RANSOHOFF

# Operation and Maintenance Manual

## Custom Conveyor


## Conveyor Cleaning System

## This manual is prepared for the following System:

## Serial Number No. 6194

## Manufacture Date: FEBRUARY 2023

If you should require any additional assistance, please contact Technical Service Support, or visit our web **site** **www.ctgclean.com**

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# GENERAL INFORMATION

## 1.1 Revision Control

REV00 ..... Initial Release

## 1.2 Technical Support

Thank you for purchasing your equipment from Cleaning Technologies Group. We appreciate having you as a customer and wish you many years of safe and satisfied use of your machine.

This manual is an important part of your machine and should remain with the machine. Reading this manual will help you and others avoid personal injury or damage to the machine. Information given in this manual will provide the operator with the safest and most effective use of the machine. Knowing how to operate this machine safely and correctly will allow you to train others who may operate this machine.

Sections in your operator's manual are placed in a specific order to help you understand all the safety messages and learn the controls so you can operate this machine safely. You can also use this manual to answer any specific operating or servicing questions.

The machine shown in this manual may differ slightly from your machine but will be similar enough to help you understand our instructions. Please check the Customer Specification sheet to determine what options you purchased.

Ransohoff Service Department and Aftermarket Sales can be reached at 1-800-248-9274 or visit our web site; www.ctgclean.com. Please be prepared to provide the product model and identification numbers.

**DISCLAIMER**: This document was compiled and edited by Cleaning Technologies Group. Nothing in this document should be viewed as an "industry standard" or required by law. Instead, it is meant to compile operations and maintenance information as a guide to help machine operators and maintenance personnel within their own manufacturing area. Images within this document are for illustration purposes only and may not represent your exact machine.

## 1.3 Warranty

This manual provides operating and maintenance information concerning the machine designed and built by Ransohoff a division of CTG LLC. This document is written for the operation and maintenance personnel responsible for the daily operation and maintenance of the machine. After studying this manual, the operation and maintenance personnel should understand the machine components, characteristics, and functions. It is absolutely mandatory that operation and maintenance personnel have a total understanding of the equipment prior to attempting any maintenance or operation of this equipment.

CAUTION

**In the event that the machinery or controls described within this manual are changed or modified in any way or if the machinery and controls are not maintained in the prescribed manner, the instructional material within this manual may become inaccurate. Authorized individuals that have the knowledge to operate, repair or maintain the equipment should only utilize the information contained within.**

**Table 1 Customer Service Contacts**

| Contact for Service or Warranty: | Contact for Spare Parts |
|---|---|
| **Joe Servizzi**<br>Technical Service Manager<br>E-Mail: jservizzi@ctgclean.com<br><br>Customer Service<br>4933 Provident Drive<br>Cincinnati, Ohio 45246<br>Phone: (513) 870-1772<br>Fax: (513) 870-6111 | **Lisa Finley**<br>Aftermarket Manager<br>E-Mail: amorders-ransohoff@ctgclean.com<br><br>Customer Service<br>4933 Provident Drive<br>Cincinnati, Ohio 45246<br>Phone: (513) 870-1772<br>Fax: (513) 870-6111 |

## 1.4 Customer Selected Options List

The following list of options are provided as a guide as to what portions of this manual pertains to the machine that has been built. This list is provided to aid in shortening search time.

**MACHINE CONTROL CABINET**

- ☐ Control Cabinet – Relay Logic (Standard)
- ☒ Control Cabinet – Ladder Logic (PLC w/HMI)
- ☐ Control Cabinet – Ladder Logic (PLC w/Pushbutton)

**TANK HEATERS**

- ☒ Electric Element Heater
- ☐ Gas Fired Heater
- ☐ No Heater

**FILTERS**

- ☒ Bag Filter (Single Canister)
- ☐ Bag Filter (Multi Bag Canister)
- ☐ Cartridge Filter
- ☐ Fresh Water Line Rinse
- ☐ No Filter

**PUMPS**

- ☒ Centrifugal Pump
- ☐ Vertical End Suction Pump

**OIL REMOVAL SYSTEM**

- ☒ Pro-Sep Oil Removal System (Standard)
- ☐ Pro-Sep Oil Removal System (Heavy Oil)
- ☐ Skimmer Belt Oil Removal System
- ☐ Skimmer Belt Oil Removal System w/Timer
- ☐ None

**BLOW-OFF SYSTEM**

- ☐ Regenerative Fan Blow
- ☐ Recirculating Fan Blow
- ☐ Pressure Blow Fan Blow
- ☐ Compressed Air Blow
- ☒ Blow-off System Electric Heat Blow
- ☐ Blow-off System Gas Heat
- ☐ Blow-off System No Heat

**EXHAUST SYSTEM**

- ☐ Filter Mist Exhauster System
- ☒ Tube-Axial Fan Exhauster System
- ☐ High-volume Fan Exhauster System
- ☐ None

**MATERIAL HANDLING (CONVEYOR)**

- ☐ Plastic Belt Conveyor
- ☐ Flat-wire Heavy Duty Belt Conveyor
- ☒ Chain Style Conveyor
- ☒ Fixture Conveyor
- ☐ No Conveyor

**OTHER OPTIONS FREQUENTLY USED**

- ☐ Chemical Mix Dispenser (Dosatron Unit)
- ☐ Rosemount Analytical Tester (Chemical Strength Testing Unit)
- ☐ Mechanical Tank Refill System (Bob Float) (Standard)
- ☒ Automatic Refill System (Electric Solenoid)
- ☐ Sump Pump System (Electric)
- ☐ Cool Down Zone with Chiller

## 1.5 Overview of Custom Conveyor

This machine is a multi-stage parts cleaning machine. All stages are insulated and compartmentalized with individually adjustable exhaust dampers, reducing system heat loss. Parts are placed on a flat wire belt or custom fixture and travel the full length of the machine. While moving through the tunnel there are one or more stages that the parts go through to complete a cleaning cycle. These stages remove cutting oils, debris, dirt, and other contaminants that may be left over from the manufacturing operation.

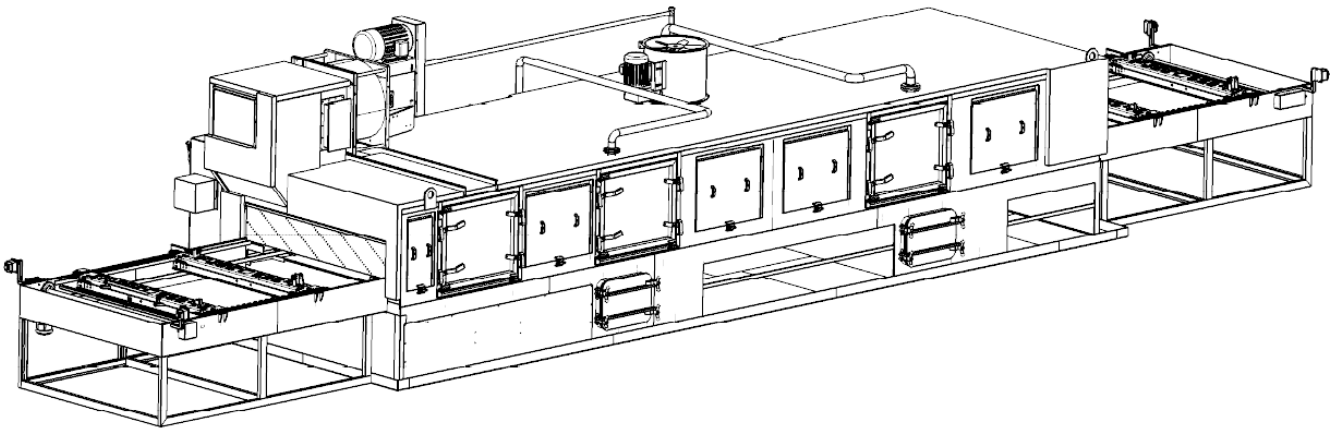

**Figure 1 Custom Conveyor**

| Machine Specifications | |
|---|---|
| **Parts:** | Battery Tray |
| **Carriage Speed:** | |
| **Pump(S):** | Wash Pump- 200 GPM @ 3.45 bar (30 PSI) Gusher (Stainless Steel) |
| | Rinse Pump- 150 GPM @ 3.45 bar (30 PSI) Gusher (Stainless Steel) |
| **Operating Temp:** | Wash Heat- Electric – Immersion Heater up to 60°C (140°F) |
| | Rinse Heat- Electric – Immersion Heater up to 60°C (140°F) |
| | Electric – Duct Heater up to 82°C (180°F) |
| **Heat Source:** | Electric heat |
| **Construction:** | Stainless Steel |
| **Insulation:** | 25mm (1") thick |
| **Electrical:** | 460V, 3Ph, 60Hz – Wye configuration |
| **Finish:** | All the sheet metal including the housing and control cabinet will be painted Telegray 4, RAL 7047. |
| **Cleanliness:** | |
| **Sound:** | 85 dBa TWA |
| **Contamination:** | Welding debris – No chips or coolant |
| **Cleaning Expectations:** | **Requirements:**<br>• Maximum remaining total particles weight = 1 gram<br>• Maximum particle size for conductive materials = 1mm<br>• Maximum particle size for non-conductive materials = 3mm<br>• Tray is to be delivered to VCC in dry condition to not negatively affect the final assembly or installation in VCC plant. |
| **Drying Expectations:** | Tray is to be delivered to VCC in dry condition to not negatively affect the final assembly or installation in VCC plant. |
| **Part Acceptance Method:** | Millipore per the above specifications |
| **Production:** | 14 PPH per part |
| **Loading/Unloading:** | Robot |
| **Preceding/Succeeding Ops:** | Welding |
| | Leak testing |
| **Footprint Constraints:** | None specified |
| **Options:** | Pro-Sep |
| | Exhaust Fan |
| | Vacuum Drying System |
| | |

# NOTES

# MACHINE SAFETY

## 2.1 Precautionary Statements

Your manual contains special messages to bring attention to potential safety concerns, machine damage, as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

The full U.S. Occupational Safety and Health Administration (OSHA) standard, including regulations on machine guarding, lockout/tagout, hand and power tools, electrical safety, and other machine safety requirements, can be found at the following link: http://www.osha.gov.

These statements are intended for the personal safety of operating and maintenance personnel and for proper use and maintenance of the equipment. **YOU MUST** take time to read the precautionary statements before attempting to operate or maintain the machinery. Failure to do so could lead to damage of the equipment, loss of production time, and injury.

**Table 2 Precautionary Statements**

| | |
|---|---|
| DANGER  | **Danger is a designation throughout this manual of an immediate hazard presenting a threat of death or serious injury to employees** |
| WARNING  | **Warning is a designation throughout this manual of a possible or impending danger presenting an area not safe for workers or not safe for hot work.** |
| CAUTION  | **Caution is a designation throughout this manual of a minor hazard situation where a non-immediate or potential hazard or unsafe practice presents a lesser threat of employee injury.** |
| NOTE  | **Note is a designation throughout this manual of procedures, practices or information which is intended to be immediately helpful and informative.** |
| SAFETY  | **Safety is a designation throughout this manual of the need for personal protective equipment that may be needed for the specific operation.** |

## 2.2 Explanation of Signal Word Consequences

On the machine, as well as in the manual, there are safety signs located in key areas. It is important to identify them and know why they are there. Failure to heed the instructions on these signs could lead to personal injury and/or damage to the equipment.

**Table 3 Machinery Warning Signs**

| | |
|---|---|
|  | Danger signs shall be used in major hazard situations where an immediate hazard presents a threat of death or serious injury to employees. Standard colors are red, black, and white. |
|  | Caution signs shall be used in minor hazard situations where a non-immediate or potential hazard or unsafe practice presents a lesser threat of employee injury. Standard color of the background shall be yellow; and the panel, black with yellow letters. |
|  | Warning signs need not be posted at an individual tank, compartment, or workspace within a work area if the entire work area has been tested and certified: not safe for workers, not safe for hot work, and if the sign or label to this effect is posted conspicuously at each means of access to the work area. |

## 2.3 General Machine Safety

- Read the operator's manual before using the machine. Receive training in proper operation before operating independently.
- Do not use the machine unless you have been trained.
- Avoid working alone so help is available in the event of an emergency.
- Inspect the machine before each use and replace or repair any damaged parts before operating.
  1. Points of operation and surrounding areas are clean of debris and other hazards.
  2. Shields/guards are in place and controls and interlocks or other safety devices are accessible and operating properly.
  3. Machine components are in good working condition (do not use damaged equipment).
  4. Labels and warnings are present and legible.
- Do not repair the machine unless you are trained.
- Follow the recommendations for routine cleaning and preventative maintenance.
- Do not attempt to override or defeat safety features. Guards and shields must be in place during normal operation. Observe appropriate lockout/tagout procedures when guards, shields, or other safety devices are removed or deactivated for maintenance or repair.
- Only use the machine for the purpose for which it is designed, and do not operate outside these limits.
- Never alter the machine unless you are trained to do so in a safe manner.
- Keep hands away from moving components.
- Do not wear loose clothing or jewelry while operating machine.
- Confine long hair, including restraint of ponytails and beards.
- Wear appropriate work attire and prescribed Personal Protective Equipment, including, at a minimum, safety glasses and closed-toed shoes.
- Restrict persons not involved directly in the operation from the immediate area.
- Only qualified personnel should perform the procedures in this manual.
- Ensure unimpeded access to all operating controls, emergency shut-down devices, and electrical panels/shut-offs servicing the equipment.

## 2.4 Energy Control and Power Lockout Procedures (ECPL)

Before servicing components that, if started unexpectedly, could damage equipment, or injure personnel, ALL ENERGIES SHOULD BE LOCKED OUT AND TAGGED OUT. Remember an emergency stop does not disconnect high voltage power from motors and other components. The emergency stop only removes control voltage to stop mechanical operation. Below is a list of energy sources. Your machine may or may not have these specific energy types.

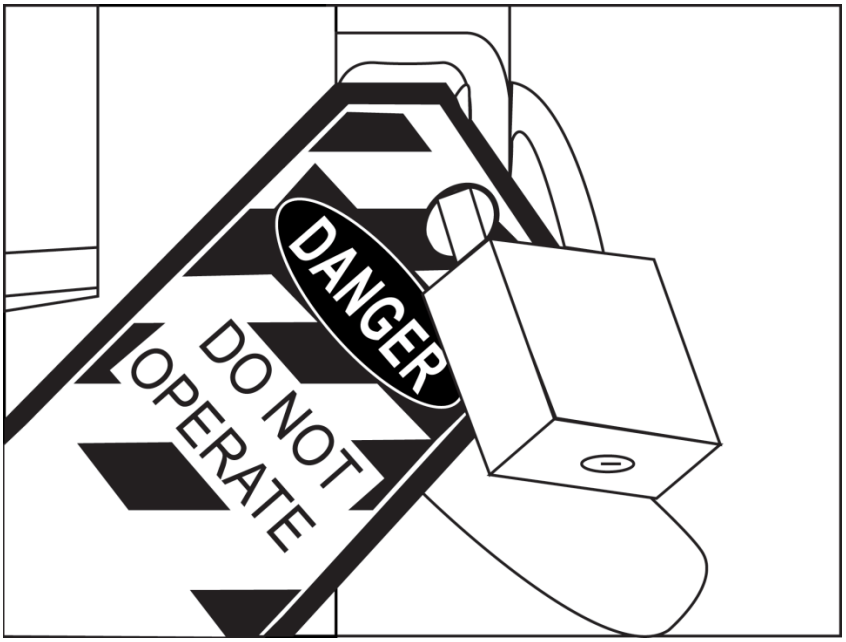


**Figure 2 Lockout/Tagout**

Before beginning service or maintenance, the following steps must be accomplished in sequence and according to the specific provisions of employer's energy-control procedure:

1. Prepare for shutdown.
2. Shut down the machine.
3. Disconnect or isolate the machine from the energy source(s).
4. Apply the lockout or tagout device(s) to the energy isolating device(s).
5. Release, restrain, or otherwise render safe all potential hazardous stored or residual energy. If a possibility exists for re-accumulation of hazardous energy, regularly verify during the service and maintenance that such energy has not re-accumulated to hazardous levels.
6. Verify the isolation and de-energization of the machine.

**Table 4 Energy Source**

| Energy Type & Source | | Lockout Location |
|---|---|---|
| E | Electrical | Locate rotary disconnect, breaker switch, or plug. Isolates electrical energy supply. |
| P | Pneumatic | Locate ventable/lockable valve, ball valve, gate valve, quick disconnect fitting. Isolates compressed air supply. |
| H | Hydraulic Pump | Locate electrical disconnect that powers hydraulic pump. Isolates hydraulic pump motor. |
| H | Hydraulic Line | Locate ball valve. Stops flow/backflow in hydraulic oil circuits. |
| W | Water | Locate ball valve, gate valve, butterfly valve. Stops flow/backflow in water system. |
| G | Gas | Locate ball valve, gate valve, butterfly valve. Stops supply of gas. |
| C | Chemical or Coolant | Locate ball valve, gate valve, butterfly valve. Stops chemical/coolant supply or return. |
| S | Steam | Locate ball valve, gate valve, butterfly valve. Stops supply/return of steam. |

### 2.4.1 How to Lock a Ball Valve.

For maintenance or troubleshooting purpose, the ball valves on the filter system plumbing and tank fill plumbing shall be locked. Follow this procedure to lock the ball valves. Keep in mind these instructions have been written under the assumption that the ball valves are in the “open” position. If the valve is already closed, then proceed to step 4.

NOTE **A valve is “open” when the handle is parallel with the piping and “closed” when the handle is perpendicular with the piping.**

1. Lift the locking mechanism, if equipped.
2. Rotate the valve handle to the “closed” position.
3. Release the locking mechanism to expose the hole on the valve handle.
4. Place a lock through the hole on the valve and close the lock.

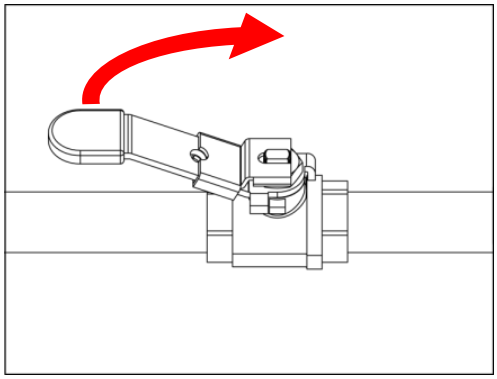

**Figure 3 Close Ball Valve**

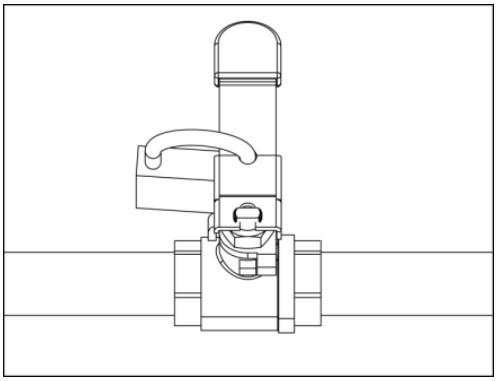

**Figure 4 Locked Ball Valve**

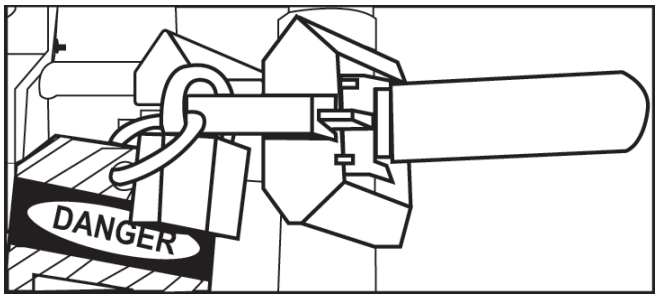


**Figure 5 Lockout & Tagout**

# NOTES

PAGE

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# MACHINE OVERVIEW

## 3.1 General Machine Description

This portion of the manual will give the operator and maintenance personnel an overview of the cleaning machine. Illustrations throughout the manual are for reference only. Please refer to your drawings for specific part number information. Throughout this section the following topics will be covered:

- General Machine Description
- Control Overview and Operation
- Access Doors
- Wash/Rinse Systems
- Blow-off System
- Exhaust System
- Conveyor System

### 3.1.1 General Description.

This machine is a multi-stage parts cleaning machine. All stages are insulated and compartmentalized with individually adjustable exhaust dampers, reducing system heat loss. Parts are placed on a flat wire belt or custom fixture and travel the full length of the machine. While moving through the tunnel there are one or more stages that the parts go through to complete a cleaning cycle. These stages remove cutting oils, debris, dirt, and other contaminants that may be left over from the manufacturing operation.

- **WASH STATION:** Through the use of pressurized jets and specialized cleaning chemicals, the parts are cleaned. This removes cutting oils, debris, dirt and other contaminants that may be left over from the manufacturing operation.
- **BLOW-OFF STATION**: The final stage is the blow-off cycle. Air is heated and is forced through Blow-off Knives which removes the liquid left on the part during the cleaning process.

To maintain water temperature and reduce noise levels, insulation is used throughout the machine. Cleaning performance is highly dependent upon the chemistry used in the process tanks. The chemistry selected must be compatible with both the process and equipment. If you do not have a reliable chemistry source, please contact Ransohoff Service Department at 1-800-248-9274 or visit our web site; www.ctgclean.com. Please be prepared to provide the product model and identification numbers.

## 3.2 Machine Components and Dimensions

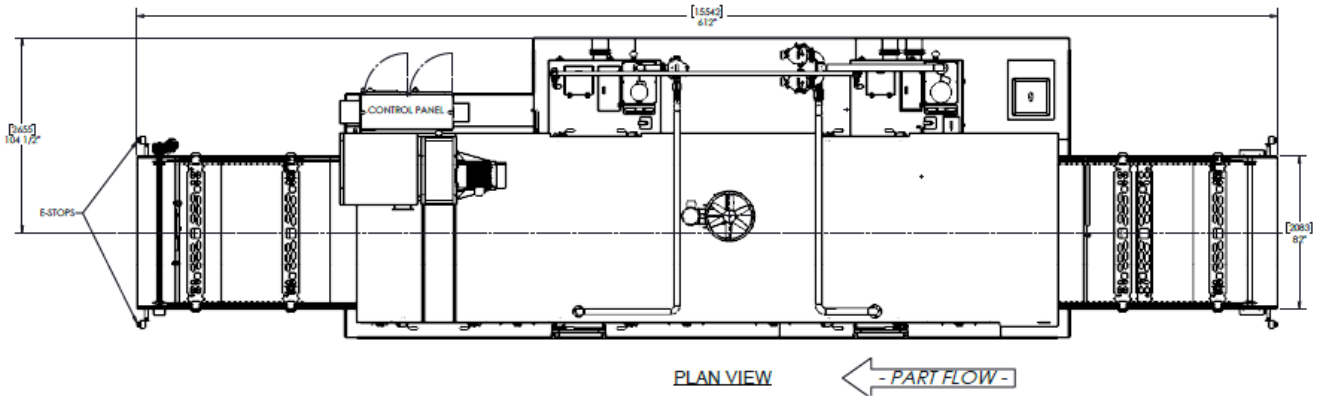
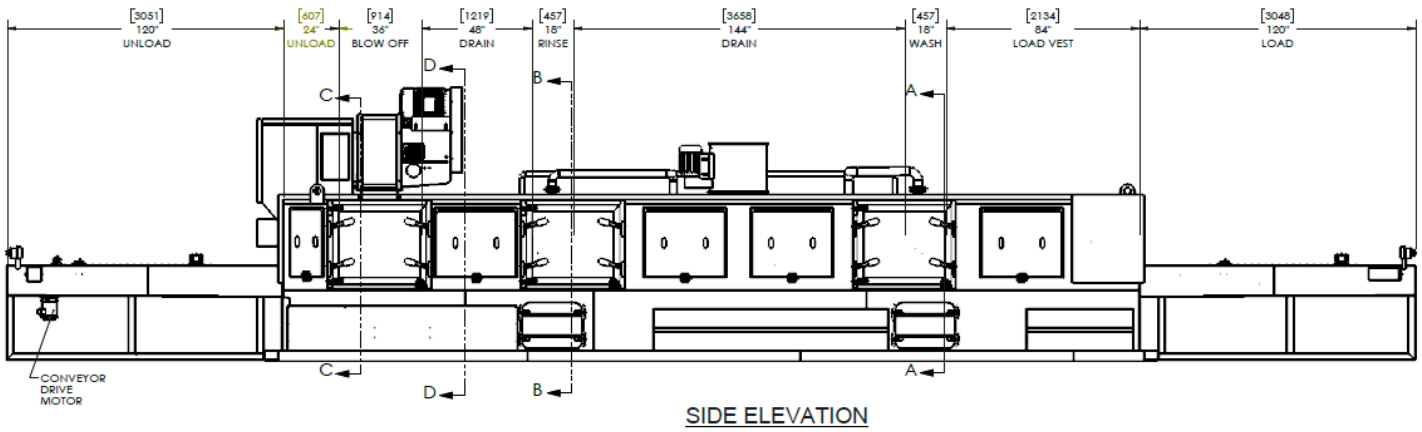
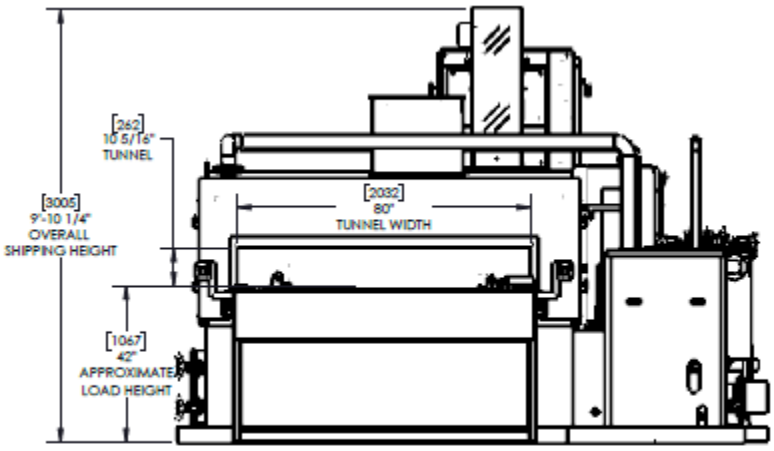



**Figure 6 Machine Components and Dimensions (Sheet 1 of 2)**




SIDE ELEVATION




LOAD END VIEW - PART GOING

**Figure 7 Machine Components and Dimensions (Sheet 2 of 2)**

## 3.3 Machine Control Overview

### 3.3.1 HMI and Operator Control Panel.

The machine is controlled by the latest in PLC technology. The Human Machine Interface (HMI) is a color touch screen monitor that allows the operator to set up and select a program, see the parameters of the current cycle, and monitor the progress. The PLC monitors all aspects of the cycle such as time, temperature, and pressure to assure that the parts will come out the cleanest possible every time.

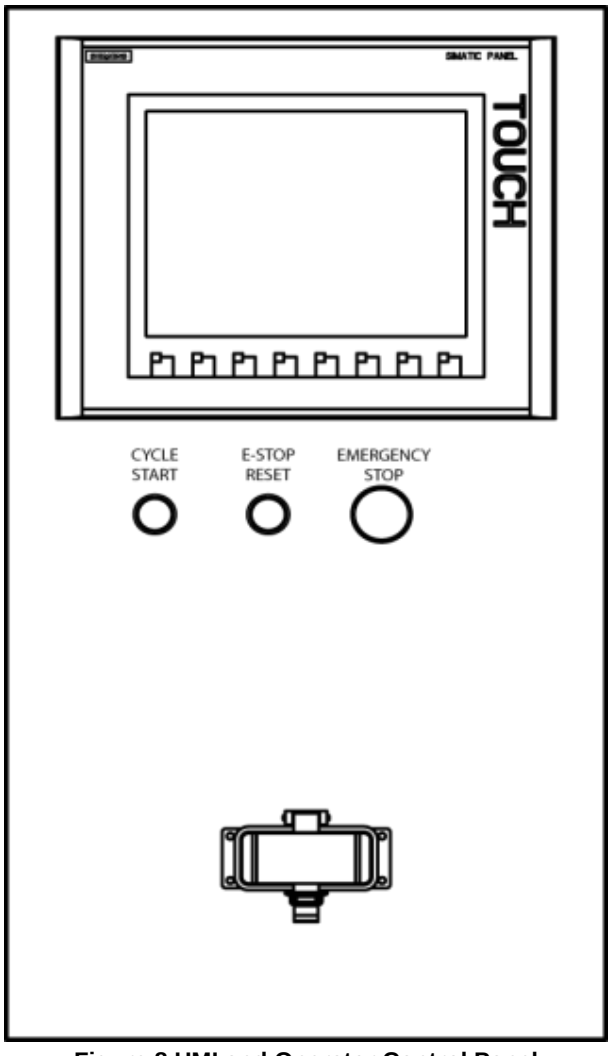



**Figure 8 HMI and Operator Control Panel**

### 3.3.2 Screen Structure

The HMI is used as an interface between operator and machine. This system is preprogrammed at the factory and has several screens and settings that personnel working with this machine should become familiar with.

If the operator or maintenance personnel do not take the time to familiarize themselves with the screen structure and functions, they could inadvertently cause a change in settings. This could cause loss of production, parts not being cleaned properly, damage to the machine and place personnel working with, or around the machine in a hazardous situation.

An **E-STOP RESET** button energizes the relays in the control panel. Be sure to check all E-Stops on the machine to ensure they have been reset. If any one of them is activated the machine will not start.

NOTE **Several screen shots have been placed in this section of the manual. This is to help the operators and maintenance personnel become familiar with the screens and what their functions are. It is recommended that personnel take time to physically work the displays to become familiar with the way they react.**

NOTE **Ransohoff Inc. Is not responsible for any changes that are made by the customer to the operator interface or PLC program. It is recommended that an authorized Ransohoff Inc service technician perform any changes to the operator interface or PLC program that might be required.**

NOTE **The current date and time display on the screen is for reference only. The functional time of this machine is set on the HMI and sent to the PLC. This is completed by maintenance for setting up the correct time zone.**

After a power up where the main disconnect was off the following screen will appear. Press anywhere on the screen to start the program. This will take you to the **MAIN MENU**.


**Figure 9 Power-Up Screen**

### 3.3.3 MAIN MENU Screen.

This screen is the first screen that will appear after the machine is powered up. This screen allows the operator to select the desired mode of operation and start and stop the machine in **AUTO MODE**. From this screen the operator will be able to access other screens and functions.

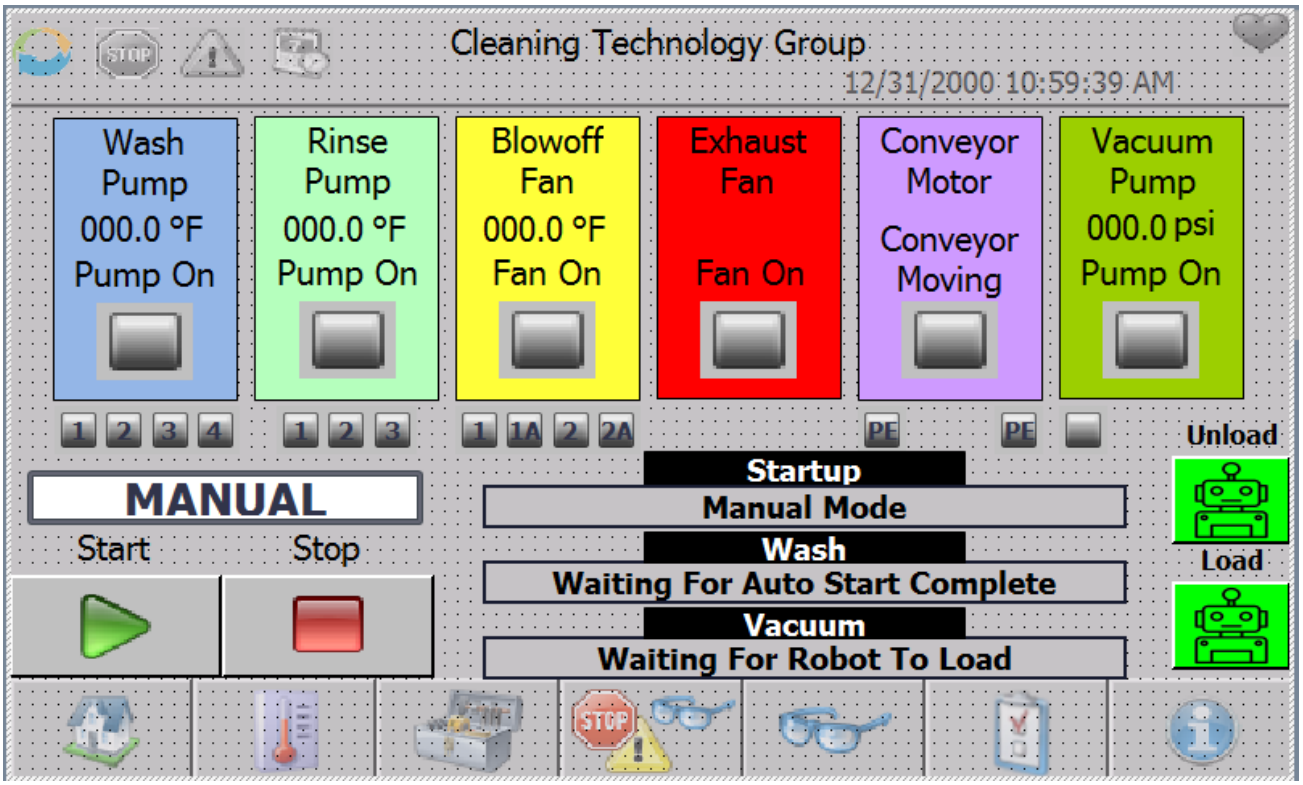
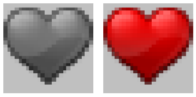



**Figure 10 Main Menu Screen**

### 3.3.4 MAIN MENU Icons.

The following is a description of icons across the top of the MAIN MENU.

**Table 5 Description of MAIN MENU Icons**

| Icon | Description |
|---|---|
|  | Active Alarm: Icon changes from black and white to red when there is an active alarm. An active alarm stops the cycle and needs to be addressed. Push this icon repeatedly to acknowledge the fault without going to the ALARM screen. |
|  | Active Warning: Icon changes from black and white to yellow when there is an active warning. |
|  | 7-Day Timer: Icon shows if the 7-Day Timer is active and controlling the tank heat. |
| | 12/31/2000 10:59:59 AM Current Date and Time. See setting clock if not correct. |
|  | Communicating: Icon beats to indicate that it is communicating with the PLC. |

### 3.3.5 MAIN MENU Items.

The following is an explanation of the screen items shown from left to right. The descriptions are the same for each tank and are only described for one.

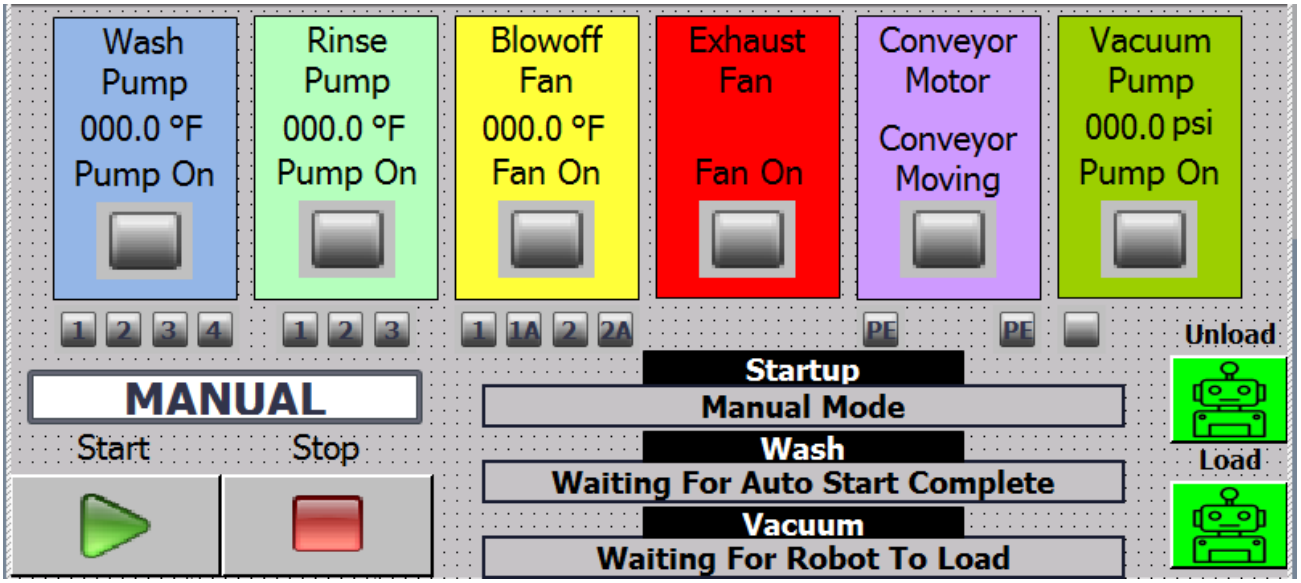
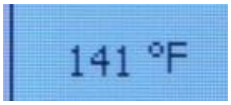
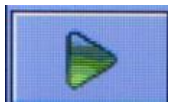



**Figure 11 MAIN MENU Items Screen**

The following is an explanation of the screen items shown from left to right.

**Table 6 Description of MAIN MENU Items Screen**

| Icon | Description |
|---|---|
|  | **Temperature:** Current temperature for the cycle indicated. It shows the temperature numerically below the display. Can be displayed in Fahrenheit or Celsius. |
|  | **Power On:** Icon turns from gray to orange when the cycle is in operation (see below). |
|  | |
|  | **AUTO MODE:** This button places the system in Auto Mode and allows for starting the machine. It disables all Manual Functions. Pressing this button will start the sequence of all the motors, fans and heat and then start the conveyor. For the conveyor to start, the machine must be in Auto Mode and the tanks up to temperature. If the tanks or blow off is below its alarm set point, the conveyor will wait and then start automatically once up to temperature. |
|  | **MANUAL MODE:** Press this to take the machine out of **AUTO MODE** and into **MANUAL MODE**. In **MANUAL MODE** the machine can be operated manually using the **MAINTENANCE** screen. Manual operations are normally used by maintenance personnel. |

The following icons allow access to the screens indicated.

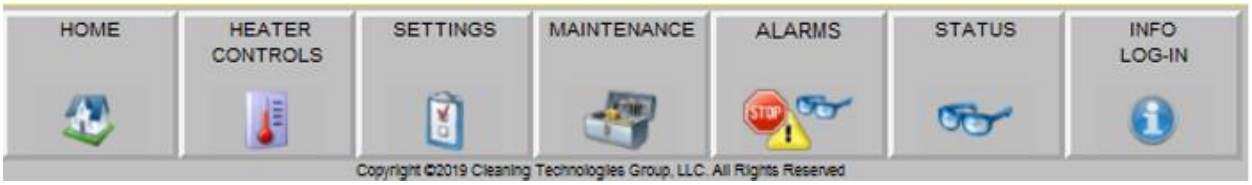
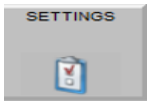



**Figure 12 Access Screens Icons**

**Table 7 Description of Access Screens Icons**

| Icon | Description |
|---|---|
|  | **MAIN MENU** |
|  | **HEATER CONTROLS** |
|   | **SETTINGS** |
|  | **MAINTENANCE** |
|   | **ALARMS AND WARNINGS** |
|  | **SYSTEM STATUS** |
|  | **SYSTEM INFORMATION AND SETTINGS** |

### 3.3.6 Heater Controls Screens.

Press the **HEATER CONTROLS BUTTON** to access the **HEATER CONTROLS** screen which consists of three screens. The first screen is the **HEATER CONTROLS** screen. The heater screen is used to set the tank temperatures, blow-off temperature, and to enable the heaters. The next two screens are the **7-Day Timer** screens which is used to automate the on and off times of the tank heaters. To switch to the 7-Day Timer page press the **7-DAY TIMER BUTTON** at the bottom of the page.

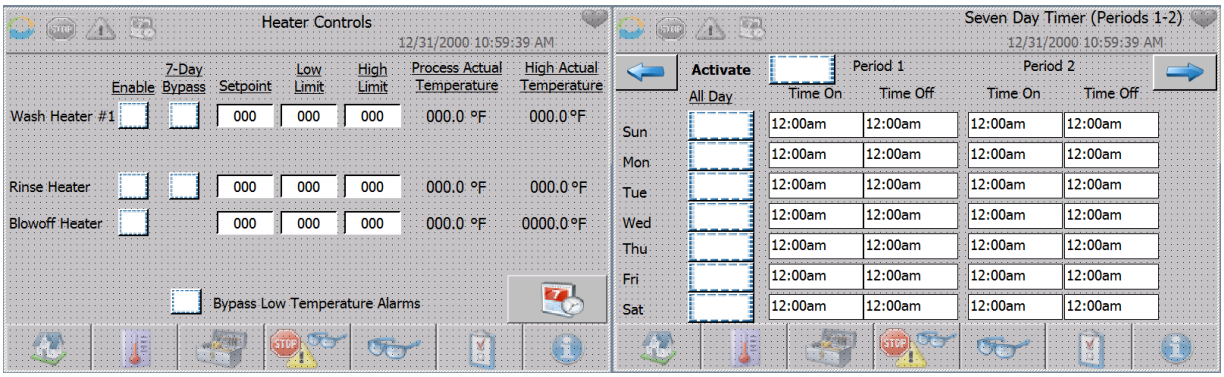



**Figure 13 Heater Control Screens**

The Heater Controls screen has three editable fields. The Actual Value zone displays the temperature in the tank from two different thermocouples: the control and the high temperature thermocouples.

1. **Enable Button**: Press this to turn the heat on or off. When enabled, the heaters will control the heat to the chosen set point when the 7-Day timer allows.
2. **7-Day Override Button**: This will bypass the 7-day timer and allow the heat to operate at the preset temperature.
3. **Set Point Input Field**: This is the heat temperature set point. The heater will turn on when the temperature falls below the value in this field.
4. **Bypass Low Temperature Alarms Button**: If selected the conveyor will move regardless of the tank and blowoff temperatures.

The 7-Day Timer screen has many editable fields. This screen requires **TECH** or **SYS** level login to save changes. To set up the 7-Day timer, simply enter the “Time On” and “Time Off” times for each day then activate the timer. There are four periods each day that can be programmed.

To enter the time; press the field, then select the time from the drop-down menu. The all-day button can be used to have the heat on for the entire day.

### 3.3.7 Settings Screen.

The manual functions for all the major items on this machine are available from this screen. The maintenance screen allows the operator to run pumps, fans, and the valves manually.

1. **Low Limit Input Field**: This is the low limit warning setpoint. This setpoint also the controlling temperature for when the conveyor will begin moving.
2. **High Limit Input Field**: This is the high limit alarm setpoint. If the temperature ever rises above this point an alarm will trip and the machine will shut down.
3. **Energy Conservation Enable**: This button activates the energy conservation. If the load photoeye is not broke for the set time, then the pumps and blowers will shut down until it is broken again.
4. **Conveyor High Limit Timer Input Field**: This is the high limit for the conveyor. If the unload photoeye is blocked for the set amount of time the conveyor will stop until the parts are unloaded or moved.

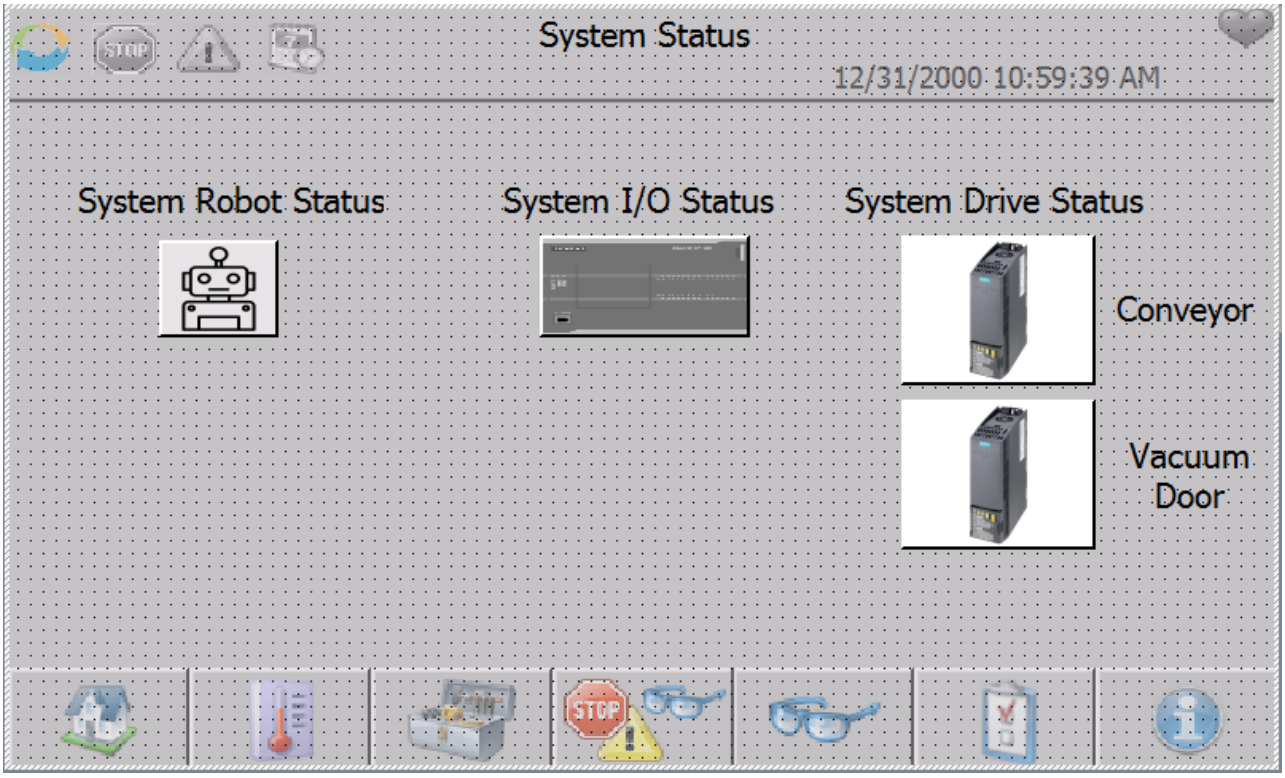



**Figure 14 Settings Screen**

### 3.3.8 Maintenance Screens.

The manual functions for all the major items on this machine are available from these screens. The maintenance screens allow the operator to run pumps, fans, and the valves manually.

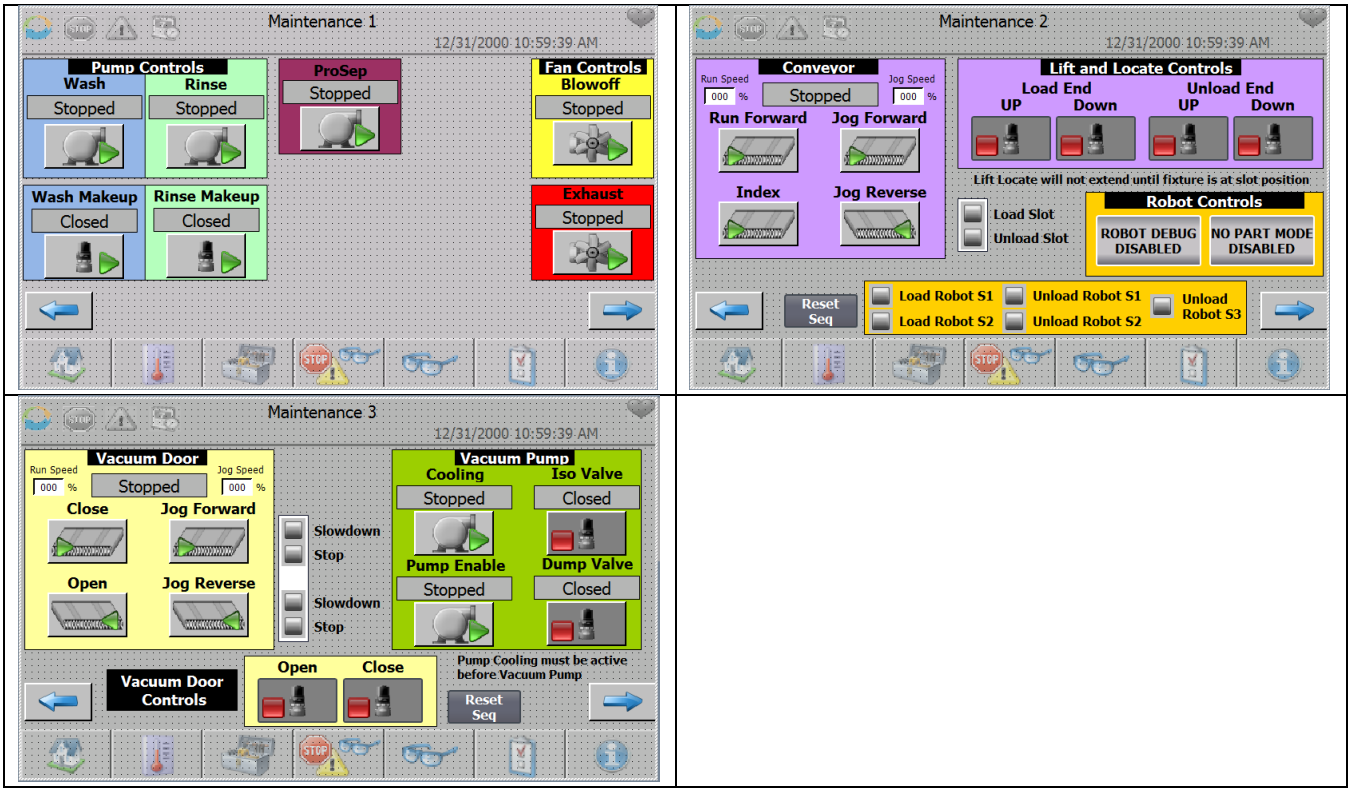
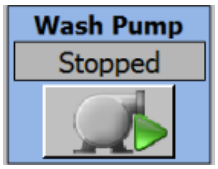
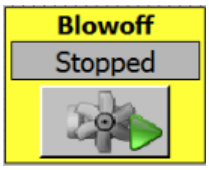



**Figure 15 Maintenance Screens**

The following is an explanation of the screen items shown from left to right.

**Table 8 Description of Maintenance Screen Icons**

| Icon | Description |
|---|---|
|  | Press the **WASH /OIL SKIMMER PUMP** icon for the matching pump to activate the pump. The indicator at the top of the button will display the current pump condition. Press the icon to de-activate the pump. |
|  | Press the **BLOWOFF/EXHAUST** icon to activate the fan controls. The indicator at the top of the button will display the current fan condition. Press the icon to de-activate the pump. |
|  | Press the **CONVEYOR** icon to activate the conveyor manually. The indicator at the top of the button will display the current pump condition. |

### 3.3.9 Alarms & Warnings + Event History Screens.

Press the **ALARMS & WARNINGS BUTTON** to access the **ALARMS & WARNINGS** screen which consists of two screens. The first screen is the **ALARMS & WARNINGS** screen. The second screen is the **ALARMS HISTORY**. This screen allows the operator to view and reset active warnings as well as to view past warnings and events.

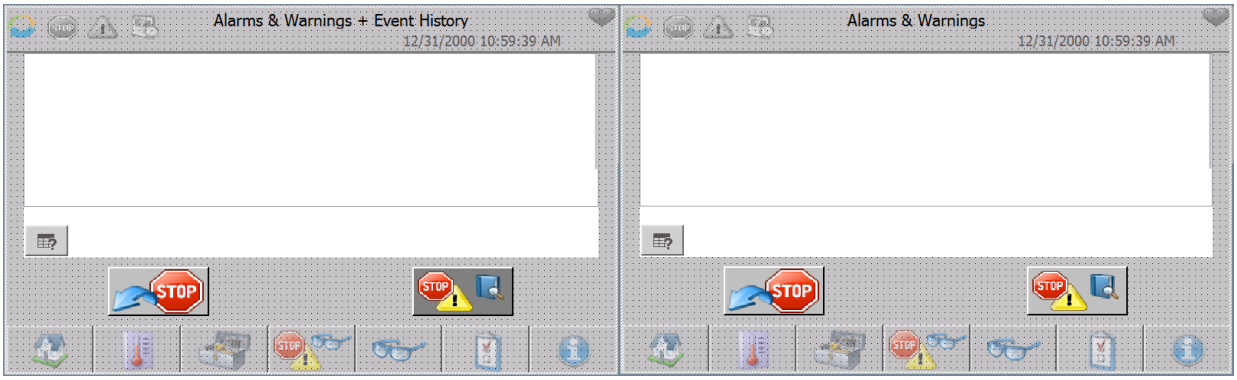



**Figure 16 Alarms & Warnings Screens**

The following is an explanation of the screen items shown from left to right.

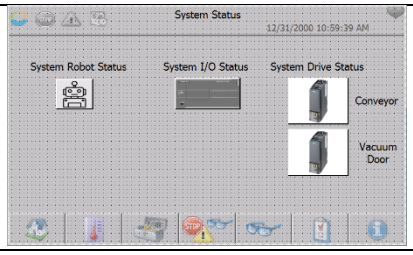
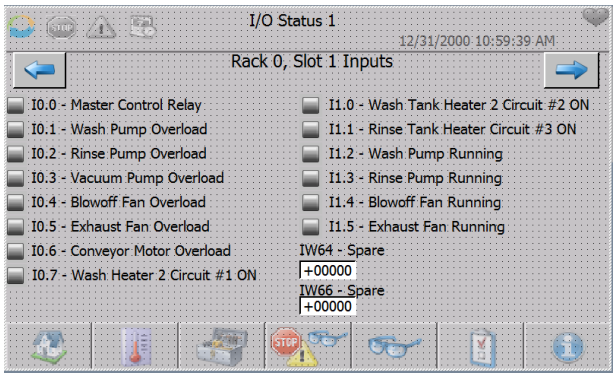
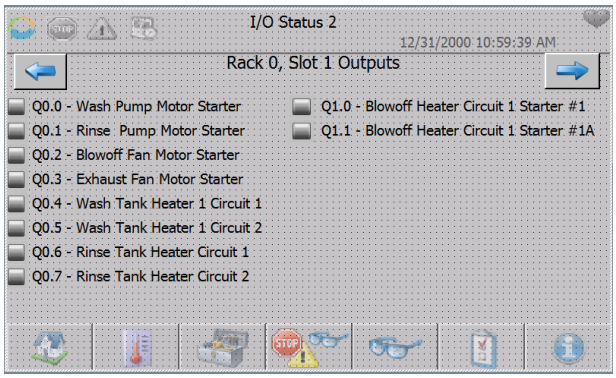
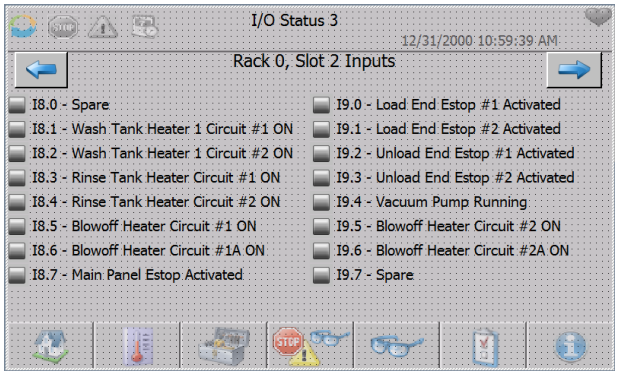
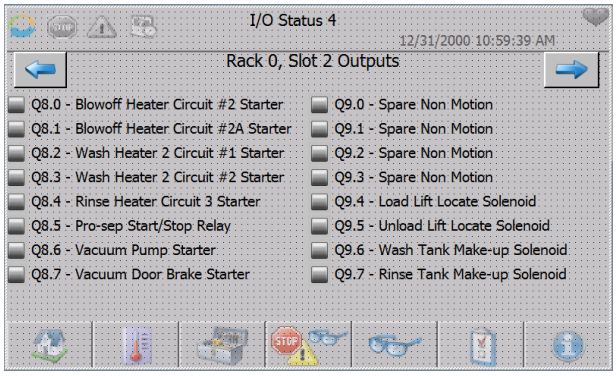
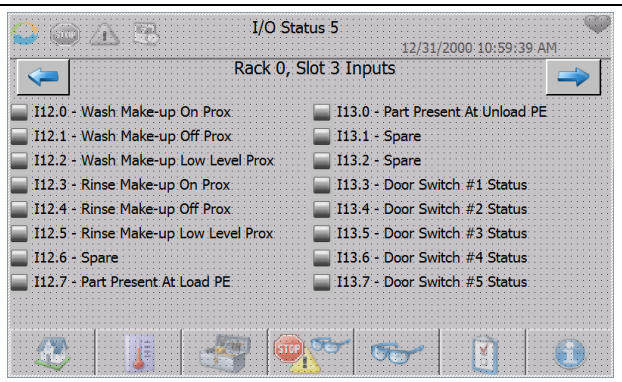
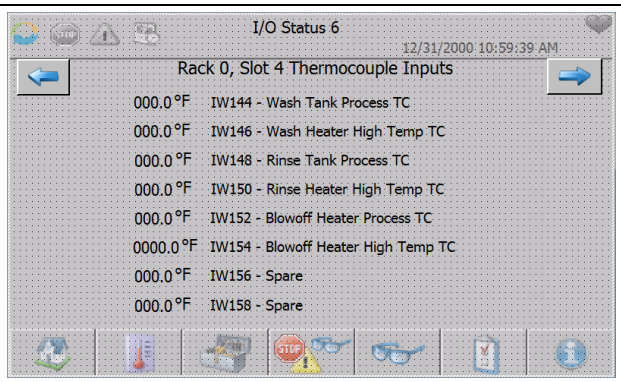
**Table 9 Description of Alarms & Warnings Screen Icons**

| Icon | Description |
|---|---|
|  | Press the **VIEW ACTIVE ALARMS BUTTON** to see the active alarms that need to be reset before the machine will continue. |
|  | Press the **STOP BUTTON** to clear and reset the alarms. This will move the alarms to the history screen. |
|  | Press the **VIEW ALARM HISTORY BUTTON** to view the history alarms and events. Press the up or down arrows to page through the different alarms. |

### 3.3.10 System Status Screens

Press the **SYSTEM STATUS BUTTON** to view and reset the machine cycle counters and to connect to the System I/O Status Area.

**Table 10 System Status Screens**

<table>
<tr>
<td> 
</td>
<td>Press the SYSTEM I/O STATUS BUTTON to view the current state of each of the inputs and outputs in the PLC.</td>
</tr>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
</table>

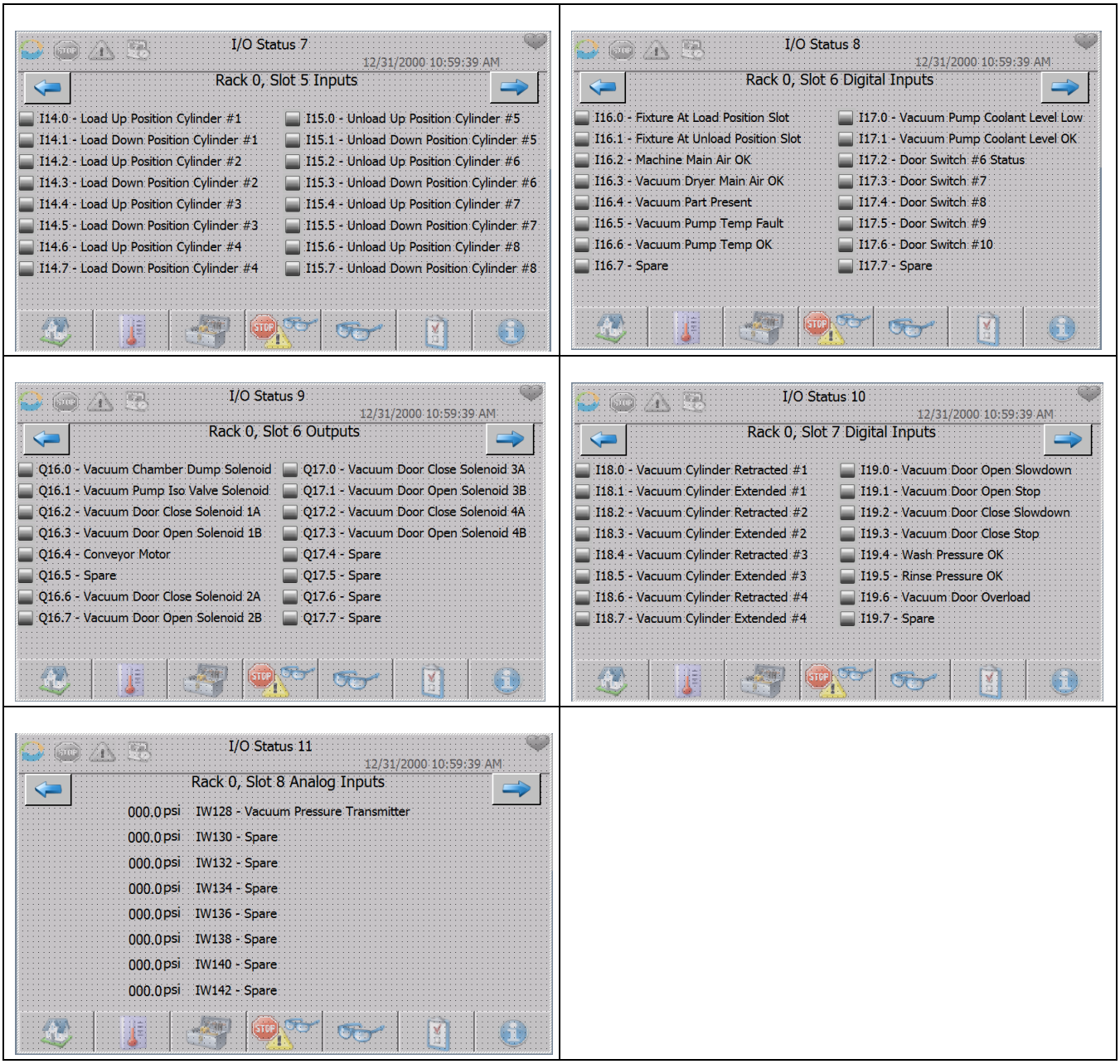



**Table 11 System Status Screens**

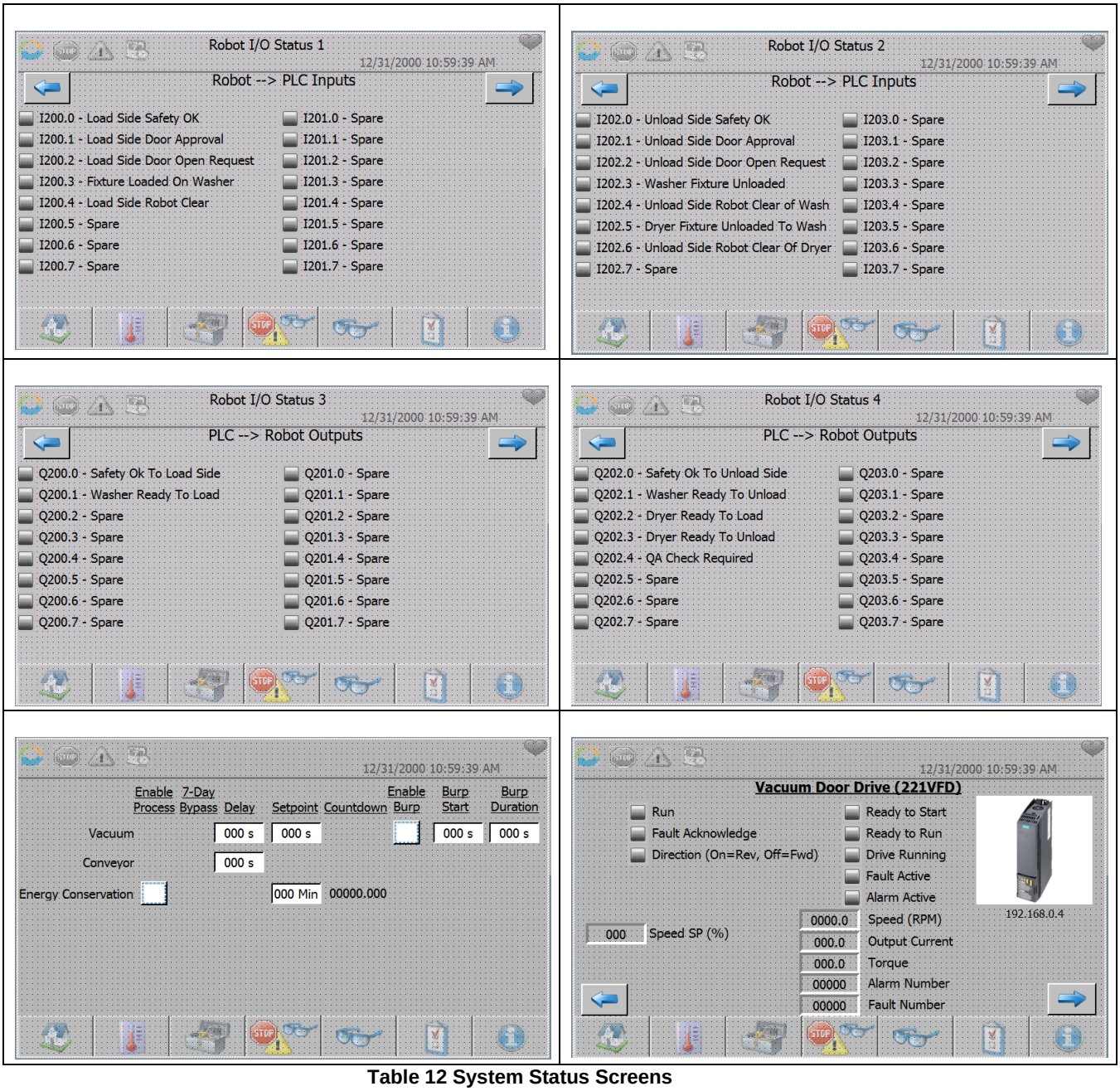



**Table 12 System Status Screens**

### 3.3.11 System Information.

Press the **SYSTEM INFORMATION BUTTON** to login as a user, test the stacklight or access machine information. The first screen displays the machine's serial number, which is necessary when requesting service from CTG.

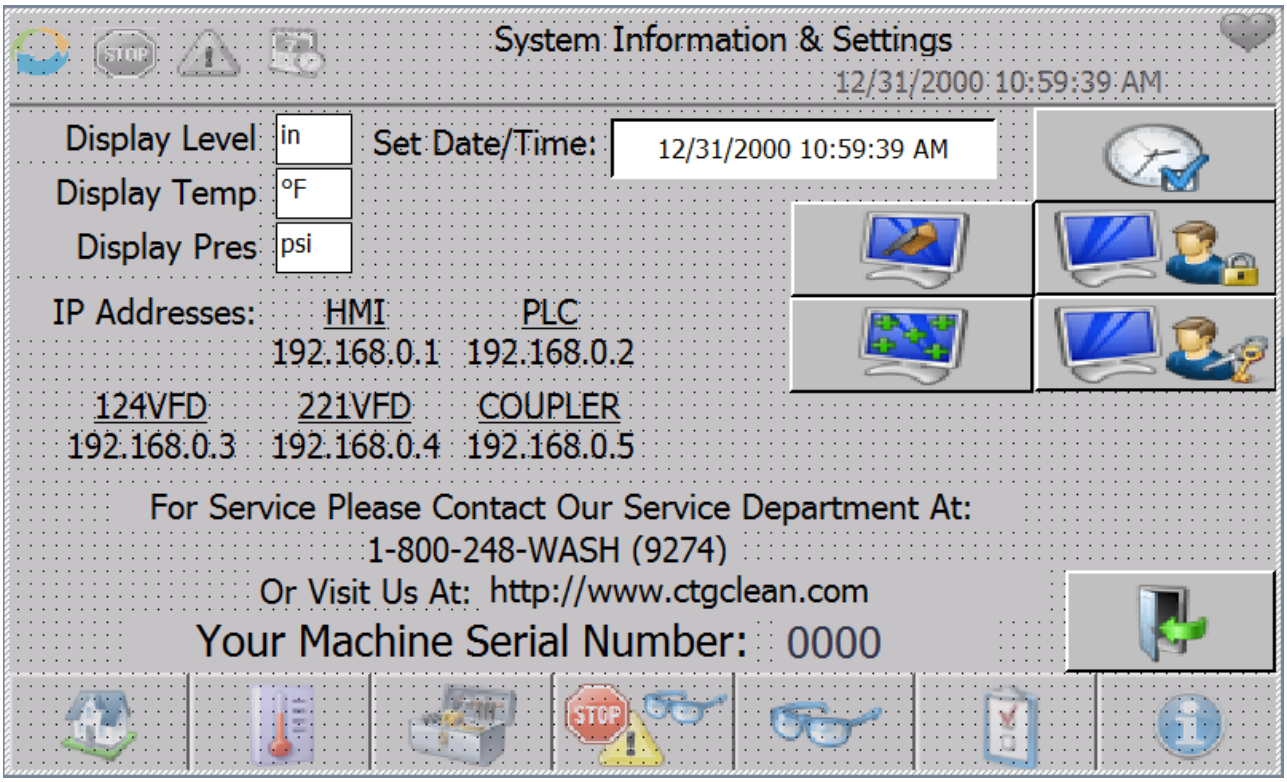



**Figure 17 System Information Screen**

**Login / Log Off:** After entering a password in any required fields, the password will stay active for 5 minutes. Press this button to immediately log off. After logging off the password will need to be entered again to gain access to the password protected function.

## 3.4 Ethernet Port.

A customized ethernet port opening is provided on the control cabinet. This port allows personnel to access control panels without having to open the panel doors. Thru-door voltage detection gives the visual indication outside the panel that voltage exists inside the panel. It also allows for the creation of local area networks (LANs) for communication between the machine and local devices for sharing of information.

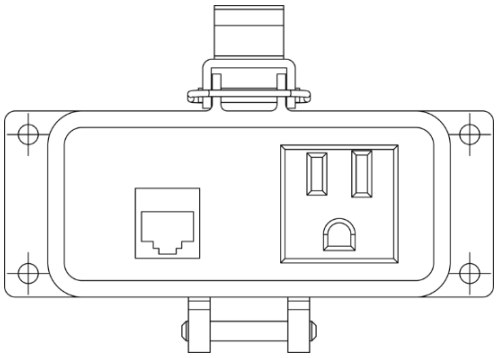


**Figure 18 Ethernet Port**

## 3.5 Safety Light Curtain (Option)

This machine may be equipped with a safety light curtain. The light curtain is a microprocessor-controlled, infrared transmitted-beam safety light curtain. The system consists of a receiver assembly and a transmitter assembly. The receiver and transmitter assemblies are not physically interconnected.

A light curtain is used where personnel protection is required. The system will power up with its safety and auxiliary outputs OFF, and, if the detection zone is not obstructed, enter the machine run state. In this state, when an object is sensed entering the detection zone, the system will change from machine run to machine stop and remain in this state until the obstruction is removed. Once the detection zone is clear, the system will automatically change from machine stop to machine run. The system detection zone is delineated by the inside edge of the transmitter and receiver end caps. The area outside these marks is not protected.

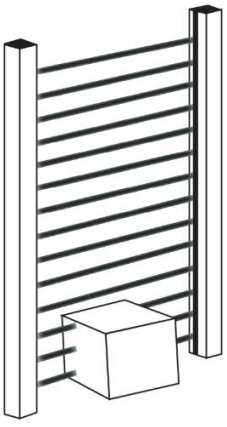


**Figure 19 Safety Light Curtain**

## 3.6 Stack Lights (Option)

The machine may be equipped with a stack light to indicate the status of the machine.

NOTE

**Multiple lamps can be illuminated at once depending on the status of the machine.**

- Solid Red – Machine Fault
- Blinking Red – Machine Warning (Does not interrupt a cycle)
- Amber or Yellow – Machine Idle
- Green – Machine Running

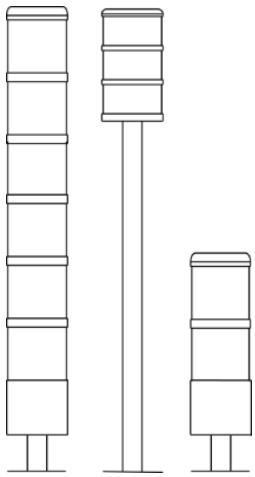


**Figure 20 Stack Lights**

## 3.7 Proximity Switch (Option)

A proximity switch is set up at the load and unload end of the material handling. The through beam sensor detects objects and materials without contact and indicates their presence by a switched signal. The unit is composed of a receiver and a transmitter. The receiver output is a yellow LED when an object is detected. The transmitter has green LED lights when the unit is ready for operation.

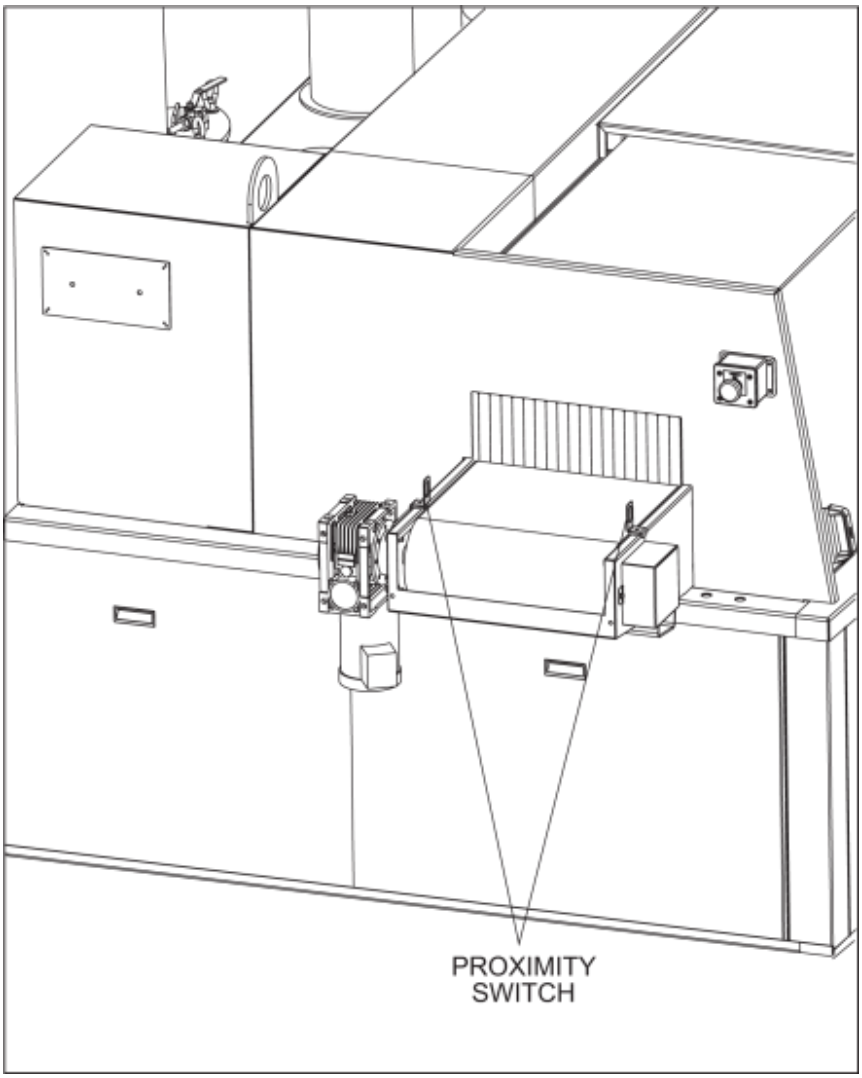



**Figure 21 Proximity Switch**

## 3.8 Machine Access Doors

Access doors are in key areas of the machine. These doors are of different sizes and open with different methods. The type of door is determined by the frequency of access to that portion of the machine. Throughout this sub-section the different types of doors, there are three in all, will be discussed.

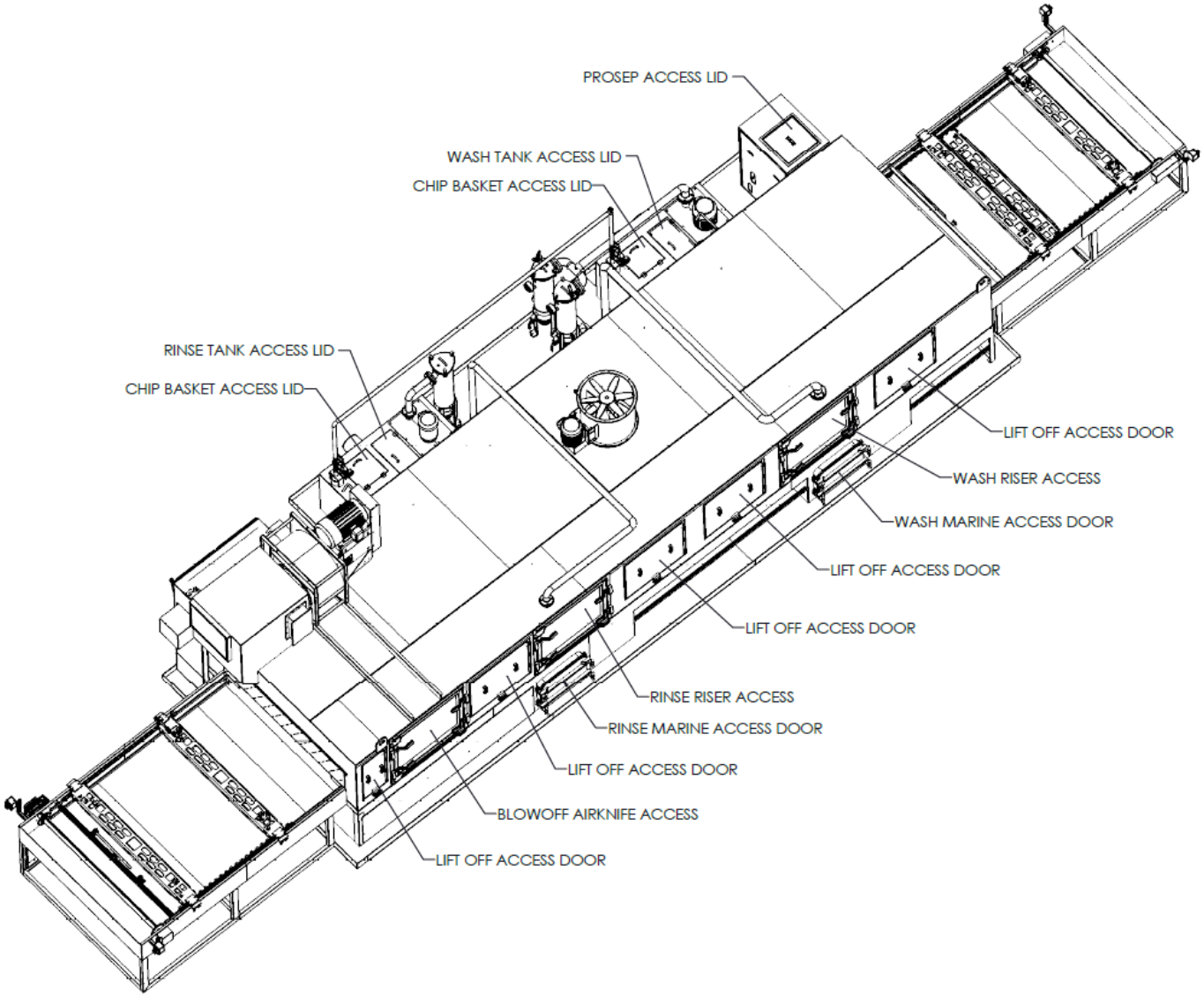



**Figure 22 Machine Access Doors**

### 3.8.1 HD Access Doors.

HD access doors are located on the front and rear of the machine. These doors cover station access points.

These doors are made from stainless steel and are mounted on hinges.


**Figure 23 HD Access Doors**

### 3.8.2 Tanks Access Door (Marine Door).

Marine doors are used on the wash and rinse tanks, covering the access port that is available for cleaning of the tanks. This marine door is made of steel and has a soft rubber gasket that is seated on the lip of the door. This gasket provides a watertight seal when the door is properly seated.

In the event that the machine requires relocation or to be offloaded from a truck, Ransohoff has provided forklift slots on the machine for this reason. One is located just under the marine door and the other is located to the left of it.


**Figure 24 Tanks Access Door (Marine Door)**

### 3.8.3 Lift Access Doors.

Lift-off access doors come with the standard machine. They are used for the areas of the machines that require access but not as often as the areas that have the sliding access or double opening doors. These doors are loose fit doors that cover access to the lower portion of the machine. Removing the doors is done by just simply lifting the door up high enough to clear the lower frame and tipping the lower portion of the door clear of the frame and allowing it to slide out.


**Figure 25 Lift Panels**

# 3.9 Wash System

The Wash system consists of several different components. Understanding how this portion of the machine works is very important to ensuring the parts that are put through are cleaned properly. Improper cleaning of parts can cause a loss of production and possible subsequent failure of the assembled component.

The following components will be discussed:

- Solution Tank
- Wash/Rinse Pump
- Filters
- Wash Nozzles
- Tank Level Control

## 3.9.1 Solution Tank.

There could be several tanks in the machine. They are located under the conveyor and have access lids to the tanks from the top located in the back. There are also fill, drain, and overflow connections which are provided. A screen is provided to catch large debris.

NOTE **The drain and overflow connections are capped at the factory. Should you want to attach the drains to your factory drain system, the caps will need to be removed and drain valves installed. This must be done before filling the tank.**

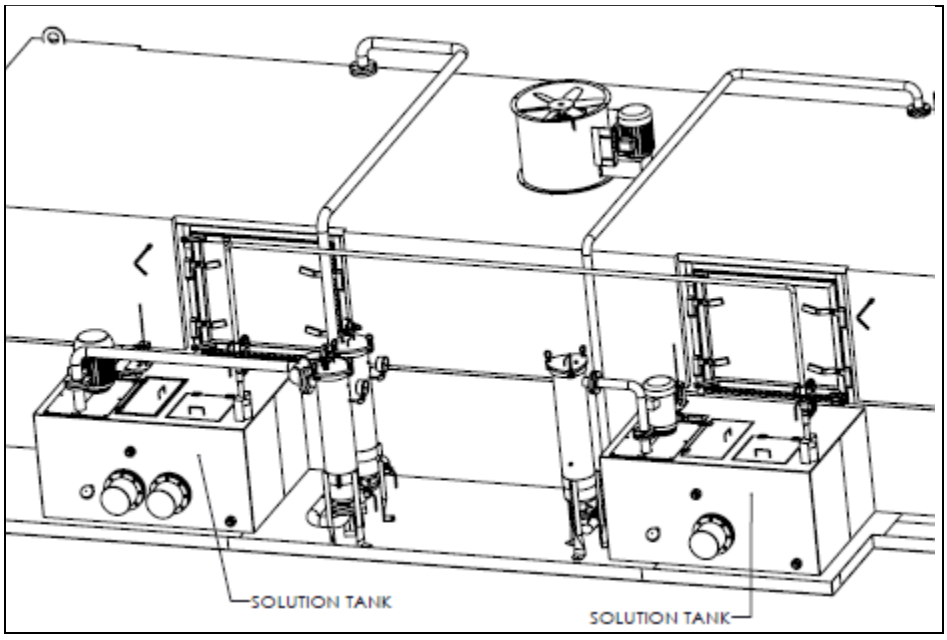



**Figure 26 Solution Tanks**

### 3.9.2 Wash Pump.

The wash pump is located on the cleanout side of the machine. The pump delivers the solution to the solution stage nozzles through the filters.

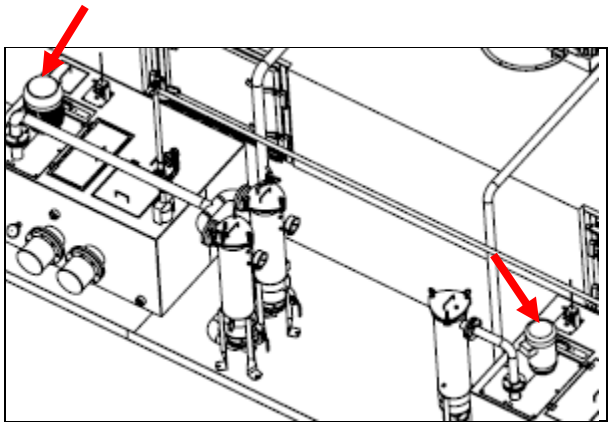


**Figure 27 Wash Pump**

### 3.9.3 Spray Nozzles.

This machine is equipped with VeeJet Spray Nozzles. This type of nozzle offers high impact flat spray pattern with spray angles of 0° to 65°.

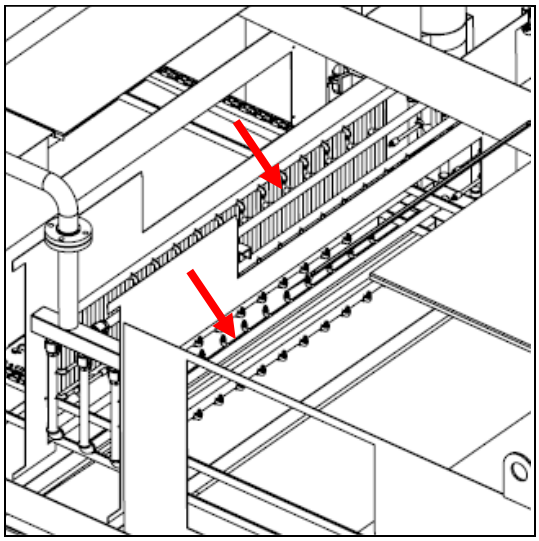


**Figure 28 Spray Nozzles**

### 3.9.4 Filters, Screens and Chip Baskets.

Each solution tank has a filtering system and pump screen to capture the contaminants and to maintain the cleanliness of the solution. The wash tank has an optional chip basket available.

The filters are located after each pump before the spray nozzles. The filters keep the solution from being sprayed onto the parts clean and free of contamination. The standard filter is a canister style vessel with a single bag filtering element. There are optional upgrades to multi-bag or cartridge style filter elements depending on the micron rating preferred. The standard filter rating is typically 50 microns however ranges from 1 to 150 microns are available. The smaller the micron rating, the smaller the particles removed from the fluid resulting in a higher frequency of required element replacement.

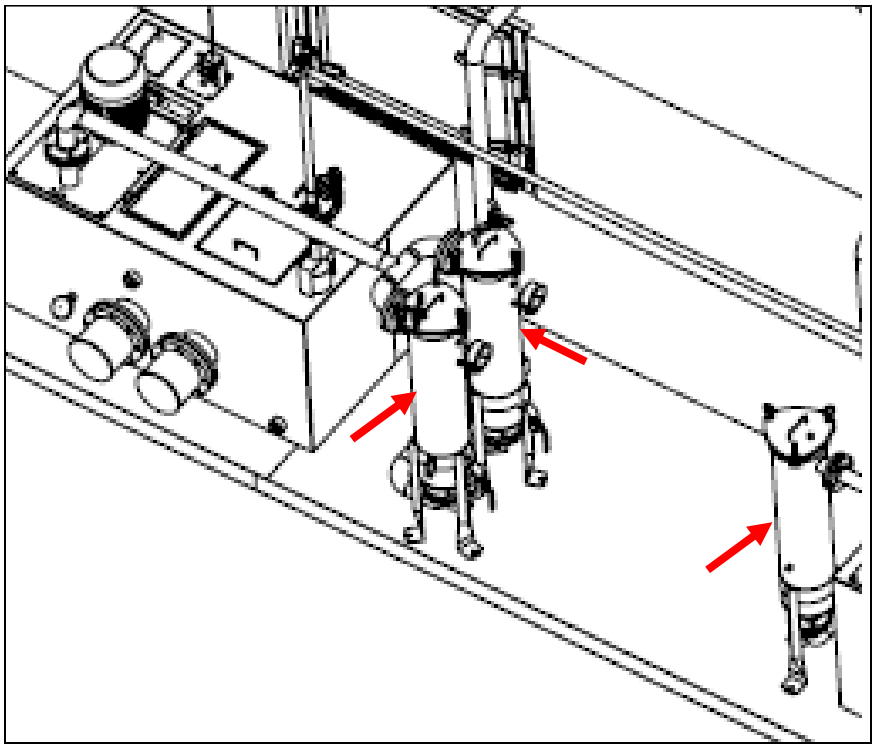


**Figure 29 Bag Filters**

Each pump is protected by a pump screen. The screen is located in front of the pump inlet to catch larger sized debris from entering the pump and possibly causing damage.

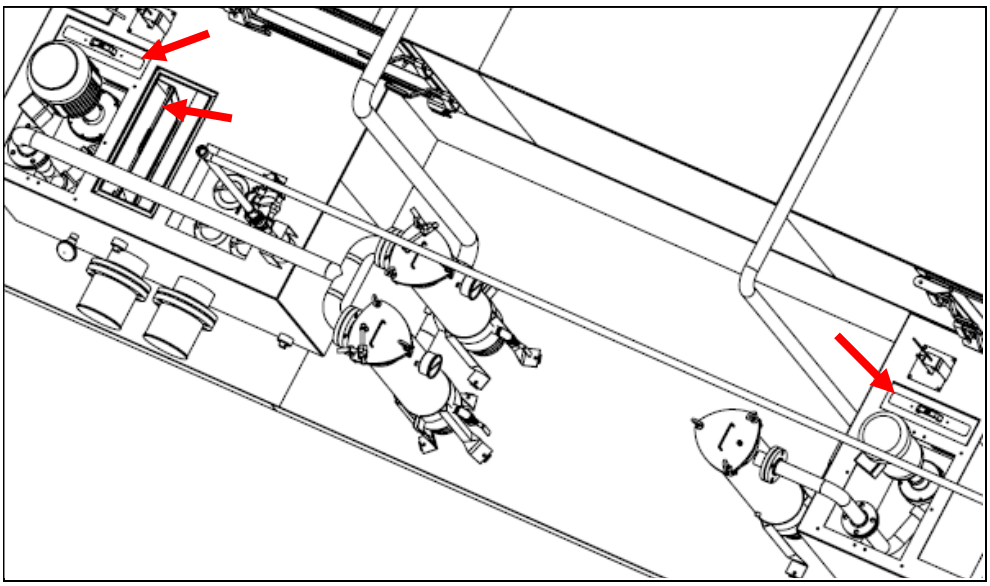


**Figure 30 Pump Screen Wash Tank**

An optional chip basket can be provided to catch chips and debris that are removed from the parts during the wash process. The chip basket is located at the point at which the wash chamber drains and will prevent chips from entering the storage tanks.

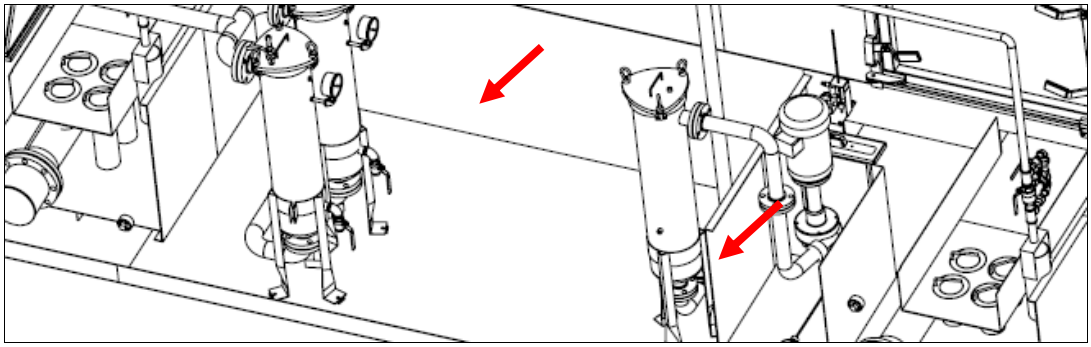


**Figure 31 Chip Baskets Wash & Rinse**

### 3.9.5 Level Float (Bob Float) Standard.

The Level Float or Bob Float is a device that maintains the level of the water in the tank. Should the level drop to a preset level the valve opens allowing fresh water to enter the tank. The float assembly is made up of a stainless-steel float attached to a stainless-steel rod. The rod is attached to a brass plunger valve that when the float drops down, the valve opens, and when it rises it closes.

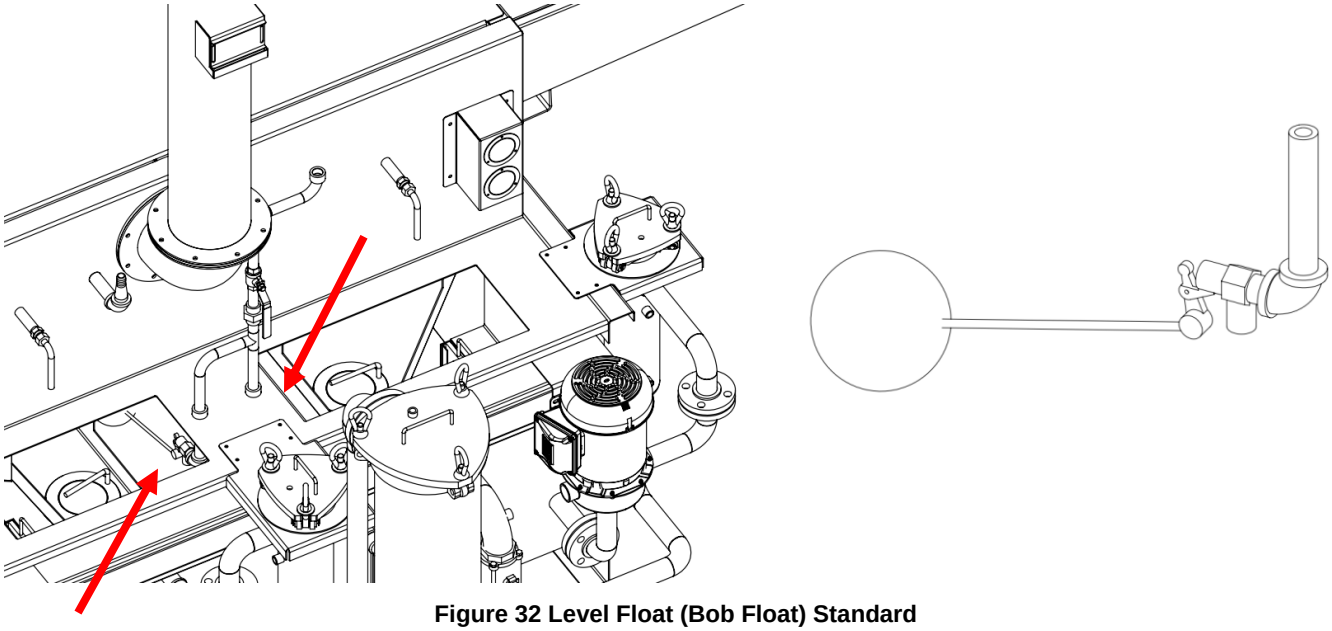


Figure 32 Level Float (Bob Float) Standard

### 3.9.6 Tank Level Switches – Proximity Switch Float Sensor.

The tank level switch used on this machine monitors the flow of liquid media. It consists of a float ball mounted to the end of a vertical rod. There are three (3) proximity sensors in the assembly. When the water level drops, the float ball drops and subsequently the set collar on the rod trips the middle proximity sensor, opening the fill solenoid for that tank. As the tank level rises, the set collar will trip the upper sensor, indicating normal running level, and close the fill solenoid. If the solenoid fails or water supply is otherwise disabled and the water level continues to drop, the set collar will trip the lower proximity switch triggering an alarm and shutting down the machine for solution low level.

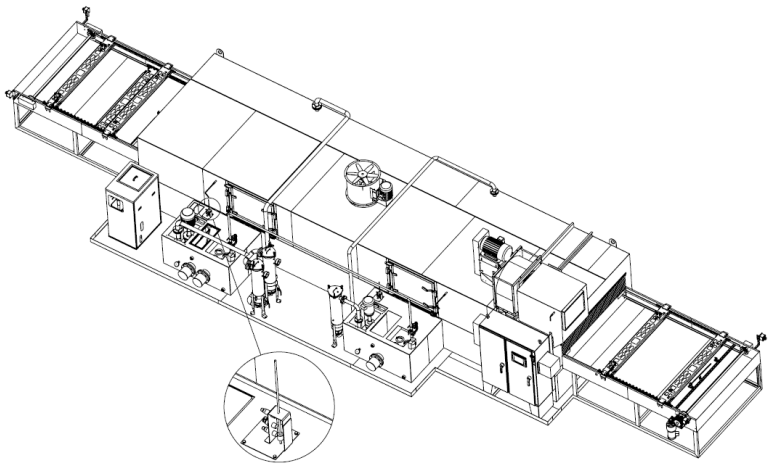


Figure 33 Tank Level Switches

## 3.10 Heated Blow-off System

The Blow-off system used is designed to remove the water left from the washing cycles that the parts just went through. The system consists of the following components:

- Recirculating Blower
- Air knives

WARNING

**It is very important to clean the plenum and perform routine maintenance at designated intervals, failure to do so could result in a fire hazard.**

### 3.10.1 Recirculating Blower Assembly.

The recirculating blower draws air through a heater duct then forces it through the air knives which strip the water from the part. The air is recirculated within the system.

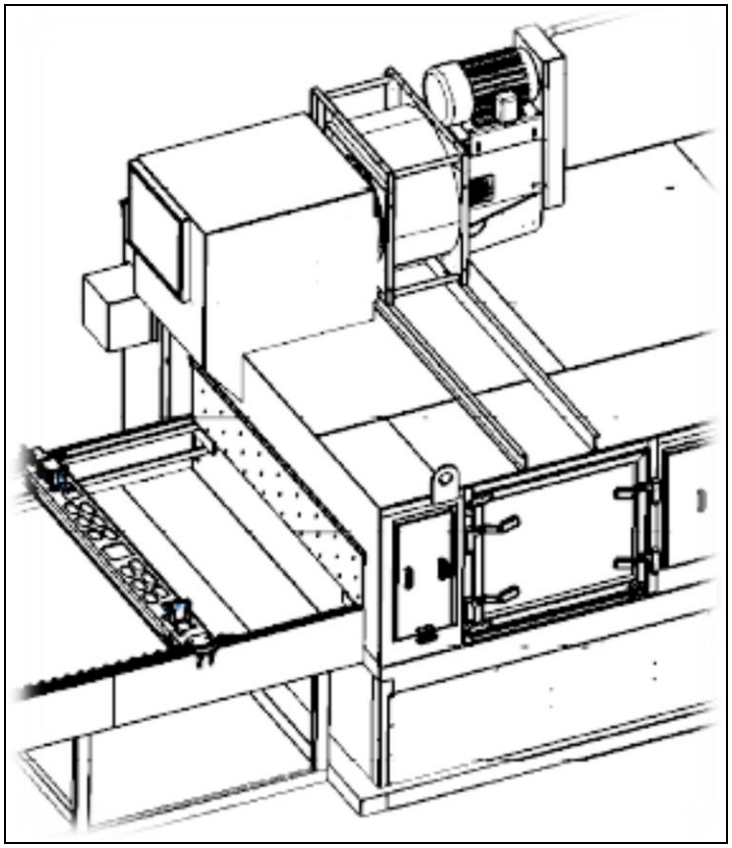


**Figure 34 Blow-off System**

### 3.10.2 Air Knives.

Heated air flows from the blower outlet through a pipe and into the air knife plenum where a sheet of air is directed out through a linear nozzle onto the part being dried. The parts traveling down the conveyor pass through the heated air for drying.

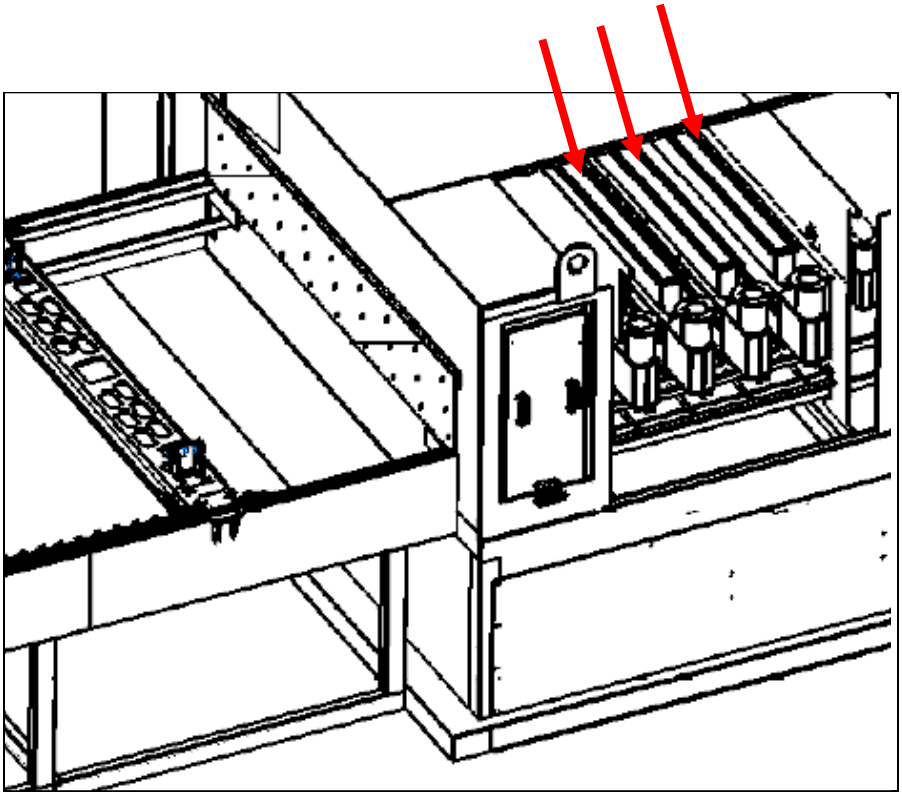


**Figure 35 Air Knives**

## 3.11 Machine Exhaust System

A Machine exhaust system is supplied with the machine. It consists of the following components:

- Internal Exhaust Duct work
- Exhaust Dampers

The purpose to having a means of exhausting the machine is to eliminate vapors, mist, or steam from escaping the confines of the machine into the plant.

### 3.11.1 Internal Exhaust Duct Work & Dampers.

Internally the exhaust duct runs from the Load station to the start of the Blow-off station, there are dampers located at the entrance of the Load station and the entrance of the Blow-off station. The duct work is designed to produce optimum draw of air from the stations to eliminate the escape of vapor and gasses from the machine when setup properly. The dampers are designed to regulate the flow of air that is drawn by the exhauster fan. They can be adjusted easily and quickly.

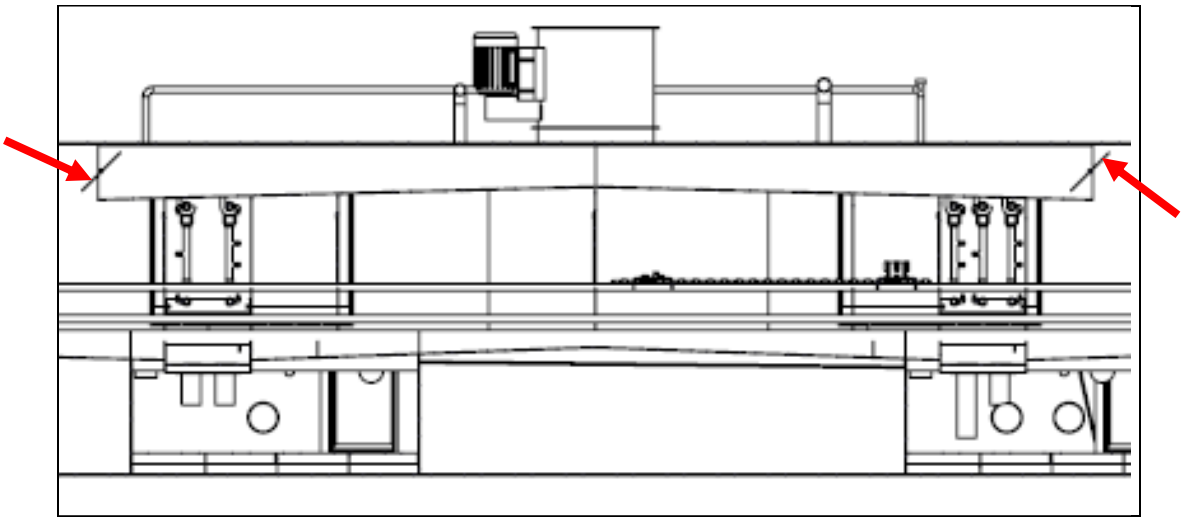


**Figure 36 Internal Dampers**

## 3.12 Blow off Fresh Air Intake Damper

Machines with recirculating blow-off fans require fresh air. Ideally, the damper should be set up for 25% fresh air and 75% recycled hot air intake on the blow-off fan. This damper is set during manufacturing but may require adjustment after the machine is set up at the customer site.

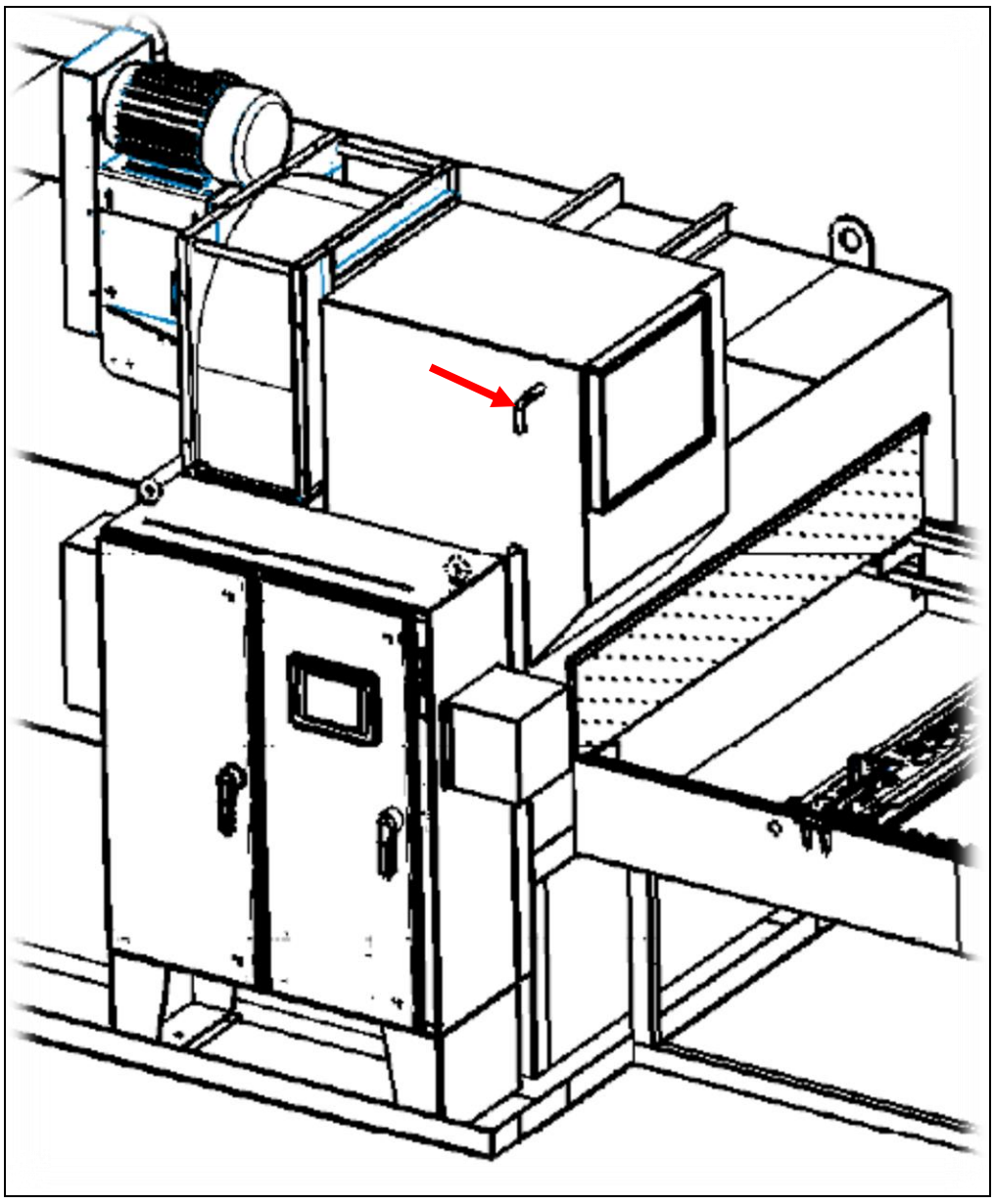


**Figure 37 Fresh Air Intake**

## 3.13 Material Handling

To move the parts being cleaned, a custom fixture conveyor system is built into the machine. The conveyor is powered by a variable speed motor with a speed controller or controlled from the control cabinet. The parts are riding on the conveyor specifically designed for the customer's parts.

When a conveyor is provided, a part out of position gate may be installed. This gate limits the orientation of the part optimal to the machine, so the part may not be misloaded and interfere with the internals of the machine (nozzles, air knives, etc.).

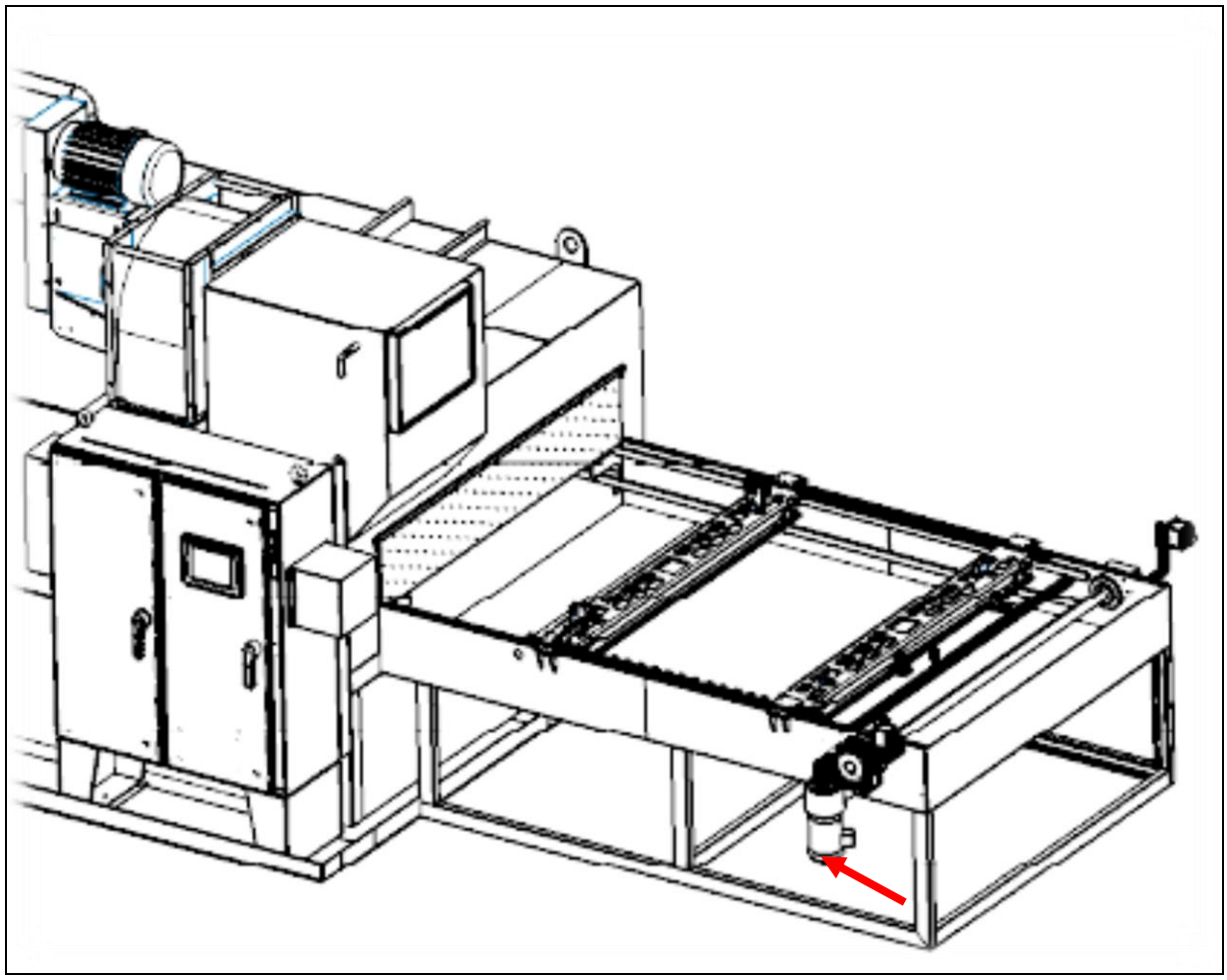


**Figure 38 Drag Chain Conveyor**

# NOTES

# SET-UP PROCEDURES

## 4.1 Machine Installation

This section provides instruction on installation and setup of the machine. The information given is general and it is assumed that the personnel, if not Ransohoff Service Technicians, have been properly trained to install and prepare this type of machine for production.

### 4.1.1 Machine Installation and Startup Instructions

1. Off-loading and moving the machine can be done in two (2) ways, depending on the size of the machine. Smaller machines incorporate pockets for use of a forklift. Slots are provided in the center of the machine to ensure proper balance. Larger machines have lifting lugs at strategic points for the use of a crane or other lifting device.

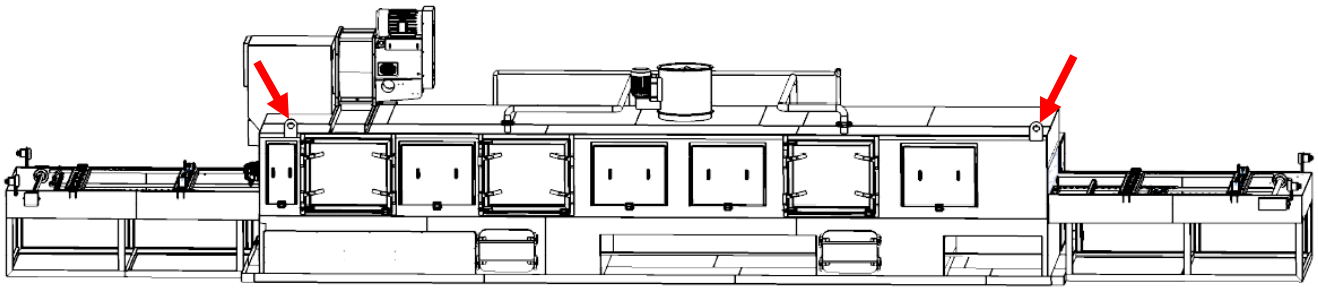


**Figure 39 Fork-lift Slot Location**

2. Once the machine is offloaded, remove the protective wrapping that is on the machine. There may be wrapping in between the sliding doors. Should this be the case it may be necessary to lift the doors from the machine to remove this material.
3. Inspect the machine for any shipping damage, should any damage or missing panels be noted contact Ransohoff as soon as possible.

4. Should your machine have the Pro-Sep option be sure the Pro-Sep is with the unit, check this portion of the machine for damage and/or missing parts. There should be two (2) hoses attached to the machine and a zip lock bag of hardware to attach the hoses to the machine. Installation instructions of the Pro-Sep will be covered later in this section.
5. Clean the area where the machine will be installed. Prepare and install proper drops. There should be an electrical, water, and air drop (if required) at the location.
6. Move the unit into place and ensure there is proper clearance.
7. Check the level of the machine on the front, back, load end and unload end of the conveyor. Shim the machine as needed.
8. Once the machine is set in place, remove the lift off panels if included, from the back side and front side of the machine. This will expose the filter areas and the pumps. Also remove the lift-off panels on the unload end of the machine. This will expose the blow-off fan unit.
9. Check the bolts on the tank access doors (marine doors) to ensure they are tight.
10. Should your machine have a Pro-Sep oil removal system with it, the feed and return hoses need to be attached at this time. Also connect the electrical to the Pro-Sep unit.

NOTE **It is advised that the operator be aware of the requirements for the chemical being used. In some cases, the water is required to be at operating temperature before mix begins to reduce the likelihood of the chemical foaming up from the water be agitated.**

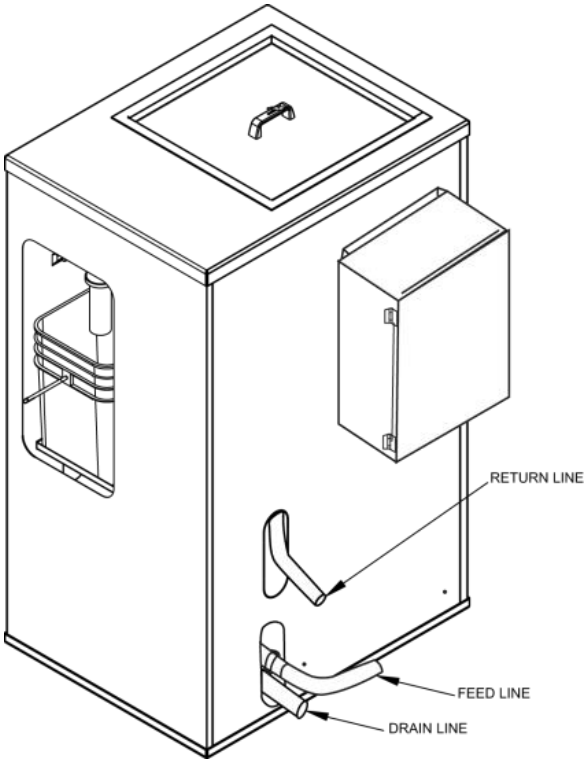



**Figure 40 Pro-Sep Line Hookup**

11. Connect the machine drain lines to the plant drainage system, if equipped. Your machine may have come with a sump pump. If this is the case, connect the drain hose to sump pump reservoir tank.
12. If your machine is equipped with a tube-Axial exhauster, be sure to connect the plant exhaust system to the exhauster.
13. Connect the plant water to the machine and connect the electrical to the control cabinet. Once the water is turned on and power is supplied to the machine, the tank will begin filling. Should your machine have a gas heater instead of electric, be sure to attach the gas line to the machine.
14. As the tanks are filling, chemical can be added to them. Be sure to follow the chemical manufacturer's instructions for the proper ratio.
15. As the tanks are filling, check the marine doors for any indication of leaks. Tighten the locking bolt to seal the door if leaks are noted.

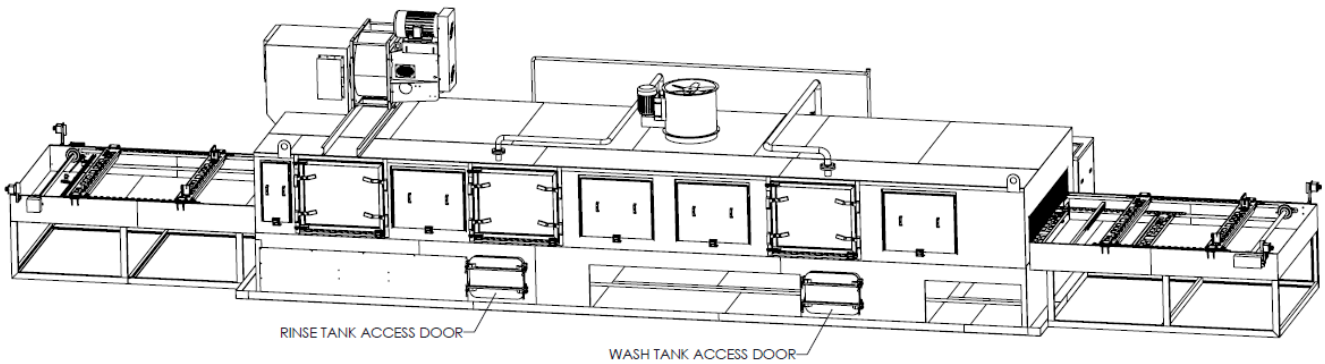



**Figure 41 Tank Access Door Check**

16. Once the tanks have filled, turn on the pumps and check for leaks. Allow the pumps to run for a few moments to mix the chemical with the water. Should your machine have electrical heating elements, or gas fired heater turn them on to bring the solution up to proper temperature.

CAUTION

**Be sure to read and follow all manufacturers' instructions on use of the chemicals being placed in your machine. some chemicals can be harmful.**

17. Once the tanks have been charged the machine can be started. Be sure all tools, rags, and other debris are clear of the machine, and removed from the inside.

### 4.1.2 Initial Machine Startup Checklist

This check list is provided to double check that the machine is properly installed:

- ☐ Ensure that the machine is level and set on a finished floor. If the machine is improperly leveled the liquids in the wash tank could spill out and possibly cause the machine to operate improperly.
- ☐ Ensure that the main freshwater drop connection is made. DO NOT RUN THE MACHINE WITHOUT WATER.
- ☐ Check the electrical drop. Ensure the machine has power coming to it.
- ☐ Ensure the drain piping connection is secure. Without proper connection, liquid will spill out on the floor and cause a slipping hazard.
- ☐ Check all access doors, such as the rolling doors and lift off doors and ensure they are in place and secure.
- ☐ Check the tank access door (Marine Door) is seated properly and tightened down. If this door is not seated properly the liquid in the tank will drain out causing a slipping hazard.
- ☐ Check the tank drain valve, if equipped, to ensure it is closed. If not closed the water that is put into the tank will drain out.
- ☐ Check the exhaust dampers to ensure they are securely fastened. If they are loose set to about 50% open and tighten the wing nuts to lock them into place. If left loose improper air flow through the machine will occur and vapor and steam coming from the machine will not be vented properly causing it to enter the plant atmosphere without being filtered.
- ☐ Ensure all safety guards are in place. This machine should not be run without guards for safety purposes.
- ☐ Check the tank for the internal screen. Without this screen large chips and pieces of debris would be allowed to enter the pump and cause damage.
- ☐ Jog all the motors to ensure they are operating in the correct direction. If these motors are not operating properly, the machine will not operate properly.

# NOTES

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# OPERATING INSTRUCTIONS

## 5.1 Operating Procedures

This section of the manual will cover the machine operation. It is important that all personnel receive proper training before operating this equipment. Improperly operating this equipment could cause damage to the machinery and/or injury to personnel.


**It is extremely important to be aware of all safety notices, caution, warning, and danger signs that are posted on this equipment.**

The following will be covered in this section:

- Machine Safety and Pre-Startup Safety Checklist
- Machine Startup, Sequence of Operation and Shut Down Procedure
- Emergency Stop and Reset Procedures
- Operation of Sliding Access Doors
- Operation of Lift-up Doors
- Operation of Load, Mid-Machine and Unload Access Panels
- Operation of Wash, Rust Inhibitor and Rinse Pumps
- Operation of Effector Level Sensor

### 5.1.1 Pre-Startup Safety Checklist

The following is to assist the operator in forming a defined safety habit whenever a machine is to be started. This safety checklist does not preclude any plant safety rules or procedures. This list is to be used in conjunction with plant safety regulations. In the event that a conflict with existing policies happens the plant rules are to be followed. All government safety standards and company safety policies should be followed while operating and servicing this machine.

Before attempting to run this machine, answer the following questions:

1. Am I a qualified operator?
   - If not, get help. This machine is costly and dangerous. If you have not been trained properly, you could put yourself and other personnel in a hazardous situation. If you are unsure about the machinery or any part of it ask your supervisor.
2. Is anyone working on this machine?
   - Walk around the machine and see if there are any maintenance or repair personnel still working on it. Be aware of any out of service signs or lockout tags on the control panel. If there is any doubt in your mind, ask your supervisor.
3. Are all electrical boxes closed?
   - All electrical cabinets and junction boxes should be closed and secured. If you find one open, look for notification of maintenance or repair being done on the machine. If you are still unsure ask your supervisor.
4. Are all guards and doors in place and closed?
   - All guards and doors must be in place or closed. Ensure that no maintenance personnel are working on the machine. Look for any signs indicating work being done. If in doubt, ask your supervisor. Failure to do so can result in injury to personnel or damage to the machine.
5. Do you know the location of the emergency buttons for this machinery?
   - Knowing the location of these buttons is very important. If you are unsure ask your supervisor.
6. Are all access areas to the machine and its components clear and free of debris, tools, and any hazardous objects?
   - Be sure to make house cleaning an important part of the pre-start of this machine. Any tools, debris or other objects that could cause a trip hazard or fall into the machine could cause serious injury and damage to the machine.

Once this checklist is complete you should be prepared to run the machine. If for any reason you feel unprepared or inadequately trained contact your supervisor for help.

## 5.2 Machine Startup and Shutdown Procedures

In this section, machine startup and shutdown will be discussed. This will also include initial system setup and startup. Once initial setup and startup have been completed a standard startup procedure can be followed.


**It is extremely important that all safety procedures are followed when initial setup and startup are taking place. Failure to do so could result in injury to personnel around the machine and damage to the machine.**


**It is extremely important that a trained ransohoff technician install this machine. If the machinery is improperly installed serious injury to personnel and/or damage to the machinery could occur.**

Please note that during shipping, the machine is exposed to large amounts of vibration and shifting and in this process parts, components, and fittings can work themselves loose. Therefore, it is important that once the machine has reached its destination and placed in the proper location on the plant floor that an inspection of the machine be done. This is to ensure that the machine is in good working order before initial startup.


**Failure to perform pre-startup inspection of the machine could result in damage to the machine and injury to personnel working around this machine. The machine must be inspected before initial startup can begin.**

### 5.2.1 Startup Procedure

Prior to operating the machine, check to make sure all tanks are full. Fill as needed. Complete the following steps to start the machine:

1. Place the **MAIN DISCONNECT** switch to the **ON** position.
    a. Check all E-stops and pull if necessary.
    b. The PLC will now boot and come up to the main menu.
    c. Confirm all covers and doors are closed.
2. Press the **E-STOP RESET** button.
    a. This will energize the main relay and readies the circuit for starting sequence.
    b. If Heaters are enabled, they will activate, assuming they are below set point.
3. Press the **AUTO START** button on the HMI to place the machine in automatic mode.
    a. This will sequence all blowers and conveyors.
    b. The Conveyor will only run if tanks are above the low limit set point. Allow time for the heat to come up to temperature. Approximately 1 hour.
    c. Or select bypass low level alarm for the conveyor to move.

Now the machine has started, walk around, and look for any escaping vapor from the machine. If vapor is escaping, the dampers may need to be opened slightly more.

### 5.2.2 Shutdown Procedure

NOTE

**Remove all parts prior to shutting down machine.**

1. Press the **STOP AUTO CYCLE** button on the HMI.
   a. The Pumps and Conveyor will immediately turn off.
   b. Blowoff and Exhaust Fan will enter Fan Rundown Mode, they will remain on for 60 secs to remove vapors.
2. The Machine will now be in Manual Mode. Heaters will remain active if enabled and below set point.
3. Turn **MAIN DISCONNECT** switch to the **OFF** position.

### 5.2.3 Emergency Stop and Reset Procedures

There is an Emergency Stop (**E-Stop**) buttons on the machine.

To activate the **E-stop**, push it in. This opens the circuit powering the main control relay. With the main control relay opened, the electricity to the other relays is interrupted and the machine stops. To reset the system, pull the **E-stop** button and press the **MASTER CONTROL** button. The startup sequence can then be followed.

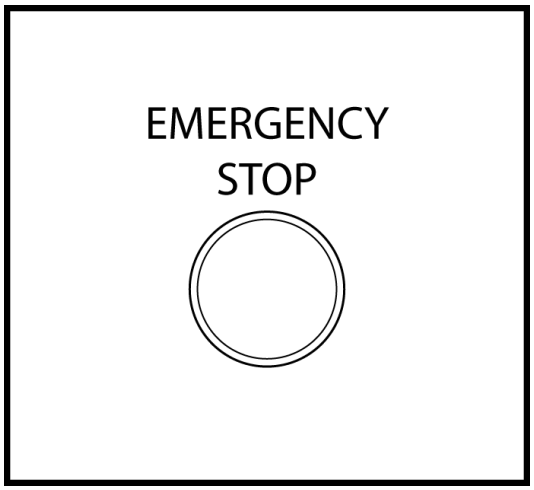



**Figure 42 E-Stop Button**

## 5.3 Operation of Access Doors

Access doors are all doors, covers, and removable doors that can be removed with little effort from the machine to gain access to the interior of the machine.

In this sub-section instruction will be given on how to operate the doors, covers, and removable panels that are found on the LeanVeyor machine. The following is a list of covers and panels:

- Sliding Access Doors
- Lift-up Doors

### 5.3.1 Sliding Access Doors

Slide doors allow access to the associated stage when the door is opened. Sliding doors are moved from side to side. Some doors may overlap other doors. Rollers are mounted to the top and bottom of the doors which move along a guide rail.

To open the doors just simply move them from one side to the other.

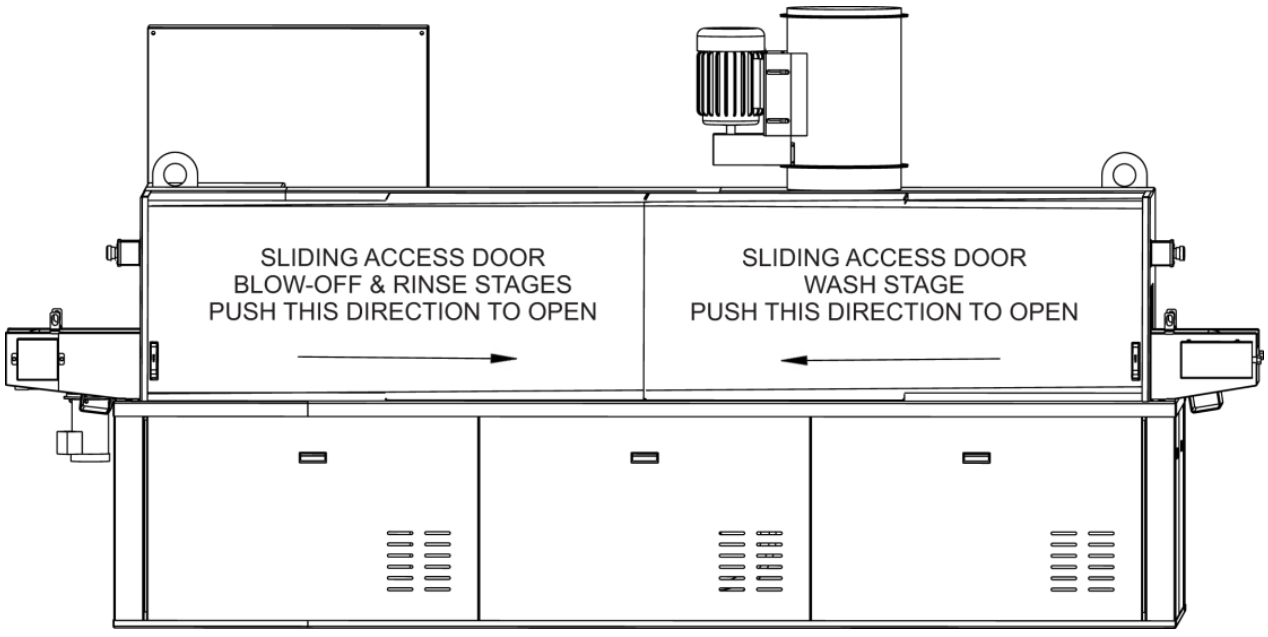



**Figure 43 Sliding Access Door**

### 5.3.2 HD Access Doors

The HD Access Doors are located at each station within the machine. Doors allow access to the associated stage when the door is opened. In the following sub-sections, instruction will be given in how to operate, maintain and repair the access doors that are found around this machine. The following type of doors will be covered in this portion of the manual.

1. HD Access Doors
2. Lift Off Doors
3. Tank Access Door (Marine Door)


**Figure 44 Access Doors**

## 5.4 Operation of Load, Mid-machine, and Unload Access Panels

There is a set of access panels that are at the load end of the machine, between the stages, and at the unload end of the machine. These panels cover the areas that do not require frequent access. They are in place to keep the draw of the exhauster efficient through the length of the machine.

Check them for damage and clean with a soft cloth and mild detergent.

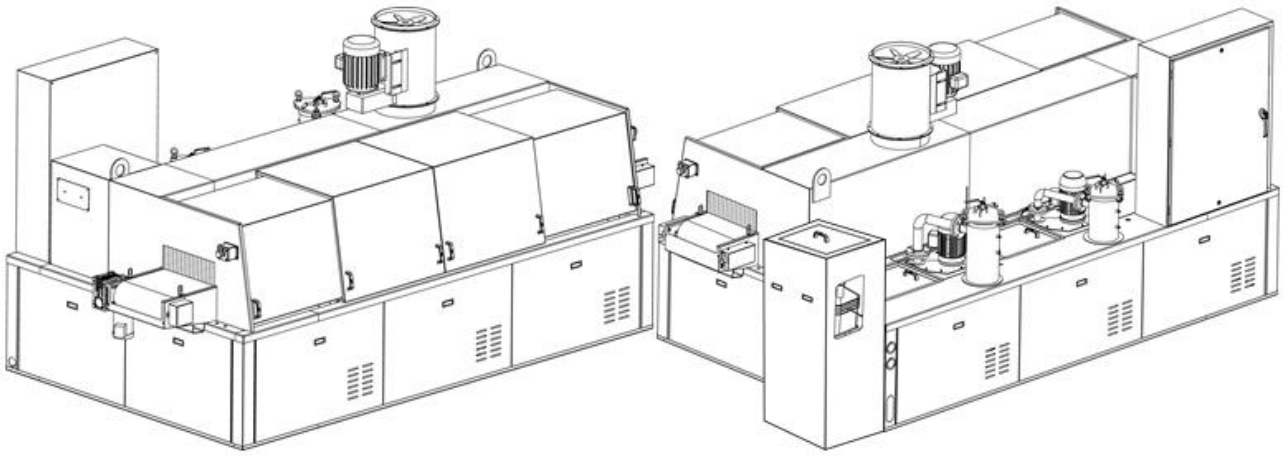


**Figure 45 Load, Mid-machine, and Unload Access Panels**

## 5.5 Operation of Wash, Rust Inhibitor, and Rinse Pumps

The following will explain the operation of the wash pumps on the machine. It is very important that these instructions be followed as failure to do so could cause damage to the pump.

### 5.5.1 Wash, Rust Inhibitor, & Rinse Pump Operation

The system is equipped with vertical style pumps that do not use seals. This type of pump requires very little if any maintenance at all. Other than checking for debris that has been pulled into the pump there is no other maintenance required. This is due to the once piece housing that the manufacturer uses on these pumps.

It is recommended by the manufacturer that a data log be developed to create a history of pump operation. In doing this an indication of pump performance can be logged. And if the pump starts showing signs of wear, any drop of pressure other than what would be considered normal, will give an indication to the operator that the pump impeller should be replaced at the next maintenance interval. The best suggested time for this is when the tanks are being cleaned. The wash tank uses vertical style pumps that have no mechanical seals.

# NOTES

# MAINTENANCE INSTRUCTIONS

## 6.1 Maintenance Procedures

This section of the manual will cover the machine operation, maintenance and repair procedures that are required to operate and maintain the machine.

It is important that all personnel receive proper training before operating this equipment. Improperly operating this equipment could cause damage to the machinery and/or injury to personnel.


**It is extremely important to be aware of all safety notices, caution, warning, and danger signs that are posted on this equipment.**

The following will be covered in this section:

- Maintenance of the Machine Access Doors
- Maintenance of the Wash, Rust Inhibitor & Rinse Systems
- Maintenance of the Blow-off System
- Maintenance of the Exhaust System
- Maintenance of the Conveyor System


**Before conducting any repairs it is suggested that Ransohoff Service Representative be contacted.**

## 6.2 Machine Safety and Pre-Startup Safety Checklist

The following safety guidelines are specific for maintenance, and pre-startup safety. These safety guidelines **DO NOT** supersede the safety guidelines covered in the first section of this manual. Before operating or performing maintenance on this machinery, take time to understand the operating functions and components of this machinery. Failure to do so could put yourself and/or others in danger.

The work supervisor will provide general procedures for ensuring safety, but the operator and maintenance personnel must understand the machinery and the necessary steps for safely maintaining this machine.

### 6.2.1 Maintenance and Repair Safety

Before beginning any maintenance or repair to the machinery the operator or maintenance personnel **MUST** take safety precautions to protect himself, his co-workers, and all other personnel around the machinery. Preform the following steps:

1. Always lock and tag out the machinery before performing maintenance. Be sure to read and understand the lockout/tag-out procedures. Failure to do so could put yourself and other personnel in danger of electrical shock or unexpected movement of equipment. Place appropriate signs around machinery that maintenance is being done.
2. Never assume a circuit is de-energized. Always use a circuit tester before beginning to work on a “cold” circuit. Electrical shock can cause serious injury or death.
3. Electrical troubleshooting may require the testing of live high-voltage circuits. **Only qualified electricians and their helpers are to perform this task.**
4. Remove only the guards, shields and doors that are necessary.
5. In the performance of maintenance, pipes, cables, hoses, or wires may have to be removed. It is advisable to mark them for identification to simplify reassembly of these components.
6. It may be necessary from time to time to test a portion of the machinery for adjustment or troubleshooting with guards removed. Be sure to stay clear of moving parts. Proper clothing is essential in these situations. Loose clothing, watches, rings and long hair can get caught in the machinery and cause serious injury or death.
7. Before working on any electrical components, be sure to remove all jewelry such as watches, rings, necklaces, and anything else that may pose a shock hazard. Safety glasses should not have wire or metal rims.
8. In some cases, other machines are wired into the controller on the machine that is being worked on, even though disconnect has been thrown there still may be “hot” wires in the box. These wires are colored yellow and are live and can cause electrical shock.
9. Be sure to keep the work area clean and dry to help avoid trip hazards and possible electric shock hazards. Place all removed guards, components and tools in areas that will not cause a hazard. Be sure that all liquid is cleaned up. It is not advisable to stand in liquid and work on electrical components, even with rubber soled shoes on.
10. Before starting machinery, after performing maintenance or repair to it, ensure that all personnel are clear of machine prior to starting the machine.
11. Safety is one thing that cannot be taken lightly, working on this machinery puts personnel in direct contact with moving and electrical components.

## 6.3 Maintenance of Access Doors

Access doors can be moved or removed with little effort, to gain access to the interior of the machine.

In the following sub-sections, instruction will be given in how to operate, maintain and repair the access doors that are found all around this machine. The following type of doors will be covered in this portion of the manual.

- Sliding Access Doors
- Lift-up Doors
- Load, Mid-machine, and Unload Access Panels
- Lift-off Doors
- Tank Access Door (Marine Door)

### 6.3.1 Maintenance of the Sliding Access Door

The following steps are to aid the operator through the maintenance of the Sliding Access Doors. Even though these doors can be opened while the machine is running, it is suggested that the machine be shut down while performing maintenance on the sliding doors.

1. Visually examine the doors for any damage.
2. Open doors and check the condition of the guide rails. Debris and chemical residue will accumulate in the railings and on the rollers. Clean out guide rails using a small brush or cloth. Clean water can be used for most chemical build up.
3. Check the condition of the rollers. Clean rollers using a small brush or cloth. Replace if damaged.
4. After cleaning, slide the door back and forth to ensure that the rollers are moving smoothly. If doors are not rolling smoothly repeat steps above.

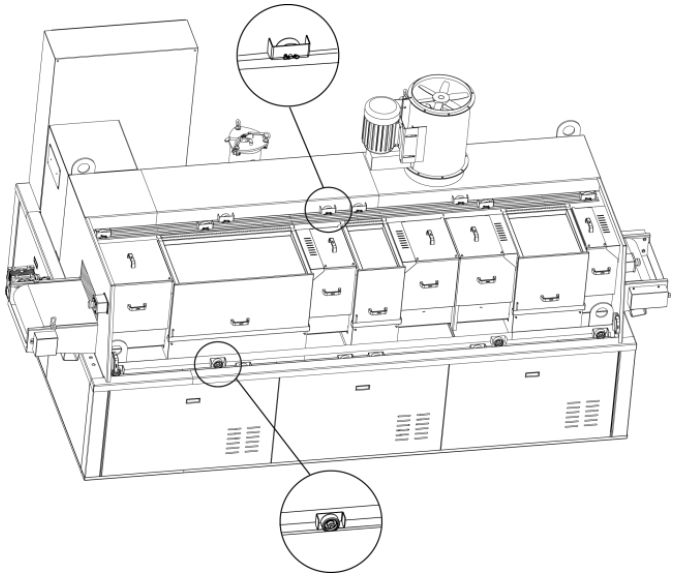


**Figure 46 Sliding Access Door**

#### 6.3.1.1 Sliding Door Roller Removal and Replacement

The following will give the information needed to remove and replace the sliding doors and rollers.

1. Lift doors from machine with a small crane or forklift. Doors should be removed one at a time. Place in area that has plenty of work room.
2. Place door with roller side up.
3. Remove bowtie pin.
4. Remove roller pin.
5. Remove the damaged roller and replace with a new roller.
6. Insert roller pin.
7. Insert bowtie pin.
8. Once the rollers are replaced, replace the doors in the same manner that they were removed.

### 6.3.2 Maintenance of the Lift-up Doors

The Lift-up Doors are located over each station within the machine. When the Sliding Door is moved to expose the station, a lift-up style door is directly over that station. This provides a barrier between the operation of the station and the sliding door to contain the overspray or blow-off air.

To gain access to the station, lift the doors open and put them into position. In most cases there is a pin on the bottom of the door that should be placed in a hole on the top of the wall to prevent the door from closing.

### 6.3.2.1 Lift-up Doors Maintenance

The lift-up doors are manufactured with stainless steel and can be cleaned with a mild cleaner and a soft cloth.

Lubricate the hinges with a small amount of 3-in-1 oil. Do not use a silicone-based lubricant and exercise the hinges.

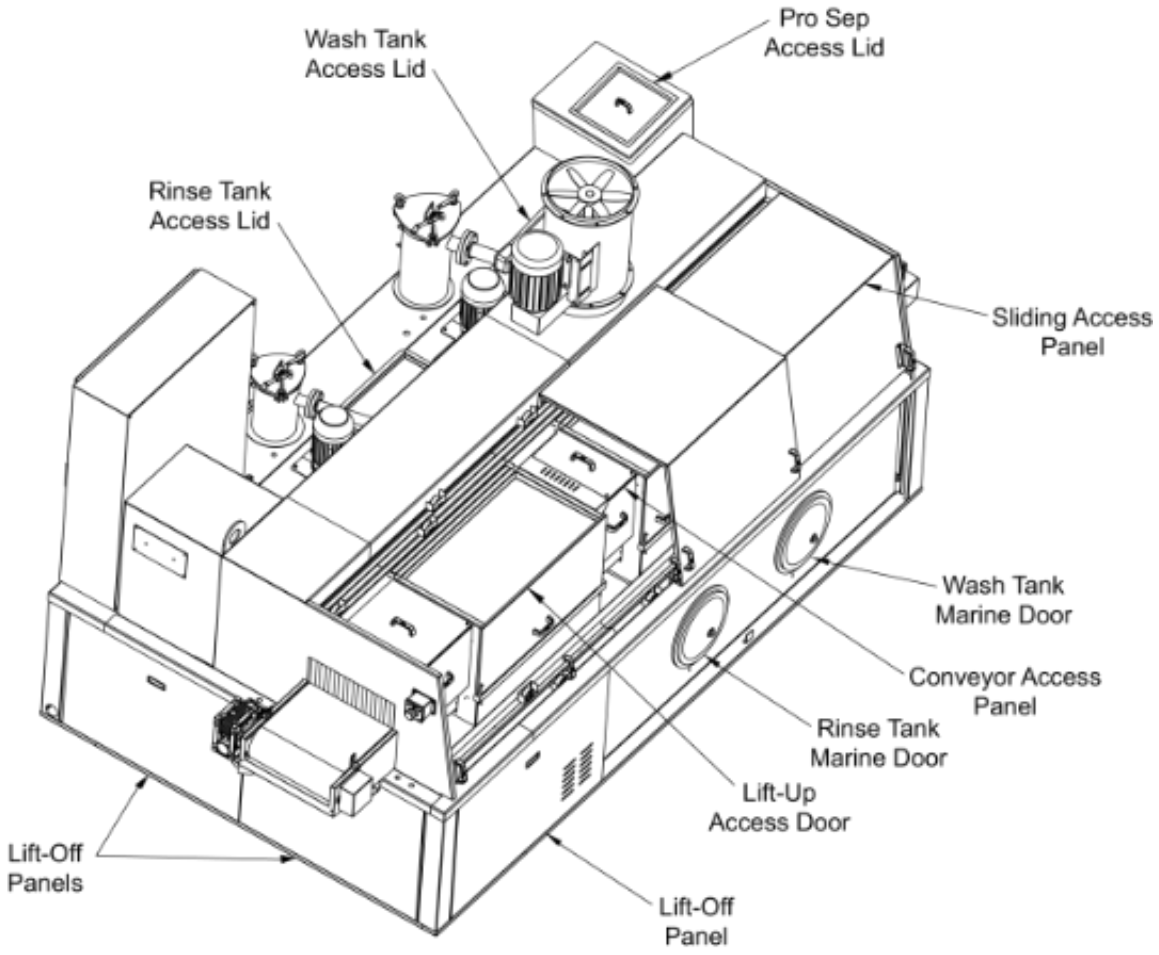



**Figure 47 Lift-up Doors**

### 6.3.3 Maintenance of the Load, Mid-machine, and Unload Access Panels

There is a set of access panels that are at the load end of the machine, between the stages, and at the unload end of the machine. These panels cover the areas that do not require frequent access. They are in place to keep the draw of the exhauster efficient through the length of the machine.

Check them for damage and clean with a soft cloth and mild detergent.

#### 6.3.3.1 Access Panel Removal and Replacement

The following will give the information needed to remove and replace the access panels.

1. Remove the wing nuts holding the panels in place and set them in a secure location for reuse.
2. Remove the top panel first. Each station requires a different way of removal.
    a. For the Load area panels, the top panel, lift and twist counterclockwise and remove. The front access panel lifts right out.
    b. For the Mid-machine area (the area between the wash station and the blow-off station) the top panel will lift right out with a slight twist. The bottom panel will drop down enough to give clear access to the center of the machine.
    c. For the Unload area panels, the top panel, lift and a slight twist will allow removal, the bottom panel is just a slight twist, and it will slide out.
3. Replacement of the panels is in the same manner as removal.

### 6.3.4 Maintenance of the Lift-off Doors

The lift off doors is situated all around the lower portion of the machine. Check for any damage and wipe them off with a clean and soft cloth.

### 6.3.5 Maintenance of the Spray Curtain

The spray curtains should be inspected carefully for any missing strips or tears. Should one fail, become worn or missing several strips, mist from the stage or air from the blow off will escape causing poor wash effect.

1. To change the spray curtain, remove the panels that are surrounding the curtain to be changed. For panel removal instructions.
2. Push the curtain out of the holder and replace with a new one.

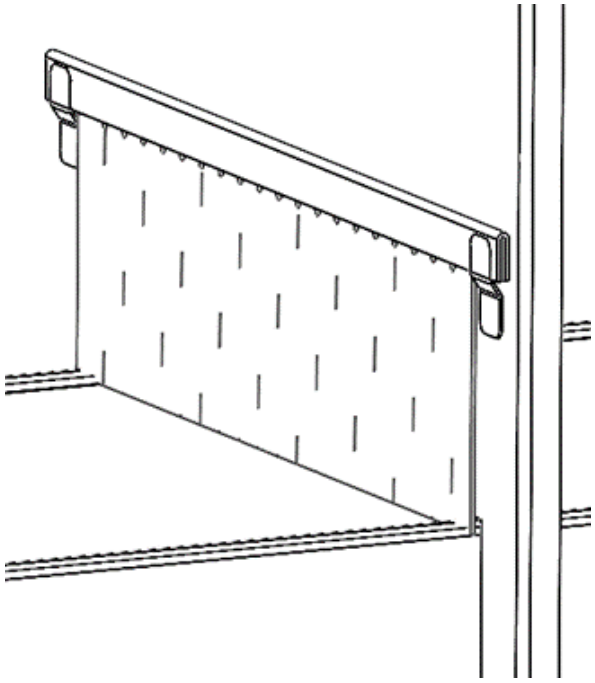


**Figure 48 Spray Curtain**

### 6.3.6 Maintenance of the Tank Access Door (Marine Door)

There is one Tank Access Door on the front side of each holding tank to allow access to the tanks for cleaning. Do not remove this door without draining the tank first.

CAUTION

**Removal of the tank access door without draining the tanks could cause injury to personnel around the machine.**

To perform maintenance to these doors the following should be done:

1. Before removing the Tank Access Doors, be sure to drain the tank that the access door is being removed. Check the door for physical damage that may cause it to not seal properly.
2. Once the tank has been drained, the access door can be removed. Simply unscrew the 4 handles until they can be rotated out of the way and the access door will be free.
3. Visually inspect the seal for dry rot, cracks, cuts, and tears. If any of these conditions exist replace the seal immediately.
4. Before replacing the door put a light coat of petroleum jelly like Vaseline or equivalent on the seal to keep it pliable.
5. Be sure the Tank Access Door is seated in place and refill the tank with water and chemical. Check the seal around the access door for any leaks.


**Figure 49 Tank Access Door (Marine Door)**

# 6.4 Maintenance of the Wash System

The Wash system consists of several different components. Each component plays a vital part in the machine and proper maintenance of these components is essential.

In this sub-section the following areas will be covered:

- Wash Tanks
- Pumps
- Filters and Screens
- Wash Nozzles
- Tank Heaters

## 6.4.1 Maintenance of the Wash Tank

The wash tanks are the most important part of the machine. Failure to maintain this portion of the machine will have a significant impact on the cleanliness of the parts going through this machine.

Besides the parts not being cleaned properly this portion of the machine can also become a health hazard through bacteria growth.

There are chemicals in the water to aid in the washing of the parts going through this machine, but, after a period of time these chemicals do break down and need to be replaced and just replenishing the chemical isn't enough, **THE TANKS HAVE TO BE CLEANED!**

### 6.4.1.1 Fill and Drain the Tank

The following instructions will provide direction in draining, cleaning, and refilling the wash/rinse tanks:

1. Shutdown the machine and lockout-tagout the main power switch. This is to prevent the machine from being started without warning. Be sure the tank heater(s) are off and let the machine set for a period of time to allow the liquid in the tank to cool down.
2. Ensure that the freshwater line feeding the machine is shut off and locked out. This is to prevent the refilling of the tanks while they are being drained.


**Before physically cleaning the wash and rinse tanks, be sure to lockout and tagout the main disconnect on the control panel. Failure to do so could result in injury and damage to the machine.**

3. Begin to drain the tank by either opening the drain valve, if equipped, or pump the tanks out. The drain line should be connected to the plant sewage line. This is the responsibility of the customer. Should your machine be equipped with a sump pump, be sure to monitor the flow of solution being drained from the tank. Every time the sump tank fills the pump will activate and empty the reservoir tank.
4. While the tank is draining, remove the pump screen for cleaning. The bag/cartridge filters should be changed, and the canisters cleaned out by flushing the canister with clean water.
5. Once the tank is drained and the filter canister has been flushed, remove the Tank Access Doors to access the tanks for cleaning. See **page 92** for information on Tank Access Door removal.
6. Spray the tank knocking down as much debris and sludge as possible. Wash the tank out with a good antibacterial detergent with a grease cutter. This will aid in the cleaning and retard the growth of bacteria in the water. Scraping the sludge from the bottom of the tank maybe required.
7. After washing, rinse the tanks out thoroughly to ensure no detergent is left. If any is left it is possible that it may foam up during refilling or it could react to the chemical being used.
8. Once the tanks are cleaned and rinsed, replace the tank access doors. Be sure to observe the instruction given in Section 6.3.1.1 for door replacement.
9. Ensure that the tank drain is clear of any debris or sludge and close the drain valve, if equipped.
10. Replace the pump screen over the pump inlet and put a clean bag/cartridge filter in the canister.
11. Ensure that the tank access door is in place and that the drain valves are closed. Remove the lock from the water valve and turn the water back on. The tank should begin filling once power is restored.
12. Recharge the tank as instructed by the chemical manufacturer.
13. As the tank is filling check the access doors for any leaks. If any are found shut the water off immediately and attempt to tighten the access door. If this does not work the tank will need to be drained or pumped and the seal checked on the access doors for any deformities or debris that might have found its way onto the seal.
14. Once the tanks have been filled remove the lockout-tagout from the control panel and turn the tank heater on. While the tank is heating up run the pump to mix the chemical and water unless the chemical requires the water to be to a certain temperature before adding.
15. Once the tanks are charged and up to running temperature the machine is ready for production.

### 6.4.2 Maintenance of the Wash Pump Motor

Inspect the motor(s) at regular intervals, approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. The following steps should be performed at each inspection:

**WARNING**

**Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury.**

1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a “Megger” periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
3. Check all electrical connectors to be sure that they are tight. Over a period of time the vibration of the motor and corrosion may work these connections loose.
4. The motor for the wash tank pump does not require lubrication but there are grease fittings for the lower bearing on the pump shaft.
5. Add two to three pumps of grease into each bearing, being careful not to over lubricant. Be sure to use a Chevron SRI or an equivalent polyurea base lubricant.

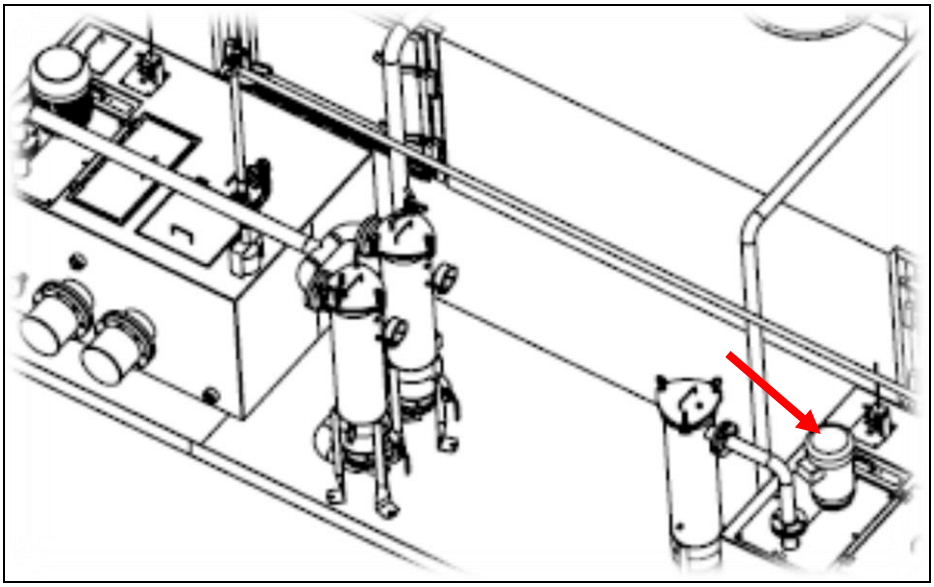


**Figure 50 Wash Pump Motor**

### 6.4.3 Maintenance of the Nozzles

Nozzles are very important in the cleaning of the parts that are put through this machine. Therefore, regular inspection, cleaning and even replacement of the nozzles are necessary to keep the machine as productive as possible.

The following steps will help give the operator or maintenance personnel a guide to cleaning and maintaining the nozzles in the machine:

1. Shutdown the machine and lockout-tagout the control panel. This is to prevent unwanted startups when working in the spray stages.
2. Slide the roller door to expose the wash stage and open the lift-up door to gain access to the wash stage. Be sure to secure the door so it does not close while working in the station.
3. Inspect the nozzles looking for dirty or damaged nozzles.
4. Remove and clean any nozzles that look dirty, clogged, or caked with deposits. Flush the nozzles out with clean water or blow them out with compressed air. Do not use anything to poke the orifice open or scrape the dirt off the nozzle. Any damage done to the nozzle will affect the spray pattern and their cleaning ability.
    a. To remove the nozzle will require an open-end wrench that will fit the hex portion of the nozzle. Do not use pliers or vise grips because these will damage the nozzle.
    b. Mark the direction of the slot opening on the nipple; this is for alignment purposes when replacing the nozzle.
    c. Remove the risers from the station. Risers should be placed in a vise, with a soft cloth wrapped around the pipe to prevent damage. Do not over tighten the vise because over tightening will cause damage to the riser and render it unusable.
    d. With the proper size wrench, remove the nozzles from the riser. Once all the nozzles are removed, remove the riser from the vise and clean out with water and compressed air. This is to ensure all debris and chemical buildup is removed before replacing the cleaned nozzles on the riser. Be sure not to remove the marks that were made for realignment of the nozzles.
    e. Once the riser is clean, place it back in the vise. Again, be sure not to damage the riser.
    f. Clean and replace each nozzle. When replacing the nozzles, the use of a liquid pipe threading compound can be used to help ensure a leak free fit. Be sure that the nozzles slots are aligned with the marks made before removal.
    g. If any of the nozzles are damaged replace them with new ones.
    h. Once cleaned, replace the risers into the wash station.

5. After all the nozzles and risers are cleaned and replaced, close the lift door. Follow the same instructions for the rinse nozzles.
6. Remove the lockout from the control panel and reenergize the system. Jog the motor at this time to ensure proper spray pattern of the nozzles and check for any leaks. If needed adjust as necessary.
7. Close the sliding door and return the machine back to production.

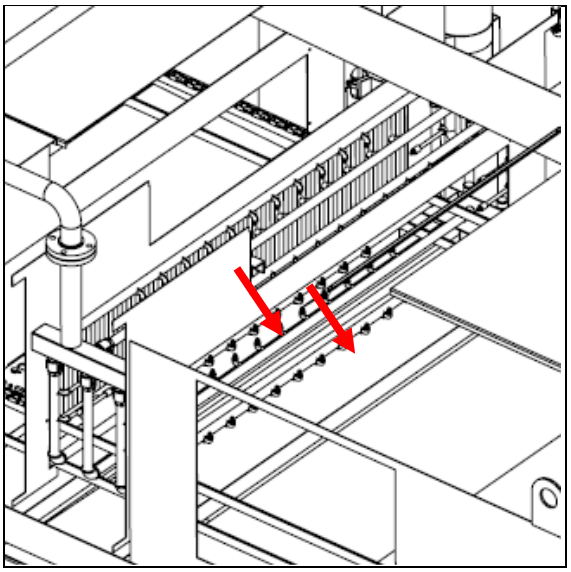


**Figure 51 Nozzles**

### 6.4.3.1 Common Causes of Spray Nozzle Problems

What should you look for during inspection? The answer depends on the application of the nozzles. The following are the seven most common causes of nozzle failure:

1. **Erosion and Wear:** The gradual removal of material from the surfaces of the nozzle orifice and internal flow passages causes them to become larger and/or distorted which can affect flow, pressure, and spray pattern.
2. **Corrosion:** The chemical action of sprayed material or the environment causes corrosion breakdown of the nozzle material.
3. **Clogging:** Unwanted dirt or other contaminants blocking the inside of the orifice can restrict the flow and disturb spray pattern uniformity.
4. **Caking:** Over spraying, misting or chemical buildup of material on the inside or outer edges of the orifice from evaporation of liquid can leave a layer of dried solids and obstruct orifice or internal flow passages.
5. **Temperature Damage:** Heat may have an adverse effect on nozzle materials not intended for high-temperature applications.

6. **Improper Reassembly:** Misaligned gaskets, over tightening or other repositioning problems can result in leakage as well as poor spray performance.
7. **Accidental Damage:** Inadvertent harm to an orifice can be caused by scratching through the use of improper tools during installation or cleaning.

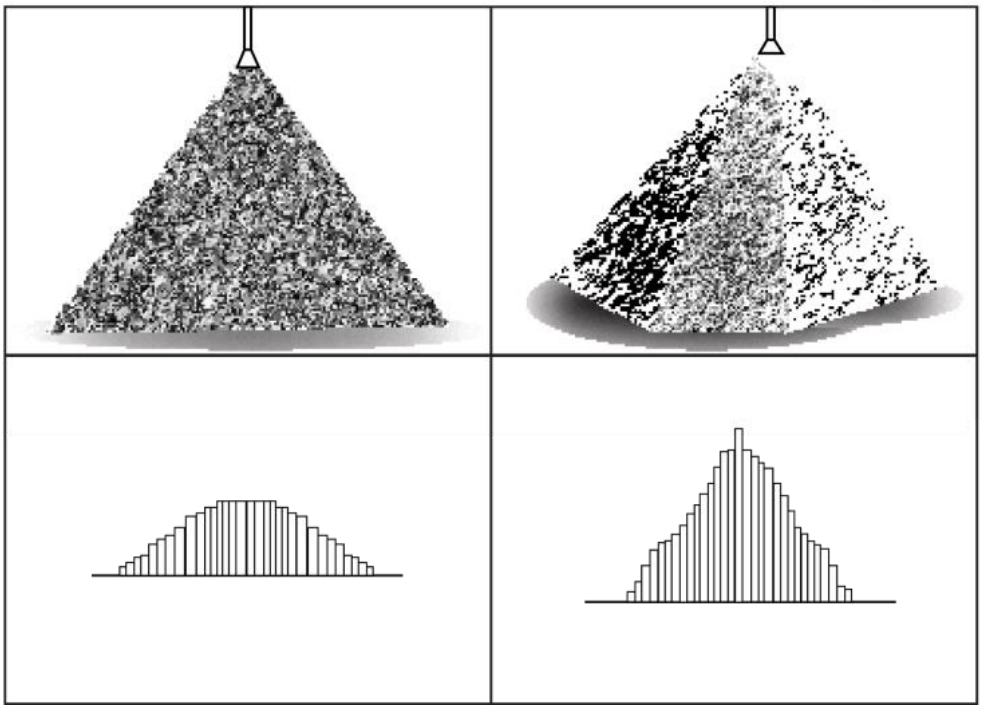


**Figure 52 Spray Nozzle Problems**

### 6.4.4 Maintenance of the Filters and Screens

There are screens and filters that will need attention from time to time on this machine. These are the cylindrical pump screens used to filter the larger pieces of debris that come from the parts being cleaned. With a standard machine there will be only one filter to change out.

Some machines have duplex filters used to filter out the smaller pieces of debris that are not filtered by the screens. The filters for this stage are a duplex style setup, where one filter is closed off and the other is opened. Except when the filter is being swapped over there should only be one filter in use.

The following instructions will inform the operator in how to clean and replace the screens and filter on this machine.

### 6.4.4.1 Pump Screen Maintenance

The pump screen is attached to the inlet tube of the pump. The following instruction is to guide the operator in the maintenance of this screen:

1. Be sure to shut down the machine when removing the pump screen. It is recommended that the machine be locked out to prevent any unwanted operation during this time. If the machine is left running while the screen is removed the likelihood of large debris entering the pump and causing damage is much greater.
2. Remove the tank access lid to gain access to the pump screen. It is located just to the right of the tank float.
3. To remove the screen, pull straight up on the screen hand firmly. The screen has a snug fit, so a small amount of effort will be required to remove it.
4. Once the screen has been removed from the pump inlet tube, inspect, and clean the screen. Cleaning can be done by lightly tapping the screen on a cloth that has been placed on the floor or by brushing with a soft bristled brush.
5. Inspect the screen for any damage that may allow large pieces of debris to enter into the pump. If damage is found replace the screen immediately.
6. Once the screen is cleaned, replace it over the inlet tube of the pump and return the machine back to service.

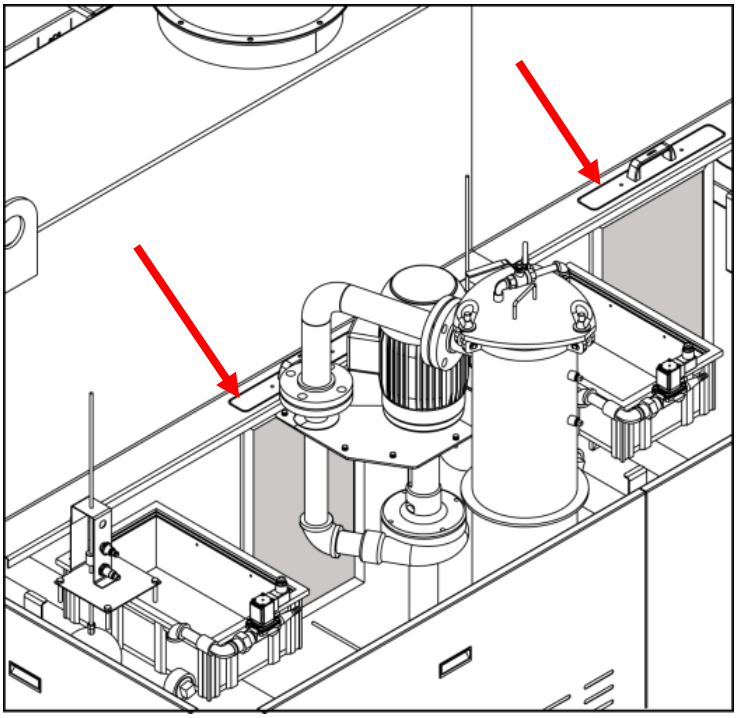


**Figure 53 Pump Screens**

### 6.4.4.2 Bag Filters Maintenance

The standard filters used in the solution filtering system use a bag type filter element. These bags fit inside the filter canister. The filters are positioned between the solution tanks and the spray nozzles. The solution is pumped into the top of the filter canister and as it passes through, debris is trapped by the filter bag.

These filters should be changed whenever the HMI Warning/Alarm indicates “Low Pressure” or there is a pressure difference greater than 10-15psi between the input pressure to the filter and the output pressure. Failure to change these filters could cause the filter bag to rupture, allowing the contaminants to enter the system. This will clog the nozzles and contaminate the part being washed. In addition, failure to maintain clean filters could cause reduction of wash pressure and cleaning capability.

To replace the filters, follow these steps:

1. Shut the machine down and lockout the system for proper energy control and lockout procedures. This is to prevent anyone from starting the machine while the filter canister is open.
2. Close the inlet valve to the filter to prevent the fluid from flowing out of the tank when the canister is opened.
3. Open the filter housing **DRAIN VALVE** located at the bottom of the housing and allow liquid to drain.
4. Open the **VENT VALVE** on the top of the canister. This will allow the canister to equalize in pressure, allowing for a free flow from the drain valve.
5. Loosen three **EYE BOLTS** on the lid. Two bolts will lie back through the slots provided. One bolt allows the lid to pivot out of the way.
6. Swing lid out of the way to the canister opening. If you swing it all the way back it will rest against the machine, so you don’t have to hold it while removing the filter.
7. Remove the **FILTER HOLD DOWN** handle.
8. Lift the **FILTER BAG** out by its built-in handle. Be careful not to tear the filter. Once the old filter is out clean around the area of the seal.
9. Lift out the **BASKET** retainer and check for damage.
10. Check the condition of the O-rings. It is suggested that a light coat of petroleum jelly be used on them to keep the O-rings soft and pliable.


**Make sure that the canister lid is closed tightly. Hot fluid may discharge from the housing if not properly tightened.**

11. Close the lid of the canister by reversing the steps above. Be sure that the seals seat properly. If the seals don't seat, they will leak when pressure is built up in the canister.
12. At this point unlock the controller and power up the machine. Before allowing the machine to go to automatic mode, manually jog the pump(s) to check for filter leaks. This will purge the air from the system allowing the operator to ready it for production.

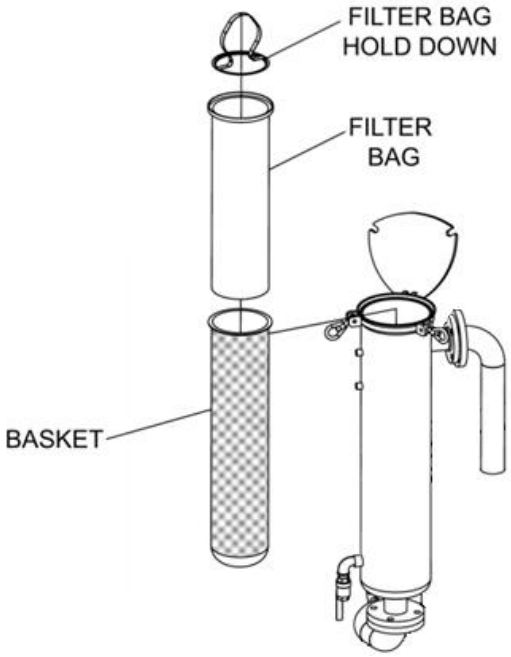



**Figure 54 Bag Filters Maintenance**

## 6.5 Maintenance of the Electric Tank Heater

The tank on this machine is equipped with an electric heating system. As noted in section 2, the heater is a “Watlow” immersion type heater controlled by a thermostat located in the control panel. The following instructions will aid the operator or maintenance personnel in the maintenance of the electric heater.

1. Visual inspection of the heater from the tank lid should be possible, unless the tank liquid is so clouded you cannot see the heater coil, and then solution change should be done.
2. Ensure that the heater brings the solution temperature up to running temperature in the required time of one hour from ambient temperature. This is to test the productivity of the heater coil. Should it take longer than 1 ½ hours to heat the solution a more in-depth inspection of the heating element is required.
3. Check the water temperature with a separate thermometer to ensure the accuracy of the thermostat for the heater. If an inaccuracy is noted a more in-depth inspection of the heating element and thermocouple is required.
4. To prevent the problems noted in items 2 and 3, the heater element and thermocouples should be cleaned thoroughly while the tank is being cleaned. With the liquid out of the tank, the element is exposed and a more in-depth inspection can take place.
    a. Check the element for any mineral or chemical build up. Clean the element thoroughly with a soft cloth and clean water.
    b. Inspect the element for corrosive wear to the element. Should the element show signs of breaking, the heating element should be replaced. If the element should break, a shock hazard will become evident causing a dangerous situation for the operator and other personnel around the machine.
    c. Clean off the thermocouples with a soft cloth and clean water. Check for any damage to the thermocouple while cleaning. If any damage is noted the element will need to be replaced.

5. To replace the heater element the following instructions are provided.
    a. Ensure that the machine is shut down, locked out and tagged out. This is to prevent unwanted energizing of the heater element.
    b. The tank must be drained before removing the heating element. Removal of the element without the tank being drained will cause a hazardous situation to develop.
    c. Remove the enclosure cover over the element flange. This will expose the flange bolts for the element and the wiring connections.
    d. Disconnect the wiring to the element, and then remove the mounting bolts. The element should slide out of the tank. Be sure to remove the old gasket from the tank.
    e. Place the new element in position, ensure the gasket is in place and not kinked, torn, or pinched. Replace the bolts and tighten.
    f. Reconnect the wiring ensuring the leads are clean of any corrosion. Clean with electrical cleaning compound or steel wool.
    g. Refill the tank with water and check the seal for leaks. If a leak develops, attempt to tighten. If leak persists, discontinue filling tank and drain tank down to where it is 3 to 4 inches below the heating element opening. Loosen the mounting flange and reposition the gasket. Tighten and refill the tank.
    h. Once the tank is filled, remove the lockout-tagout from the control panel, and energize the heating coil.
    i. Return the machine back to production.

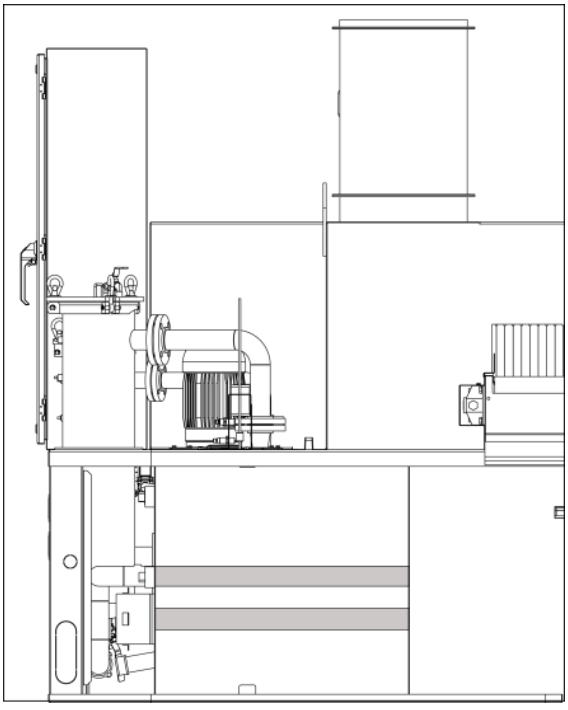


**Figure 55 Electric Tank Heater**

# 6.6 Maintenance of the Recirculating Blow-off System

The blow-off system is designed to remove the water left from washing. This is done as heated air hits the parts and strips away the water. To accomplish this, the suction side of the fan is connected to a return air duct. The fan draws the air through the return air duct and ultimately into the inlet cone of the fan. As the air returns to the fan the air velocity is accelerated and pressurized again.

As the air goes into the fan it passes the blow-off element that heats the air as it enters the piping for the air knives.

Even with the air being heated the recycled air can become moisture laden. This moisture can reduce the drying effectiveness of the fan. To help eliminate the moisture, a fresh air damper is located on the front lower part of the machine that feeds into the return air duct. The introduction of the fresh air helps reduce the moisture from the air. The fresh air inlet is adjustable. The introduction of fresh air can reduce the temperature of the heated air effecting drying quality.

## 6.6.1 Belt Driven Blow-off Fan Maintenance

The following steps are for step-by-step maintenance of the blow-off fan. Because of the high-speed nature of the fan, maintenance is very important.

1. Visually inspect the blow-off fan as it is running, listen for any unusual noise emanating from the fan area. It is suggested that the machine be shut down, run the blow off fan manually. This provides less background noise to contend with, when listening for unusual noises.
2. Shutdown the machine completely, lockout the main power switch. This is to be done to prevent unwanted startup of the machine.
3. Remove the drive belt guard covering the drive belts. Doing this will allow the operator or maintenance personnel access to the drive belts.
    a. To remove the guard over the drive belts, the operator will need to remove six screws holding the guard in place. Be sure to place the screws in a safe location for further use.
    b. There is a small guard that covers the fan bearings; it is just left of the drive belt guard. There are two guards, one is on the tank side and the other is on the door side of the machine. Remove the guard on the tank side. The one on the door side has lubrication lines running through it and it cannot be removed without removing these lines. There are four nuts that hold the guard in place.
4. Check the drive belts (there are two of them) for frays, cracks, and separations that might cause the belts to break or if the belts are showing extreme signs of wear, they will need to be replaced. For instruction on replacement of drive belts see Blow-off Fan Drive Belt adjustment and removal.

5. Check the belt tension; this can be done physically using a spring gauge. The belt should move about 3/8” with 3.8lbs to 5.5lbs of pressure. If the belts move under the minimum force (3.8lbs) then the belt needs to be tightened, if the force to move the belt is greater than (5.5lbs) then the belts are too tight and need to be loosened.
6. Check all mounting hardware (nut and bolts) for tightness. Because of the expansion and contraction of the metal in the machine from heating and cooling, mounting bolts could loosen over time. There for checking those for tightness are important. See the torque chart at the end of this chapter for proper torque specifications.
7. Check the Preventative Maintenance section for lubrication time of fan bearings and motor bearings. The following instruction will give guidance to the lubrication of the fan bearings and the motor bearings.
    a. **Fan Bearings:** When greasing bearings, it is important not to over grease them. Pump grease in until a small bead of grease forms around the bearing seals. Do over grease, the seals will rupture or the excess grease will overheat the bearing causing premature failure. The fan manufacture recommends that greasing the bearings be done while the fan is in operation.


**Bearings on high-speed fans tend to run hot. Therefore, do not replace a bearing because it feels hot to the touch. Place a pyrometer or contact thermometer against the pillow block and check the temperature. Ball pillow blocks can have total running temperatures of 165f before the cause of overheating should be investigated.**


**Caution should be taken while working on and near rotating equipment. This fan, when running at full speed, is turning over 3000rpm. Only necessary guards should be removed to perform this task.**

b. **Motor Maintenance:** Normally the motor for the blow-off system is a sealed bearing style motor. Should the motor require periodic lubrication there will be grease fittings at the front of the motor and another at the rear of the motor. See the service schedule for lubrication frequency of the motor.

c. Listen to the motor while it is running and take note of any peculiar noises such as a bearing squeal or grinding. If this noise is present or the motor is running hotter than it normally would, investigate the problem. Motor replacement maybe required.

d. Use a “Megger” periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings in a log and immediately investigate any significant drops in insulation resistance. If the motor is left unattended when the insulation begins to breakdown, an electrical short could occur causing the motor to short out or catch fire. The motor should be replaced.

NOTE

**Because there are no inspection ports on the side of the fan housing, the fan assembly will need to be removed from the blow-off plenum to gain access to the wheel blades.**

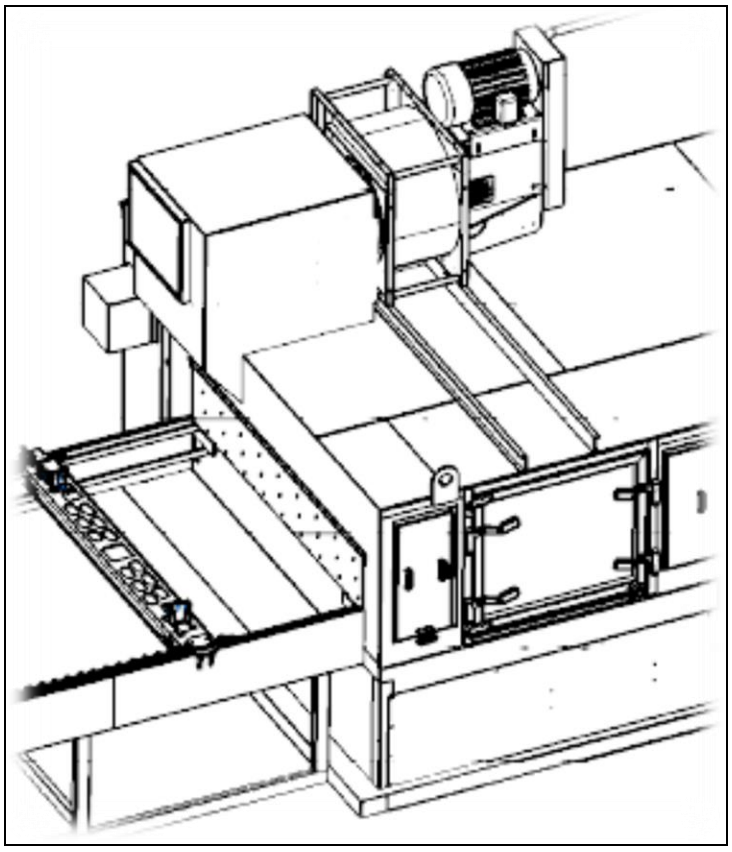


**Figure 56 Blow-off Fan Maintenance**

### 6.6.2 Standard Air knife Maintenance

WARNING

**It is very important to clean the plenum and perform routine maintenance at designated intervals, failure to do so could result in a fire hazard.**

There is little maintenance that is required for the air knives. The following are points to be aware of when performing maintenance to the air knives.

1. Clean the air knives with clean water and a soft cloth, remove all chemical residue that maybe built up on the knife. While cleaning the knives check them for any damage that may have occurred.
2. Be sure the linear opening is free of any debris that might have become logged or has begun to build up along the opening. This will affect the efficiency of the knives to dry the parts as they go by. A soft cloth or brush with clean water can be used for cleaning.

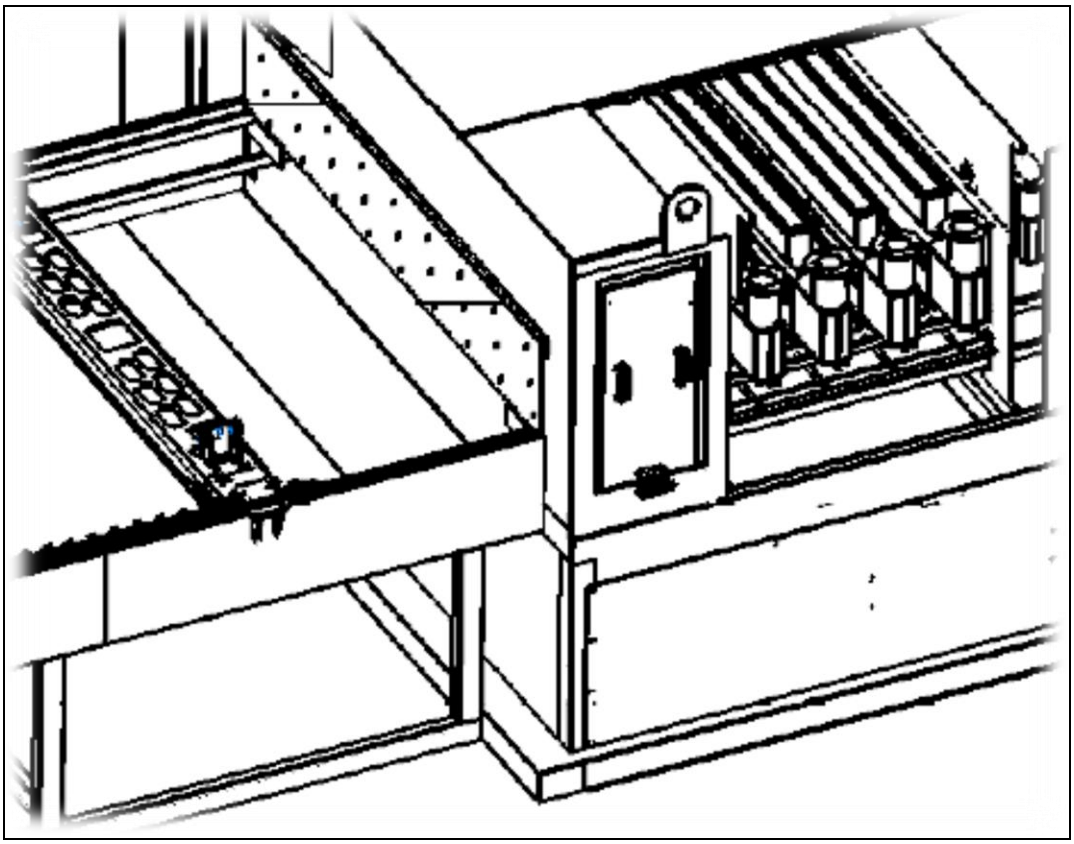


**Figure 57 Standard Air knife Maintenance**

## 6.7 Maintenance of the Tube-Axial Exhaust System

This type of exhaust system is designed to pull the vapor and mist or steam from the machine interior and vent it outside before it escapes into the plant atmosphere.

By venting the vapor and mist or steam from the machine it keeps it from entering the plant atmosphere and it helps keep the air in the blow-off stage of the machine dry. The following information will help the operator maintain and repair the exhaust system:

1. Lubricating the bearings on this piece of equipment does not require the machine to be shut down because the fittings are accessible from the outside without having to remove any guards. It is vitally important to remember that when greasing the bearings only give two pumps of grease into each bearing. This may not seem like much, but because the bearings are inside the equipment and inaccessible there is no visual indicator to tell when to stop greasing the bearings, i.e., beading around the seal. Overloading the bearings with grease can be just as bad as running them without.
2. Listen for any unusual sounds, like a grinding, or high pitch squeal. This may indicate a bearing beginning to fail, the fan rubbing against the housing or the motor beginning to fail. See the troubleshooting portion of this manual to isolate the problem.
3. Shut the machine down, lockout the main power switch disconnects. This is to prevent any unwanted startups while performing maintenance on the machine.
4. Remove the drive belt guards and visually inspect the drive belts. If there are any signs of excessive wear, cracking or fraying they need to be replaced see page 108 for drive belt removal information. By replacing them know, you will avoid any unwanted down time that might be required when one or both belts break because of failure due to wear.
    a. Check the belts for proper tension with a spring gauge. This is done by using a straight edge such as a ruler or a piece of flat metal. Lay it on top of the pulleys and aligning the edge with the top of the pulleys.
    b. Once this is done take the spring gauge and press down one belt at a time. They should have between 3.8lbs to 5.5lbs of pressure to move the belt about a ¼”.
    c. If the belt moves this distance with less force the belts need to be tightened, or if the belt move less than the prescribe distance with more than the maximum amount of for the belts need to be loosened.
5. Be sure the motor is free of debris, oil, dirt. A soft cloth or brush should be used for cleaning. Compressed air can be used to remove dust and dirt from the fan cover, fan, and cooling fins. Any oil or other liquids should be removed quickly. If this is allowed to accumulate on the motor, the motor will overheat due to lack of cooling capability and shorten the life of the motor.
6. The motor that is supplied by the manufacturer of the exhaust fan has sealed bearings. These bearings require no lubrication for long periods of time and therefore no grease nipple is provided on the motor.

7. Remove the exhaust duct from the exhaust fan assembly. Remove the fan to gain access to the bearing cover.
    a. Once the bearing cover is removed inspect the seals on the pillow block bearings to ensure they are not showing signs of failure, such as excessive grease leakage or a spray on the inside of the bearing cover. If this is discovered the bearing will have to be replaced due to seal failure.
    b. While the fan is out of the exhaust housing, this would be a good time to wipe it off with a clean damp cloth to remove any buildup of soap.
    c. For removal of the fan and bearing cover see bearing removal and replacement in paragraph.
8. Once inspection and maintenance are done, replace the bearing cover and fan. Then replace the exhaust duct work. Replace the drive belt guard and return the machine back to service.

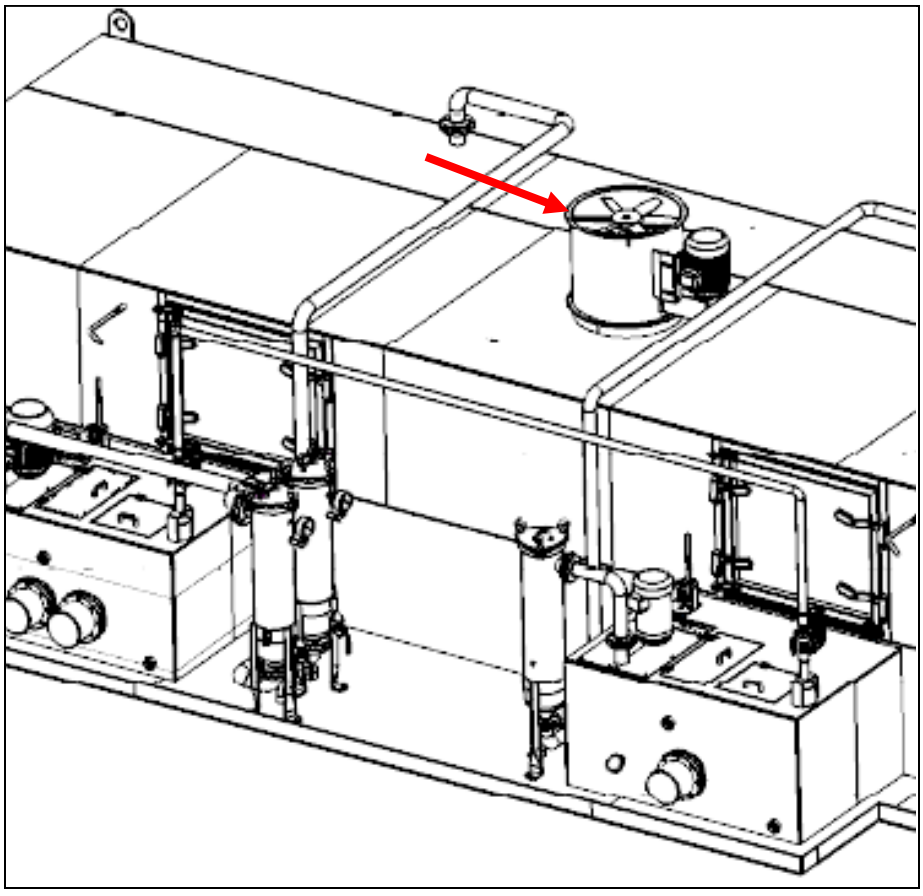


**Figure 58 Tube-Axial Exhaust System Maintenance**

### 6.7.1 Exhaust System Assembly Removal and Replacement

In the event that the drive belts, motor, or bearings require replacement the following steps will guide the operator or maintenance personnel in the removal of these components. These steps will be broken down into sub-paragraphs for easy reference.

#### 6.7.1.1 Belt Removal and Replacement

1. Shut down the machine and lockout and tagout the main power switch. This is to ensure that there are no unwanted startups of the machine.
2. Remove the drive belt guard from the exhaust system to expose the drive belts. There are two bolts on both sides that need to be removed to release the guard. Once the bolts are removed the guard will slide off. Just pull it away from the exhaust system.
3. There are four threaded studs mounted to the motor mounting. These studs are used to adjust the motor towards or away from the exhaust to increase or decrease the tension of the belts.
    a. To adjust the belts, loosen the four bolts that are located on the side of the motor mounting plate. These assist in guiding the plate and help lock it in place when tightened.
    b. Once these four bolts are loosened, loosen the locking nuts on top of the adjusting nut that are located on the threaded rod.
    c. Once the lock nuts are loosened and backed off enough for adjustment there are eight other nuts that will have to be worked. Four are on the top of the motor mounting plate and four on bottom, underside, of the mounting plate.
    d. If you loosen the bottom nut the motor can be moved towards the exhaust system. This will loosen the belts.
    e. Loosen the top nuts and turn the bottom nuts counterclockwise. The motor will move away from the exhaust system. Tighten the belts.


**When tightening the belts, be sure to move the nuts on the underside of the mounting plate equal amounts. Failure to do this could cause a twisting of the mounting plate and will cause an unequal tension on the motor pulley and the fan pulley, causing premature failure of the bearings or belts.**

4. Move the motor towards the exhaust system to loosen the belts. Once the belts are loosened sufficiently remove them and replace with new belts.
5. Adjust the tension of the belts as directed.
6. Once the belts are adjusted, tighten the locking bolt located on the side of the mounting plate and run the nuts on the top side of the motor mounting plate so that they are snug against the plate. Then run the lock nut down on the top adjustment nuts.
7. Replace the drive belt guard by sliding it over the motor pulley and belts. Replace the bolts that were removed.
8. Remove the lockout from the control panel disconnect and return the machine back to service.

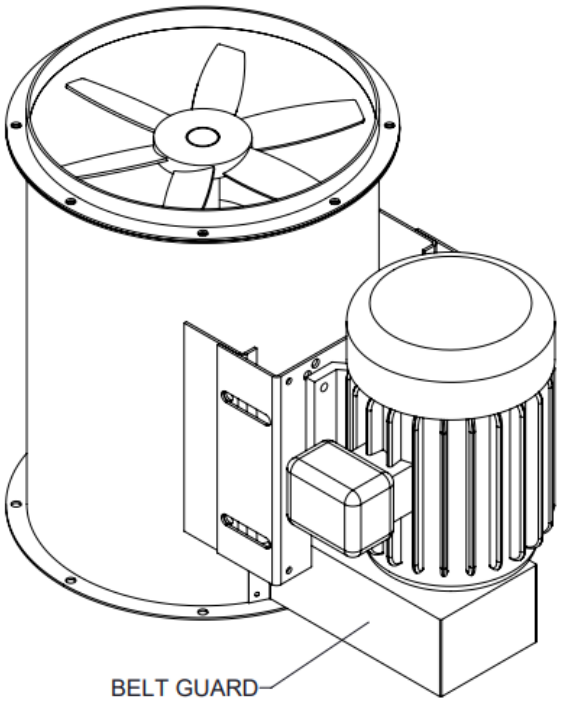



**Figure 59 Belt Guard Removal**

### 6.7.1.2 Exhaust Fan Motor Removal and Replacement

1. Shut down the machine and lockout the main power switch. This is done to prevent any unwanted startup of the machine and to disconnect any power going to the motor that is being worked on.
2. Remove the drive belt guard and drive belts refer to.
3. Once the drive belts have been removed, disconnect the wiring from the motor. To do this the following will have to be done.
    a. Remove three screws from the lid, with the fourth just loosened. Swing the lid clear of the junction box to gain access to the wiring.
    b. Before removing the wiring, test the connections first with a circuit tester or multi-meter to ensure all power is cut from the motor. Even though the main disconnect has been placed in the “OFF” position never assume a circuit is cold until it has been tested. Once tested label the wiring for rewiring of the new motor. It will help in identifying which wire goes where, the wires that belong to the motor are identified, use the same identity to label the wires coming into the junction box.
    c. Remove the wire nuts and disconnect the wiring. Once the wiring is disconnected remove the conduit from the junction box and pull it and the wiring from the junction box.
4. Once the wiring to the motor has been disconnected, remove the mounting bolts to the motor and remove the motor from the mounting plate. Don’t lose the mounting bolts they will be needed for remounting of the new motor.
5. Before putting the new motor in place, the pulley on the old motor may need to be used on the new one. If so, this will require pulling the pulley off the old motor. Do the following to remove and place the pulley.
    a. Place the old motor on a work bench and secure into place.
    b. Loosen the setscrews on the pulley, do not remove them, they are small and can be lost easily.
    c. Once the setscrews are loosened, work the pulley off the motor shaft, if needed use a wheel puller to pull the pulley off the shaft. Never hit the pulley with a hammer, damage to the pulley will cause the belts to ride improperly and prematurely wear them out.
    d. Place the pulley on the new motor; be sure that the key is in the keyway on the shaft. If the key is missing, use the one off the old motor. Once the pulley is in place tighten the setscrews.
6. Now the new motor is ready to be put in place. Put the motor on the mounting plate, lining the mounting holes and replace the bolts that were used to mount the old motor. Tighten the bolts to the torque specified in the chart at the back of this section.

NOTE **Before replacing the mounting bolts, it is suggested that a removable thread locking liquid be used to ensure the bolts stay in position.**

7. Once the motor is mounted, remove the cover to the junction box in the same manner as instructed in line three.
8. The access hole for the wires to pass into the junction box will have a knockout plug that will need to be removed. To do this, use a pin punch or a center punch and a hammer. Place the punch in the center of the knockout plug and strike firmly until the plug in knocked through. If the plug does not completely dislodge itself from the junction box, use pliers to remove it. Never attempt to remove the plug with just your fingers, the edges are sharp.
9. Pull the wires through the hole along with the conduit and secure the conduit in place.
10. Once the conduit is in place reconnect the wiring to the motor. Use new wire nuts to ensure a secure connection. Just twisting the wires together is not a secure connection and cause a disruption if they separate or short out.

CAUTION **Failure to wire any motor or electrical circuit correctly could cause an electrical hazard in which personal injury and damage to the machine could occur. Do not use short cuts!**

11. After the wiring is reconnected, replace the lid; be sure that the gasket is in place.
12. Replace belt and guard.
13. Once the motor is in place and everything is adjusted appropriately, remove the lockout and tagout from the main disconnect and reenergize the system. Check the exhaust fan by running independent of the machine to ensure proper rotation of motor.
14. Once the check is complete and the exhaust fan is running correctly, return the machine back to service.

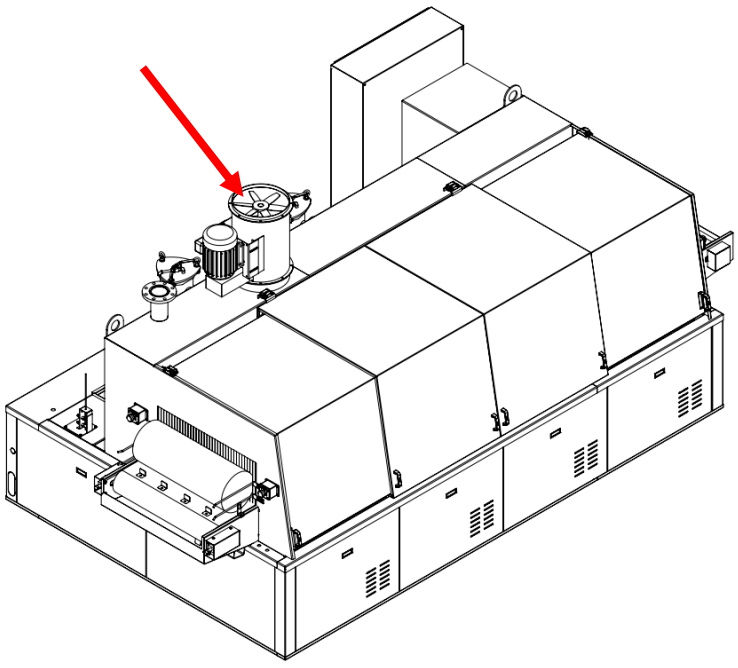


**Figure 60 Exhaust Fan Motor Removal and Replacement**

### 6.7.1.3 Exhaust Fan Bearing Removal and Replacement

1. Shut down the machine and lockout the main power switch. This is to shut off all power to the machine to prevent unwanted startups during the time the machine is being worked on.
2. The drive belt guard and drive belts need to be removed.
3. Once the belts are removed, remove the motor, it is not necessary to disconnect the wiring, the motor will be set aside. The only reason the motor is being removed is to reduce the weight to the exhaust system and make it easier to maneuver around on top of the machine. To remove the motor, remove the mounting bolts holding the motor to the mounting plate. Set them aside in a safe location for reassembly. Once the motor is free from the mounting bracket, set it aside in a location where it will not get in the way. There should be enough flexible conduit to allow for this.
4. Remove the mounting bolts for the duct flanges. This is for both the upper flanges and the lower flanges. Place all the hardware in a secure location; they will be needed for reassembly.
5. With a putty knife, slide it between the flanges to separate the silicon that was used to create a gasket during assembly. This may take a little effort, but the exhaust assembly will not be free until this is done.
6. Once the silicon has been separated and the flanges are free from one another, slide the exhaust assembly from the exhaust duct work and place it on the machine.


**Extreme caution should be used while on top of the machine. There are a number of "tripping hazards" that are present. Be aware of where you are stepping at all times.**

7. With the use of a forklift or other lifting devise, remove the exhaust assembly from the top of the machine and place it on a work bench and secure it in place.
    a. Remove the fan blade by loosening the setscrew on the fan blade hub and remove the snap ring. Once the setscrew is loosened and the snap ring is removed work the fan blade free from the axle. A wheel puller may be needed to assist in pulling the fan blade free. There is a key in a keyway that will need to be removed also; it may come out with the fan blade. Be careful not to drop any of the hardware or tools. Even though the housing is stuffed, there is still a remote chance of the object finding its way into the duct work.
    b. Filler material that is being used to stuff the housing needs to be moved. Push the filler material down past the bearing housing. Be careful not to push it too far, if it is pushed into the duct work it may be difficult to remove.
    c. The bearing housing cover will need to be removed. There are five screws holding it in place. Remove these screws and slide the cover off the fan shaft. This cover has to be removed so that the housing can be removed.
    d. To remove the housing there are four nuts on studs, two on the left and two on the right. Remove the nuts; be careful not to drop them. Once the nuts are removed the housing can be slipped over the studs and removed from the interior of the exhaust plenum.

8. After removing the housing, the pillow block bearings are exposed. The bearings and the fan shaft will come out as one unit.
    a. To remove the bearings, remove the mounting bolts starting with the bottom first. Once the mounting bolts for the bottom bearing are removed, then remove the top mounting bolts. Once these are broken loose the assembly will begin to swing freely.
    b. Once the bolts and nuts are removed, remove the fan shaft assembly from the exhaust plenum. Place the assembly on a work bench and secure it so the shaft can be removed.
    c. Mark the locations of the bearings on the fan shaft so the new bearings can be placed in the proper position on the shaft. Use a permanent marker, or a scribe to draw a line locating their positions. It is also suggested that a measurement be taken from center line of mounting of the top bearing to center line of the bottom bearing mounting hole. This will ensure that the bearings are properly spaced.
    d. Loosen the set screws that are holding the bearings and remove the shaft from them. The use of a rubber mallet or dead blow hammer may be used. Do not use a regular steel hammer, the end of the shaft will mushroom over and make removal the bearing very difficult.
    e. Once the shaft is removed clean the shaft, be careful not to remove the marks that you made to locate the bearings. Also check the condition of the pulley on the shaft end. If there is any sign of extensive wear or damage to the pulley now would be a good time to replace it.
    f. If required, to replace the pulley, loosen the setscrews and remove the snap ring. Tap the shaft from the pulley with a pin drift. Be sure to keep the key, it will be needed at assembly.
    g. Clean that end of the shaft and replace the pulley, be sure to place the key in the keyway if it comes out. It may be required to tap the pulley on the shaft, use a rubber mallet or dead blow hammer, not a regular hammer. Using a regular steel hammer could mushroom the end of the pulley over making it difficult to put on.
    h. Once the pulley is on tighten the setscrews and replace the snap ring.
    i. Put the new bearing in place according to the locations marked on the shaft and tighten the setscrews. Check the distance from the center line of the top bearing mounting hole to the center line of the bottom bearing mounting hole to ensure proper distance. It is suggested that the use of a liquid thread locker, that is removable, be used to help keep the setscrews from backing out.
    j. Now that the bearings are in place; replace the shaft assembly back into the exhaust housing plenum, mounting the top bearing first then the bottom. If for some reason the mounting holes for the bearings and the mounting holes on the mounting plate don’t line up, loosen the setscrews on the upper bearing and adjust the location as needed.
    k. When replacing the mounting bolts use a liquid thread locker to ensure the bolt will not back out and tighten to the specified torque listed in the chart at the back of this chapter.

9. Once the bearings have been replaced, the exhaust assembly is ready for remounting. With the use of a lifting device place the exhaust assembly on top of the machine.
10. Now that the exhaust assembly is on top of the machine, it would be a good idea to ensure that the flanges on the machine and the duct work are clean from any silicon sealant. It should peel off easily, just be care not to drop any into the duct work of the machine.
    a. After cleaning off the silicon from the duct work, a new bead should be placed on the flanges. Do not overdo it with the silicon sealant; just a thin coat is required.
11. Once the fresh silicon is on, replace the exhaust assembly back into the duct work. Be sure to align all the flange holes and that the motor mounting plate is closest to the motor; it should be facing the blow-off fan. Replace all of the mounting bolts for the flanges, be sure they are tightened. The use of liquid removable thread locking compound is recommended to prevent the bolts from becoming loose. Tighten to torque specifications listed in the chart at the back of this section.
12. Now that the exhaust assembly is back in place the motor can be replaced. It is suggested that a liquid thread locking compound be used to ensure that the mounting bolts do not come loose. Tighten to torque specifications listed in the chart at the back of this section.
13. Replace the drive belts and the drive belt guard. Ensure that belts are adjusted properly,
14. Remove the lockout from the main control panel disconnect and return the machine back to service.

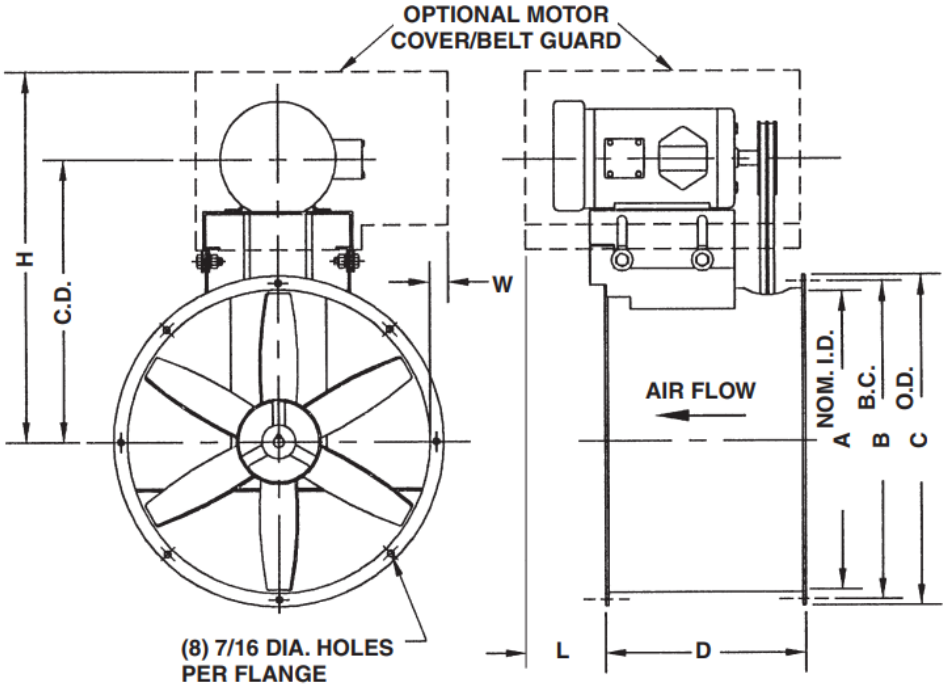



**Figure 61 Exhaust Fan Bearing Removal and Replacement**

## 6.8 Maintenance of the High-volume Exhauster

Exhaust System is designed to pull the vapor, mist and steam from the machine interior and vent it outside before it escapes into the plant atmosphere. This also helps keep the air in the blow-off stage of the machine dry.

WARNING

**Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury.**

1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a “Megger” periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
3. Check all electrical connectors to be sure that they are tight. Over a period of time the vibration of the motor and corrosion may work these connections loose.
4. The motor requires no lubrication, it has permanently lubricated bearings.
5. Visually inspect the exhauster for any damage, should any exist replace the unit.

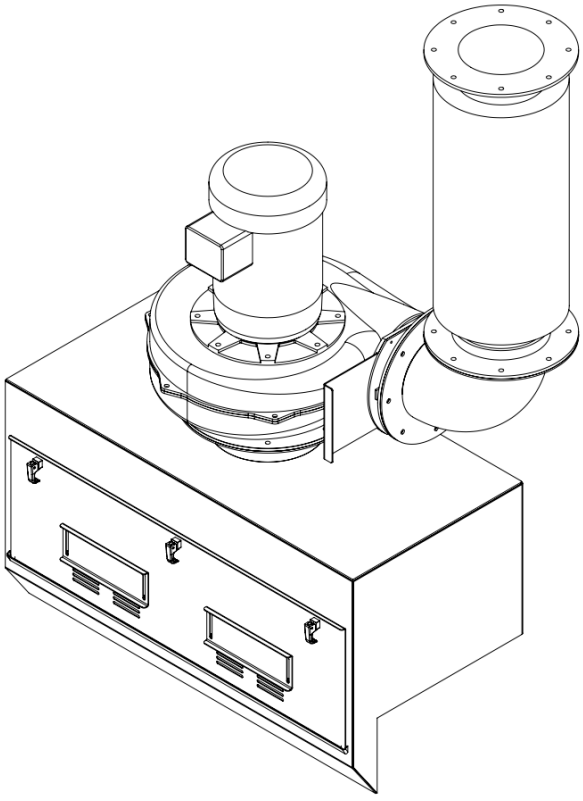


**Figure 62 High Volume Exhauster Maintenance**

# 6.9 Maintenance of the Material Handling System (Conveyor)

The machine has a built-in conveyor for transferring parts from one station to the other. Because of the slow rate of movement, this portion of the machine travels, the wearing of parts is less likely to be noticed. Therefore, it is important that a constant visual inspection be done to the conveyor chain and conveyor chain sprockets. There is no drive chain on this system. The motor is a direct drive style.

The following paragraphs will cover the maintenance and replacement of components that make up the conveyor for this machine.

## 6.9.1 Chain Conveyor

1. Place the appropriate signs and indicators around the machine stating the machine is down for maintenance. Shut down the wash pump, heater, and exhauster, leaving the conveyor running.
2. Open the right sliding door and lift the door over the wash station to observe the chain as it is running. While the chain is moving observe it for any visible damage to the chain and/or fixtures. If significant damage is found the chain will need to be replaced. Damage to the chain can cause the conveyor to track improperly causing damage to the sprockets and other components of the machine.
3. Check the condition of the sprockets, if they are showing wear or damage they will need to be replace. See chain and sprocket replacement instructions in the following pages.
4. Stop the conveyor and visually inspect the chain for debris caught in the chain or fixtures. This condition will shorten the life of the chain and possibly cause damage to product riding in the fixtures. Remove any debris found and inspect the chain conveyor chain for any damage.
5. Check the tension of the chain by lifting it approximately 2” in the middle of the conveyor. If the slack is more than 2”, tighten the conveyor chain.
6. To adjust the conveyor chain slack, turn the adjustment bolts counterclockwise on the conveyor chain tension device. Be sure to turn each device an equal number of times, otherwise the chain begins to track unevenly.
7. Start the conveyor to check tracking and to allow the chain to settle into the new tensioning position. Then stop it again and check the tension as noting in step 5.
8. Close the lift door and sliding doors, the machine can be place back into production.

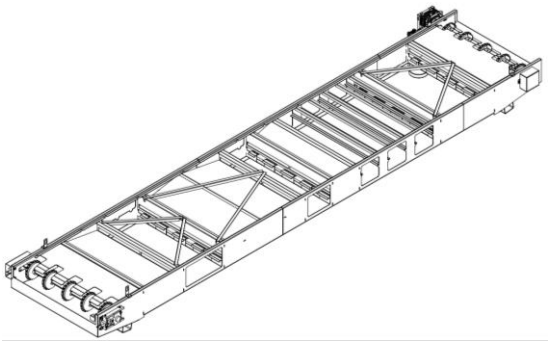


**Figure 63 Chain Conveyor (Without Belt)**

### 6.9.2 Conveyor Belt (Heavy duty flat wire belt)

1. Place the appropriate signs and indicators around the machine stating the machine is down for maintenance. Shut down the wash pump, heater, and exhauster, and leave the conveyor running.
2. Open the sliding door and lift the door over the wash station to observe the belt as it is running. While the belt is moving observe it for any visible damage. If significant damage is found the belt will need to be replaced.
3. Check the condition of the sprockets. If they are showing wear or damage, they will need to be replaced.
4. Stop the conveyor and visually inspect the belt for debris caught in the belt. This condition will shorten the life of the belt and cause damage to product riding on the belt. Remove any debris found and inspect the conveyor belt for any damage.
5. Check the tension of the belt by lifting it approximately 2” in the middle of the conveyor. If the slack is more than 2”, tighten the conveyor belt. Should the conveyor belt show signs of extreme wear, such as oblong holes in the belt that the shafts pass through, the belt will need replaced.
6. To adjust the conveyor belt slack, turn the adjustment bolts counterclockwise on the conveyor belt tension device. Be sure to turn each device an equal number of times, otherwise the belt begins to track unevenly.
7. Start the conveyor to check tracking and to allow the belt to settle into the new tensioning position. The stop it again and check the tension as noting in step 5.
8. Close the lift door and sliding doors. The machine can be placed back into production.

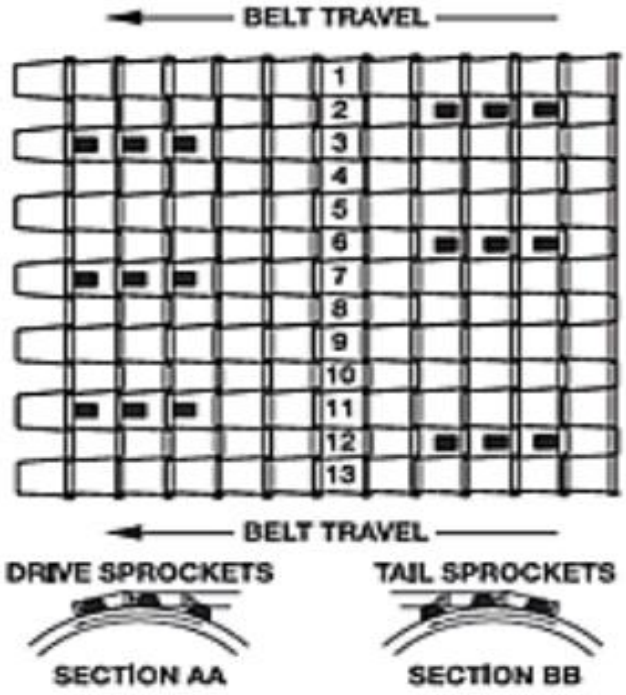



**Figure 64 Conveyor Belt (Heavy duty flat wire belt)**

### 6.9.3 Fixture Maintenance

1. When performing inspection to the conveyor chain, visually inspect the fixtures for extreme wear or damage.
2. Visually inspect the alignment pin bushings on the fixture for extreme wear or damage.
3. Manually place a part on the fixture to ensure proper fit; should the fixture appear unserviceable, replacement is required.

### 6.9.4 Conveyor Drive System

The conveyor drive system for the machine is a 90V DC 1/4 hp motor that is controlled by a motor controller located inside the control panel or from the HMI screen. The speed has been preset at the factory but can be adjusted by simply turning the speed control pot.

This motor is a direct drive arrangement so there are no drive sprockets or chains. The one maintenance item to check if there is evidence of any fluid leaking form the input shaft seals.

There is no lubrication requirement according to manufacture. The gear box is filled then permanently sealed at their factory.

1. Check that there is no gear lube leaking from the gear reducer at the mounting flange.
2. If the seal for high-speed input is worn lubricant will begin to leak out. If this condition is noted call Ransohoff Service Support for further instruction.

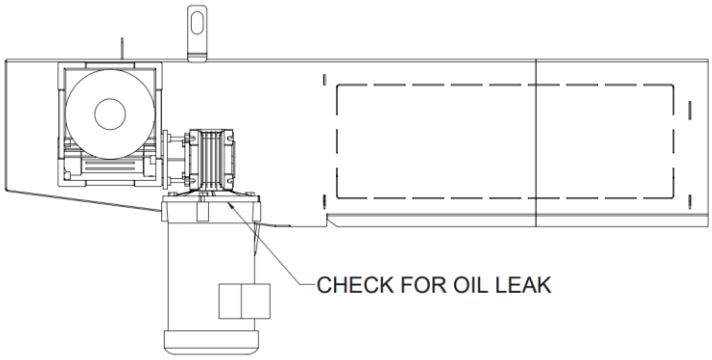



**Figure 65 Oil Leak Area**

### 6.9.4.1 Conveyor Drive System

1. Shut down the machine and lockout the main power switch. This is to prevent any unwanted startups.
2. Disconnect the wiring at the junction box on the side of the motor. Be sure to properly mark all wires being disconnected. This will aid the reconnection of wiring when installing the drive system. Remove the lock nut holding the cord connector in place and pull the wiring through.
3. Remove the four mounting bolts holding the reducer to the conveyor. Once the bolts have been removed, slide the assembly from the shaft. Once the shaft has cleared the gear reduce it may drop which is expected.
4. Once the assembly is removed, the motor can be separated from the reducer if just replacing the motor or reducer. There are four socket cap screws that need to be removed and the gear reducer can be separated from the motor.
5. To remount the assembly, align the shaft with the gear reducer, there is a key, so the keyways will have to be aligned, and gently slide it into position.
6. Replace the mounting bolts and torque according to the chart at the end of this section.
7. Reconnect the wiring as required and remove the lockout from the control panel and jog the conveyor motor to ensure it is rotating in the correct direction.
8. Once complete return the machine to production.

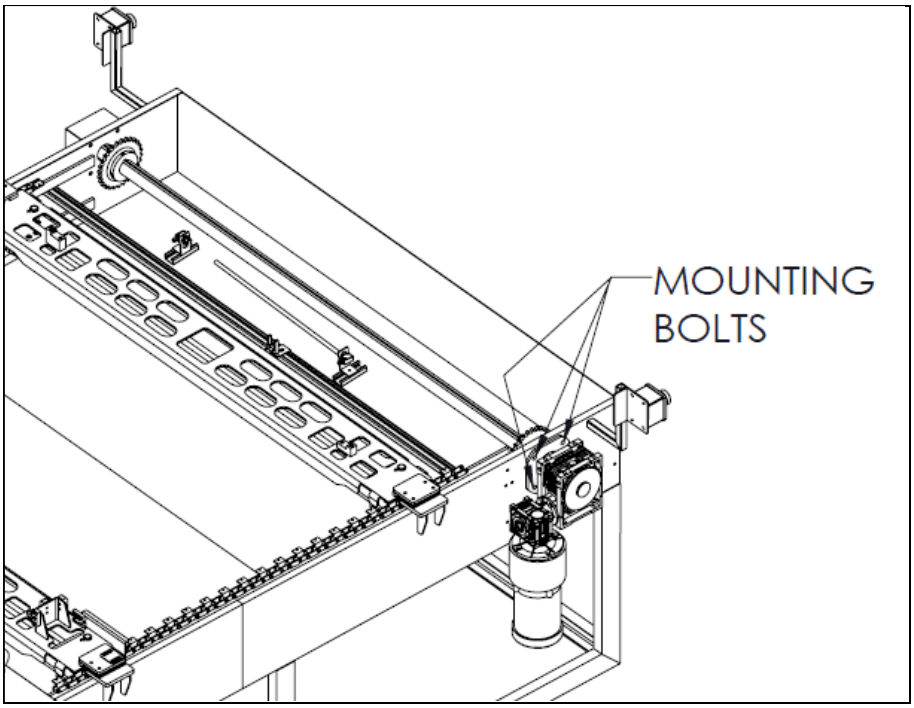



**Figure 66 Drive System Mounting Bolts**

### 6.9.4.2 Belt Conveyor Sprocket Removal and Replacement

The sprockets will eventually wear out; to avoid damage to the belt any worn sprockets should be replaced.

The following instructions will aid the operator or maintenance personnel in the removal and replacement of the conveyor belt sprockets.

1. Shutdown the wash pump, heater, and exhauster, jog the conveyor until the master pin is over either the load station sprockets or the unload station sprockets. Once the pin is in position shut down the conveyor and lockout the control panel.
2. Remove the master link and fold the upper portion of the belt away from the sprockets unless the chain has been removed. Be sure to clear an area large enough to work on the sprockets without any interference.
3. There is a difference in removing the sprockets at the load station and removing the sprockets at the unload station. The instructions on removing the sprockets for the unload station will be first then the load station.
4. The following instructions are for sprocket removal at the unload (drive end) station.
    a. Be sure that the area around the sprockets is clear.
    b. Mark the locations of the sprockets on the Axial. This will aid in reassembly.
    c. Loosen the set screws on the sprockets, if needed remove the lockout on the panel and jog the motor so the setscrews are accessible. Be sure that the lockout is replaced on the control panel.
    d. Remove the mounting bolts that hold the Axial bearing in place, on the side opposite the drive chain.
    e. Gently slide the shaft clear of the reducer, be aware of the key that is in the reducer, it may stay on the shaft, more than likely it will come off. Be sure to secure it in a safe location so it won't get lost. If the key stays on the Axial, it will need to be removed so the sprockets can be removed.
    f. Remove the old sprockets and replace them with new ones. Be sure to locate the sprockets on the marks that were made on the shaft. Once in place tighten the setscrews.
    g. Slide the shaft back into the motor reducer; be sure to replace the key into the keyway.
    h. Replace the mounting bolts for the bearing and tighten. See torque chart at end of this section.
5. The following instructions are for sprocket removal at the load (take up end) station.
    a. Be sure the belt or chains are clear of the sprockets.
    b. Loosen the setscrews on the bearing and remove one of the take up bearings and the take up frame from either side of conveyor.
    c. Push the shaft inward until it clears the remaining take up bearings and conveyor side.

d. Remove the shaft with sprockets and set collars. By doing this it will be easier to remove the sprockets.

e. Put the shaft in a vise; be sure to wrap a soft cloth around the area that the vise will be clamping to, so the shaft does not become marred.

f. Mark the location of the sprocket; this will help in locating the positions for the new sprockets.

g. Loosen set screws in the sprockets and set collars. Slide the sprockets and set collars off the shaft and slide the new sprockets and set collars on. Be sure to position them on the marks that were made before removing the old sprockets.

h. Now place the shaft back into the conveyor.

i. Once the shaft is in the fixed bearing, remount the take-up device removed and slide the shaft back into this bearing. Be sure that the shaft is centered. See the torque setting chart in the back of this section for the take-up mounting bolts.

j. Check the alignment of the sprockets, if needed loosen the setscrews on the sprockets and adjust the alignment of them.

6. Once the conveyor belt sprockets have been replaced, reattach the conveyor chain or belt and adjust the tension with the take up.

7. Remove the lockout and jog the conveyor, ensure the conveyor chain is tracking properly and that the sprockets are in proper position. Make adjustments if needed.

8. Return the machine back to production.

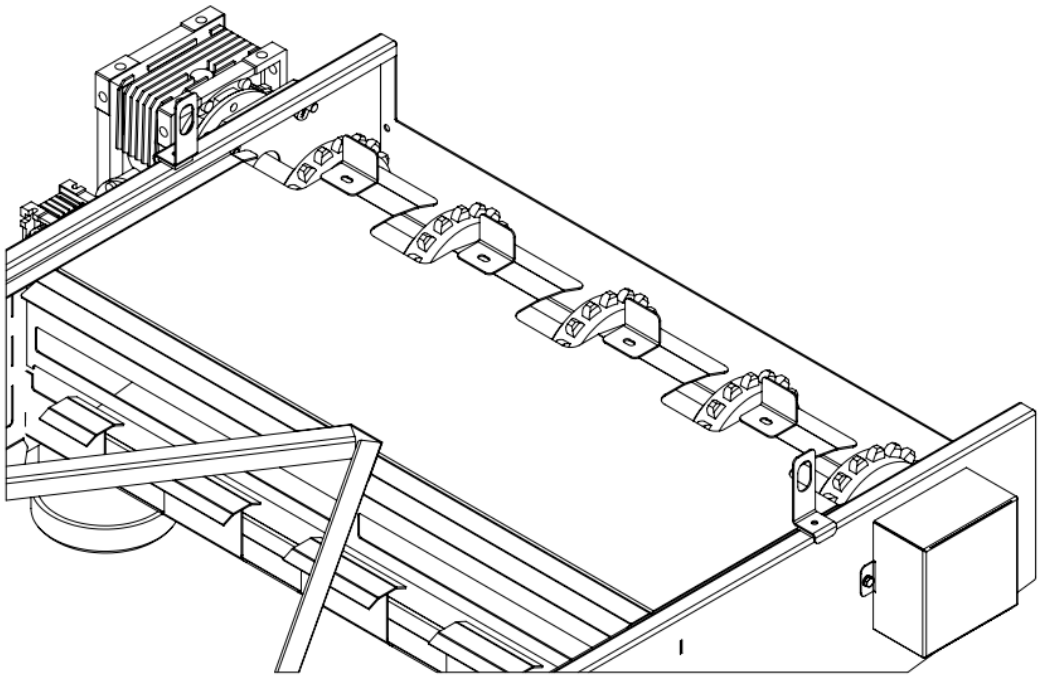


**Figure 67 Belt Conveyor Sprocket**

### 6.9.5 Torque Limiter Maintenance and Adjustment

The following steps will aid the operator or maintenance personnel in the maintenance and adjustment of the torque limiter.

1. Follow the instructions for drive chain removal.
2. Once the drive chain is removed, wipe away any excess oil that may be building up on the sprocket. If oil is allowed to saturate the linings for the torque limiter, the unit will become inoperable and will allow the sprocket to slip under any amount of load. When this happens, the linings will have to be replaced.
3. Check the condition of the sprocket, if excessive wear is noticed, the sprocket will either need to be flipped or replaced. See the following paragraph for removal and replacement.
4. Check the location mark for the torque setting. This mark should be a line either scribed on the torque limiter body or the sprocket. Should there be any noticeable movement the torque limiter should be reset. To reset the torque limiter the following instruction are given.
    a. If the drive chain has been removed to check the sprocket, replace it at this time.
    b. The machine's controller will need to be removed from a lockout state and set to run the conveyor manually.
    c. Loosen the set screws located on the torque adjusting nut. This will free the nut and allow it to be turned.
    d. Turn the nut counterclockwise to lessen the torque that is already applied, this should be done enough until the torque limiter slips under normal conditions and start the conveyor. This procedure may need to be done a few times until the conveyor is slipping.
    e. Once the conveyor is slipping, shut down the conveyor and adjust the torque limiter and start again. Do this until the conveyor does not slip any longer. Once this is done shut down the conveyor and turn the nut clockwise ½ turn to give the system enough torque to hand a full load.
    f. Once the torque is set on the torque limiter, tighten the setscrews, this is so the torque adjusting nut will not over tighten or become loose. And make a mark on the sprocket to give a line of reference to check for any slippage that may occur.

Once these steps are complete for readjusting the torque limiter return the machine back to service.

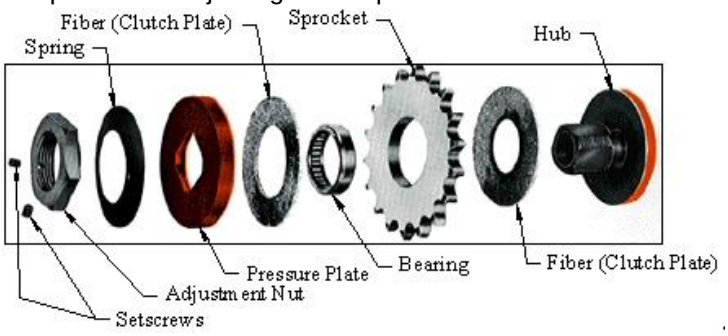



**Figure 68 Torque Limiter Assembly**

### 6.9.5.1 Torque Limiter Sprocket Removal and Replacement

Eventually the sprocket on the torque limiter will need changing due to wear. The same concept applies with the sprocket on the torque limiter as any other sprocket, if one side is worn, flip the sprocket and utilize the other side.

But there is one other thing to look for and that is any grooving or excessive wear on the face of the sprocket.

The sprocket has two clutch plates or pressure plates on either side of it. These plates are made of a material that is similar to that of a clutch plate on a car. Over the life of the sprocket and these plate grooves could wear into the sprockets and thus the sprocket will need to be replaced along with the clutch facings.

What will dictate the condition of the sprocket face will be the amount of slippage that the torque limiter encounters during operation.

The following instruction will aid the operator or maintenance personnel in the removal and replacement of the sprocket and clutch plates.

1. Shutdown the machine and lockout the main control panel disconnect. This is to prevent any unwanted startups. See section for lockout procedures.
2. The drive chain guard and drive chain will need to be removed.
3. Once the drive chain has been removed, loosen the setscrews on the lock nut. This is to free the locknut, so it can be removed.

NOTE **The torque limiter does not have to be removed from the shaft of the conveyor. Only the front end will be removed.**

4. Once the setscrews are loosened, remove the torque adjusting nut. Be sure to put this and all the other parts for the torque limiter in a secure place.
5. Now that the nut has been removed, remove the spring and pressure plate. Inspect the condition of the pressure plate, there should be no grooves worn into it or scoring. It should be free of any oils or other liquids. Clean with a soft cloth and put it with the other parts for the torque limiter.
6. Remove the clutch plates and sprocket, the bearing is press into the sprocket, and check for any damage to the plates, grooving or scoring to the sprocket. If any of these conditions exist, the sprocket and the clutch plate replacement will be required.
7. Clean and inspect the hub for any damage. Wipe clean with a soft cloth. Should there be any oils or other liquids, clean with a mild degreaser. The surfaces must be free of anything that could contaminate the clutch plates.
8. Once all the parts are clean and free of any contaminants, begin replacing them. If a new sprocket and clutch plates are required, then replace them otherwise, if possible, flip the sprocket and reassemble using the existing clutch plates.
9. Replace the pressure plate, spring and adjusting nut. Before securing the setscrews, adjustment of the torque limiter will be required.

10. Once adjustments are completed return the machine back to service.

### 6.9.5.2 Torque Limiter Removal and Replacement

Should the necessity come to replace the torque limiter the following instructions will aid the operator or maintenance personnel.

1. Shutdown the machine and lockout the main control panel, this will prevent unwanted startups.
2. Follow the instructions for chain removal and replacement.
3. Once the chain is removed, rotate the torque limiter until the setscrew access holes are in a position to access the setscrews. Use the hex wrench or a small screw drive to rotate the torque limiter. Just stick the hex wrench or screwdriver in the access hole for the set screw and pull toward you.
4. Loosen the setscrews, there are two set 90° apart.
5. Slide the torque limiter off the shaft, a puller maybe required to remove it. There is a key also on the shaft, it may stay, or it may come off with the limiter, be sure to set it aside. It may be required when replacing the new torque limiter.
6. Slide the new torque limiter on the shaft, a dead blow hammer or rubber mallet maybe used to tap the torque limiter on.
7. Follow the instructions in Section 6.9.4 to adjust the limiter for proper break away torque. Then return the machine back to service.

**Table 13 Torque Settings**

| Bolt Size | Torque (ft lbs.) |
|---|---|
| 1/4-20 | 10.0 ± 0.25 |
| 5/16-18 | 19.0 ± 0.25 |
| 3/8-16 | 33.0 ± 0.5 |
| 7/16-14 | 54.0 ± 0.5 |
| 1/2-13 | 78.0 ± 1 |
| 9/16-12 | 114.0 ± 1.5 |
| 5/8-11 | 154.0 ± 2 |

## 6.10 Maintenance of the Safety Light Curtain

This machine is equipped with a Safety Light Curtain. It is recommended that the light curtain be tested to detect a failure within the curtain.

The following test procedure must be performed during regular inspection programs and after any maintenance, adjustment or modification to the light curtain or guarded machine. Testing ensures that the light curtain, safety system and machine control system work together to properly stop the machine. Failure to test properly could result in serious injury to personnel.

To test the light curtain, use the correct size test objects:

1. Shut the machine down, but do not shut off the power. Keep the machine enabled.
2. Visually inspect the machine to ensure that access to the load door is only through the detection zone. If there are any additional guards or barriers that are added verify that they are in working order.
3. Check for signs of external damage to the light curtain, the machine the electrical cables and wiring. If damage is found, lock the machine off and report to the supervisor.
4. Interrupt the light curtain detection zone with the proper size test object. Move the test object inside the perimeter (along the top, sides, and bottom) of the detection zone and up and down through the center. At least one Individual Beam Indicator must be lit while the test object is anywhere in the detection zone. Verify that the “Auto Cycle Reset” message is visible.
5. Start the machine. While the machine is running interrupt the detection zone with the test object. The machine should shut down. Similar to pushing the E-stop button, the machine should stop and not start again.

Should this device fail, tag and lockout the machine to prevent its use and notify the supervisor.

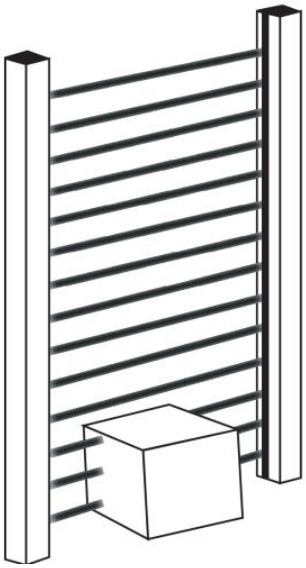


**Figure 69 Safety Light Curtain**

## 6.11 Optional Equipment

This section contains the operation and maintenance of the optional equipment available for the LeanVeyor LV-18 multi-stage parts cleaning machine.

- Proximity Sensor Photo-Eyes
- Cartridge Filter
- Gas Fired Tank Heater
- Pro-Sep Unit
- Blow-Off Heater Gas Burner
- Oil Skimmer
- Regenerative Blow-off System
- Filter Mist Exhaust System
- Mist Eliminator
- Vertical End Suction Pump
- Ultrasonic System
- Sump Pump

### 6.11.1 Proximity Sensor Photo-Eyes

The following instructions are for the maintenance and replacement of the proximity sensors throughout the machine.

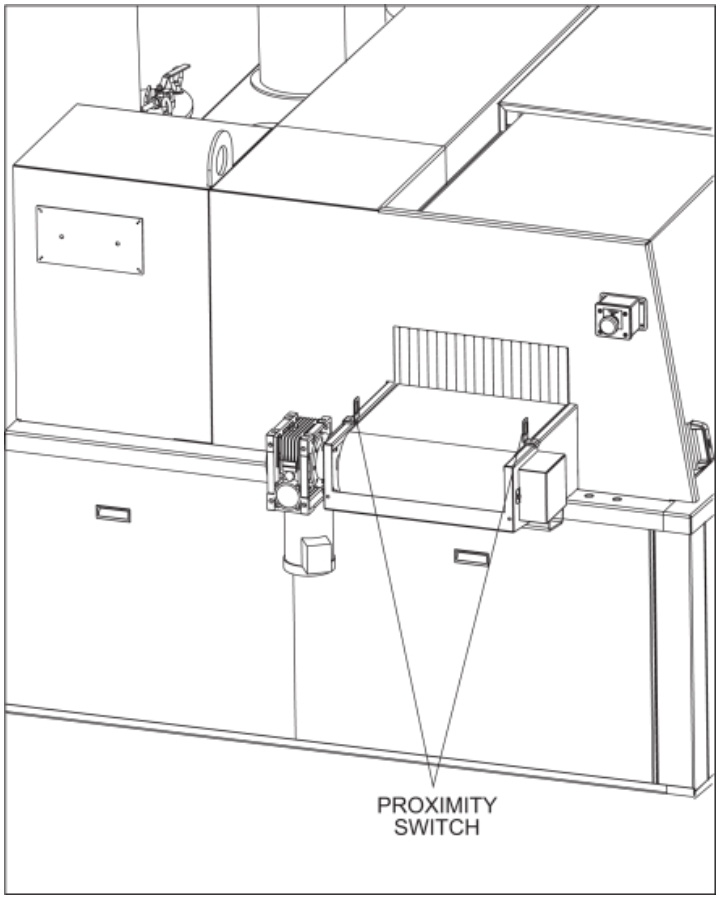



**Figure 70 Proximity Sensor Photo-Eyes**

1. Be sure the photo-eye is clean, with a soft, clean cloth wipe off the face of the lens. Inspect for any visible damage and if any is noted the sensor should be replaced.
2. Move an object in front of the photo-eye, the photo-eye should indicate that it is reading the object by illuminating the indicator located between the sensor and connector. If this indicator does not illuminate, check the exposed wiring for any damage, should no damage be found replace the sensor. To replace the sensor the following should be done:
    a. Shutdown the machine to prevent any unwanted operation of the machine because the sensor will be removed, any machine movement may not be indicated.
    b. Disconnect the wire powering the sensor by turning the connecter counterclockwise. This will loosen the connector from the sensor.
    c. Measure the distance from the barrel end of the photo-eye and the mounting nut; write it down, the mounting nut on the new sensor will need to be in the same location.

d. Once the connector has been removed, loosen the inner mounting nut and remove it, be sure it is the nut on the sensor side not the connector side, and remove the sensor from the bracket.

e. With the new photo-eye, place the mounting nut on the connector side; place it at the measurement that was taken earlier.

f. Place the sensor in the bracket and place the mounting nut in place and tighten it.

g. Replace the connecter to the sensor, and return the power to the machine, ensure that the sensor reads the object as needed.

3. With the photo-eye replaced adjust as needed for proper operation and return the machine to production.

### 6.11.2 Cartridge Filter

The standard filter used on the machine is a single bag style, however, cartridge filters can be added to or take the place of the standard bag filter. Cartridge filters usually have a finer micron rating and are required to be replaced more frequently than the standard bag. These filters should be changed whenever the HMI Warning/Alarm indicates “Low Pressure” or there is a pressure difference greater than 10-15psi between the input pressure of the filter and the pressure of the liquid leaving the filter. Failure to change these filters could cause reduction of wash pressure, cleaning capability and possible collapse of the filter element.

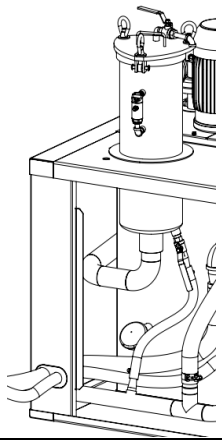
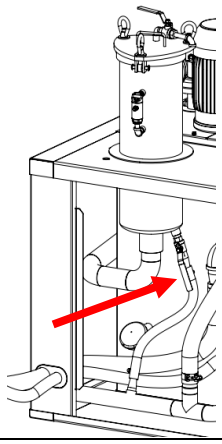
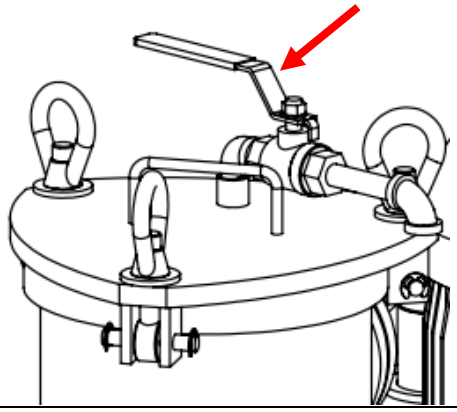
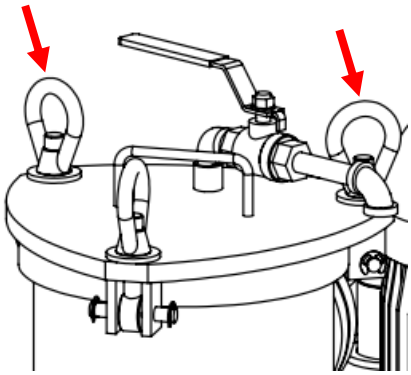
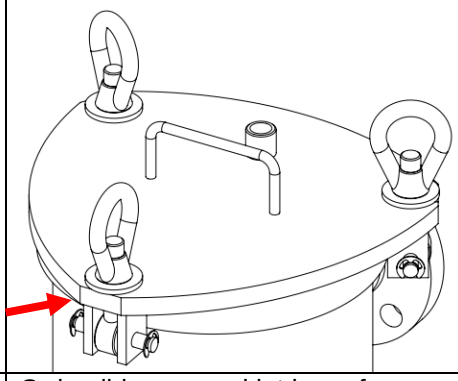
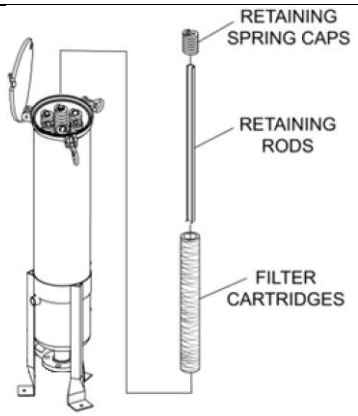
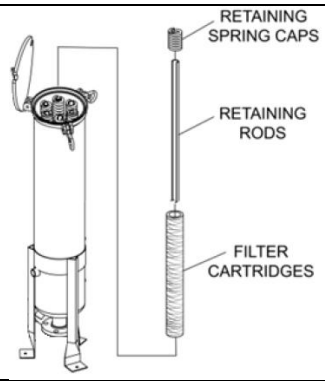
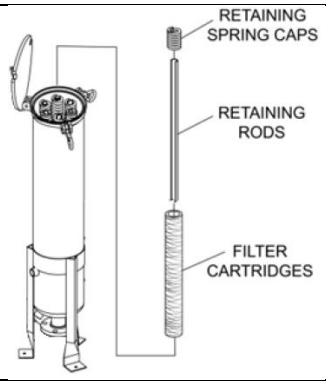
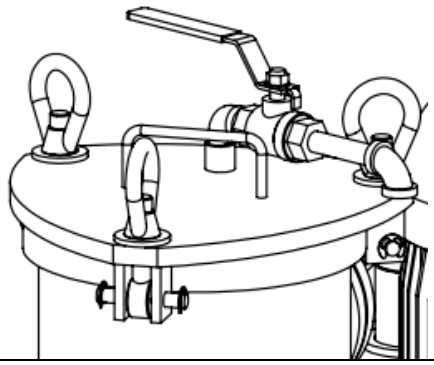
1. Shut the machine down and lockout the system. See “Proper Energy Control and Power Lockout Procedures”. This is to prevent anyone from starting the machine while the filter canister is open.
2. Close the inlet valve to the filter, if equipped, to prevent the solution from flowing out of the tank when the canister is opened.
3. Open the filter housing **DRAIN VALVE** located at the bottom of the housing and allow solution to drain.
4. Open the **VENT VALVE** at the top of the canister. This will allow the canister to equalize in pressure, allowing for a free flow from the drain valve.
5. Once the canister is drained, open the lid. There are three lifting **EYE BOLTS** that are also securing nuts; these will have to be loosened to the point that they can be swung away from the lid. The nuts maybe quite tight so a pinch bar or large screwdriver will be needed to loosen them.
6. Swing lid out of the way. Allow the lid to hang from the attached eye bolt.
7. Remove the **RETAINING SPRING CAPS** from each of the cartridges.
8. Lift the **FILTER CARTRIDGES** out leaving the retaining rod in place. If **RETAINING ROD** becomes displaced, reinsert the rod into the cavity at the bottom of the canister.
9. Remove the old cartridges and install the new **FILTER CARTRIDGES**.
10. Replace the **RETAINING SPRING CAPS** on top of each cartridge.
11. Before closing the canister lid, clean around the area of the seal and check the condition of the O-ring. It is suggested that a light coat of petroleum jelly be used on the O-ring to keep it soft and pliable.

CAUTION

**Make sure that the canister lid is closed tightly. hot fluid may discharge from the housing if not properly tightened.**

12. Loosen the pivoting **EYE BOLTS** so that the lid can sit freely and evenly on all the spring caps. Tighten down the lid evenly. It is important to not tighten the lid at an obscure angle. This tends to bend the cartridges.
13. Close the **DRAIN VALVE and** leave the vent valve open until the canister is purge of any air.
14. At this point unlock the controller and power up the machine. Before putting the machine back into production, manually jog the pump to purge any air from the canister, once purged close the vent valve, check for filter leaks. This will purge the air from the system allow the operator to ready it for production.

**Table 14 Cartridge Filter Replacement**

| | | |
|---|---|---|
|  |  |  |
| Close valve at inlet (If equipped) | Open drain valve at bottom and allow to drain | Open vent valve at top |
|  |  |  |
| Loosen canister eye bolts | Swing lid away and let hang from eye bolt. | Remove retaining spring caps from all cartridges |
|  |  |  |
| Remove old filter cartridges | Reinsert any displaced retaining rods back into cavity at bottom of canister | Insert new cartridges, replace springs, and close lid, tightening down maintaining parallel to top |

### 6.11.3 Gas Fired Tank Heater

This machine may be furnished with a gas heating package. This consists of a gas burner, temperature controller, process thermocouple and low solution switch located in the tank.

This system is designed to maintain the solution temperature in the wash tank and rinse tanks.

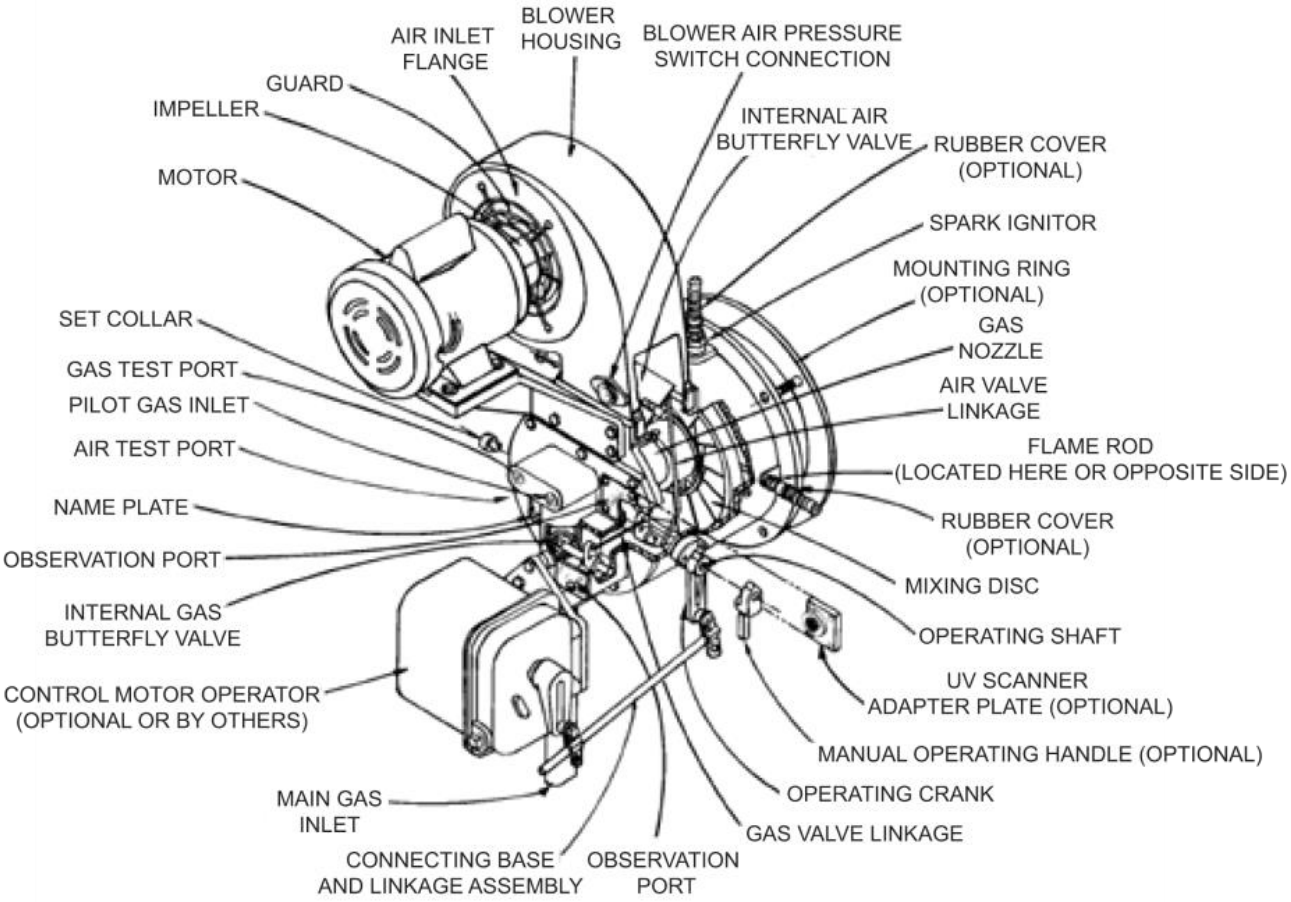



**Figure 71 Gas Fired Tank Heater**

### 6.11.3.1 Gas Fired Tank Heater Maintenance

The following items should be checked. See the service schedule located in Preventative Maintenance schedule for frequency.

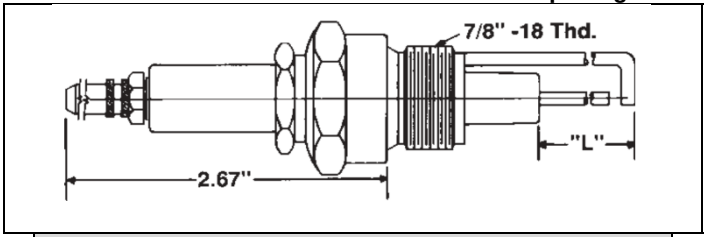
WARNING

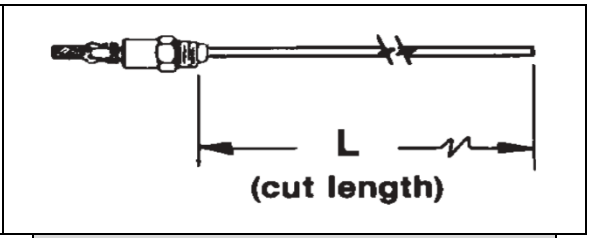
**Natural gas and propane are extremely volatile! If a gas smell is noticed around any part of the machine turn off all gas at the main lockout valve. If allowed to build up damage to the machine and serious injury to personnel could occur.**

1. The temperature setting for the tank heater is maintained at the burner controller located on the Main Control Panel.
2. Check the mounting bolts for the burner; ensure they are tight.
3. Inspect the fan for proper rotation, speed, and dirt build-up which might reduce air flow. Clean the air intake with a vacuum to ensure no debris is pushed into the fan.
4. Remove the igniter from the burner. This is done by removing the igniter wire and then the igniter. When removing the igniter wire, twist back and forth and pull at the same time. Once the igniter is removed check it for abnormal wear and carbon build-up. Should the igniter require replacement discard the old one and replace with a new igniter. But if cleaning is all that is required then the following steps are given:
    a. Clean the igniter of any carbon that might be on the electrode and the ground. These parts of the igniter can be cleaned with spark plug cleaning brush and alcohol.
5. Once the igniter has been cleaned or is replaced, return the igniter to the port in which it was removed. Do not over tighten; it just needs to be snug. Reattach the igniter wire. Press down with a small amount of side-to-side motion until you hear a “snap” then the connector is seated onto the igniter.
6. Remove the flame rod to check its condition. To remove the flame rod wire simply pull and lightly twist side to side. Once the wire is released from the igniter remove the flame rod and check for damage and carbon build up.
    a. To clean the flame rod, use a soft cloth and alcohol and wipe the carbon off the sensor. Check it for any damage or wear.
7. Once the flame rod has been cleaned or replaced, return the flame rod to the port in which it was removed. Do not over tighten; it just needs to be snug. Reattach the flame rod wire. When placed back on the flame rod press down with a small amount of force using a side-to-side motion until you hear a “snap” then the connector is seated onto the flame rod.
8. Check for dirt or debris collected on the motor and cooling fan grill. If any is found wipe off with a clean and soft cloth. If the motor is left unattended the dirt and debris will cause the motor to overheat and result in a shorter life span.
9. Check all wiring conduit going to the motor and the air flow switch to ensure it has not been pulled from the strain relief.
10. Check the connecting base and linkage assembly to ensure they have not become loose. Tighten if needed. If this linkage is left loose, it will affect the way the burner operates.

11. Check the Low-Fire Start Switch to ensure it is making contact with the cam. Visually inspect that the roller on the switch is riding on the cam.

**Table 15 Spark Igniter and Flame Rod**




| Spark Igniter | |
|---|---|
| 6” w/flame rod | 2.5” |
| 6” w/UV scanner | 3.5” |
| 8” thru 14” | 3.5” |

| Flame Rod | |
|---|---|
| 6-08 | 2” |
| 8-15 | 3” |
| 10-25 | 4” |
| 10-30 | 7” |
| 12-38 | 7” |
| 14-50 | 4” |

### 6.11.3.2 Gas Fired Tank Heater Repair

If the blower motor should require repair, Ransohoff Service Department should be contacted for immediate service response. As for Spark Igniter or Flame Rod replacement.

In the event that the blower motor should fail the following instructions are given for removal and replacement.

1. Shut down the system and lockout the main power switch to ensure that the controller for the burner is not energized. Do this to ensure that there is no electricity going to the motor or that the system does not become energized.
2. Remove the screws on the junction box lid attached to the side of the motor. This will allow access to the motor wiring. Remove the wire nuts and separate the wiring then remove the strain relief locknut and pull the wiring clear from the box.
3. Loosen impeller cover.
4. Loosen the setscrews on the fan shaft coupling attached to the motor shaft. There are two setscrews 90° from one another. Be aware that once the motor is separated from the impeller, the impeller may drop slightly.
5. Remove the motor mounting bolts and place in a secure location. These bolts will be required for mounting the new motor.
6. Slide the motor back, being aware that the impeller may drop slightly when the motor is pulled from position.
7. Slide the new motor in position, the impeller will need to be lifted slightly to meet the motor shaft. Once slid in place replace the motor mounting bolts, do not tighten them just yet only snug.

8. Adjust the fan slightly to ensure it is not colliding with the fan guard when turning and tighten the setscrews.
9. Again, check the fan for clearance by spinning it, and then tighten the mounting bolt to the torque specifications noted in the torque chart at the back of this section.
10. Remove the lid to the junction box that is mounted to the side of the motor, a knockout will more than likely need to be removed, so, with a small punch and hammer knockout the plug on the side closest to the blower. It may not come off all the way so with a pair of pliers grab a hold of it and pull it out. Don't use your fingers, the edges are sharp.
11. With the knockout removed, run the wires through the hole and push the strain relief through. Attach the strain relief to the junction box by using the locknut.
12. Rewire the motor as required. Be sure to use the wire nuts that came from the other motor. Then replace the junction box lid.
13. Remove the lockout from the main power switch and run the blower motor to ensure it is rotating in the correct direction. If it is not, shut down the system and remove the lid to the junction box on the motor and swap two wires.
14. Follow the startup procedures for the burner and return the machine to service.

### 6.11.3.3 Gas Fired Tank Heater Adjustment Instructions

The following instructions will aid in the adjustment of the tank heater. Completely read the instructions before attempting to start the burner.

CAUTION

**Initial adjustment and light-off should be done by a ransohoff service technician.**

The following start-up instructions are for initial start-up:

1. Close all burner fuel valves and cocks. Make preliminary adjustments to the fuel gas regulator.
    a. Remove main gas regulators' adjusting screw cover.
    b. Turn the adjusting screw down (clockwise) to approximately mid-position.
2. Check all electric circuitry. Verify that all control devices and interlocks are operable and functioning within their respective settings and ranges.
    a. Be sure all gas manifolds are tight and that test ports are plugged if not being used.
3. Check that the immersion tube stack damper is properly positioned and locked into operating position.
4. Disconnect the automatic control motor's linkage (mark setting) from the operating crank arm by loosening the control motor's connecting rod from the burner's toggle linkage.

NOTE

**Initial start-up adjustment should only be accomplished while in "manual" burner control mode.**

CAUTION

**Do not by-pass the control panel timers, typically controlling sequential operations.**

5. Start all system related fans and blowers, check for proper motor rotation and impeller direction.
    a. Verify that all control interlocks are working.
    b. Allow air handling equipment to run for adequate amount of time to purge the manifold and immersion tube. This is completed by purge card in flame relay.
    c. With the gas shut off, manually advance the operating crank to "High Fire" position so that air only flows through the burner and firing tube.

### 6.11.3.4 Gas Fired Tank Heater Liquid Level Controller Reset Instructions

The liquid level controller is set to process temperatures up to 240°F. A manual reset is required to re-energize the heater once the liquid level drops below the heater and the thermostat changes states (opens) and remains open until it is physically reset. The controller features:

1. Positive action switch requires manual reset to re-energize the heater.
2. Pilot light indicates heater ON.

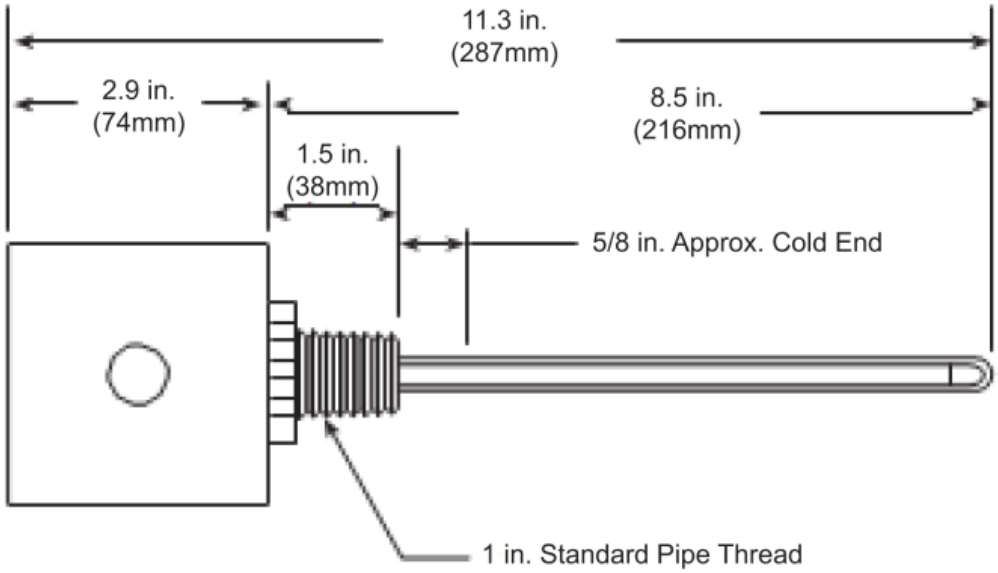



**Figure 72 Liquid Level Controller**

## 6.11.4 Pro-Sep Unit Maintenance

This section of the manual will cover the system operation and maintenance procedures that are required to operate and maintain the Pro-Sep Oil Removal System.

### 6.11.4.1 Cartridge Filter

Access doors and panels are provided to allow access to vital components within the machine.

- Separation Chamber Access Door (Marine Door)
- Lift-off Panels

### 6.11.4.2 Separation Chamber Access Door

CAUTION

**Should the door be damaged and removed from the machine, it is likely that it will warp once the pressure is released. This will cause it not to seal properly. A new door should be ordered before removal of the old one.**

1. Before removing the access door, be sure to drain the separation chamber first. Check the door for any physical damage. Replace door as needed.
2. Once the separation chamber has been drained, the access door can be removed. This is done by turning the bolt, which is in the center of the access door, counterclockwise until it is removed from the cross support.
3. Visually inspect the seal for dry rot, cracks, cuts and tears. If any of these conditions exist replace the seal immediately.
4. Before replacing the door put a light coat of petroleum jelly on the seal to keep it pliable.
5. Be sure the access door has seated in place and refill the separation chamber; check the seal for any leaks.

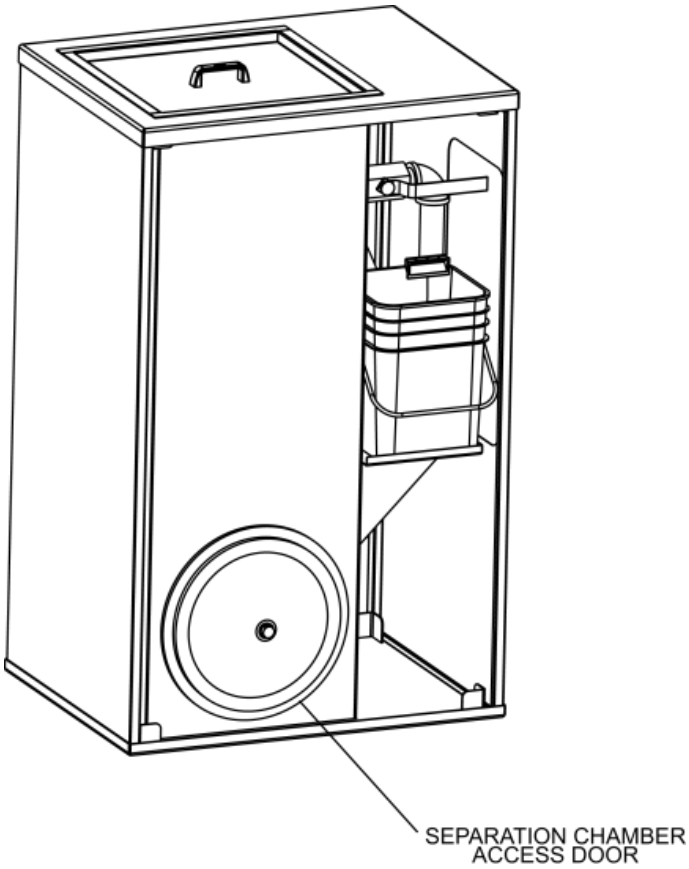



**Figure 73 Separation Chamber Access Door**

### 6.11.4.3 Lift-off Panel Maintenance

1. Visually inspect all panels for damage. If any of the panels have damage, they should be replaced when possible.
2. Lift up on the panel to swing the bottom portion of the panel towards you. Once the bottom has cleared the frame, drop the panel down until the top of the panel has cleared the upper frame and remove the panel.
3. If the panel is difficult to remove, check the condition of the upper and lower framework of the unit. If any damage is noted repair to the slot will be required. Check the slot for debris and dirt and clean as needed.
4. With the panels removed, wipe them down with a soft and clean cloth. Use of a stainless-steel cleaner and polish is recommended.
5. Replace the panels when finished.

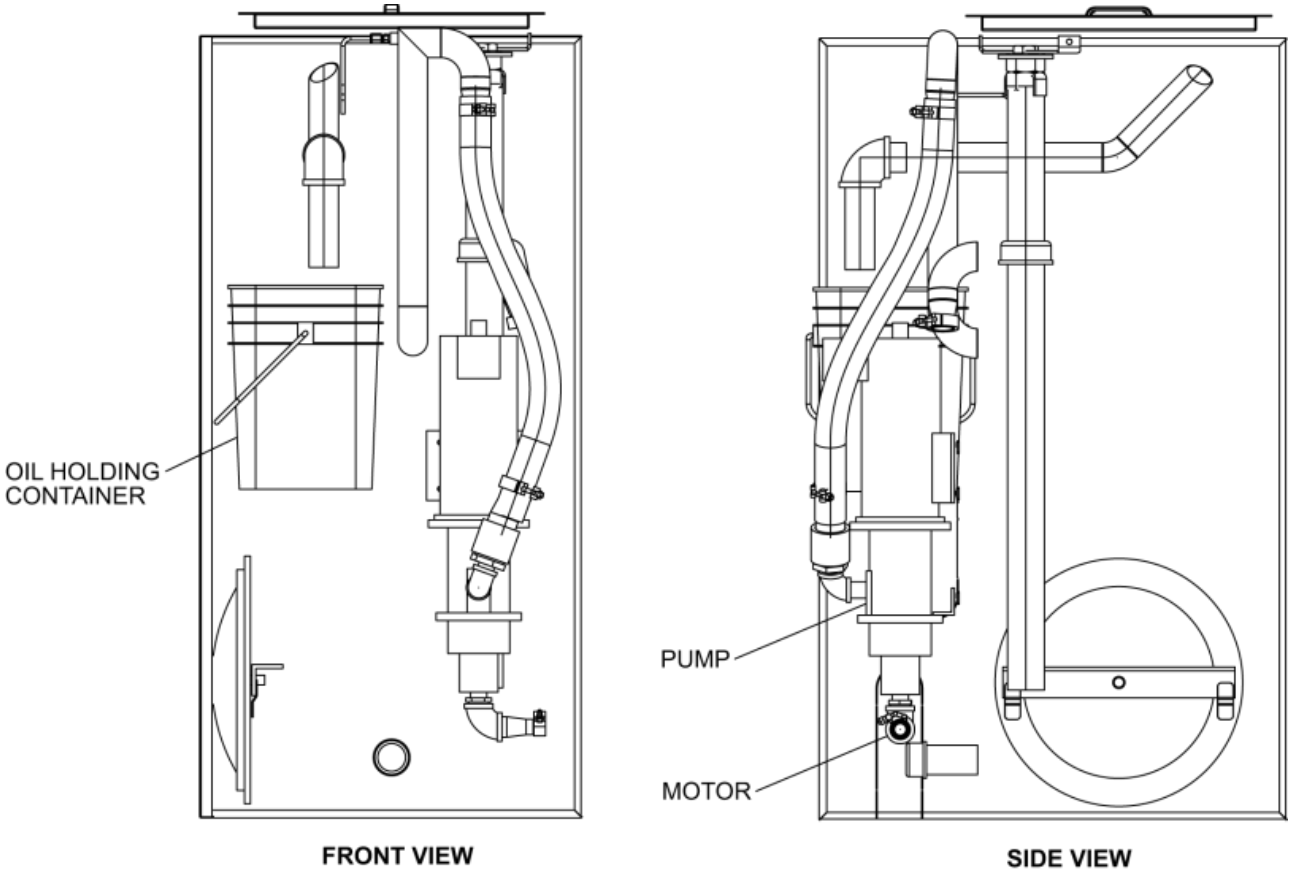



**Figure 74 Lift-off Panel Maintenance**

### 6.11.4.4 Pro-Sep Unit Maintenance

1. Shut down the Pro Sep at the Control Cabinet and remove the lift off door on the container side.
2. Dump the oil catch container.
3. Check condition of hoses including the drain hose. If the drain hose is clogged replace it as needed. Be sure all the clamps on the other hoses are present.
4. Wipe off any oil or debris that is on the pump motor. If the pump motor is left unattended it will overheat and fail.
5. Remove the lid from the top of the Pro Sep and remove any debris that may have found its way into the basin.
6. Once completed replace all doors and lids. Ensure an oil catch container is in place and return the Pro Sep back to service.
7. It is highly recommended that the lower tank on the Pro-Sep Unit be drained and cleaned at least annually. It is recommended that it be cleaned after the first quarter of the operation to gauge how often it will need cleaning.
8. Start the Pro-Sep unit and observe the freshwater overflow tube. A decreased flow rate is a possible indication that the stator is wearing and may require replacement.

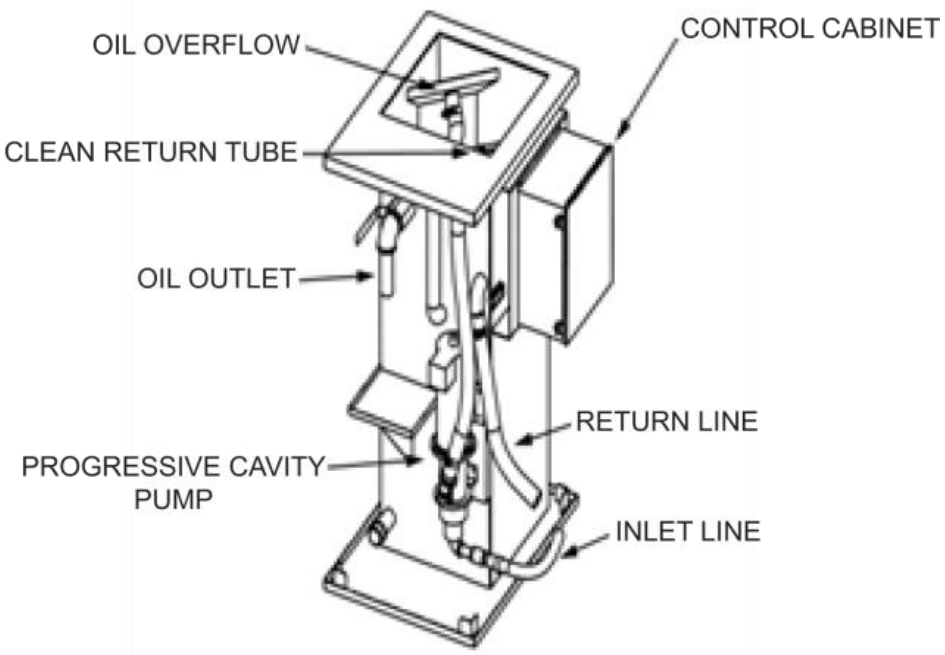



**Figure 75 Pro-Sep Unit Maintenance**

### 6.11.4.5 Pro-Sep Unit Adjustment

There are two adjustments that need to be made. When the speed is correct, the flow in the Pickup Head will float naturally at the surface. Too much flow will begin to pull the pickup head down and suck too much water. The flow in the Clean Return Tube should have a steady laminar flow down the sides and not a mushroom or splashing waterfall.

1. Pump Speed
2. Clean Return tube Height

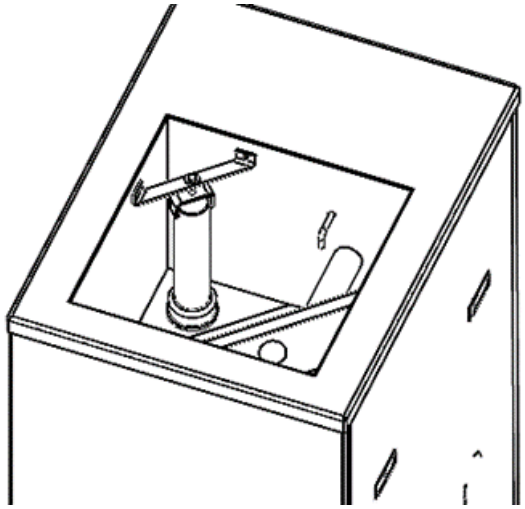


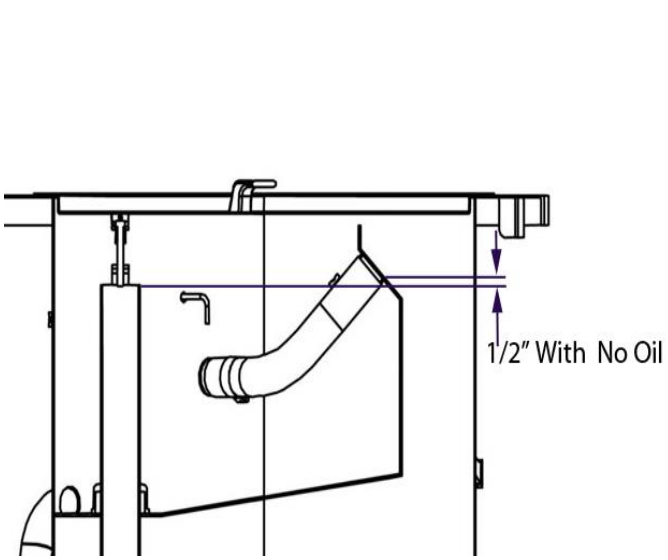
**Figure 76 Pro-Sep Unit Adjustment**

### 6.11.4.6 Pump Speed Adjustment

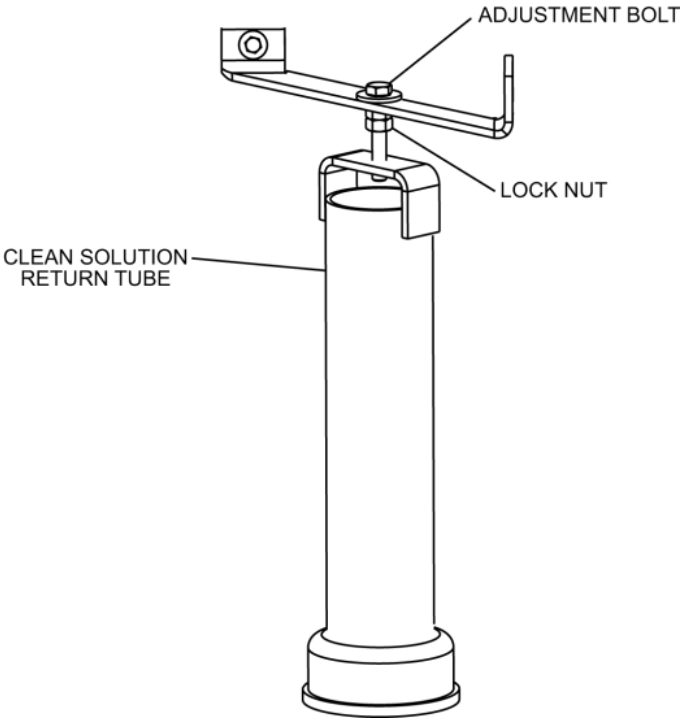
The pump speed has an adjustment from 0 to 100 and is in the Pro-Sep control panel for a standalone unit or in the main control panel for an integrated unit. To adjust the pump speed start with the pump speed set at 30. Adjustments to this dial are increased or decreased based on observation of the head in the wash tank and the clean return tube in the Pro-Sep. Record the speed number for later reference.

### 6.11.4.7 Clean Return Tube Adjustment

Fluid enters the Pro-Sep then fills and overflows down the Clean Return Tube. That sets the fluid height in the Pro-Sep. When the height is correct it should be about ½" below the Oil Overflow Pipe. Oil begins floating on top of the fluid and will overflow out the Oil Overflow Pipe and into the holding bucket. Adjust the Clean Return Tube up or down until the fluid level is about ½" below the Oil Overflow Pipe. To make the adjustment turn the adjustment bolt only ½ or 1 turn at a time and allow the solution level to settle. Observe the height and repeat if necessary. The unit is now set for a steady oil flow and will not need further adjustment. Once the unit is adjusted tighten the locking nut to lock the tube into position.




Pro-sep Collection and Return Tubes




Clean Solution Return Tube

**Figure 77 Clean Return Tube Adjustment**

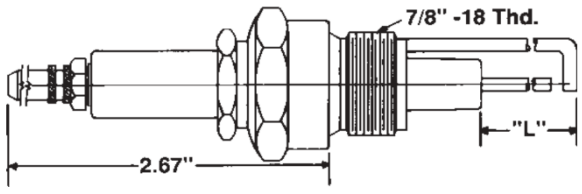
### 6.11.5 Blow-Off Heater Gas Burner

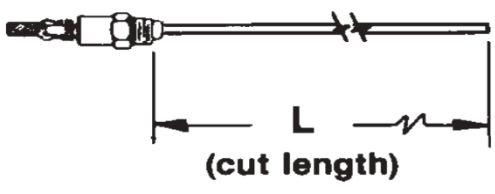
The blow-off systems air is heated with a gas burner. This burner is in the return air duct. All of the air that goes through this part of the blow-off whether it is coming from the housing or fresh air inlet has to pass by the burner.

As it passes the burner the air is heated to about 250°F. Temperature may vary per unit installation. To protect the system from overheating there is a high-level cutout switch that is at 50°F above the operating temperature setting.

Because the heated air is very important to drying the air maintenance to the heater is vitally important in insuring that the machine is drying the parts efficiently. Therefore, the following steps will aid the operator in the maintenance of the blow-off heater unit.

1. The temperature settings for the blow-off heater are maintained at the burner controller location on the right side of the unload station.
2. Check the mounting bolts for the burner, ensure that they are tight. This can be done by checking the torque of the nuts holding the burner in place. There is a chart with specific torque listings for each bolt size in the back of the maintenance section.
3. Inspect the blower for proper rotation, speed, and dirt build-up. Dirt build-up will reduce the flow of air causing the burner to run inefficiently. Use a vacuum to clean the intake port with; this will ensure that no dirt or debris can be pushed into the intake port.
4. Check the spark igniter for wear of the electrode. Over time the igniter will erode from use, so it is extremely important that the igniter is in good working order. Improper firing could cause poor ignition, which would cause the heater to become inefficient. Check the electrical connection to the igniter to insure proper contact.
5. Check the flame rod for proper size. And as the igniter will erode over time from use so will the flame rod. Without the flame rod being proper size, the burner could malfunction and possibly cause damage to the machine or injury to operating personnel. See the figures below for flame rod size check.
6. Be sure that the cooling fins on the motor are clean and free from debris. Overheating of the motor could cause it to fail. The fins can be clean with either compressed air or a soft cloth with a mild detergent or cleaning solution.




| Spark Igniter | Flame Rod |
|---|---|
| L=0.559” #47789 | L=7.125” #18117 |

**Figure 78 Igniter & Flame Rod**

### 6.11.5.1 Blow-off Burner Removal and Replacement


**Natural gas and propane are extremely volatile, if a gas smell is notice around any part of the machine turn off all gas at the main lockout valve and shut down the machine. If the gas is allowed to build up damage to the machine and serious injury to personnel could occur.**

In the event that the blow-off burner should fail, whether it is the motor or any of the internal parts, the whole burner assembly should be replaced. The following instructions will give direction in the removal of the burner assembly.

It is also suggested that Ransohoff Service Department be contacted about this matter. A service technician could be sent to assist.

1. Shutdown the machine and lockout the main disconnect on the controller. Turn off the gas and lockout the gas going to the blow-off burner.
2. Be sure all pressure in the gas line going to the burner is relieved and disconnect the lines at the connector. There is only one place to break the line and that is on the main line going to the burner. Vent the area of any gas that may be released.
3. Remove the junction box lid on the burner fan motor to expose the motor wiring. Check that there is no electricity flowing through the wiring with a circuit tester or multi-meter. Be sure to label the wiring for reassembly and disconnect the wiring.
4. After the wiring has been disconnected, remove the conduit that is attached to the junction box.
5. Disconnect the wiring to the spark igniter and the flame rod. They are similar to spark plug wires on a small engine. To remove them simply twists slightly and lightly pull.
6. Disconnect the burner air flow switch. This is done by disconnecting it from the burner at the connector. Once disconnected place the switch out of the way. Before disconnecting, it is suggested that the setting of the switch be recorded before moving it. This is to ensure that the setting can be reestablished at assembly.
7. While the burner is still mounted remove the gas tube and flow switch fittings that are still attached to the burner. You will need them on the new burner.
8. Remove the four mounting bolts holding the burner to the mounting flange and slide the burner clear by pulling it straight back.
9. Remove all the shipping plugs from the new burner and place into the existing mount. Be sure to slide it straight in, once the burner is in place secure with the mounting screws that were used with the old burner. It is suggested that a removable thread locking liquid be used to insure the bolts will not back out. Torque the bolts according to the torque chart in the back of this section.
10. Replace the gas and air pressure switch fittings. Use a liquid thread sealer to insure a leak proof fit.
11. Once the burner is in place and the fittings for the gas and air pressure switch are in place, reattach the gas line and the air pressure switch. Be sure to put a liquid thread sealer to insure a

leak proof fit. Any form of a leak in the gas line will cause problems with the performance of the burner and a dangerous situation.

12. Reattach the conduit to the junction box on the motor. A punch out will have to be removed to accommodate the conduit.

CAUTION

**Do not use your hands to remove the knocked-out punch, the edges are sharp and could cause injury.**

13. To remove the punch out just simply use a small center punch or pin punch and a hammer and tap the punch out until it can be removed with a pair of pliers.

CAUTION

**Failure to wire any motor or electrical circuit correctly could cause an electrical hazard in which personal injury and damage to the machine could occur. Do not use short cuts!**

14. Reattach the spark igniter and flame rod wires. Be sure to get a good connection when reattaching them. You should hear a “snap” sound when they are attached.
15. Now that the new burner is in place remove the lockout on the control panel and return power to the machine. Remove the lockout on the gas. As gas pressure is returned to the burner line, check it for leaks with a solution of soap water or a gas detector. When using soapy solution. Just apply a small amount around threaded fitting that were removed and look for a constant stream of bubbles. If a leak is detected tighten the connection.
16. Return the machine back to service; be sure to return the malfunctioned burner back to Ransohoff Inc.

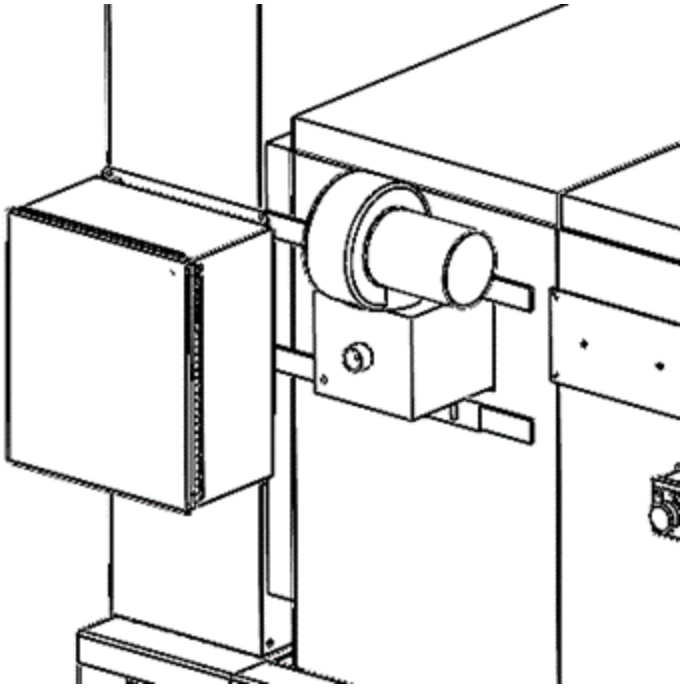


**Figure 79 Blow-off Burner**

### 6.11.5.2 Blow-off Heater Initial Startup Instructions

CAUTION **Initial adjustment and light-off should be done by a ransohoff service technician. Instructions provided by the company and/or individuals responsible for the manufacture and overall installation of complete system, should be followed.**

The following instructions will aid in the start-up of the blow-off heater. Completely read the instructions before attempting to start the burner. Familiarize yourself with the equipment.

The following start-up instructions are for initial start-up a basic start-up will follow these instructions.

1. Close all burner fuel valves and cocks. Make preliminary adjustments to fuel gas regulators.
    a. Remove main gas regulator adjusting screw cover.
    b. Turn the adjusting screw down (clockwise) to approximately mid-position.
2. Check all electric circuitry. Verify that all control devices and interlocks are operable and functioning within their respective settings and ranges.
    a. Be sure all air gas manifolds are tight and that test ports are plugged if not being used.
3. Disconnect the automatic control motor's linkage from the operating crank arm by loosening the control motor's connecting rod from the burner's toggle linkage.
4. Start all system related fans and blowers, check for proper motor rotation and impeller direction.
    a. Verify that all control interlocks are working.
    b. Allow air handling equipment to run for adequate amount of time to purge the manifold and immersion tube. This is controlled by the purge card in flame relay.
    c. With the gas shut off, manually advance the operating crank to "High Fire" position so that air only flows through the burner and firing tube.

NOTE **Initial start-up adjustment should only be accomplished while in "manual" burner control mode.**

5. Set burner to low fire position. Main combustion air blower should be on.
6. Adjust the combustion air shutter such that the combustion air differential corresponds to the charts. For direct spark ignition, proceed to step "LIGHT THE APX BURNER".
7. Open main and gas cock. Energize spark ignition transformer and pilot gas solenoid valve then attempt low fire ignition. If necessary, slowly increase flow through adjustment of gas pressure regulator. Repetition of this procedure may be necessary as ignition will occur only when air trapped in the gas line has been bled. If an APX BURNER is equipped for direct spark ignition, the minimum flame is a complete ribbon of uniform flame in the trough of the burner.
8. Light the APX burner. With low fire flame established and flame supervision operational, opening the main fuel shut off valve will allow fuel flow to burner.
9. Adjust main gas pressure regulator to maintain required differential gas pressure.

10. Slowly cycle (by adjusting) the APX burner from light off to minimum through maximum and back to ensure that the burner functions satisfactorily throughout the operating range. Refine adjustment if necessary.
11. When burner performance is satisfactory and stable throughout the operating range, reconnect the control linkage and allow unit to operate in automatic control mode.
12. Shut system down closing all fuel valves. Disconnect and plug in all test connections. Replace all equipment covers and caps. Tighten all linkage setscrews.

### 6.11.6 Oil Skimmer

CAUTION

**Do not by-pass the control panel timers typically controlling sequential operations.**

To set the timer, turn the time dial to the time of day. Set the desired switching program by pushing the switch actuators toward the center of the dial. Each segment equals 15 minutes. Always turn the dial clockwise. Inspect the skimmer periodically for dirt build up and clean with a clean cloth.

1. Turn off the oil skimmer.
2. Remove lid and pull on the media handle to remove from enclosure.
3. Place media into container to ensure fluid trapped in media does not spill on ground.
4. Wash off media using water or any water-based cleaning solution applied by spray to ensure contaminants attached to media are removed.

Repeat process on a regular basis to ensure media has the optimal oil coalescing surface available. Perform this full cleaning at least once a year.

### 6.11.7 Regenerative Blow-off System

The blow-off system used in this machine is designed to remove the water left from the washing cycle.

This system is designed to use fresh air only; the air is not recycled like that of a re-circulating air blow off system. This system produces a 275cfm @ 40" s.p.; it is powered by a 5hp TEFC motor that runs at 3450rpms. The accelerated air is directed by tubes to the air knives.

When the air exits the air knife it moves against the part causing a stripping action of the remaining liquid left on part. This blow-off system uses ambient air. The air is not heated so as the part leaves the blow off station, it will not be in a dripping condition, but some residual solution may be present on the part.

#### 6.11.7.1 Regenerative Blower Maintenance

1. There is very little vibration from the type of system used in this machine, so any amount of vibration noted to the motor or blower should be investigated. Refer to the Troubleshooting portion of this manual to determine course of action.

NOTE **An air flow switch is provided on the regenerative blower units to monitor the vacuum pressure of the air intake. As the vacuum goes up the filter is becoming more contaminated. Once the indicator reaches a preset level a fault condition will occur indicating that the filter requires changing.**

2. Ensure that the fan guard is clean of debris and dirt, anything clogging the fan guard will cause a reduction of air flow over the motor that helps in cooling. This condition will cause the motor to run hotter and shorten the life span of it.
3. Be sure to wipe down the motor. Dirt that is accumulated on the motor itself will cause it to overheat which will shorten its service life.
4. Listen for any unusual noises or sounds, if any are noted see the troubleshooting portion of this manual to determine course of action.

CAUTION **For this next step shut down the machine and tagout the control panel. This is to reduce the likelihood of anything entering the blower while it is running.**

5. Remove the canister cover to expose the filter. Check for damage and cleanliness. Remove the foam cover over the filter and wash in warm soapy water then rinse in clean water. This form cover helps in extending the life of the filter. Allow the foam cover to dry before replacing it over the filter.
6. Clean the canister lid and canister inlet tubes of any dirt that may have accumulated. This is important for the full life of the filter.

CAUTION **Be careful not to drop anything down the intake tube. If anything is accidentally dropped it must be retrieved before the blower is started.**

7. Clean the filter with compressed air by directing the air from the inside of the air filter out. If needed replace the filter with#516495 (Ametek Rotron canister filter).
8. Allow the foam to dry. Replace the foam and filter in the canister.

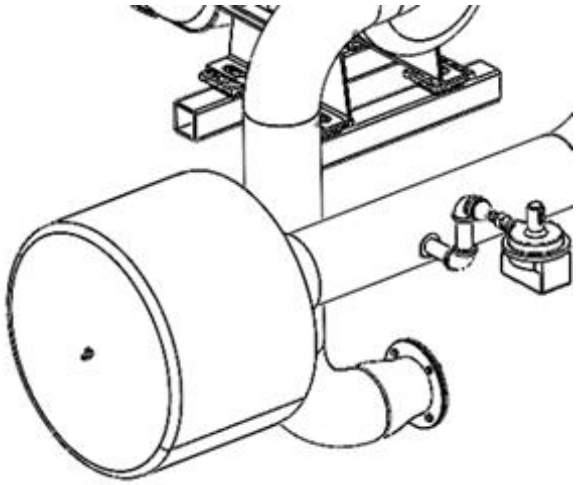


**Figure 80 Clean Air Intake Filter Replacement**

### 6.11.8 Filtermist Exhaust System

Because the Filtermist does not use media filters or electrostatics, it requires very minimal maintenance. It almost works as well when it is dirty as it does when it is clean. For safety purposes, it is necessary to periodically inspect the Filtermist unit's main components for wear or damage, especially if loud noises or vibration is present. Additionally, we recommend these simple maintenance procedures be carried out once a year.

1. Inspect and replace the motor mounts and torque limiting straps if worn or damaged.
2. Inspect and replace silencer if necessary.
3. Remove drum and thoroughly clean. Inspect for any damage.
4. Replace or clean drum pads. Sometimes the pads can be cleaned with soapy water. Remember, the pads are not filters so they do not have to be perfectly white, but it is important that they are not packed with solid buildup which could cause vibration and wear problems.
5. Replace lid seal.
6. Check all other accessories for wear and damage, i.e.: ducting, flange adapters, etc. Repair or replace as necessary.
7. Check all mounting fixtures such as stands and suspension kits for damage or signs of fatigue. Repair or replace as necessary.

Some aspects of this program may have to be carried out on a more frequent basis, depending upon the application. Applications which typically require more frequent maintenance are those in which very fine chips are produced, such as cast-iron machining and grinding.

### 6.11.9 Mist Eliminator

The maintenance of mist eliminators is very simple, based on a common-sense approach. Temperatures more than the design operating temperature may cause shrinkage of the pad, which can usually be corrected. Extreme temperatures will result in destruction of the structure and necessitates replacement of the mist eliminator or packing.

In dirty service it may be necessary to clean the pad(s) weekly or even continuously. Periodic cleaning can usually be done by a variety of methods including:

1. Shutdown the machine and lockout the control panel. This is to prevent any unwanted startups of the machine.
2. Remove the access door to the moisture eliminator, this door is located near the control panel on the unload side of the machine.
    a. To open the door, simply lift on the latch and turn 90° to release the door.
    b. Pull the door toward you and lift from the frame.
3. Now that the door has been removed the moisture eliminator is visible, simply slide it out of the exhaust plenum.
    a. High-pressure/high-volume washing (i.e.: fire hose, hydro-blaster, etc.) in which plugged material is mechanically removed. Pressures of up to 600 psig can be used safely and pressure of up to 2,000 psig with fan nozzle have been used by experienced operators. Damage can be done to the pad at high pressures.
    b. Washing can be done in place or after removal of the pad from the Bessel. Flexing the pad is extremely effective in releasing scale buildup. Depending on the style of material and safety consideration; walking on the pad, rolling with ‘lawn roller’, or merely flexing the pad by hand can be considered.
    c. Chemical cleaning is frequently used; either in place, or with the pads removed. Complete saturation may be required for good clean up so soaking or high-volume washing is preferred.
4. Replace the pad and replace the access panel. Be sure that it is latched properly.
5. Adjust damper as needed.

During handling of the pads care must be taken to avoid damage of the exposed edge. Some fibers can be If serious damage to the edges occurs, repair as needed.

### 6.11.10 Vertical End Suction Pump

This type of pump requires very little if any maintenance at all. Other than checking for debris that has been pulled into the pump there is no other maintenance required. This is due to the once piece housing that the manufacturer uses on these pumps.

It is recommended by the manufacturer that a data log be developed to create a history of pump operation. In doing this an indication of pump performance can be logged. If the pump starts showing signs of wear, any drop of pressure other than what would be considered normal, will give an indication to the operator that the pump impeller should be replaced at the next maintenance interval. The best suggested time for this is when the tanks are being cleaned.

### 6.11.11 Ultrasonic System

Along with the regular spray wash, the machine could be equipped with an ultrasonic wash, which enhances the cleaning process. The ultrasonic system is designed to use sound waves to loosen and remove debris from the parts that are being washed. It is accomplished using ultrasonic transducers that are mounted to the tank bottom which are powered by ultrasonic generators. The wash cycle will begin with the spray system washing the chips and oil off the parts with the sump drain closed. This fills the tank with the wash or rinse fluid. When full, the spray then turns off and the ultrasonic transducers turn on filling the tank with ultrasonic sound waves that loosen the smallest particles even in blind cavities. The loosened particles are then swept away during a follow up spray wash or spray rinse cycles.

#### 6.11.11.1 Care and Preservation of the System

Several routine care and preservation measures can ensure the long life of the system.


**Never run the ultrasonic system in an empty tank. Doing so will damage the ultrasonic generators.**

1. Never operate the ultrasonic unless the transducer is fully submerged below the liquid level. Ultrasonic generation in air will effectively shake the transducer elements apart.
2. Never permit the cleaning basket or other objects to touch the transducer while it is operating. This will reduce cleaning efficiency and shorten the life of the transducer by causing erosion.
3. Use care in treating the front surface of the transducer. Scratches reduce the operating life of the transducer by providing starting points for erosion. Dents can physically damage the transducer elements inside the transducer housing.
4. Never allow moisture to enter the transducer via the cable conduit as this will corrode the transducer elements and cause short circuits.
5. Normal operation of the system causes gradual erosion of the transducer face. Therefore, do not operate the ultrasonic for longer than necessary.
6. Do not operate the transducer in concentrated acids, which may eat away the transducer housing, or in volatile, explosive, or combustible liquids.

### 6.11.11.2 Safe Operation of the System

Complying with the following directives will ensure safe operation of the system.

1. The system is designed for use at the voltage specified on the serial tags of the components. Do not connect the tank or generator to any other power supply.
2. Do not immerse hands or other body parts in the ultrasonic cleaning tank. This can cause skin irritation from contact with cleaning chemicals, oils and contaminates and exposure to high-intensity ultrasonic energy.
3. Do not move the cleaning system without draining the tank and disconnecting the system from the power supply.
4. The ultrasonic energy produced by the system is measurable by sound meters and OSHA sound constraints may apply. Know the sound levels experienced in your environment and wear hearing protection if necessary.
5. Make sure you are fully aware of the chemical characteristics, as well as health and safety issues involved before working with a chemical. Wear suitable protective clothing and take all necessary precautions.

### 6.11.11.3 System Maintenance

The system must be maintained in a clean environment, regularly inspected, and cleaned as detailed in the following instructions.

1. Visually inspect and clean the generators regularly. Accumulations of dirt can cause overheating and component breakdown. Dirt on components acts as an insulating blanket, preventing efficient heat dissipation. Remove loose dust on the outside of the generator with a soft cloth. Remove remaining dirt with a soft cloth dampened with a mild detergent and water solution. Do not use abrasive cleaners on the unit.
2. Remove and clean the cooling fan filter under running water. Dry and replace.
3. Inspect the generator and tank for damage or wear. Check units that appear to have been dropped or damaged thoroughly to verify correct operation and performance. If you find any deficiencies that could cause personal injury or could lead to further damage to the system, they need immediate repair.
4. If a cord or cable has visible damage, have a qualified technician check for ground integrity and ground leakage. If necessary, replace the cord or cable using an exact replacement. Only a qualified technician can perform such a replacement since it may be necessary to disassemble the tank or generator.

### 6.11.11.4 Performance Verification

In order to verify the proper functional performance of your system, you need a Performance Kit (Part No. 4050114), which consists of five ceramic rings, two pencils and a bottle of Water Wetter. Use the following procedure:

1. Fill the cleaning tank with water and add two ounces of Water Wetter.
2. Bring the water to operating temperature (normally 130°F - 170°F).
3. Using a pencil supplied with the kit, coat the smooth side of each of five ceramic rings with pencil lead. Cover at least 95% of the surface of each ring.
4. Place the rings face up in an “X” pattern in the cleaning basket. One ring should be in the center of the basket and the others approximately 1-inch in from each corner.
5. De-gas the liquid in the tank by operating the ultrasonic continuously for 10 minutes.
6. Turn OFF the ultrasonic and allow the system to settle for 30seconds.
7. Turn ON the ultrasonic and lower the basket into the tank. Start timing as soon as the ceramic rings are immersed in the liquid.
8. Gently move the basket up and down approximately ½-inch (1-cm) for thirty seconds.
9. After 30 seconds, turn the ultrasonic OFF and remove the basket.
10. Compare each ring with the comparison chart below and grade the rings accordingly.
11. Add the five scores together. A minimum total score of 30 is acceptable.

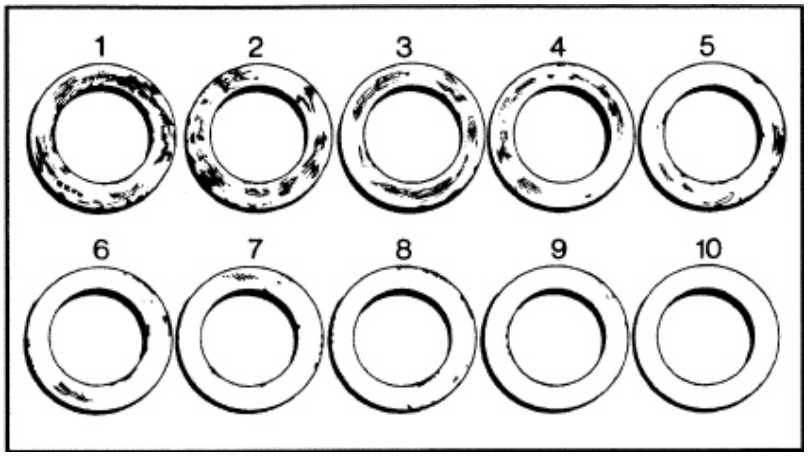



**Figure 81 Ceramic Ring**

### 6.11.12 Sump Pump

This machine may be equipped with a sump pump to evacuate the excess. Liquid flows into the sump tank from the overflow and when draining the tank. This pump is a stand-alone unit and will be remote from the machine. Typically, this unit requires a separate power drop.

#### 6.11.12.1 Sump Pump Operation

Keep the unit clean by using a soft cloth and water if necessary. To start the sump pump, follow these steps:

1. Turn the power lever to the ON position.
2. Turn the SUMP PUMP control switch to the AUTO position.
    a. The SUMP PUMP RUNNING button will illuminate.

#### 6.11.12.2 Sump Pump Maintenance

Maintenance required for the pump and motor is minimal. Below are a few steps that should be followed.

1. Inspect and clean the motor ensuring that all debris that may obstruct the flow of air from the cooling fan has been cleared. Failure to clean the motor could cause premature motor failure due to overheating.
2. Look for any other physical damage that may hamper operation of the motor.

# NOTES

# ELECTRICAL MAINTENANCE INSTRUCTIONS

## 7.1 Electrical Maintenance

This section will cover electrical maintenance and repair. Without proper training in working with the electrical components of this equipment serious injury and damage to the machine could occur. Much of the electrical troubleshooting and repair technique comes with general electrical training, reading schematics, and reading component literature. Thus, in-depth electrical troubleshooting is not part of this manual.


**It is extremely important to be aware of all Safety Notices, Caution, Warning, and Danger signs that are posted on this equipment.**

The following will be covered in this section:

- Electrical Safety
- Control Panel Maintenance

### 7.1.1 Electrical Safety

1. Always lockout in the off position any panel or disconnect unit whenever possible. Many people have been injured by panels that have been “turned off”. Never assume that the panel is OFF.
2. Only those personnel qualified in electrical/electronic maintenance and repair should service the electrical system of this machine. Anyone with improper training or no training at all working on the electrical equipment of this machine could put others and themselves in a dangerous situation and cause damage to the machinery.
3. Remove all metal items such as watches, necklaces, and other jewelry. Safety glasses should not have metal rims. Anything that could be a possible conductor should be removed. Besides the possibility of electric shock from providing a contact point severe burns will occur where metal is in contact with the skin when electricity passes through it.
4. Obtain a current and complete set of electrical circuit drawings before attempting any maintenance or repair. From time-to-time wiring within a panel will change and using an out of date set of drawings is dangerous. Knowing what voltage that you are working with is very important.
5. If a portion of the machine such as the carriage must be run to test any of the electrical components, extreme care must be taken. Signs should be posted on or around the machine that warns of electrical testing and servicing is being done. Should someone come in contact with any equipment being tested or attempt to start the unit, severe injury to personnel and damage to the machine could occur.

6. All machines have wiring in the control panels and/or other enclosures which are connected to other machinery and systems. These wires may be “HOT” even though the main power to the machine has been disconnected. Any wires that are of this nature are yellow in color and should be avoided. For this reason alone, it is important to take extreme measures when working within the control panel or other enclosures on the machine.

### 7.1.2 Main Control Panel

1. Shut down the machine, lockout and tagout the main disconnect to the controller. Follow the lockout and tag out directions in Section 2.4.


**Be aware of any system wiring (yellow color wires) that may be running through the control panel. Even though the control panel may be disconnected these wires will still be “HOT” and they could be handling high voltage.**

2. Open the control panel door and inspect the wiring for any signs of discoloration. This can indicate overheating caused by loose connections or overloading. If the wiring is to the point of being burned, it should be replaced immediately.
3. Look for any signs of corrosion that may be on the terminal strips or any other location where a wire makes a connection. If the connector is severely corroded replacement of the wire connector and/or the terminal strip may be required. Clean corroded connections thoroughly with a wire brush and contact cleaner. An eraser can be used to remove mild forms of corrosion.
4. Look for any debris that may be in the controller cabinet and remove it. Anything that could touch a bare connection could cause an electrical short. Clean the cabinet thoroughly.
5. Check any drawings that remain in the cabinet for reference, these drawings should be the latest revisions. Use of out-of-date electrical drawings could cause a hazardous situation which could result in severe injury and damage to the machine.
6. Check all the conduit connectors for tightness. Any loose connectors should be tightened. This may also allow contaminants to enter the cabinet.
7. Check the seal on the door for tears and dry rot. Use a petroleum jelly to lubricate the seal and keep it pliable. Doing this will ensure that no contaminates will enter into the cabinet that could cause an electrical hazard.
8. Once maintenance on the inside of the control panel is complete, close the door and restore power to the control panel. All control boxes, on this machine, that have indicator lights are push to test. Push the indicator light on the control panel to ensure the lamp illuminates. If the lamp does not illuminate replace the bulb.
9. Once maintenance to the control panel is complete return the machine back to production.

# NOTES

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# PREVENTATIVE MAINTENANCE INSTRUCTIONS

## 8.1 Preventative Maintenance Instructions

This chapter contains the Lean Jet maintenance check chart and schedule. Perform required maintenance and inspect the machine using these methods:

- **Visual Awareness Review:** Always examine the machine. Be aware of anything that looks out of place.
- **Manual Inspection and Repair:** Physically look at every part of the machine, especially when scheduled service is being performed.

Maintenance frequency for some equipment can best be determined over time or from routine equipment use.

WARNING

**Before performing any maintenance procedure, or making any adjustments on the washer, follow the Lockout/Tag-out procedures included in the Safety Section of this manual. If any safety guards are removed during routine maintenance procedures or for making repairs, replace guarding before restoring power to the system.**

NOTE

**The frequency for stator maintenance will be determined by a number of factors, such as, the type of chemicals used, the condition of the solution, temperature, and environment of the plant. The annual maintenance noted below are just a suggested time, actual maintenance frequency will vary.**

### 8.1.1 Machine Access Doors Component PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 16 Machine Access Doors Component PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Sliding Doors | Check condition of doors and roller wheels. | | | | 🛠 | | |
| Check Tank Access Door | Check seals and clamping hardware (this should only be done when tank is drained). | | | | | | 🛠 |
| Check condition of Lift off Panels | Check for any damage to lift off panels. | | | | 🛠 | | |

### 8.1.2 Wash System Components PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 17 Wash System Components PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Titration tests | Check tank solution concentration using Titration tests provided by your chemical provider. (Average condition, some machines might require daily titration.) | 🛠 | | | | | |
| Cleaning Solutions | Change out solution from tanks, clean tanks as needed. (Weekly to Quarterly). | | | 🛠 | | | |
| Gauges | Check pressure gauges for proper readings, 25-35 psi. | 🛠 | | | | | |
| Bag Filters | Replace filter bag when the HMI Warning/Alarm indicates “Low Pressure” or there is a pressure difference greater than 10psi between the pressure going into the filter and the pressure coming out. | 🛠 | | | | | |
| Cartridge Filters | Replace filter elements when the HMI Warning/Alarm indicates “Low Pressure” or there is a pressure difference greater than 15psi between the pressure going into the filter and the pressure coming out. | 🛠 | | | | | |
| Wash Pump Motor | Clean motor. | | | | | | 🛠 |
| Wash & Rinse Pump | Inspect pumps and piping for leaks. | | | | 🛠 | | |
| Wash Nozzles | Check wash stage nozzles for damage or missing, replace if needed. | | 🛠 | | | | |
| Spray Curtains | Check the condition of the spray curtains and replace if needed. | | | 🛠 | | | |

### 8.1.3 8.1.3 Blow-off Unit PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 18 Blow-off Unit PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Blow-off Temperature | Check the blow-off temperature for the first blow-off, temperature = 180°F. | 🛠 | | | | | |
| Blow-off Drive Motor | Clean and inspect motor for damage. | | | | | | 🛠 |
| Blow-off Fan | Inspect and clean fan, remove all debris that has built up. | | | | | | 🛠 |
| Fresh Air Filter | Inspect and replace and needed. | | | 🛠 | | | |
| Air Knives | Inspect and clean. | | | | 🛠 | | |

WARNING

**It is very important to clean the plenum and perform routine maintenance at designated intervals, failure to do so could result in a fire hazard.**

### 8.1.4 Blow-off Unit PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 19 Blow-off Unit PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Exhauster Drive Motor | Clean and inspect motor as needed. | | | | 🛠 | | |
| Drum Pads | Inspect and clean. | | | | 🛠 | | |
| Drum | Inspect for debris and residue build up, clean as needed. | | | | 🛠 | | |
| Exhaust Dampers | Check exhaust dampers for proper adjustment. | | 🛠 | | | | |

### 8.1.5 Tube-Axial Exhauster Unit PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 20 Tube-Axial Exhauster Unit PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Exhaust Drive Motor | Clean and inspect motor as needed. | | | | 🛠 | | |
| Exhaust Drive Belts | Check the condition and tension of drive belts, replace if required. | | | | 🛠 | | |
| Exhaust Fan Bearings | Inspect bearings for any sign of failure; bearings are auto-lubed, check for proper lubrication. | | | | 🛠 | | |
| Exhaust Fan | Inspect and clean fan, remove all debris that has built up. | | | | | | 🛠 |
| Exhaust Dampers | Check exhaust dampers for proper adjustment. | | 🛠 | | | | |

### 8.1.6 Machine Exhauster Unit PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 21 Machine Exhauster Unit PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Exhauster Drive Motor | Clean and inspect motor as needed. | | | | 🛠 | | |
| Exhaust Dampers | Check exhaust dampers for proper adjustment. | | 🛠 | | | | |

### 8.1.7 Washer Conveyor and Drive Component PM (Plastic Belt)

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 22 Washer Conveyor and Drive Component PM (Plastic Belt)**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Gear Reducer | Check lube levels, observe for worn seals. The lubrication should be changed annually. | | | 🛠 | | | 🛠 |
| Drive Motor | Clean and inspect. | | | | 🛠 | | |
| Flat Plastic Belt Conveyor and Sprockets | Inspect chain and sprockets for wear. | | | | 🛠 | | |
| Flat Plastic Belt | Inspect for damage and wear. | | | | 🛠 | | |

### 8.1.8 Washer Conveyor and Drive Component PM (Flat-Wire Belt)

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 23 Washer Conveyor and Drive Component PM (Flat-Wire Belt)**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Gear Reducer | Check lube levels, observe for worn seals. The lubrication should be changed annually. | | | 🛠 | | | 🛠 |
| Drive Motor | Clean and inspect. | | | | 🛠 | | |
| Flat Plastic Belt Conveyor and Sprockets | Inspect chain and sprockets for wear. | | | | 🛠 | | |
| Fixtures | Inspect for damage and wear, replace as needed. | | | | 🛠 | | |

### 8.1.9 Washer Conveyor and Drive Component PM (Chain Conveyor)

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 24 Washer Conveyor and Drive Component PM (Chain Conveyor)**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Gear Reducer | Check lube levels, observe for worn seals. The lubrication should be changed annually. | | | 🛠 | | | 🛠 |
| Drive Motor | Clean and inspect. | | | | 🛠 | | |
| Flat Plastic Belt Conveyor and Sprockets | Inspect chain and sprockets for wear. | | | | 🛠 | | |
| Fixtures | Inspect for damage and wear, replace as needed. | | | | 🛠 | | |

### 8.1.10 Pro-Sep System Components PM

D=Daily, W=Weekly, M=Monthly, Q=Quarterly, S-A=Semi-Annual, A=Annual

**Table 25 Pro-Sep System Components PM**

| Component | PM Action | D | W | M | Q | S-A | A |
|---|---|---|---|---|---|---|---|
| Pro-Sep | Check and drain the separation chamber as needed. | 🛠 | | | | | |
| Pro-Sep | Inspect hoses and tank for damage and debris. | | | | 🛠 | | |
| Pro-Sep Pump | Inspect pump for leaks. | 🛠 | | | | | |
| | Replace stator, inspect rotor, coupling and seal. | | | | | | 🛠 |

# NOTES

# TROUBLESHOOTING

## 9.1 Troubleshooting

The following charts will cover the troubleshooting that will more than likely occur.

### 9.1.1 General Machine Troubleshooting

**Table 26 General Machine Troubleshooting**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Process stage is not achieving operating temperature Wash Temperature=140°F Rinse Temperature=140ºF | Machine requires 2 hours to achieve operating temperature. | Adjust heater timing for wash tank. |
| | Heater is not enabled. | Enable heater as instructed. |
| | Heater Failure. | Contact Ransohoff Service Department for immediate assistance. |
| Pressure gauge is reads low pressure Wash pressure = 35-45psi | Filter bag is filled. | Change filter bag. |
| | Missing nozzle(s). | Replace missing nozzles in the wash station. |
| | Pressure gauge is damaged. | Change pressure gauge. |
| Machine does not start | E-stop button is pushed in. | Pull E-stop button to release. |
| | Disconnect is not in the “ON” position. | Place the Disconnect in the “ON” position. |
| | Fuse blown. | Check and replace blown fuses. |
| Solution Carryover | Cleaner is foaming. | Determine concentration of cleaner and dump if necessary. |
| | Check valves are not seating. | Inspect check valves for lodged objects. |

**Table 27 General Machine Troubleshooting (continued)**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Parts are abnormally dirty and/or wet. | Blow-off not operating. | Check blow-off for operation. |
| | Conveyor speed to fast. | Slow conveyor speed down. |
| | Clogged nozzles in the wash station. | Clean or replace nozzles. |
| | Dirty bag filter. | Replace bag filter. |
| | Pump has failed. | Replace pump – Contact Ransohoff Service Department. |
| | Wrong chemical used. | Check with supervisor for correct chemical. |
| Wash tank is flooding | Emergency overflow is plugged. | Unplug emergency overflow. |
| | Make-up system is not shutting off valves when operating level is reached. | Check adjustment of make-up ball float valve. |
| Excessive amount of oil in solution | Chemistry is an active agent. | Change chemistry or change solution more often. |
| Contactors not working | Contactor failed. | Contact Ransohoff Service Department for immediate assistance. |

### 9.1.2 Flat Plastic/Flat Wire Belt Troubleshooting

**Table 28 Flat Plastic/Flat Wire Belt Troubleshooting**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Belt is jerking | Take-up roll is stuck. | The roll bearings are worn, replace the bearings. |
| | Take-up roll is at the end of its travel. | Remove a section of belt. |
| | Accordion action can occur on a flat wire belt. | Sprocket is too small, increase the number of teeth on the sprocket. |
| Belt Vibration | Belt passes over rough or uneven supports. | Smooth the supports that the belt is traveling over, remove any debris buildup. |
| | Belt dragging over an obstruction. | Remove obstruction. |
| | Sprockets are not aligned properly. | Reposition sprockets for proper engagement. |
| Belt Stretch | Excessive take-up tension. | Use just enough tension to drive the load. |
| | Overloading the belt. | Reduce the load on the belt. |
| | Non-uniform dragging or loading. | Ensure a smooth and level surface exists for the belt to travel over. |
| | Belt is worn out, no longer serviceable. | Replace belt. |

### 9.1.3 Blow-off and Exhaust Fan Troubleshooting

**Table 29 Blow-off and Exhaust Fan Troubleshooting**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Vibration and/or Noise | Misalignment of drum or fan blade. | Contact Ransohoff Service Department. |
| | Mounting unstable not shimmed properly. | Check and tighten bolts, adjust shimming if required. |
| | Foreign material in fan or drum causing unbalance. | Clean fan or drum of any foreign material. |
| | Worn bearings. | Contact Ransohoff Service Department. |
| | Broken or loose bolts or setscrews. | Contact Ransohoff Service Department. |

### 9.1.4 Motor Troubleshooting

**Table 30 Motor Troubleshooting**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Motor fails to start | No voltage supply. | Check feed connections to control system. |
| | Low voltage supply. | Check voltage supply and ascertain the voltage remains within 10% of the rated voltage shown on the motor plate. |
| | Wrong control connections. | Compare connections with the wiring diagram on the motor nameplate. |
| | Loose connection at some terminal lug. | Tighten all connections. |
| | Overload. | Try to start the motor under no-load conditions. If it starts, there may be an overload condition or a blocking of the starting mechanism. |
| High noise level | Unbalanced. | Vibration can be eliminated by balancing the rotor. Contact Ransohoff Service Department. |
| | Distorted shaft. | Shaft key bent, replace motor. |
| | Incorrect alignment. | Check alignment while running, adjust as needed. Contact Ransohoff Service Department. |
| | Check shaft for warping or bearing wear. | Contact Ransohoff Service Department. |
| | Extraneous matter stuck between the fan and the motor casing. | Remove fan guard and clean dirt from motor casing. |
| | Loose motor foundation. | Tighten all mounting screws, ensure the motor is properly aligned. |
| Intense bearing vibration | Unbalanced rotor. | Contact Ransohoff Service Department. |
| | Dirty or worn bearings. | Contact Ransohoff Service Department. |
| | Bearing rings too tight on shaft and/or bearing housing. | Contact Ransohoff Service Department. |

**Table 31 Motor Troubleshooting (continued)**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Overheating of motor | Obstructed cooling system. | Clean dry motor, inspect air vents and winding periodically. |
| | Overload. | Check application, measuring voltage and current under normal running conditions. |
| | Incorrect voltages and frequencies. | Contact Ransohoff Service Department. |
| | Frequency inversions. | Contact Ransohoff Service Department. |
| | Rotor dragging on stator. | Contact Ransohoff Service Department. |
| | Unbalanced electrical load. | Check for unbalanced voltages. |

### 9.1.5 Gas Burner Troubleshooting

**Table 32 Gas Burner Troubleshooting**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Start-up sequence runs but burner does not light | No ignition; there is no power to the ignition transformer. | Restore the power to the ignition transformer. |
| | No ignition; open circuit between the ignition transformer and the igniter. | Repair or replace the wiring to the igniter. |
| | No ignition; the igniter is not correctly grounded to the burner. | Clean the threads on the igniter and the burner, do not apply grease to the threads on the igniter. |
| | No ignition; the igniter needs cleaning. | Clean the igniter. |
| | No ignition; igniter insulation is broken, igniter is grounding out. | Inspect the igniter, replace if broken. |
| | Not enough gas; the gas pressure going into the ratio regulator is too low. | Check the start-up settings, measure the gas pressures and adjust where necessary. |
| | Not enough gas; Start gas solenoid valve does not open. | Check the solenoid valve coil for proper operation, replace it if necessary. |
| | Not enough gas; gas valve does not open. | Check the wiring to the automatic gas shut-off valve; check the output from the flame safeguard. Open manual gas cock. |
| | Not enough gas; ratio regulator is incorrectly set. | Adjust the ratio regulator to the proper setting. |
| | No flame signal; broken flame rod or dirty UV scanner lens. | Inspect and clean sensor replace if necessary. |
| | Not flame signal; spark plug and flame rod revered. | Exchange spark plug/flame rod or their wiring. |
| | Too much gas; wrong or missing burner fuel orifice. | Check manufacturers' literature for fuel orifice. |

**Table 33 Gas Burner Troubleshooting (continued)**

| Trouble | Possible Causes | Solutions |
|---|---|---|
| Cannot initiate a start sequence | Air pressure switch has not made contact. | Check air pressure switch adjustment. |
| | High gas pressure switch has activated. | Check air intake. |
| | | Check blower rotation. |
| | | Check outlet pressure from blower. |
| | Low gas pressure switch has activated. | Check incoming gas pressure. |
| | | Adjust gas pressure if necessary. |
| | | Check pressure switch setting and operation. |
| | | Check incoming gas pressure. |
| | | Adjust gas pressure if necessary. |
| | | Check pressure switch setting and operation. |
| | Malfunction of the flame safeguard system (e.g., shorted out flame sensor or electrical noise in the sensor line). | Have a qualified electrician troubleshoot and correct the problem. |
| | No power to the control unit. | |
| | Main Power is off. | Be sure the main power to the system is switch to the “AUTO” position. |

# NOTES

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