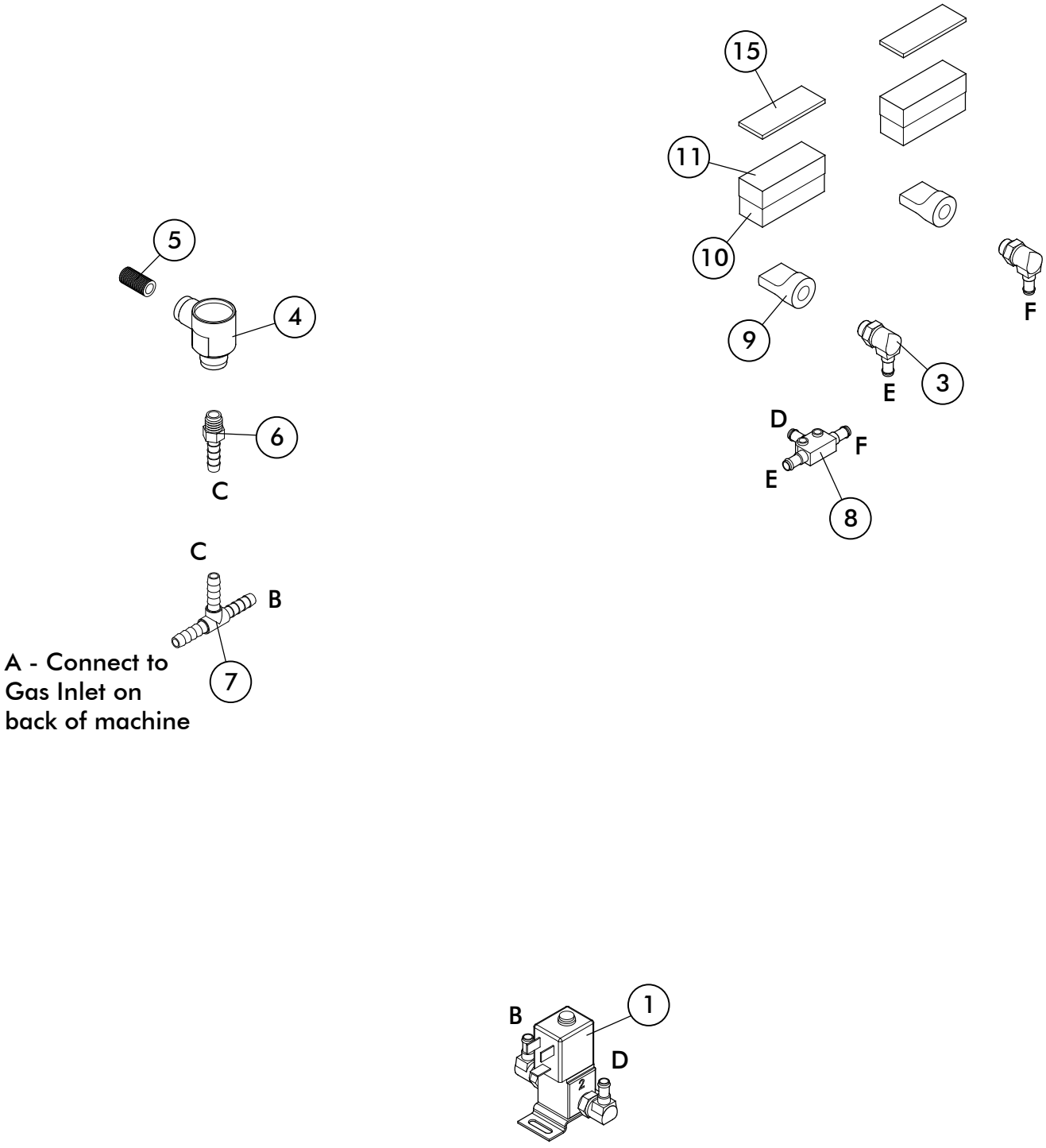
Item	Part No.	Description
1	861241	Gas Valve Assembly, 110V **OR**
	861242	Gas Valve Assembly, 220V
Assembly includes:		
		Gas Valve [SOL-3], 2-way, Normally Closed, 110V **OR**
		Gas Valve [SOL-3], 2-way, Normally Closed, 220V
		Bracket
		Fitting, Aluminum Elbow
		Screw, Self-Tapping, #8x3/8-in., SS
3	866273	Fitting, Aluminum Elbow
4	860532	Quick Exhaust Valve [V-1]
5	860535	Close Nipple, 1/8-in.
6	860530	Hose Barb, 1/8-in. x 1/4-in. Straight
7	860107	Fitting, Hose Tee, 1/4-in.
8	866254	Fitting, Aluminum Tee
9	860118	Gas Nozzle
10	860691	Holddown Pad
11	860014	Holddown Block
12	860106*	Reinforced Hose, 1/4-in. (Connect A, B-B, C-C) (not shown)
13	860548*	Gas Hose, Blue (Connect D-D, E-E, F-F) (not shown)
14	860110	Hose Clamp, 1/4-in. (not shown)
15	861239	Foam Tape, Double Sided

NOTES:

1. Wrap threads of fittings with two rotations in a clockwise motion with Teflon® tape.

Gas Flush Components

Diagram



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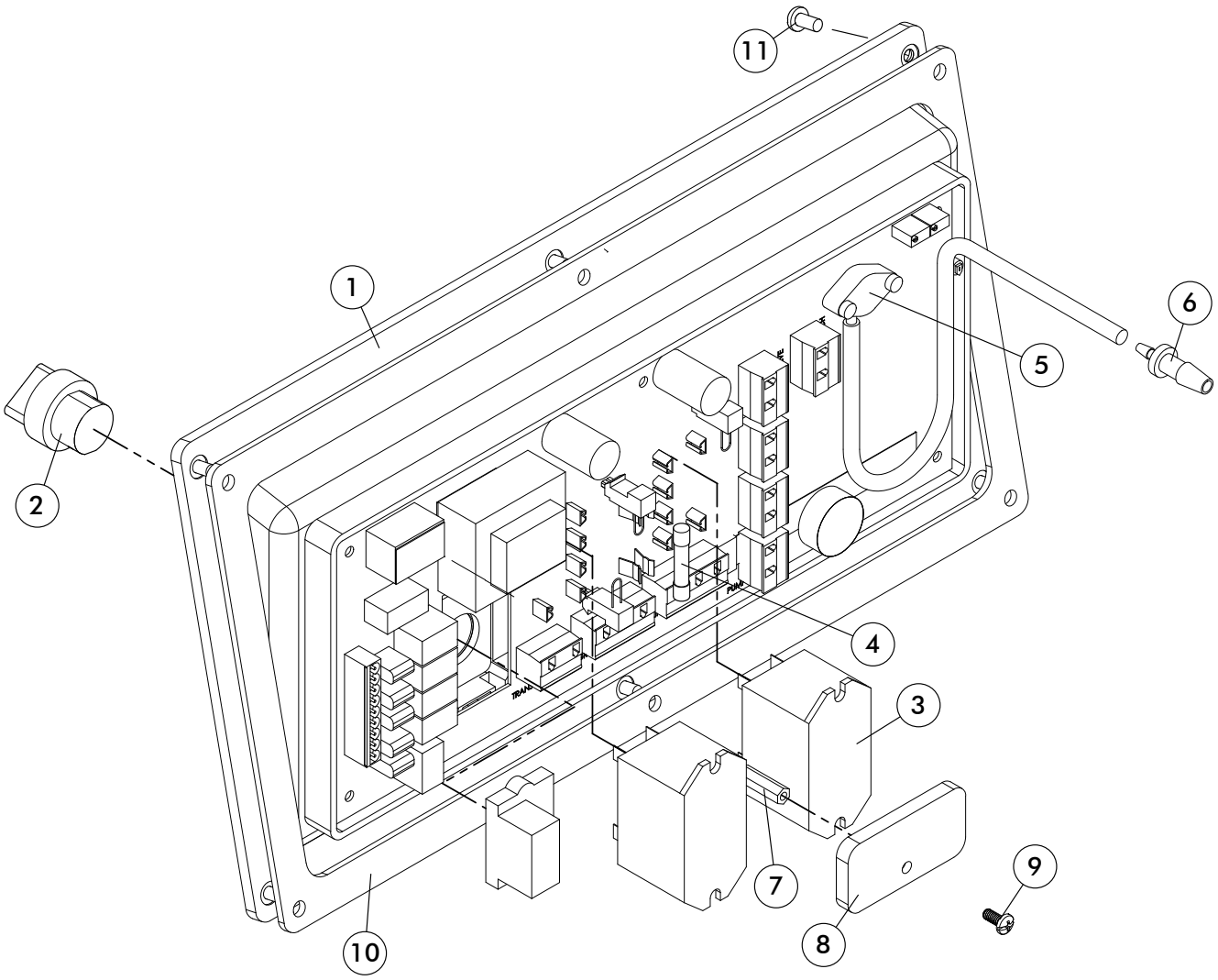
Digital Control Panel

Parts List

Item	Part No.	Description
1	861129	Digital Panel (for 110V machines Single Seam)
	861105	Digital Panel (for 220V machines)
	861114	Digital Panel (for 110V machines Double Seam/Cut Wire)
2	860316	Main Power On/Off Switch with Contact Block [SW-1]
3	860997	Relay, 30A, 12VDC Coil
4	860045	Fuse, MDA 10A (for 220V with double seam seal or cut wire)
	860046	Fuse, MDA 5A (for 220V with single seam seal)
	860045	Fuse, MDA 10A (for 110V with double seam seal or cut wire)
	861192	Fuse, MDA 8A (for 110V with single seam seal)
5	860637	Vacuum Sensor
6	860683	Fitting 1/4 x 1/8 Reducer
7	869627	Standoff, 8-23 M-F x 7/8-in.
8	861210	Contactor Holddown
9	869628	Screw, 8-32 x 3/8-in.
10	860883	Front Panel Gasket
11	866716	Bolt, M5x10 Slotted Pan Head
12	835542	Inline Filter (not shown)

Digital Control Panel

Diagram



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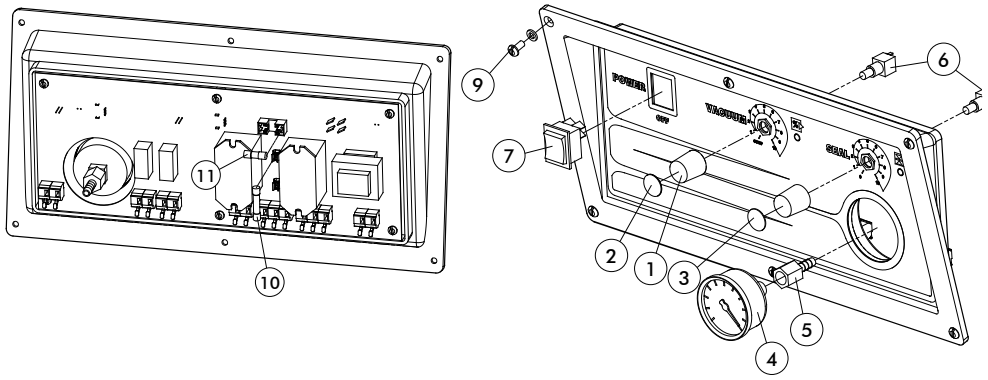
Analog Control Panel

Parts List and Diagram

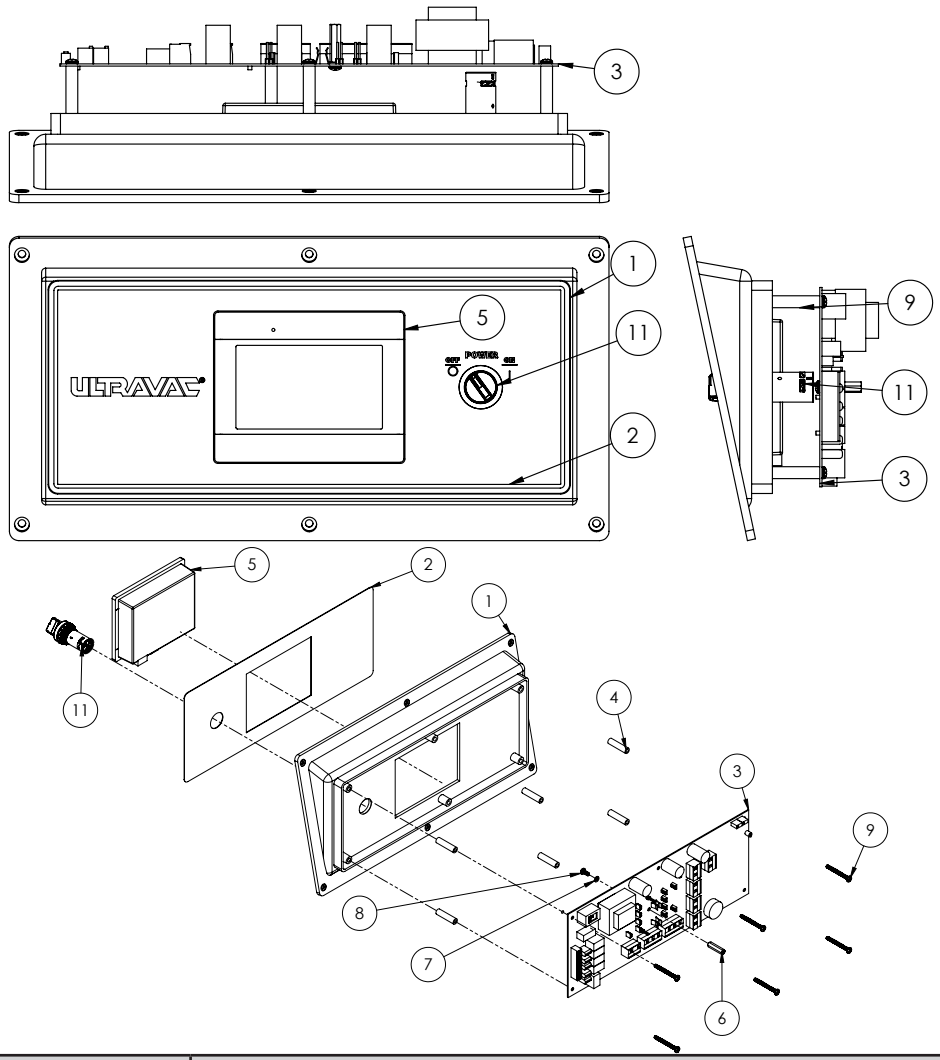


ITEM	PART NO.	DESCRIPTION
	861063	Control Panel without Gas Assembly
	861068	Control Panel with Gas Assembly
1	860315	Knob, Potentiometer Black
2	860302	Cap, Potentiometer Knob Blue
3	860301	Cap, Potentiometer Knob Red
4	860832	Gauge, 2-in. Vacuum
5	860513	Fitting, 1/4-in. Barb
6	~~860843~~	**OBSOLETE SEE 861389 Potentiometer Kit**
7		Switch, Illuminated Rocker
8	860303	Knob, Potentiometer Yellow (Not shown)
9	866716	Screw, M5x10 Slotted Panhead
10	860045	Fuse, MDA 10A (for 220V double seam seal or cut wire)
	860046	Fuse, MDA 5A (for 220V with single seam seal)
	860045	Fuse, MDA 10A (for 110V with double seam seal or cut wire)
	861192	Fuse, MDA 8A (for 110V with single seam seal)
11	860337	Fuse, MDA 1A

NOTE: Torque specification for #866716 (Item #9) is 20 inch-pounds.

Touch Screen Panel

Parts List and Diagram



ITEM	PART NUMBER	DESCRIPTION	QTY.
1	861301	BEZEL, TOUCHSCREEN PANEL	1
2	861302	DECAL, TOUCHSCREEN	1
3	861304	PWB TOUCHSCREEN HMI5043N	1
4	866783	WASHER, M4, SPLIT LOCK, SS	1
5	861382	T.S. HMI5043LB, PROG'D, ZPL	1
6	869628	SCREW, 8-23 X 3/8-IN.	1
7	861324	STANDOFF, 8-32 X 1	1
8	861320	SCREW, M4 X 40 PAN HEAD	6
9	861325	SPACER, NYLON, 5/16" X 1 1/4"	6
10	861306	DECAL, CORELOK, F/TOUCH SCREEN	1
11	860316	SWITCH, POWER ON/OFF & BODY ASSY	1

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Mebner Valve

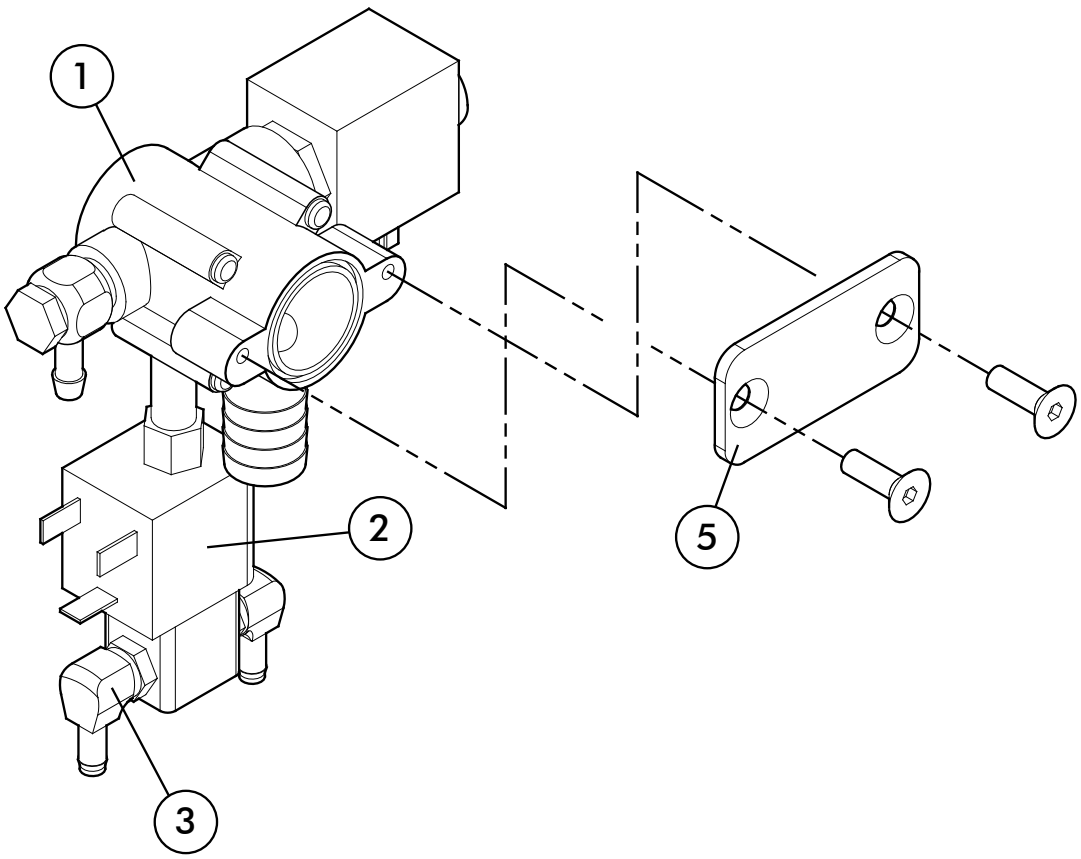
Parts List

Item	Part No.	Description
	861181	Assembly, Valve, 110V, without gas
	861182	Assembly, Valve, 110V, with gas
	861183	Assembly, Valve, 220V, without gas
	861184	Assembly, Valve, 220V, with gas
Assembly includes:		
1	860987	Mebner Valve Assembly, 110V **OR**
	861180	Mebner Valve Assembly, 220V
2	861149	Valve, 3-Way, (for 110V machines) **OR**
	861208	Valve, 3-way, (for 220V machines)
3	866273	Fitting, 1/8-in. NPT x 6mm Barb
	861146	Piping, 1/8-in. NPT Nipple, 1½-in. Long, Brass
	861222	Adapter, Spartan Bladder Valve Port
	861223	O-ring, 7mm x 9mm x 1mm
5	860192	Vacuum Block Cover
6	860932	Bolt, M6x20 FLAT HD SLOTTED machine screw
7	860110	Clamp, Hose 10.5-12mm (Not Shown)

NOTE: Wrap threads of fittings with two rotations in a clockwise motion with Teflon® tape.

Mebner Valve

Diagram



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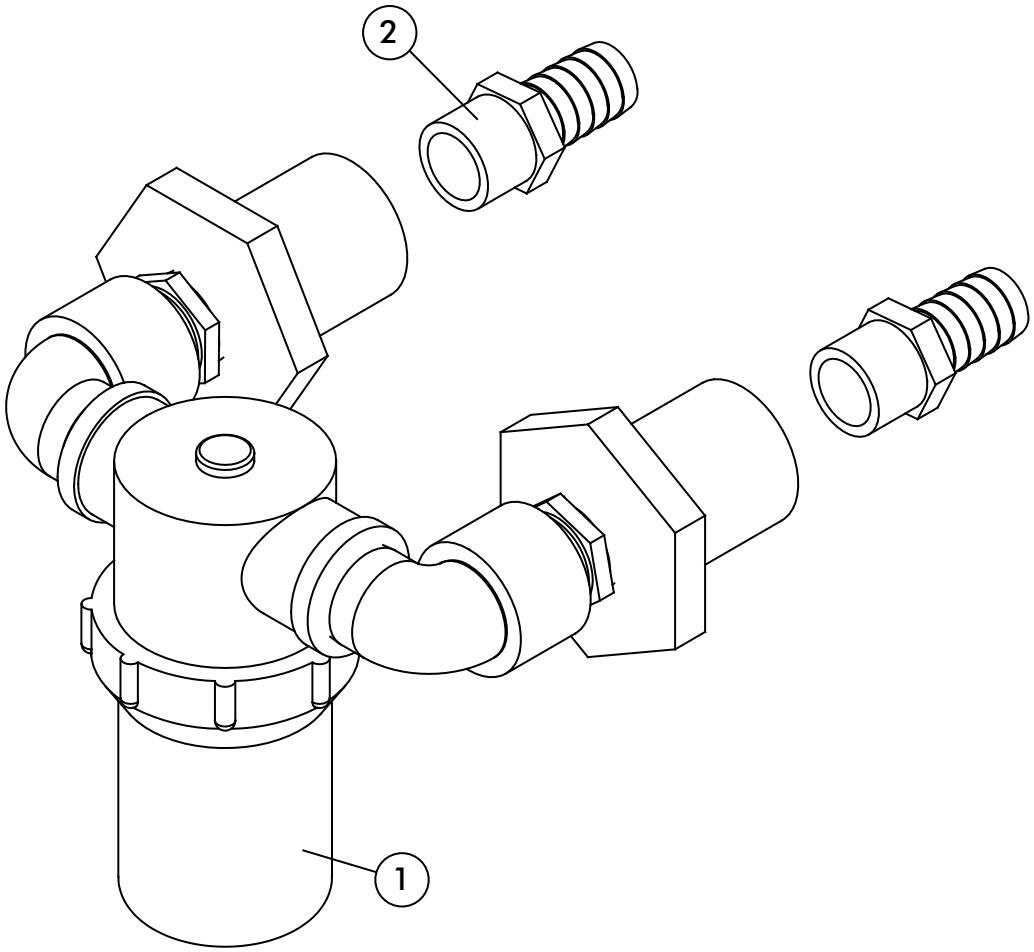
FACTORY INSTALLED ONLY

Pump Filter Option

Parts List and Diagram

Item	Part No.	Description
	903249	External Filter Kit
1	861198	Filter Element
2	860961	Fitting ST 3/4 Barb

NOTE: Epoxy is applied to fittings at filter inlets for vacuum integrity.



REFERENCE MANUALS

R5 Series Vacuum Pumps

Included with the Ultravac® 225 manual is an installation and operating manual for the vacuum pump your vacuum chamber machine is equipped with.

Refer to page 6.1 of the Ultravac® 225 manual for oil and replacement filter for this machine.

For Replacement Parts, Call:
Phone 816.753.2150 • Fax 816.561.2854
Toll-Free 800.777.5624

INSTALLATION
AND
OPERATING MANUAL

R5 Series
Models 0010, 0012, 0016, 0021,
0160, 0400, 0630, 1000, 1600

Single Stage Rotary Vane Vacuum Pumps

TABLE OF CONTENTS

We reserve the right to change the product at any time without any form of notification. The information in this publication is accurate to the best of our ability at the time of printing. Busch, Inc. will not be responsible for errors encountered when attempting to perform tasks outlined in this publication.

GENERAL

Identification

For model identification, see the nameplate mounted on the side of the exhaust box.

This manual is written to cover RA, RB and RC versions of models 0010, 0012, 0016, 0021, 0160, 0400, 0630, 1000 and 1600 with a “B” (“A” on 0010 and 0016, “S” on 0021 and no letter designation on 0012) appearing as the seventh character in the model type number. For example, it would appear as follows:

RAXXXX-BXXX-XXXX

When ordering parts, it is helpful to include the identification code stamped into the side of the cylinder as well as the serial number from the nameplate.

Example: RB0012-1029-XXXX

Operating Principles

All reference (Ref. XXX) numbers listed in the text and on illustrations throughout this manual are related to the drawings and parts list shown later in this publication.

All R5 Series, Single Stage, Rotary Vacuum Pumps are direct-driven, air-cooled, oil-sealed, rotary vane pumps that operate as positive displacement pumps. They consist of a rotor mounted concentrically on the drive shaft and positioned eccentrically in a cylindrical stator (see Fig. 1). The rotor has three radially sliding vanes which divide the pump chamber into three segments. The gas to be pumped enters at the inlet port, passes through the inlet screen and the open anti-suck-back valve into the pump chamber. As the rotor rotates, the inlet aperture is closed, the gas is compressed and forced out through the exhaust port. This operation is repeated three times each revolution.

All R5 series pumps are designed to handle air. Vapor in the air stream can be tolerated when the pump is operated within certain operating parameters as defined by Busch, Inc. Engineering (see Section 2.2 - Gas Ballast). When you desire to use the pump on an air stream that contains vapors, contact Busch, Inc. Engineering for operating recommendations; otherwise, the warranty could be void.

1.0 INSTALLATION

1.1 Unpacking

Inspect the box and pump carefully for any signs of damage incurred in transit. Since all pumps are ordinarily shipped FOB our factory, such damage is the normal responsibility of the carrier and should be reported to them.

Remove the nuts from the bottom of the box/crate and pull the pump out of the container, then unscrew the studs from the bottom of the rubber feet.

The inlet port of the pump is covered with a plastic cap prior to shipment to prevent dirt and other foreign material from entering the pump. Do not remove this cover until the pump is actually ready for connection to your system.

1.2 Location

The pump must be installed in a horizontal position on a level surface so that the pump is evenly supported on its rubber feet. Allow at least one foot (five feet for 0400 and larger pumps) of air space between the pump and any walls or other obstructions to the flow of cooling air.

Also, adequate ventilation must be provided for the fans on the pump and motor (i.e., do not locate the pump in a stagnant air location).

Whenever the pump is transported, be sure to drain the oil prior to shipping to avoid vane breakage when restarting the pump.

Do not tip the pump over if it is filled with oil.

Locate the pump for easy access to the oil sight glass (Ref. 83) in order to inspect and control the oil level properly. Allow clearance at the exhaust flange area to provide service access to the exhaust filters.

1.3 Power Requirements

The schematic diagram for the electrical connection is located in the junction box or on the nameplate of the pump motor.

CAUTION: On 0400/0630 models, a switch mounted near the exhaust port and on top of the exhaust box is a safety device. This switch is used to shut off the pump in the event the pump oil chamber is overheated. Wire this normally closed switch into the starter control circuit so that when the switch reaches the set point, power to the pump motor is discontinued.

The motor must be connected according to the electrical codes governing the installation. The power supply must be routed through a fused switch to protect the motor against electrical or mechanical overloads. The motor starter has to be set consistent with the motor current listed on the motor nameplate.

If the pump is supplied with a manual motor starter, it is preset at the factory in accordance with the customer’s specification. For other voltage requirements, contact the factory for motor and/or starter information.

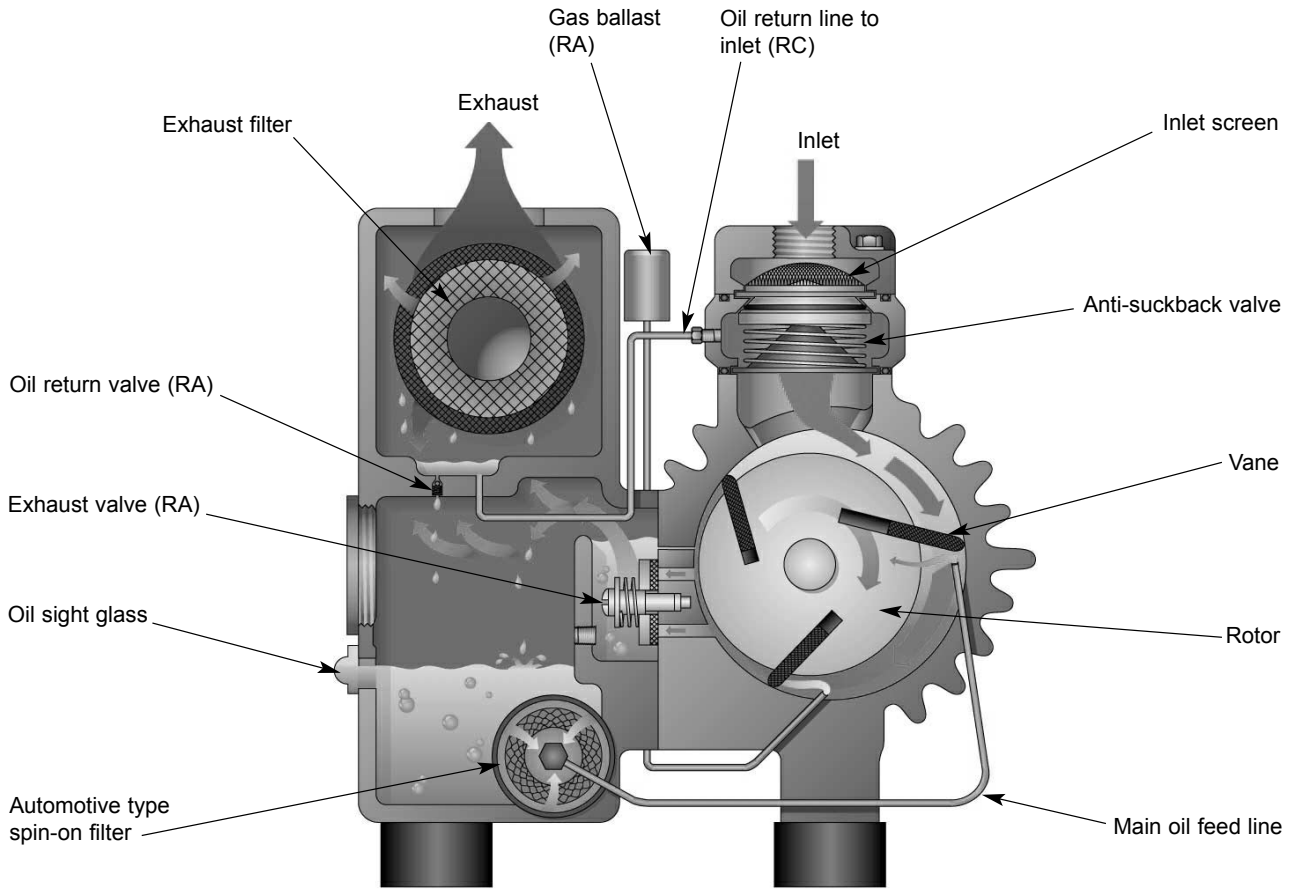


Fig. 1 - Basic R5 Pump

Note: *See the motor manufacturer's manual for start-up maintenance of the motor.*

Correct direction of rotation is marked by an arrow on the motor fan housing and is counterclockwise when looking at the motor from the motor's fan side.

CAUTION: After the electrical connection has been made, but before the pump is filled with oil, the rotation of the motor must be checked. Open the inlet port and jog the motor briefly to make sure rotation is correct. If it runs backwards and if it is wired three phase power, reverse any two leads of the three at the power connection.

1.4 Vacuum Connections

CAUTION: When using PVC pipe or any static enhancing material for the exhaust piping, make provisions to safeguard against arcing from static electricity. Arcing can ignite oil vapor that may be present.

Use a line size to the vacuum system that is at least as large as that of the pump inlet. Smaller lines will result in lower pumping speeds than the rated values.

Install a drip leg and drain on the vertical pipe near the pump inlet. Drain the drip leg often to prevent condensation from entering the pump.

If more than one vacuum pump or a receiver tank is connected to a common main line, each pump should have its own manual or automatic operated shut-off valve or positive action check valve. The built-in, anti-suck-back valve should not be used as a shut-off valve for the vacuum system.

CAUTION: The built-in, anti-suck-back valve is not positive action; do not use it as a system check valve.

Remove the plastic protective cap from the inlet port prior to connection of the pump to the system. Vertical connection of the vacuum line can be made directly to the pump inlet (Ref. 260).

The type and size of the inlet connections of the R5

Series pumps is shown in the TECHNICAL DATA page 25.

If the gas that is pumped contains dust or other foreign solid particles, a suitable inlet filter (10 micron rating or less) should be connected to the inlet port. Consult the factory for recommendations.

WARNING: Do not use hydrocarbon oils in pumps on oxygen service. See Section 2.6 - Oxygen Service Pumps.

1.5 Oil Filling

The pump is shipped without oil. After level installation, and after correct rotation has been established, fill the pump with the recommended vacuum oil through the oil filling port (Ref. 88), observing the "MAX" and "MIN" position at the oil sight glass (Ref. 83). On pumps with two sight glasses, fill the top glass up to the 3/4 mark.

Non-detergent oil should be used. **Do not use detergent motor oil** as additives in detergent oil will plug exhaust filter elements and shorten their life.

It is recommended that Busch R500 Series oil be used to receive the best performance from your vacuum equipment. R500 Series oil is a high quality vacuum oil that will give longer running time between oil changes, will provide better lubrication at high operating temperatures, and will prolong the life of exhaust filter elements. This oil can be obtained directly from Busch, Inc. in Virginia Beach, Virginia.

The strict use of Busch oils and parts from the day of purchase can extend the standard warranty to three years. Contact Busch, Inc. in Virginia Beach, Virginia for details. Refer to page 12 for the standard warranty.

For general applications, use R530 in all models covered by this manual, except for the 0021 model, which should use R580. Use R590 or R570 in pumps that are operated in high ambient temperatures (above 90°F) or high operating pressure when the oil carbonizes (turns black) before the change interval. Contact the factory for recommendations when using other oils.

The TECHANICAL DATA chart on page 25 gives the approximate quantities of oil required for each pump. The oil capacity chart should only be used as a guide, since oil capacity may be slightly lower, depending on whether the pump was filled previously, and whether all components such as oil filter, oil lines, etc., were allowed to completely drain. Use only the sight glass reading for proper level. Never overfill!

WARNING: Keep the oil fill plug tight as pressure in the exhaust box could cause bodily injury if the plug is blown out. Do not fill/add the pump with oil through the exhaust/inlet ports as there is danger of breaking the vanes!

For ambient operating temperatures lower than 41°F, use Busch R580 synthetic oil. If this does not help (where the pump has difficulty starting due to high oil viscosity), contact the factory in Virginia Beach, Virginia.

Replace the oil fill plug (Ref. 88), making sure that the gasket (Ref. 89) is in place and properly seated and secured. Some pumps are equipped with an exhaust pressure gauge as an integral part of the oil fill plug.

2.0 OPERATION

2.1 Start-up

Check rotation of the motor as described in Section 1.3 - Power Requirements.

Fill the pump with oil as described in Section 1.5 - Oil Filling.

Start the pump and immediately close the inlet. Run the pump for a few minutes before checking the oil level again. With the pump shut off, the oil level should be visible in the oil sight glass (Ref. 83), between the "MIN" and "MAX" mark.

On pumps with two sight glasses, with the pump shut off, the oil level should be visible in the upper oil sight glass, between the "MIN" and "MAX" mark.

Add oil, if necessary, but only add it when the pump has been shut off and the circulating oil has had sufficient time to return to the oil sump.

Note: *The oil separated by the exhaust filter element forms droplets on the outside of the exhaust filter that collect at a low point in the upper half of the exhaust box. From there the collected oil is drained back to the oil sump via an oil return valve (Ref. 275), which opens on R5 RA/RB model pumps when the pump is shut off. It is necessary to shut off the pump (all RA model pumps and RB0021 model pumps) after every 8 hours of operation to allow the check valve to open. If the pump is not shut off after this time period, it is possible to starve the pump of oil since the oil is not allowed to drain back into the oil sump and/or oil droplets may be blown out of the exhaust. If the pump is operating at high pressure, it may be necessary to shut it down sooner than 8 hours.*

On R5 (Standard) RC model pumps, the collected oil is drawn continuously during operation of the vacuum pump to the inlet flange (Ref. 260) via the oil return line (Ref. 290). The oil return line is connected directly to the area of the exhaust box, downstream of the exhaust filter, which is at atmospheric pressure. Therefore, a constant amount of air is sucked into the pump, which is an additional reason that the R5 Standard Series Pumps do not achieve as low a vacuum as the R5 Series Super Vacuum Pumps. RC model pumps can run continuously without having to shut them off for the oil to drain back.

2.2 Gas Ballast

All RA Series pumps are equipped with a gas ballast valve. The gas ballast valve (Ref. 440) is located between the inlet port and the exhaust box. RA0010 and RA0016 pumps are equipped with a permanent gas ballast which cannot be shut off unless the sintered filter is removed and the orifice plugged. Pumps RA0160 thru RA1600 are equipped with an adjustable gas ballast valve.

The adjustable gas ballast valve should normally be left open. Its primary function is to prevent water vapor from condensing in the pump. Condensation causes emulsification of the oil, loss of lubricity, and possible rotor seizure.

2.3 Process Gas

The R5 series pumps are designed to pump air and are not intended for use when water vapor is being pumped. In some applications, when the quantity of the water vapor is moderate, R5 pumps have been used with good results. On these occasions, the pump is run until it is up to operating temperature before it is allowed to pump the process gas. The pump is also operated for a period of time off process and on air (to clear it of process gas) before it is shut down. This operating technique prevents the vapor from condensing in the pump. Before attempting to pump a gas laden with water vapor, contact Busch Engineering for advice.

2.4 Stopping Pump

To stop the pump, turn off the power. The pump has a built-in, anti-suck-back valve (Ref. 251 thru 255) to prevent the pump from rotating backwards when it is shut off.

Caution: Do not use the anti-suck-back valve as a check or shut-off valve for your vacuum system. Do not depend on the anti-suck-back valve to prevent pump oil from migrating through the inlet into the system when the pump is shut down.

Install an automatic operated valve (such as a check valve) in front of the pump, if more than one pump is pumping on the same line or if there is a sufficient volume of vacuum in the system to cause the pump oil to be drawn into the piping when that pump is shut down.

All R5 Series pumps are vented internally to atmospheric pressure through venting holes that are next to the exhaust valve assembly.

2.5 Water-Cooled Pumps (optional)

Water-cooled pumps are cooled by circulating the oil through a shell-and-tube type heat exchanger. The circulation of the pump oil through the shell is created by vacuum in the pump, but the circulation of the cooling water through the tubes is thermostatically controlled. The flow rate of the cooling water is controlled by a thermostatically activated valve (see Fig. 2) that senses, through a capillary bulb mounted in the exhaust box, the pump's oil temperature as it is discharged from the compression chamber. The valve will open at its set point and close at approximately 3°F to 5°F below the set point. The valve set point is adjustable as follows:

(a) Rotate the valve adjustment screw counterclockwise to cause the valve to open at a higher temperature. This makes the pump run hotter.

(b) Rotate the valve adjustment screw clockwise to make the valve open at a lower temperature. This makes the pump run cooler.

The thermostatic valve can be manually opened by inserting a screwdriver under each side of the spring guide and prying the spring and guide upward away from the valve body.

The water cooling option can be used to cool pumps operating in high ambient temperatures, or it can be used to maintain a pump at elevated temperatures to prevent condensation inside the pump in wet applications. Contact Busch Engineering in Virginia Beach for details.

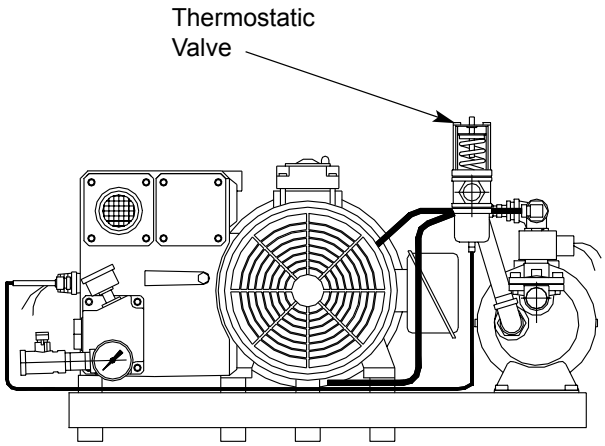


Fig. 2 - Water-Cooled Pump

2.6 Oxygen Service Pumps

Oxygen service pumps must be used in oxygen enriched applications that are defined as any application which has a process gas that is 25% or more oxygen. If this pump is contaminated by organic compounds, do not attempt to use it on oxygen service until it has been decontaminated.

These pumps have been manufactured, solvent washed (to remove organic contaminants) and assembled

according to the latest technical standards and safety regulations. If this pump is not installed properly or not used as directed, a dangerous situation or damage might occur.

WARNING: This pump is filled with a special operating fluid. Do not use any other type of fluid, oil and/or grease. Use one of the following:

- **Fomblin LC 250**
- **Tyreno Fluid 12/25V (perfluorinated polyether)**
- **KRYTOX ® Vacuum pump fluid by Du Pont Company**

If you have any questions, please phone our Customer Service Department for more information.

It is mandatory that these operating instructions be read and understood prior to vacuum pump installation and start-up!

For overhaul/repair of oxygen service pumps, Busch Inc. strongly recommends that all major repair operations be conducted at the factory. **Improper handling of repairs could result in extreme danger to personnel operating the pump.**

3.0 MAINTENANCE

R5 Series, Single Stage, Rotary Vacuum Pumps require very little maintenance; however, to insure optimum pump performance, the following steps are recommended.

3.1 Pump Oil

3.1.1 Oil Level

With the pump installed relatively level, make sure that there is sufficient clean oil in the pump. The oil level should be observed on a daily basis and/or after 8 hours of operation and should be replenished if it drops below the 1/4 mark on the oil sight glass on pumps with one sight glass or below the 1/4 mark on the upper oil sight glass on pumps with two sight glasses.

On RA/RB Series pumps, you must first shut the pump off in order to let the oil flow back into the oil sump prior to checking the sight glass. Allow sufficient time for the oil to drain back into the sump on RA/RB Series pumps prior to adding oil, or overfilling could result.

Oil level readings should be done only when the pump is turned off. Oil can be added to the oil fill port (Ref. 88) if the pump is shut off and the circulating oil has sufficient time to return to the oil sump. The oil might appear to be foamy, which is a normal phenomenon with aerated oil.

CAUTION: Do not add oil while the pump is running since hot oil vapor may escape through the oil fill port.

Under normal circumstances, it should not be necessary to add or drain oil from the pump between recommended oil changes.

A significant drop in oil level means there is an oil leak or that an exhaust filter is broken, and the pump should be smoking excessively. It is normal for the oil to be foamy and light in color in an operating pump. However, if the oil is milky colored, it is an indication that water is present in the oil. Normally, by operating the pump for an extended period, with the inlet suction blanked off and the gas ballast open on RA pumps, the water will be purged from the oil. If the oil is dark colored, it is contaminated or carbonized and must be changed. Depending on the severity of the contamination, a thorough flushing may be needed. Contact the factory for flushing oil (Busch R568) and instructions.

3.1.2 Oil Type and Quantity

See Section 1.5 - Oil Filling for details on oil type and quantity.

3.1.3 Oil and Filter Change

Oil life is dependent upon the conditions to which it is exposed. A clean, dry air stream and an oil operating temperature under 210°F are ideal conditions. When using R530 (hydrocarbon oil), it is recommended that oil changes are made every three (3) to four (4) months or 500 to 750 hours of operation, or as necessary if high heat is contaminating the oil. The use of Busch R570 or R590 synthetic oils could extend the operating hours between oil changes under ideal conditions. Oil samples should be taken regularly when exceeding the 500-750 hour recommendation.

CAUTION: When changing the oil and filters, it may be necessary to flush the pump to remove any build-up of degraded oil from the sumps, oil lines, radiators, etc., to ensure proper oil flow through the pump. Reduced oil flow, especially through radiators and cooling coils, can cause mechanical damage or extreme overheating, which could cause the oil vapors to ignite.

Excessive Heat

When the pump is subjected to operating conditions that will cause the oil to be heated above 235°F, the oil will carbonize and become contaminated after a relatively low number of operating hours. The higher the temperature, the quicker the oil becomes contaminated. If the oil temperature is too severe, Busch R570 or R590 synthetic oil should be used to withstand the elevated temperatures. If synthetic oil is used, the pump should be flushed with Busch R568 oil as outlined in the Maintenance and Repair Manual. Auxiliary oil cooling is the most practical approach to a severe heating problem.

Contaminated Air Stream

When the air stream contains a solid and/or liquid that can contaminate the oil, it must be changed more often. If the air stream contains a small percentage of contaminates and/or they are slightly aggressive* (mild acids, etc.), synthetic oil, such as Busch R570, will resist breakdown better than the standard Busch R530. The solution is to install a filter or knock-out pot to keep the contaminates out of the pump.

**Process air streams with a large percentage of contaminates and/or more than slightly aggressive contaminates must use a once-through-sealant or dry-type pump.*

Oil change intervals can only be established by experience with the pump operating in the actual conditions (see previous paragraph for some of the conditions). Develop the oil change interval by periodically checking an oil sample removed from the pump. When the oil sample has become dark in color (from solids and carbonized particles) or is milky looking (from solids), it is time to discard it. As mentioned before, a thorough flushing may be needed.

3.2 Automotive-Type Oil Filter

The 0160 - 0630 Series, Single Stage, Rotary Vacuum Pumps are equipped with an automotive-type oil filter (Ref. 100). The 1000/1600 Series has two automotive-type filters. The 0010 thru 0021 are not equipped with an automotive-type oil filter. When replacing the automotive-type oil filter, use only a genuine Busch filter.

Note: *Make sure to tighten the Busch oil filter securely against the aluminum sealing surface so that leaks will not occur.*

3.3 Exhaust Filter

WARNING: If the gas entering this pump is a health hazard, use rubber gloves and all necessary personal protection equipment when performing the exhaust filter replacement operation.

Every nine (9) to twelve (12) months, or as necessary, replace the exhaust filter elements. The service life of the exhaust filters varies widely with pump application. It is only necessary to change the filters when the elements become clogged with foreign material or burned oil. Indications of clogged filters are smoke and oil mist coming from the pump exhaust, higher than normal motor current or oil leaking from the gas ballast valve on RA models.

A pressure gauge (Ref. 90) is now supplied with your R5 vacuum pump as part of the oil fill plug. This gauge has a green field and a red field. A pressure within the green field would indicate normal pressure. Any pressure in the red field (for a continuos period of time) requires an immediate change of the exhaust filter(s).

WARNING: Wear safety glasses when installing or removing the spring retainers. The retainers can, if not secured correctly, slip off and fly out of the exhaust box.

In order to replace the filter, remove the screws retaining the exhaust port cover plate. Pull the housing off the exhaust box and set it aside. Use a slotted head screw driver to loosen the exhaust filter retaining spring (Ref. 125), then rotate and remove the spring (see Fig. 3). Pull the filter cartridge (Ref. 120) out of the exhaust box.

Fig. 3 - Removing Filter Spring

To field test an exhaust filter element, remove it from the pump, allow it to cool, clean the sealing end (or O-ring end), and use compressed air to blow through the element. Apply approximately 3 to 6 psi, which is the maximum allowable operating pressure across the filter.

Note: *Use a shop rag to seal off the connection between the air hose and the filter.* If you can blow through it, the element is good. If not, discard it and install a new one. The filter cannot be cleaned successfully. Visually inspect the filter element for cracks.

WARNING: Do not inhale through the filter or allow your mouth to come in direct contact with the filter.

Reinstall the filter elements. Make sure the open end of the element is properly seated down in its recess in the exhaust box with the O-ring (Ref. 121) correctly positioned. Retain the filter with the spring clip, tighten the tension screw until the filter is secure. Place the exhaust port gasket and cover in position on the exhaust box and retain with the cap screws.

3.4 Vacuum Inlet Filter

If the pump is equipped with a special vacuum inlet filter in applications where powder, dust or grit is present, the filter cartridge should be cleaned on a weekly basis, or as required, depending on the amount of foreign particles to which the pump is exposed.

3.5 Maintenance Chart

Note: *See the motor manufacturer's manual for the periodic motor maintenance.*

Daily: Visually check oil level (see 3.1.1 and 3.1.2).

Weekly: Check oil for contamination (see 3.1.3). Inspect inlet filter (see 3.4).

Every three (3) or four (4) months, 500 to 750 hours of operation, or as necessary: See 3.1.3 and 1.5. Drain and discard oil from the hot pump. Replace the automotive-type oil filter (not applicable on the 0010, 0012, 0016 and 0021) and refill with fresh oil through the fill plug (see 3.1.2 through 3.1.3 and 3.2).

Every nine (9) to twelve (12) months, or as necessary: Replace exhaust filter elements (see 3.3).

3.6 Overhaul Kit/Filter

An overhaul kit containing a set of gaskets and O-rings, vanes, bearings and bearing sleeves, shaft seals and taper pins, is available from the factory.

Also, a filter kit containing oil drain plug, gaskets, automotive-type oil filter (except 0010, 0012, 0016 and 0021), exhaust filter, and synthetic baffle strainer (where applicable), is available from the factory.

When ordering, please specify pump size and model (a 4-digit suffix after size), and serial number.

4.0 TROUBLESHOOTING

4.1 Trouble

Pump does not reach "blank-off" pressure, which is the lowest absolute pressure (best vacuum) when running with the inlet closed via a blank flange or a valve; or the pump takes too long to evacuate the system. "Blank-off" pressure can be measured by using a good quality capsule gauge.

4.1.1 Possible Cause

Contaminated oil is by far the most common cause of not reaching the ultimate pressure.

Remedy:

Shut off pump, after operating temperature has been reached, drain the warm oil from pump and exchange automotive-type oil filter (where applicable), if necessary. Flush and fill pump with new oil and take new "blank-off" measurement after operating temperature is reached (at least 20-30 minutes).

4.1.2 Possible Cause

Vacuum system or vacuum piping not leak-tight.

Remedy:

Check hose and pipe connections for possible leak.

4.1.3 Possible Cause

Wire mesh inlet screen plugged (Ref. 261).

Remedy:

Clean wire mesh inlet screen. Install inlet filter if problem repeats frequently.

4.1.4 Possible Cause

No oil or not enough oil in oil reservoir.

Remedy:

Shut off the pump, add the necessary oil, or if oil seems contaminated, drain balance of oil from pump, exchange automotive oil filter, and refill with fresh oil. Flush if necessary.

4.1.5 Possible Cause

Automotive-type oil filter is dirty or clogged (where applicable).

Remedy:

Replace automotive-type oil filter, exchange oil, if necessary, and refill with fresh oil.

4.1.6 Possible Cause

Inlet valve plate (Ref. 251) stuck in closed or partially open position due to contamination.

Remedy:

Disassemble inlet valve and screen. Clean as required.

4.1.7 Possible Cause

Oil tubing plugged and/or leaking.

Remedy:

Replace, clean and/or retighten the oil fittings. Replace only with same size tubing.

4.1.8 Possible Cause

Shaft seal leaking.

Remedy:

Replace the shaft seal following disassembly and assembly steps outlined in the Maintenance and Repair Manual. Check the shaft seal. It should have a spring installed inside and around the shaft sealing lip.

4.1.9 Possible Cause

Exhaust valve (Ref. 159) is not properly seated or it is partially stuck open (RA models only).

Remedy:

Follow disassembly and assembly steps outlined in the Maintenance and Repair Manual.

4.1.10 Possible Cause

The vanes are blocked in the rotor or are otherwise damaged.

Remedy:

Free vanes or replace with new ones following disassembly and assembly steps outlined in the Maintenance and Repair Manual.

4.1.11 Possible Cause

Radial clearance between the rotor and cylinder is no longer adequate.

Remedy:

Follow disassembly and assembly steps outlined in the Maintenance and Repair Manual on resetting the radial clearance correctly.

4.1.12 Possible Cause

Internal parts worn or damaged.

Remedy:

Follow disassembly and assembly steps outlined in the Maintenance and Repair Manual and replace worn or damaged parts.

4.2 Trouble

Pump will not start.

4.2.1 Possible Cause

Motor does not have proper supply voltage or is overloaded; motor starter overload settings are too low or wrong setting; fuses are burned; or wire is too small or too long, causing a voltage drop to the motor.

Remedy:

Check correct supply voltage; check overload settings in motor starter for size and setting according to motor nameplate data; check fuses; and install proper size wire. If ambient temperature is high, use larger size overloads or adjust setting 5% above nominal motor nameplate value.

4.2.2 Possible Cause

Pump or motor is blocked.

Remedy:

Remove fan cover and try to turn pump and motor by hand. If frozen, remove motor from pump and check motor and pump separately. If pump is frozen, disassemble completely per the Maintenance and Repair Manual and remove foreign objects in the pump or replace broken vanes.

4.3 Trouble

Pump starts, but labors and draws a very high current.

4.3.1 Possible Cause

Oil too heavy (viscosity too high) or ambient temperature below 5 degrees C (41°F).

Remedy:

Change to R580 vacuum oil if very cold, or warm up oil before starting the pump.

4.3.2 Possible Cause

Pump runs in the wrong direction.

Remedy:

Check for correct rotation which is counterclockwise when looking at the motor from the motor's fan side.

4.3.3 Possible Cause

Pump is overfilled with oil or the wrong kind of oil is used.

Remedy:

Correct the oil level and quality per Section 1.5 and use recommended motor oil.

4.3.4 Possible Cause

Exhaust filters in exhaust chamber are clogged and appear burned black with pump oil.

Remedy:

Replace exhaust filters, maintain proper oil condition, oil level, and use only Busch recommended vacuum oil.

4.3.5 Possible Cause

The exhaust filter is clogged due to process material.

Remedy:

Contact the factory for recommendations.

4.3.6 Possible Cause

Loose connection in motor terminal box; not all motor coils are properly connected. Motor operates on two phases only.

Remedy:

Check motor wiring diagram for proper hookup, especially on motors with six internal motor windings, tighten and/or replace loose connections.

4.3.7 Possible Cause

Foreign particle in pump, vanes broken, bearing seizing.

Remedy:

Follow disassembly and assembly steps outlined in the Maintenance and Repair Manual and remove foreign parts, and replace vanes and bearings.

4.4 Trouble

Pump discharges smoke at the exhaust port or expels oil droplets from the exhaust.

4.4.1 Possible Cause

Exhaust filter is not properly seated with O-ring (Ref. 121) or filter material is cracked.

Remedy:

Check condition and check for proper seating of exhaust filters. Replace if necessary. Also, check filter spring clips for tightness.

4.4.2 Possible Cause

Exhaust filter is clogged with foreign particles.

Remedy:

Replace exhaust filter.

4.4.3 Possible Cause

The oil return valve (Ref. 275) is stuck open on RA/RB pumps. Proper function is that when blowing into check valve, it should close. When applying vacuum on it, check valve should open.

WARNING: Do not apply pressure or vacuum by mouth.

Remedy:

Free or replace the oil return check valve.

4.4.4 Possible Cause

If RA/RB Series vacuum pumps run continuously over 8 hours without ever being shut down, it may be possible that oil accumulates behind the exhaust box cover to the extent that oil is blown out of the exhaust with the exhaust gas.

Remedy:

Shut pump down during break periods or install an additional oil return line assembly. Check that oil return valve (Ref. 275) is free and drains oil back into the pump when the RA/RB Series pump is stopped.

4.4.5 Possible Cause

Oil return line (Ref. 290) on RC Standard pump is clogged.

Remedy:

Free clogged line or replace. Check that oil is being drawn out of the exhaust filter area while the vacuum pump is operating.

Note: *An oil filling plug with pressure gauge is provided on all R5 Series pumps, so that the pressure in front of the exhaust filters can be monitored. The green field indicates that the filters are still effective. Back pressure that causes a continuous reading in the red field requires immediate change of the exhaust filter (Ref. 120).*

4.5 Trouble

Pump runs very noisily.

4.5.1 Possible Cause

Coupling insert worn.

Remedy:

Replace coupling insert in motor/pump coupling.

4.5.2 Possible Cause

Bearing noise.

Remedy:

Follow disassembly and assembly steps outlined in the Maintenance and Repair Manual and replace bearings.

4.5.3 Possible Cause

Vanes stuck.

Remedy:

Follow disassembly/assembly instructions outlined in the Maintenance and Repair Manual and replace vanes. Use only recommended Busch oil and change oil more frequently.

4.6 Trouble

The pump runs very hot. See Technical Data for typical oil sump temperature.

Note: *The oil temperature with a closed inlet should be approximately 185-225°F* depending on pump type*. At 24 in. Hg, the oil in the pump can go above 225°F. These values are taken at an ambient temperature of 68°F. The maximum recommended ambient operating temperature for an R5 is 100°F on a continuous basis. When it is necessary to operate a pump in ambient temperatures above this limit, careful oil monitoring and/or optional water cooling is necessary. Contact the factory at Virginia Beach for details.*

4.6.1 Possible Cause

Not enough air ventilation to the pump.

Remedy:

Clean motor and pump air grills. Do not install the pump in an enclosed cabinet unless a sufficient amount of cool air is supplied to the pump. On pumps with oil cooling coils, clean outside fin assembly. Bring ambient air temperature down.

4.6.2 Possible Cause

Automotive-type oil filter clogged and pump does not receive enough oil (not applicable on 0010, 0012, 0016 or 0021).

Remedy:

Change automotive oil filter.

4.6.3 Possible Cause

Not enough oil in oil reservoir or badly burned oil is used for pump lubrication.

Remedy:

Drain and refill only with Busch recommended oil. Increase oil change intervals.

Note: *On some high temperature applications, it may be necessary to change to a high temperature oil such as R590 or R570. Contact the factory for recommendations.*

4.7 Trouble

Pump is seized.

4.7.1 Possible Cause

Pump operated without oil and vanes broke.

Remedy:

Disassemble and exchange vanes as outlined in the Maintenance and Repair Manual.

4.7.2 Possible Cause

Pump was operated for an extended period of time in the wrong rotation.

Remedy:

Inspect vanes and replace.

4.7.3 Possible Cause

Liquid carryover into the pump cylinder broke vanes while pump was running, or oil broke vanes on start-up.

Remedy:

(a) Install condensate trap on the inlet of the pump.

(b) Pump was overfilled with oil in oil reservoir. Follow oil filling procedure (see Section 1.5) and do not overfill.

(c) Built-in, anti-suck-back valve (Ref. 250 through 255) leaking while pump was shut down and vacuum was left in manifold. Clean valve seat and check that anti-suck-back valve holds vacuum on inlet when pump is shut down.

(d) Two pumps or a receiver is on the same main line. Install a manual or automatic operated valve in front of each pump.

4.8 Trouble

Automotive-type oil filter (Ref. 100) does not get warm within two to five minutes when cold pump is started (not applicable on 0010, 0012, 0016 or 0021).

4.8.1 Possible Cause

Automotive-type oil filter is clogged.

Remedy:

Replace automotive-type filter per Section 3.2 and exchange oil per Section 1.5.

4.8.2 Possible Cause

Wrong automotive-type filter is used and/or oil lines and oil coolers leading to pump are clogged.

Remedy:

Use only automotive filter as listed in Section 3.2 and blow lines free. Flush oil cooler.

4.8.3 Possible Cause

Electric motor has failed and seized.

Remedy:

Check and replace motor bearings or replace motor if windings have burned up.

5.0 LIMITED STANDARD WARRANTY

Busch, Inc. warrants that all products furnished by it are free from defects in material and workmanship at the time of shipment for a period of 18 months from the date of shipment, or 12 months from the date of installation, whichever occurs first. Claims must be made during that period and are limited to the replacement or repair of parts claimed to be defective.

In the case of components purchased by Busch, Inc., such as starters, controls, mechanical seals, motors, couplings, etc., the warranty of that manufacturer will be extended to the purchaser in lieu of any warranty by Busch, Inc. The replacement of wear items including, but not limited to, seals, bearings, couplings, exhaust cover gaskets, oil drain plugs, oil fill plugs etc., made in connection with normal service, are not covered by this Warranty.

The Limited Standard Warranty is valid only when the product has been properly installed, used in a normal manner, and serviced according to the operating manual. This warranty shall not extend to products that have been misused, neglected, altered, or repaired without factory authorization during the warranty period. We highly recommend the use of Busch oils and parts to achieve documented performance and efficient operation. The use of oils or parts other than Busch could limit the life expectancy of the equipment and could void any warranties if they are the cause of any damage. Operating conditions beyond our control such as improper voltage or water pressure, excessive ambient temperatures, or other conditions that would affect the performance or life of the product will also cause the warranty to become void.

Permission to return parts for warranty repair must be obtained, and all returns must be prepaid to the factory. If, after examination, the product or part is found to be defective, it will be repaired or replaced on a no-charge basis and returned, FOB the factory. If it is determined that the Warranty has not been breached by Busch, Inc., then the usual charges for repair or replacement will be made, FOB the factory. Parts or products that are obsolete or those made to special order are not returnable.

This Limited Standard Warranty applies only to the above and is for the period set forth. Busch, Inc.'s maximum liability shall not, in any case, exceed the contract price for the product, part, or component claimed to be defective; and Busch, Inc. assumes no liability for any special, indirect, or consequential damages arising from defective equipment.

THERE ARE NO WARRANTIES IMPLIED OR EXPRESSED THAT EXTEND BEYOND THOSE CONTAINED IN THIS LIMITED STANDARD WARRANTY.

Note: *For extended warranties on your new equipment contact Busch, Inc. Headquarters at:*

1-800-USA-PUMP

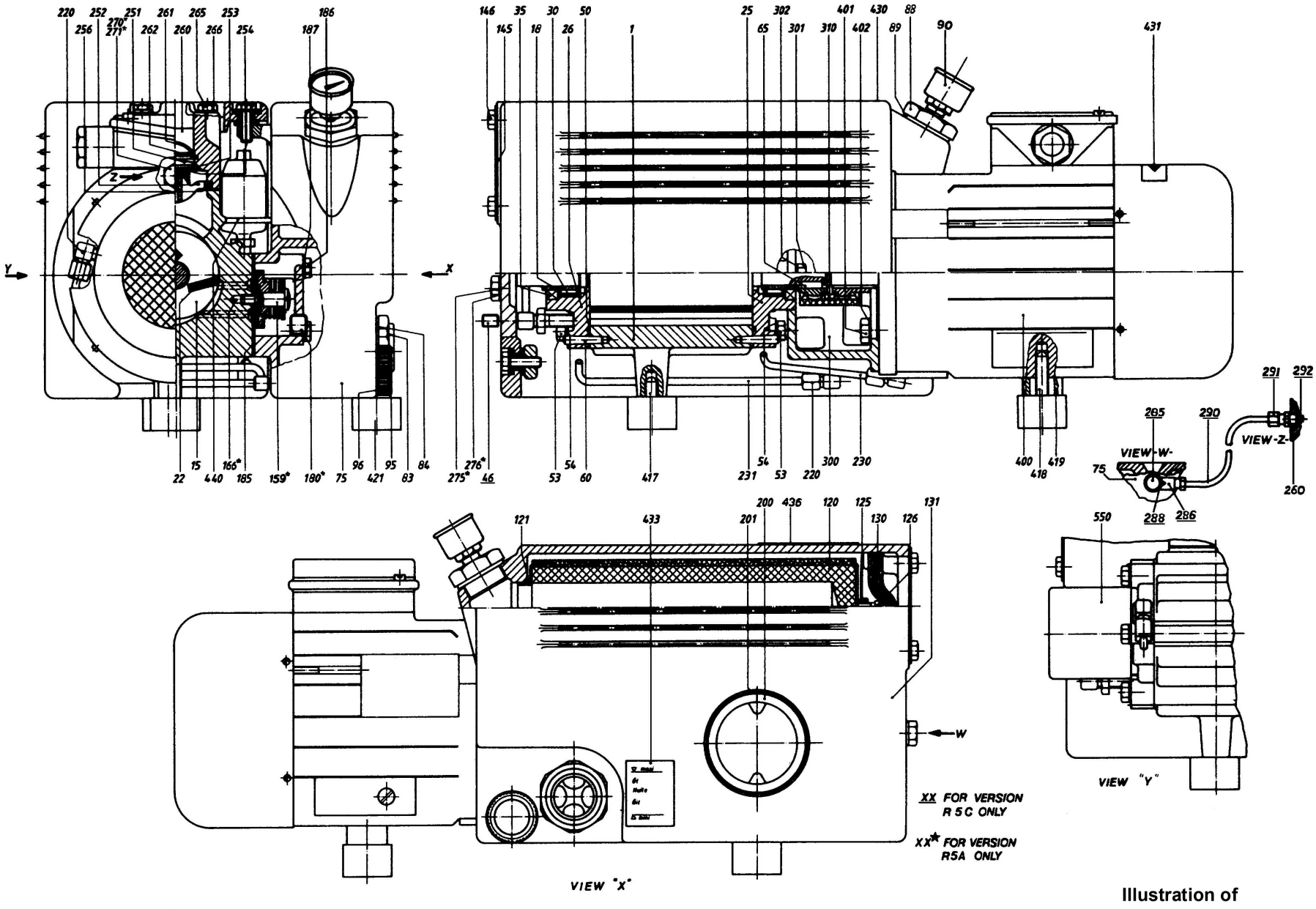
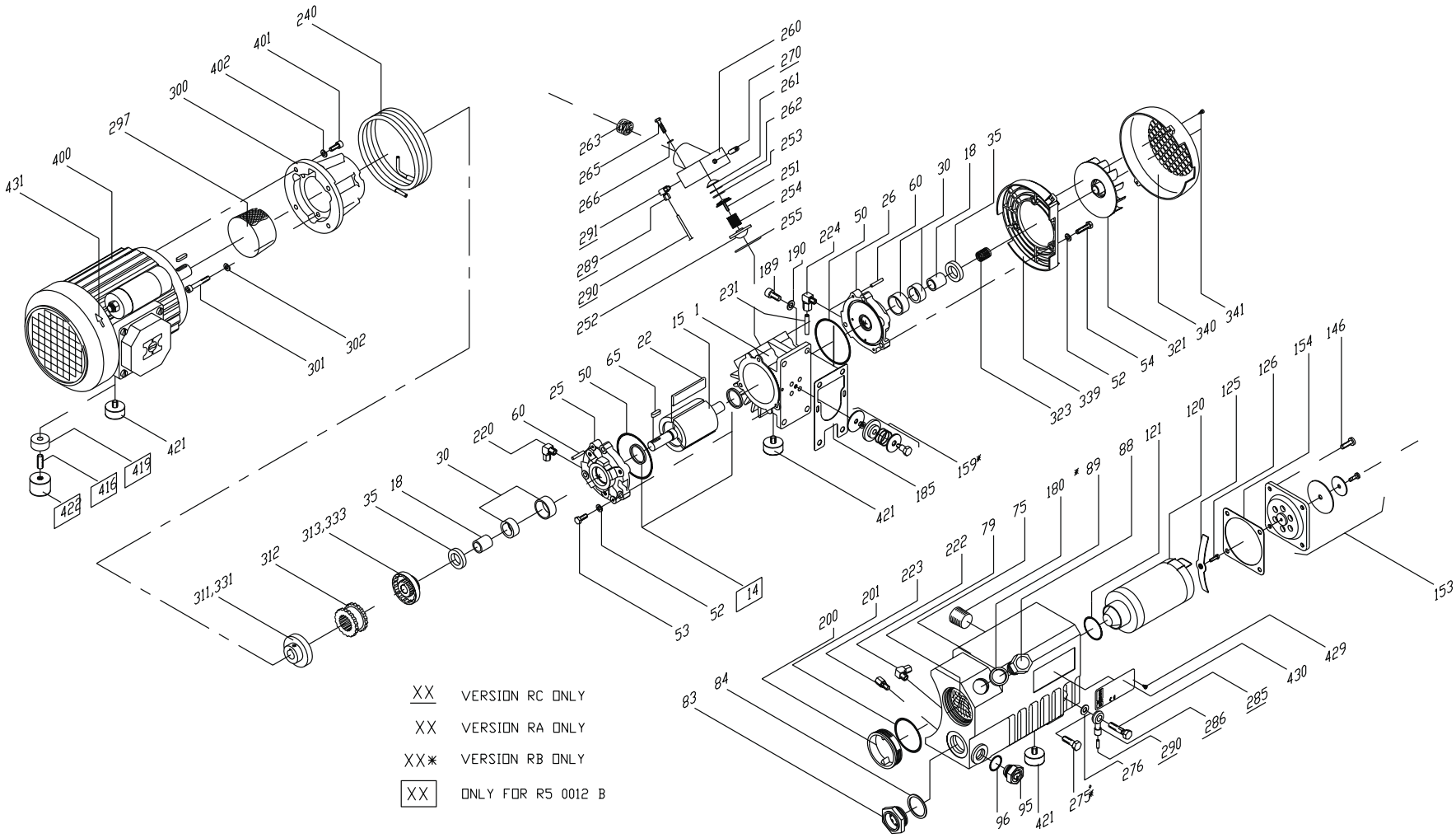


Illustration of
R5 0010/0016 Series

0010/0016 Parts List

Ref	Description
001	Cylinder
015	Rotor
018	Bearing sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
030	Needle bearing
035	Shaft seal, Viton
046	Socket set screw
047	Lockwasher
050	O-ring, Viton
053	Hex head cap screw
054	Lockwasher
056	Hex head cap nut
060	Tapered pin
065	Shaft key
075	Exhaust box
083	Oil sight glass
084	Ring gasket
088	Oil fill plug
089	Ring gasket
090	Pressure gauge
095	Oil drain plug
096	O-ring, Viton
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Slot chase head mach. screw
130	Baffle strainer
145	Cover plate exhaust screen
146	Hex head cap screw
159	Exhaust valve
166	Cylindrical pin
180	Plug
185	Cylinder/exhaust box gasket
186	Hex head cap screw
187	Lockwasher
200	Drum exhaust box plug
201	O-ring, Viton
220	Hydraulic elbow fitting
230	Oil tubing
231	Oil tubing
251	Valve plate
252	Valve guide
253	O-ring, Viton
254	Inlet check valve spring
256	Cylinder/inlet flange gasket
260	Inlet flange
261	Inlet screen
262	Retaining spring
265	Hex head cap screw
266	Lockwasher
270	Plug
271	Ring gasket
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Banjo hydraulic fitting
288	Ring gasket
290	Oil return line
291	Hydraulic straight fitting
300	Motor mounting bracket
301	Socket head cap screw
302	Lockwasher
310	Coupling
400	Motor
401	Hex head cap screw
402	Lockwasher
417	Slotted set screw
418	Slotted set screw
419	Washer
421	Rubber foot
430	Nameplate
431	Directional arrow
433	Oil level label
436	Maintenance label
440	Check valve for gas ballast
550	Cover guard



XX VERSION RC ONLY

XX VERSION RA ONLY

XX* VERSION RB ONLY

[XX] ONLY FOR R5 0012 B

Illustration of
R5 0012/0021 Series

0012/0021 Parts List

Ref	Description
001	Cylinder
014	Seal
015	Rotor
018	Bearing sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
030	Teflon sleeve bearing
035	Shaft seal, Viton
050	O-ring, Viton
052	Lockwasher
053	Hex head cap screw
054	Lock washer
060	Tapered pin
065	Shaft key
075	Exhaust box
079	Demister pad
080	Oil sight glass
081	Ring gasket
083	Oil sight glass
084	Ring gasket
088	Oil fill plug w/hole
089	Ring gasket
090	Pressure gauge
095	Oil drain plug
096	O-ring, Viton
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Slot chs. head mach.screw
146	Hex head cap screw
153	Exhaust cover plate
154	Exhaust cover gasket
159	Exhaust valve assembly
180	Plug
185	Gasket
189	Stud
190	Lockwasher
191	Hex head nut
200	Drum exhaust box plug
201	O-ring, Viton
220	Hydraulic elbow fitting
222	Hydraulic straight fitting
223	Hydraulic straight fitting
224	Hydraulic elbow fitting
231	Oil tubing
240	Cooling coil
251	Valve plate
252	Valve guide
253	O-ring, Viton
254	Inlet check valve spring
255	O-ring, Viton
260	Inlet flange
261	Inlet screen
262	Retaining spring
263	Baffle strainer
265	Screw
266	Lockwasher
270	Plug
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Banjo hydraulic fitting
289	Fitting nut
290	Oil return line tubing
291	Hydraulic fitting
297	Screen
300	Motor mounting bracket
301	Socket head cap screw
302	Lockwasher
311	Motor side coupling half
312	Coupling insert
313	Pump side coupling half
321	Pump fan
323	Tolerance ring
331	Set screw
333	Set screw
339	Fan centering ring
340	Pump end cover
341	Machine screw
400	Motor
401	Hex head cap screw
402	Lockwasher
416	Stud
417	Slotted set screw
419	Foot spacer
421	Rubber foot
422	Rubber foot
429	Screw
430	Nameplate
431	Directional arrow

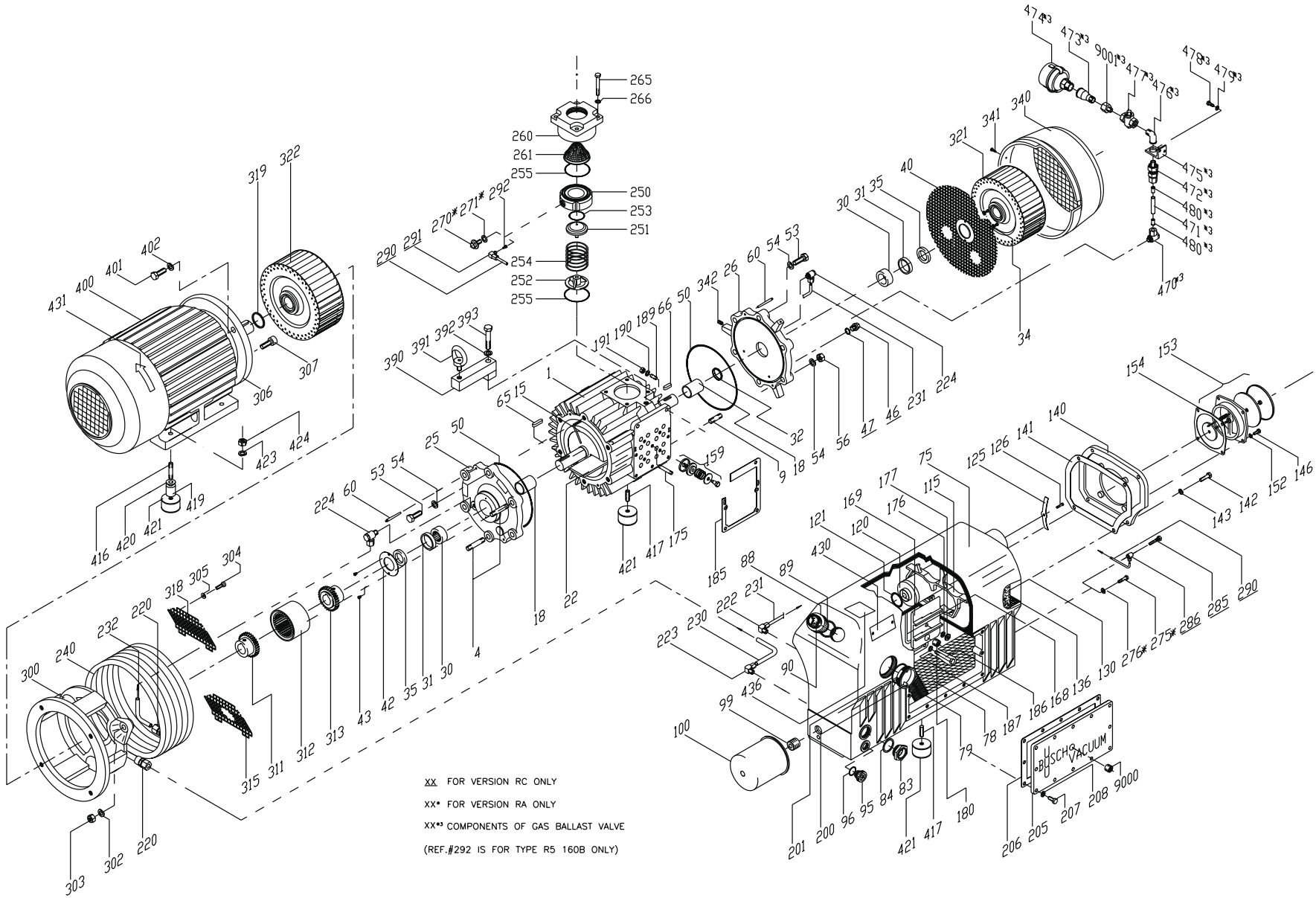


Illustration of
R5 0160 Series

0160 Parts List

Ref	Description
001	Cylinder
004	Stud
009	Stud
015	Rotor
018	Bearing sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
030	Needle bearing
031	Endplate spacer
032	Pump spacer
034	Slotted chs hd cap screw
035	Shaft seal, Viton
040	Protective screen
042	Shaft seal retaining plate
043	Hex head cap screw
046	Hex head plug
047	Copper ring gasket
050	O-ring, Viton
053	Hex head cap screw
054	Lockwasher
056	Hex head cap nut
060	Tapered pin
065	Shaft key
066	Shaft key
075	Exhaust box
078	Sheet metal baffle
079	Demister pad
083	Oil sight glass
084	Ring gasket
088	Oil fill plug
089	Oil fill plug gasket
090	Pressure gauge
095	Oil drain plug
096	O-ring, Viton
099	Nipple
100	Auto-type oil filter
115	Filter bracket
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Socket head cap screw
130	Baffle strainer
136	Support for syn. frame
140	Exhaust cover plate
141	Cover plate gasket
142	Hex head cap screw
143	Lockwasher
146	Hex head cap screw
152	Lockwasher
153	Exhaust silencer
154	Gasket
159	Exhaust valve
168	O-ring, silicon
169	Exh. valve cover plate
175	Stud
176	Lockwasher
177	Hex head nut
180	Plug
185	Gasket
186	Hex head cap screw
187	Lockwasher
189	Stud
190	Lockwasher
191	Hex head nut
200	Drum exhaust box plug
201	O-ring, Viton
205	Cover side plate
206	Gasket
207	Hex head cap screw
208	Lockwasher
220	Hydraulic fitting
222	Hydraulic fitting
223	Hydraulic fitting
224	Hydraulic fitting
230	Oil tubing
231	Oil tubing
232	Oil tubing
240	Cooling coil
250	Inlet flange
251	Valve guide
252	Valve plate
253	O-ring, Viton
254	Inlet check valve spring
255	O-ring, Viton
260	Inlet flange
261	Inlet screen
265	Hex head cap screw
266	Lockwasher
270	Plug R1/8"
271	Ring gasket
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Banjo hydraulic fitting
290	Oil return line tubing
291	Hydraulic fitting
292	Carburetor jet
300	Motor mounting bracket
302	Lockwasher
303	Hex shoulder nut
304	Socket hd machine screw
305	Flat washer
306	C-face adapter flange
307	Socket head screw
311	Motor side coupling half
312	Coupling insert
313	Pump side coupling half
315	Protective screen
318	Protective screen
319	Spacer
321	Pump shaft fan
322	Motor side fan
340	Fan Cover
341	Sheet metal screw
342	Plastic insert
390	Eyebolt adapter
391	Eyebolt
392	Lockwasher
393	Hex head cap screw
400	Motor
401	Hex head cap screw
402	Lockwasher
416	Stud
417	Slotted set screw
419	Foot spacer
420	Flat washer
421	Rubber foot
423	Washer
424	Hex head cap nut
430	Nameplate
431	Arrow label
436	Maintenance label
470	Hydraulic fitting
471	Teflon tubing
472	Check valve
473	Bell reducer
474	Gas ballast filter
475	Gas ballast valve bracket
476	Elbow fitting
477	Pet cock valve
478	Hex head cap screw
479	Lockwasher
480	Oil tube insert
9000	Steel socket plug
9001	Hydraulic adapter

Illustration of
R5 0400 Series

0400 Parts List

Ref	Description
001	Cylinder
004	Stud
005	Set screw
009	Stud
015	Rotor
018	Bearing sleeve
019	Shaft seal sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
030	Needle bearing
035	Shaft seal, Viton
040	Protective screen
041	Hex head nut
042	Shaft seal support ring
043	Hex head cap screw
046	Hex head plug
047	Copper ring gasket
050	O-ring, Viton
053	Hex head cap screw
054	Lockwasher
056	Hex head cap nut
060	Tapered pin
065	Shaft key
066	Shaft key
075	Exhaust box
078	Sheet metal baffle
079	Demister pad
080	Perforated sheet metal
083	Oil sight glass
084	Ring gasket
088	Oil fill plug
089	Oil fill plug gasket
090	Pressure gauge
095	Oil drain plug
096	O-ring, Viton
099	Nipple
100	Auto-type oil filter
105	Cover plate
106	Cover plate gasket
107	Socket head cap screw
108	Lockwasher
115	Filter bracket
116	Filter bracket
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Socket head cap screw
130	Baffle strainer
136	Perf. sheet metal screen
137	Hex head cap screw
138	Flat washer
139	Lockwasher
140	Exhaust cover plate
141	Cover plate gasket
142	Hex head cap screw
143	Lockwasher
146	Hex head cap screw
153	Cover plate exhaust screen
159	Exhaust valve
168	O-ring, silicon
169	Exh. valve cover plate
175	Hex head cap screw
176	Lockwasher
184	Socket head cap screw
185	Cylinder/Exhaust box gasket
186	Hex head cap screw
187	Lockwasher
200	Drum exhaust box plug
201	O-ring, Viton
205	Cover side plate
206	Gasket
207	Hex head cap screw
215	Reducing nipple
216	Ring gasket
220	Hydraulic fitting
222	Hydraulic elbow fitting
223	Hydraulic elbow fitting
224	Hydraulic banjo fitting
225	Hydraulic straight fitting
226	Hydraulic banjo fitting
230	Oil tubing
231	Oil tubing
232	Oil tubing
233	Oil tubing
240	Cooling coil
250	Inlet flange
251	Valve plate
252	Valve inlet guide
253	O-ring, Viton
254	Inlet check valve spring
255	O-ring, Viton
258	Ball, Viton
260	Inlet flange
261	Inlet screen
265	Hex head cap screw
266	Lockwasher
270	Plug R1/8"
271	Ring gasket
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Banjo hydraulic fitting
290	Oil return line tubing
291	Hydraulic elbow fitting
297	Screen
298	Slot chs head screw
299	Rivet
300	Motor mounting bracket
302	Lockwasher
303	Hex shoulder nut
306	C-face adapter flange
307	Socket head screw
311	Motor side coupling half
312	Coupling insert
313	Pump side coupling half
319	Spacer
320	Fan and coupling spacer
321	Pump shaft fan
322	Motor side fan
327	Locking disk
328	Socket head cap screw
329	Lockwasher
340	Fan Cover
341	Sheet metal screw
342	Plastic insert
391	Eyebolt
400	Motor
401	Hex head cap screw
402	Lockwasher
417	Slotted set screw
418	Rubber foot
419	Foot spacer
420	Stud
421	Rubber foot
422	Rubber foot
423	Lockwasher
424	Hex head cap nut
430	Nameplate
431	Arrow label
436	Maintenance label
470	Hydraulic banjo fitting
471	Teflon tubing
472	Check valve
473	Bell reducer
474	Gas ballast filter
475	Gas ballast valve bracket
476	Elbow fitting
477	Pet cock valve
478	Hex head cap screw
479	Lockwasher
480	Oil tube insert
9000	Steel socket plug
9001	Flat washer
9002	Entrance elbow connector
9003	Fenwal temperature switch
9004	Grounding washer
9005	Plain washer
9006	Socket head cap screw
9007	Hex head cap screw

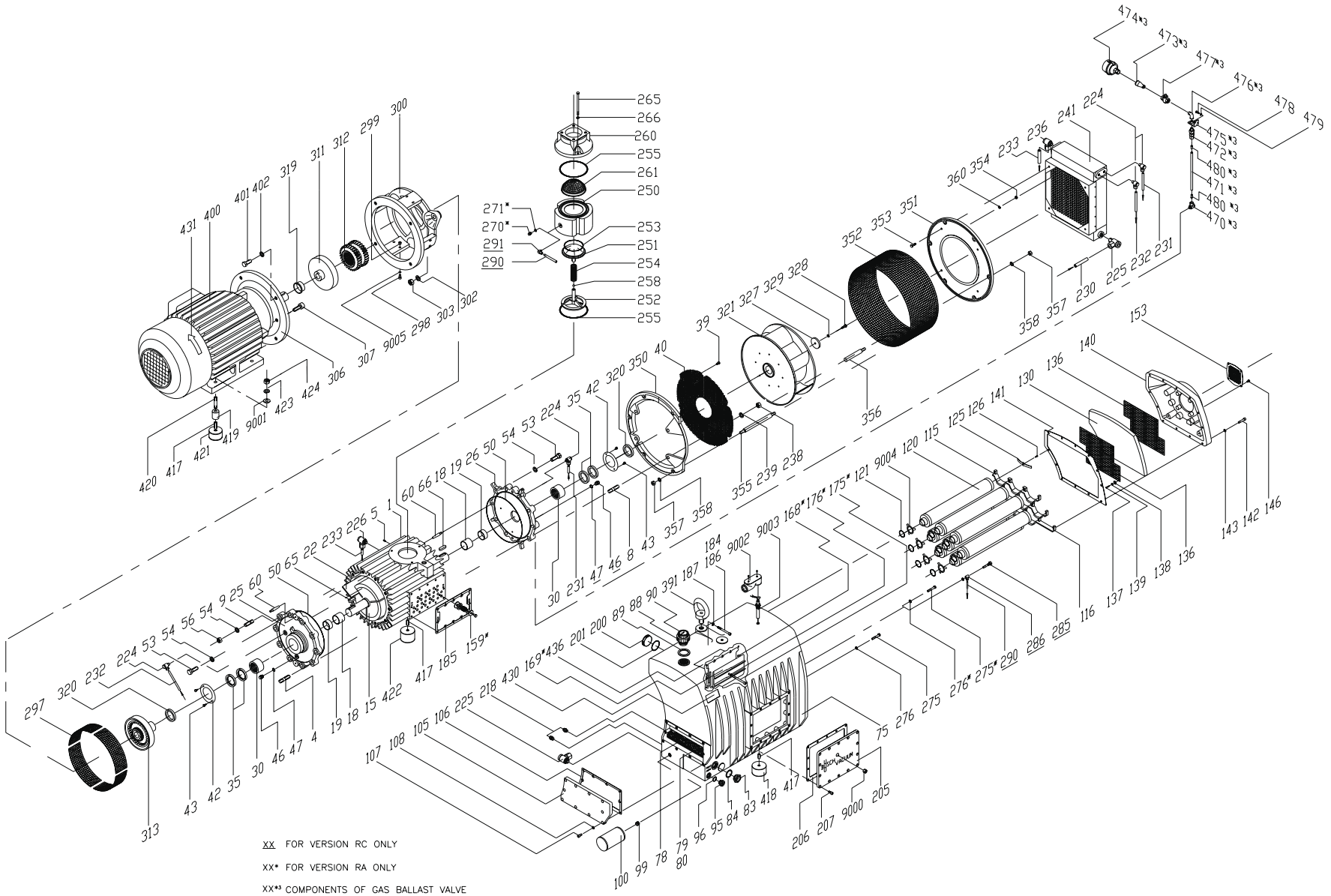


Illustration of
R5 0630 Series

0630 Parts List

Ref	Description
001	Cylinder
004	Stud
005	Set screw
008	Stud
009	Stud
015	Rotor
018	Bearing sleeve
019	Shaft seal sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
030	Needle bearing
035	Shaft seal, Viton
039	Socket head mach. screw
040	Protective screen
042	Shaft seal support ring
043	Hex head cap screw
046	Hex head plug
047	Copper ring gasket
050	O-ring, Viton
053	Hex head cap screw
054	Lockwasher
056	Hex head nut
060	Tapered pin
065	Shaft key
066	Shaft key
075	Exhaust box
078	Sheet metal baffle
079	Demister pad
080	Perforated sheet metal
083	Oil sight glass
084	Ring gasket
088	Oil fill plug
089	Oil fill plug gasket
090	Exhaust pressure gauge
095	Oil drain plug
096	O-ring, Viton
099	Nipple
100	Auto-type oil filter
105	Cover plate
106	Cover plate gasket
107	Socket head cap screw
108	Lockwasher
115	Filter bracket
116	Filter bracket
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Socket head cap screw
130	Baffle strainer
136	Perf. sheet metal screen
137	Hex head cap screw
138	Flat washer
139	Lockwasher
140	Exhaust cover plate
141	Cover plate gasket
142	Socket head cap screw
143	Lockwasher
146	Hex head cap screw
153	Cover plate exhaust screen
159	Exhaust valve
168	O-ring, silicon
169	Exh. valve cover plate
175	Hex head cap screw
176	Lockwasher
184	Socket head cap screw
185	Cylinder/exhaust box gasket
186	Hex head cap screw
187	Lockwasher
200	Drum exhaust box plug
201	O-ring, Viton
205	Cover plate
206	Gasket
207	Hex head cap screw
218	Steel socket plug
224	Hydraulic banjo fitting
225	Hydraulic banjo fitting
226	Hydraulic banjo fitting
230	Oil tubing
231	Oil tubing
232	Oil tubing
233	Oil tubing
236	Hydraulic fitting
238	Hex head nut
239	Lockwasher
241	Oil cooler
250	Inlet flange
251	Valve plate
252	Valve inlet guide
253	O-ring, Viton
254	Inlet check valve spring
255	O-ring, Viton
258	Ball, Viton
260	Inlet flange
261	Inlet screen
265	Hex head cap screw
266	Lockwasher
270	Plug
271	Ring gasket
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Hydraulic banjo fitting
290	Oil return line tubing
291	Hydraulic elbow fitting
297	Screen
298	Slot chs head screw
299	Rivet
300	Motor mounting bracket
302	Lockwasher
303	Hex head nut
306	C-face adapter flange
307	Socket head screw
311	Motor side coupling half
312	Coupling insert
313	Pump side coupling half
319	Spacer
320	Fan and coupling spacer
321	Pump shaft fan
327	Locking disk
328	Hex head cap screw
329	Lockwasher
350	Centering ring
351	Centering ring
352	Fan guard
353	Hex head cap screw
354	Hex head nut
355	Distance bolt
356	Mounting bolt
357	Hex shoulder nut
358	Lockwasher
360	Lockwasher
391	Eyebolt
400	Motor
401	Hex head cap screw
402	Lockwasher
417	Slotted set screw
418	Rubber foot
419	Foot spacer
420	Stud
421	Rubber foot
422	Rubber foot
423	Lockwasher
424	Hex head cap nut
430	Nameplate
431	Arrow label
436	Maintenance label
470	Hydraulic banjo fitting
471	Teflon tubing
472	Check valve
473	Bell reducer
474	Gas ballast filter
475	Gas ballast valve bracket
476	Elbow fitting
477	Pet cock valve
478	Hex head cap screw
479	Lockwasher
480	Oil tube insert
9000	Steel socket plug
9001	Flat washer
9002	Entrance elbow connector
9003	Fenwal temperature switch
9004	Grounding washer
9005	Plain washer

Illustration of
R5 1000/1600B Series
(R5 1000 shown)

XX version RC only
XX* version RA only
XX*3 components gas ballast

Model R51000 Shown
Ref. 155 thru 158 for R51600
not shown.

1000/1600 Parts List

Ref	Description
001	Cylinder
015	Rotor
019	Shaft seal sleeve
022	Vane
025	Motor side endplate
026	Opp. M.S. endplate
028	End plate spacer
030	Needle bearing
031	Endplate spacer
035	Shaft seal, Viton
036	Shaft seal
037	Retaining ring
046	Hex head plug
049	O-ring, Viton
050	O-ring, Viton
053	Hex head cap screw
054	Lockwasher
060	Tapered pin
061	Cylindrical pin
065	Shaft key
066	Shaft key
068	Connect piece for hyd. fitting
069	O-ring, Viton
070	Gas ballast line, A-side
071	Gas ballast line, B-side
072	Hydraulic fitting
075	Exhaust box
078	Sheet metal baffle
079	Demister pad
080	Perforated sheet metal
083	Oil sight glass
084	Ring gasket
088	Oil fill plug
089	Oil fill plug gasket
090	Exhaust pressure gauge
095	Oil drain plug
096	O-ring, Viton
099	Nipple
100	Auto-type oil filter
105	Cover plate
106	Cover plate gasket
107	Socket head cap screw
108	Lockwasher
115	Filter bracket
116	Filter bracket
117	Filter bracket
120	Exhaust filter
121	O-ring, Viton
125	Filter spring assembly
126	Socket head cap screw
129	Baffle strainer, A side
130	Baffle strainer, B side
136	Perf. sheet metal screen
137	Slot chase head screw
138	Flat washer
139	Flat washer
140	Exhaust cover plate
141	Cover plate gasket
142	Socket head cap screw
143	Lockwasher
145	Cover plate exhaust screen
146	Self tapping screw
147	Exhaust cover plate
155	Module/exhaust box gasket
156	Exh. valve intermediate plate
157	Socket head cap screw
158	Lockwasher
159	Exhaust valve
168	O-ring, silicon
169	Exh. valve cover plate
175	Stud
176	Lockwasher
177	Hex head nut
180	Plug
185	Cylinder/exhaust box gasket
186	Hex head cap screw
187	Lockwasher
200	Drum exhaust box plug
201	O-ring, Viton
205	Cover plate
206	Cover plate gasket
207	Hex head cap screw
208	Lockwasher
210	Elbow pipe fitting
211	Hydraulic straight fitting
212	Oil tubing
213	Hydraulic elbow fitting
214	Reducer bushing
225	Hydraulic banjo fitting
230	Oil tubing
237	Cooler guide
238	Socket head cap screw
239	Lockwasher
241	Oil cooler
242	O-ring, Viton
243	Fan guard
244	Cooler front cover
245	Flat washer
246	Hex head cap screw
247	Socket head cap screw
248	Lockwasher
250	Inlet flange
251	Valve plate
252	Valve inlet guide
253	O-ring, Viton
254	Inlet check valve spring
255	O-ring, Viton
257	O-ring, Viton
258	Ball, Viton
260	Inlet flange
261	Inlet screen
265	Hex head cap screw
270	Plug
271	Ring gasket
273	Distance bolt
266	Lockwasher
274	Lockwasher
275	Oil return valve
276	Ring gasket
285	Oil recirc. screw
286	Hydraulic banjo fitting
290	Oil return tubing
291	Elbow assembly kit
293	Oil steel tubing
297	Screen
298	Sheet metal screw
299	Sheet metal nut
300	Motor mounting adapter
301	Socket head cap screw
302	Lockwasher
311	Motor side coupling half
312	Coupling insert
313	Pump side coupling half
320	Distance spacer
321	Cooling fan
327	Retaining disk
328	Hex head cap screw
329	Lockwasher
331	Socket set screw
333	Socket set screw
390	Eyebolt adapter
391	Eyebolt
392	Lockwasher
393	Hex head cap screw
394	Alignment pin
400	Motor
401	Hex head cap screw
402	Lockwasher
409	Spacer
410	Frame
411	Washer
412	Lockwasher
413	Hex head cap screw
414	Hex head cap screw
421	Rubber foot
429	Sheet metal screw
430	Nameplate
431	Arrow label
465	Ring gasket
466	Plug
467	Bypass plug
471	Gas ballast valve assembly
483	Ring gasket
484	O-ring, Viton
488	Socket head plug
490	Nipple
491	Mounting plate
495	O-ring, Viton
496	Float switch
498	Socket head cap screw
499	Lockwasher

TECHNICAL DATA

Model		0010	0012	0016	0021	0160	0400	0630	1000	1600
Nominal pumping speed	ACFM	6	7	8.6	14	115	305	455	670	1030
Free air displacement	CFM	7.1	8.5	11.2	15	117	330	490	704	1130
Typ. oil sump temperature(1)	°F	-	-	-	-	214	225	215	-	-
Maximum sound level	dBA	69	68	70	72	79	83	85	85	86
3 phase motor data (2)	HP	-	-	-	-	7.5	15	25	40	50
	kW	0.55	0.55	0.55	0.75	-	-	-	-	-
	Volts	230/460	230/460	230/460	230/460	230/460	230/460	230/460	230/460	230/460
	RPM	1750	1700	1750	3420	1745	1160	1170	1170	1170
	Frame	FN80-4	FN80-4	FN80-4	LS80L1	213TC	284TC	324TC	364TD	365TD
	Amps	2.5/1.25	2.5/1.25	2.5/1.25	3.3/1.6	18/9	38/19	64/32	98/49	140/62
1 phase motor data (2)	kW	0.75	-	-	0.90	-	-	-	-	-
	Volts	115	-	-	230	-	-	-	-	-
	RPM	1750	-	-	3330	-	-	-	-	-
	Frame	R80N	-	-	E8F2B3	-	-	-	-	-
	Amps	10	-	-	7.0	-	-	-	-	-
Approx. oil capacity	Qts.	0.5	0.5	0.5	0.5	7	14	16	42	44
Inlet connection - NPT	inch	3/4	1” hose	3/4	3/4	2	3	3	6 ANSI	6 ANSI
End vacuum (RC)	Torr	15	15	15	15	15	15	15	15	15
End vacuum (RA)	Torr	0.5	2 (3)	0.5	2 (3)	0.5	0.5	0.5	0.5	0.5
Approx. weight of pump	Lbs.	49	42	60	42	416	1152	1525	2151	283
Approx. shipping weight	Lbs.	58	49	64	49	515	1269	1813	2440	3017

Notes: (1) Maximum oil temperature with 90°F ambient temperature and no supplemental oil cooling.

(2) Because various motor types might be available and/or used on your specific pump, you should always refer to the motor name plate to verify HP, volts, amps, frame size, etc. or consult the factory.

(3) RB versions for Models 0012 and 0021.

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