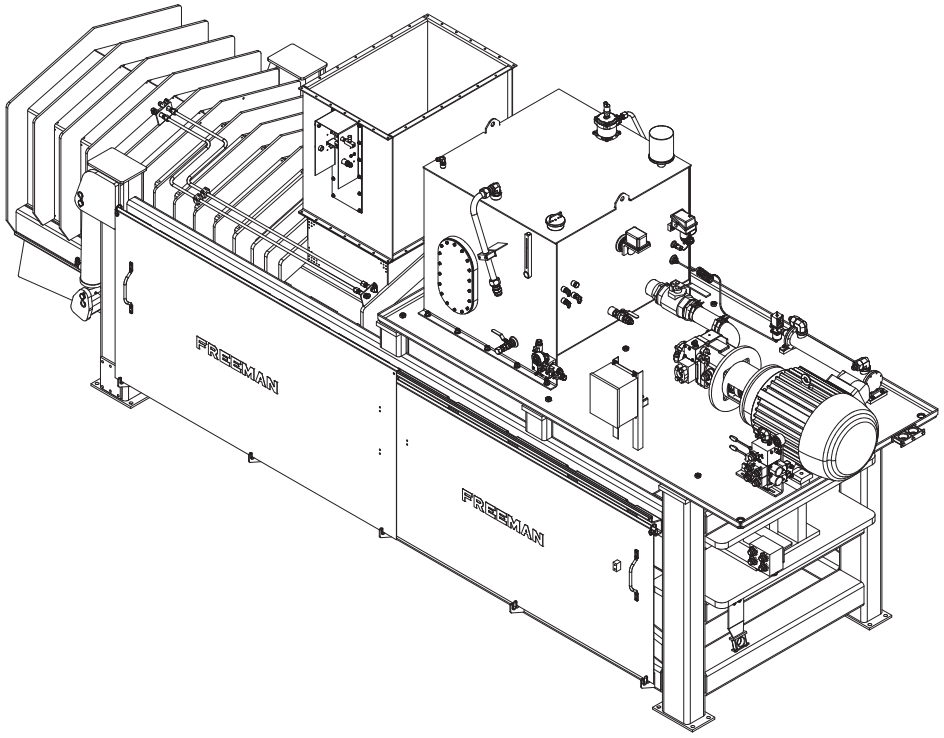
FREEMAN
A Division of Allied Systems Company

WE-5 Water Extractor



Operator's Manual

STARTING WITH S/N ASC-0WE5-506
Important: Be certain to specify the serial number of your Water Extractor when contacting Allied Systems.

A Product of
Allied Systems COMPANY
Sherwood, Oregon USA

PB0WE5OP13

SAFETY PRECAUTIONS

“THE BEST SAFETY DEVICE IS A CAREFUL OPERATOR”

Always turn off system control and Lock-Out the electrical supply to the machine before inspecting, adjusting or servicing the machine.

Do not clean, lubricate, or make any adjustments on the equipment while it is in operation.

Do not start the equipment until you are certain everyone is clear of the machine and have ensured there are no tools on the unit.

Do not work around equipment in loose clothing.

Do not attempt to service any equipment while the motor is running.

Inspection Covers and Safety Shields should only be removed by authorized service personnel.

After servicing do not place the equipment back into operation until all Safety Shields and Devices have been replaced. Operation without Safety Shields and Devices can place the operator into a hazardous situation.

Do not open or work on the In-Feed System until the flow of material has been stopped and the Motor is off.

Do not make any adjustments or reach under any load bearing surfaces while loaded.

INSTRUCT ALL OPERATORS ON SAFETY PRECAUTIONS.

⚠ WARNING

Some illustrations in this operator’s manual show the machine without shields to allow for a better view of the area being addressed. The machine should never be operated with any of the safety shields removed.

SERIAL NUMBER LOCATION AND BALER IDENTIFICATION

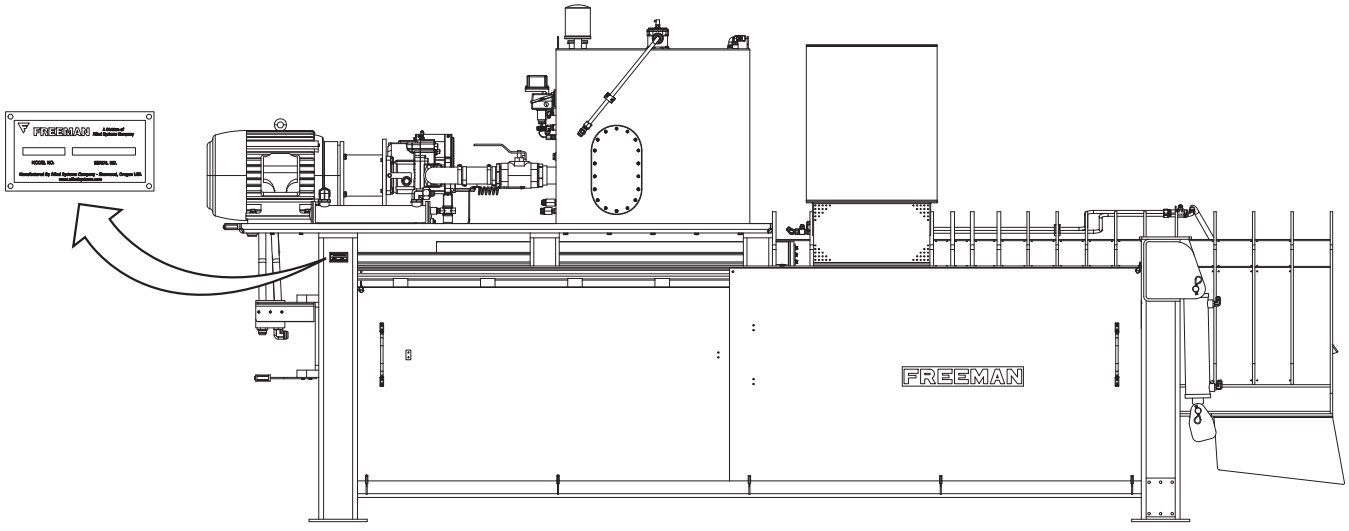
Each Freeman Water Extractor is identified by means of a model number and serial number. As a further identification, all power units are provided with a serial number.

To ensure prompt, efficient service when ordering parts or requesting repairs, record the serial numbers in the spaces provided.

WE-5 SERIAL NUMBER_____
Front side of main frame under motor.

POWER UNIT SERIAL NUMBER
Electric Motor-_____

NOTE: The motor and pump end is considered the front of the Water Extractor. The sides are described as left-hand side and right-hand side as viewed from the rear while facing the chamber.



Front Left Side Shown Rear

FREEMAN

CONTENTS

Overview

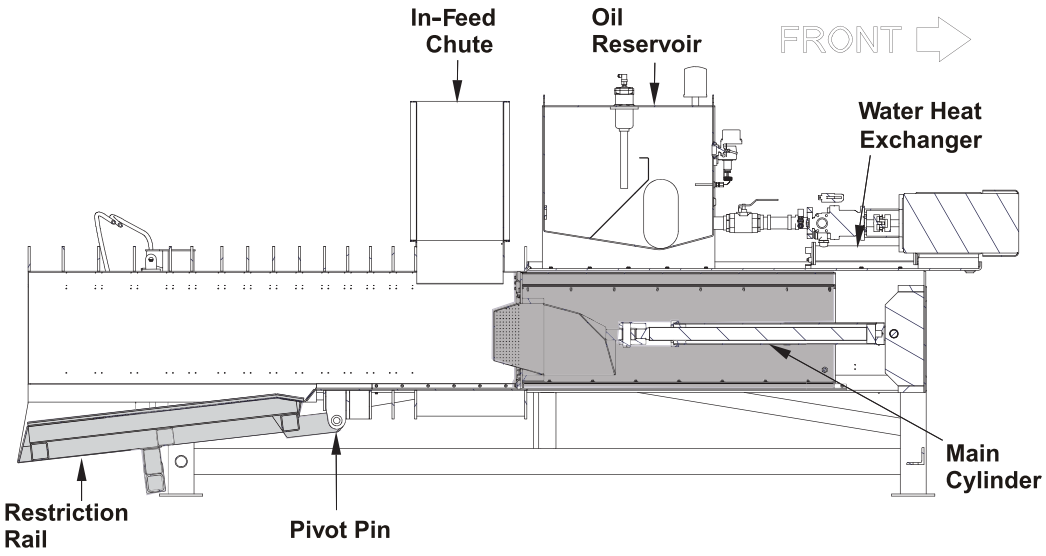


Figure 1. Right Side

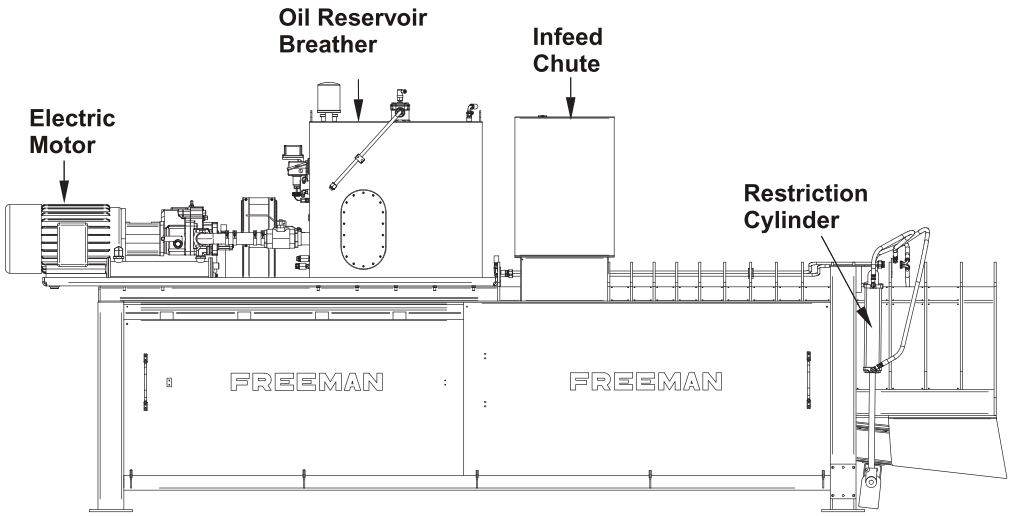


Figure 2. Left Side

Introduction

Automated water extraction The Freeman Water Extractor is an efficient, automated tool for extracting water from a continuously or intermittently fed product. Product transport is eased with compaction and water removal. A wide variety of adjustments provide a machine to suit most products.

The plunger forces water from the product. A restriction system is activated only when the plunger is advancing. A control box switch allows the restriction rail control system to be bypassed so that pressure is applied continuously for setting pressures, testing, and troubleshooting.

Drawing's and Schematics referenced throughout the manual:

Panel Wiring Diagram.....903501

Junction Box Wiring Diagram.....903502

Control Panel 905504

Hydraulic Schematic 906647

Dimensions / Weight

Length:.....19’-8”’
Height: .....8’-11"
Width: .....5’-11”
Weight: .....Approximately 19,000 Lbs Filled With Oil

Restriction Rail To Ground Fully Open: ..... 9"
Motor: .....75 hp/460 Volt

Chamber Width.....40”
Chamber Height .....33”
Plunger Stroke Length.....42”
In-Feed Opening: .....24” x 36”

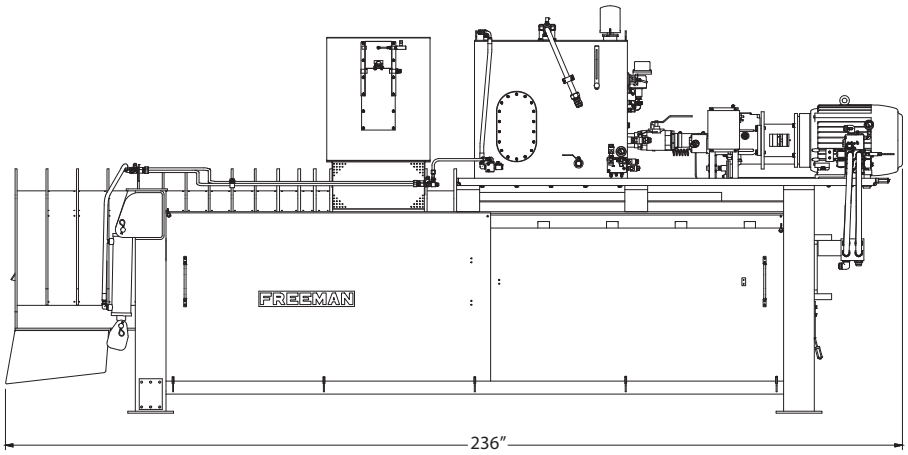
Volume... 7800 Cubic Feet Per Hour at 8 Strokes Per Minute.

Lubrication

Hydraulic Oil: Mobil 424 or Mobil DTE 15M or equivalent to a Viscosity greater than 10 centistokes at 180˚F and less than 200 centistokes at 60˚F.

Hydraulic Reservoir Capacity: ..... 182 Gallon
Check Oil level:.....Daily
Change Return Line Filter: .....Every 6 Months
Test Oil:.....Every 6 months and change accordingly
Change Oil:..... *Annually if oil isn’t being tested
Change Breather Filter: .....Every 6 Months
Grease Electric Motor:.....See Manufactures Manual
Grease Restriction Cylinder Ends: .....Every 2 Weeks

* Contact Freeman Service Department for recommendations on oil testing kits.



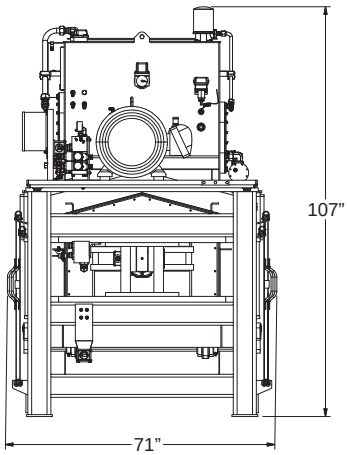


Figure 3. Dimensions

⚠ WARNING

Always turn off system control and lockout the electrical supply to the machine before inspecting, adjusting or servicing the machine.

Mechanical Installation

Anchor the base The water extractor location should allow for efficient supply of product to the In-Feed chute. Consider safety of the operator and ease of service as well when determining the location. Locate the discharge so the product discharge falls free, with no backup of the product.

The water extractor should be located within a catchment to provide for water retention and water spray drainage. Use sixteen, grade 8, 3/4 inch bolts through the foot pads to anchor the water extractor to a foundation of concrete or steel. Use shims to provide a level surface.

Electrical Connection

Power unit connection The 75 horsepower motor operates at 460 volts. At 460 volts, the rating is 96 amperes at full load. Supply wires should be correctly sized to prevent the motor from stalling during machine operation and momentary overloads and meet all relevant electrical codes and practices. See wiring diagram 903501.

Main Control Panel The Oil Level Sensor, Oil Temperature Sensor, Motor Starters (supplied by others), and mounted Junction Box are to be wired by the customer upon installation and must meet all relevant electrical codes and practices. See wiring diagram 903501.

Check Motor Rotation

IMPORTANT: Open up suction valves (see Figure 6) so the hydraulic pump is flooded with oil before turning on the motor (see "Prime Pump" on page 4).

Move the SYSTEM CNTRL Switch to STOP, RESTRICTION Switch to AUTO, and ANTI-PLUG switch to AUTO (see Figure 4). Remove the motor-pump coupler cover at the right side for viewing. Jog the motor to check for correct rotation. Note the motor shaft direction of rotation (standing at the front of the WE-5 viewing the motor). Correct rotation is clockwise (see Figure 5). Replace the cover.

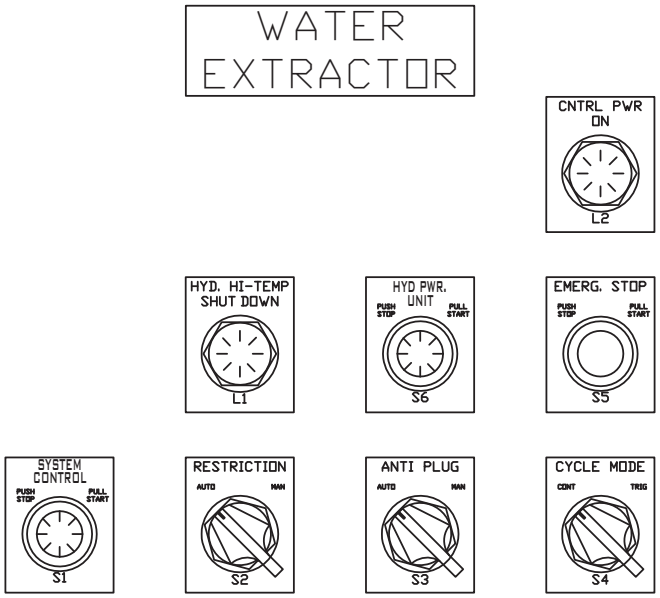


Figure 4. Control Panel

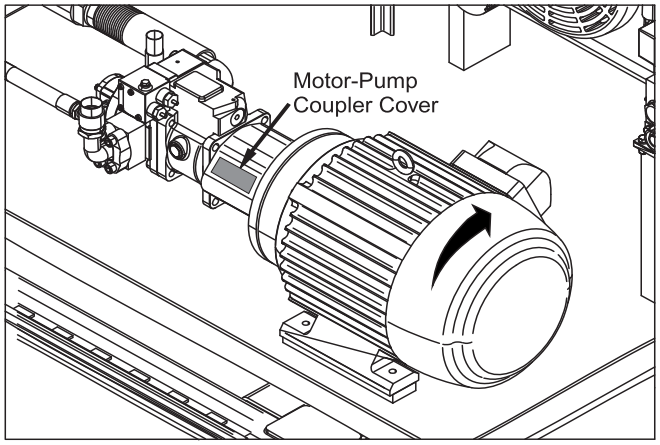


Figure 5. Correct Motor Rotation

Motor power must be supplied through an external motor branch circuit disconnect and magnetic starter, incorporating a motor overload disconnect device. The motor branch circuit disconnect should have excess current prevention devices meeting the National Electric Code Table 430.52. Overload disconnects should be set to the motors full load current rating.

Emergency Motor Stop and Low Oil Shutdown

The emergency motor stop switch and low oil shutdown float switch (see Figure 13 on page 6) are connected to control box terminals 15 and 16 (see wiring diagram 903501). Connect the motor starter power as shown on 903501 to place the switches in series with the motor control circuit.

Prime Pump

NOTICE

Do not let motor run continuously before the pumps are primed.

1. Make sure the pump case is filled with clean, filtered fluid identical to that used in the rest of the system (see "Lubrication" on page 2). The pump case must be full at all times to ensure proper lubrication of internal components.

2. Verify that piping is completed and any inlet valves are open to prevent cavitation or aeration of the pump.

3. Confirm that the direction of rotation of the motor matches the pump installed (see "Check Motor Rotation" on page 3).

4. Jog start the motor with the pump unloaded and operate until the air is bled from the system.

5. Check the pump for external leakage, abnormal noise, and vibration.

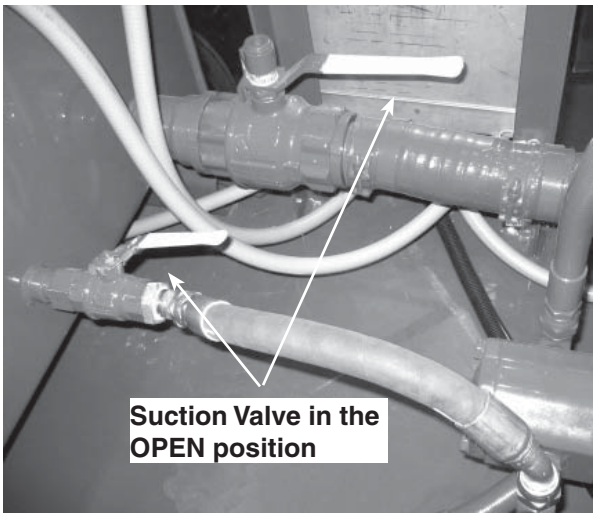


Figure 6. Suction Valve

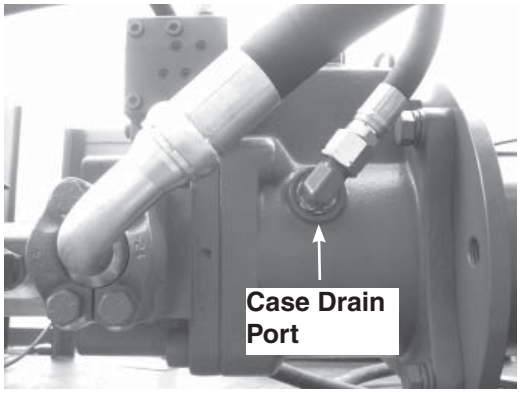


Figure 7. Prime Pump Location

Connect Water Lines To Water Throttling Valve *(if equipped)*

A Water Throttling Valve is used with water extractors that are equipped with an Oil to Water Heat Exchanger. The throttling valve meters the flow of cooling water through the heat exchanger based on the temperature of the hydraulic oil. The valve is set to open when the oil temperature reaches 110°F (43 °C) (see "Water Throttling Valve" on page 16). Connect in-going water line (provided by others) to Water In port (Min. 5 GPM @ 75 °F (24 °C) maximum 150 psi, 25 GPM). Connect out-going water line to Water Out port (see Figure 8).

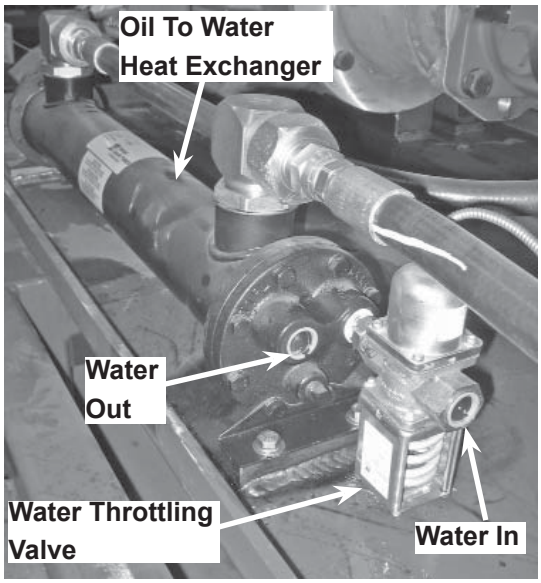


Figure 8. Water Throttling Valve

Remove Metal Shipping Bracket on Float Level Switch

A metal bracket is installed on the Float Level Switch located on the Oil Reservoir (see Oil Level Float Switch page 5) to prevent damage to the float during transport. Remove the bracket after installation (see Figure 9).

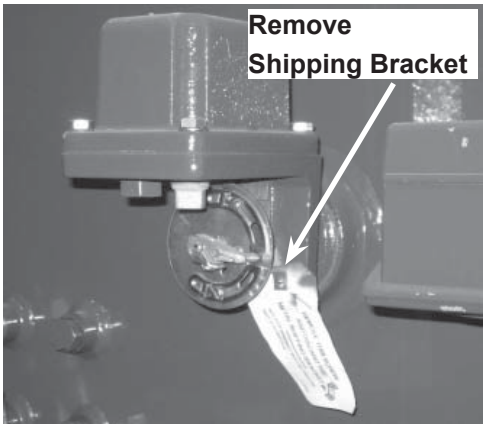


Figure 9. Float Level Switch

Connect Air Line to Air Nozzle On In-Feed Chute

The Air Nozzle cleans the Plexiglas in front of Level Detector. This keeps the Level Detector accurate. Connect to a compressed air source (supplied by others) with 50 - 100 PSI and approximately 5 CFM.

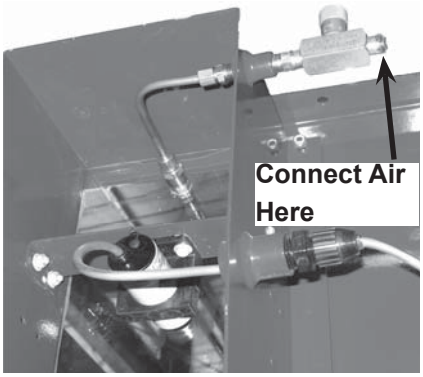


Figure 10. Air Nozzle

Hydraulic Power Unit

Check oil level Check the oil level gauge, which should be 1" below the HIGH mark with the plunger cylinder extended and the restriction cylinders retracted (see Figure 12, and Figure 34 on page 18).

Filter and lubrication Dirt is an intolerable element in a hydraulic system. Your power unit is designed to preclude the introduction of external dirt into the system.

All new oil put into the system is added through a “Fill Port” (see Figure 11). To get from the fill port into the system, the oil must pass through the Fill Screen. This degree of filtration helps to reduce component wear within the system, resulting in improved system life.

The oil tank breather cap should be changed every six (6) months (see Figure 11).

Each time a new breather filter is installed please take the time to write the yearly replacement date on the unit with a black felt pen.

Reservoir capacity is 182 gallons. Oil change intervals vary according to actual operating conditions. The oil should be tested every six (6) months and changed accordingly. If not testing, under normal conditions the oil should be changed yearly.

Use one of the following recommended oil types:

Hydraulic Oil: Mobil 424 or Mobil DTE 15M or equivalent to a Viscosity greater than 10 centistokes at 180˚F and less than 200 centistokes at 60˚F.

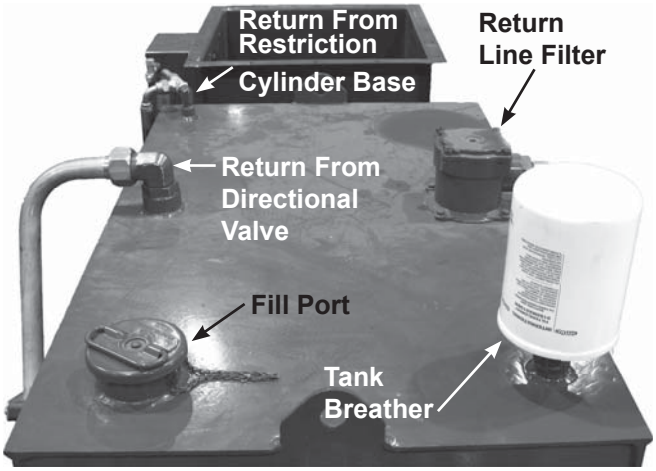


Figure 11. Fill Port and Breather Cap

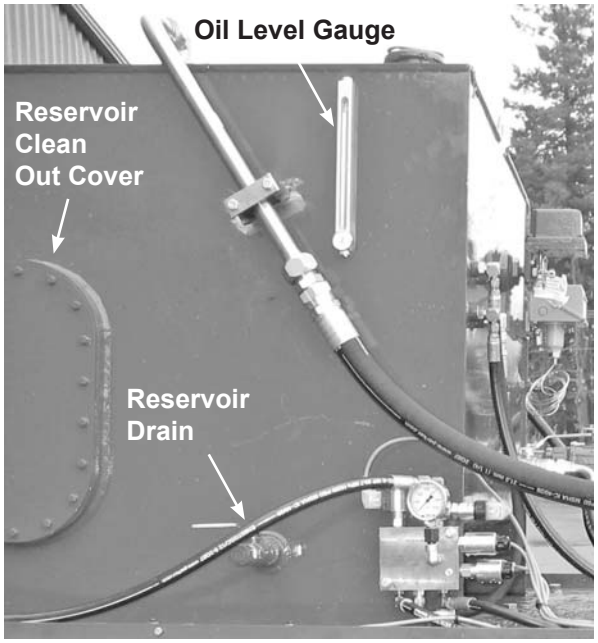


Figure 12. Reservoir Drain

Oil Level Float Switch An emergency low level float switch (see Figure 13) is installed to automatically stop the pump to protect it from damage in the event of line breakage or faulty maintenance. The low level float switch is connected (by others) as shown on wiring diagram 903501.

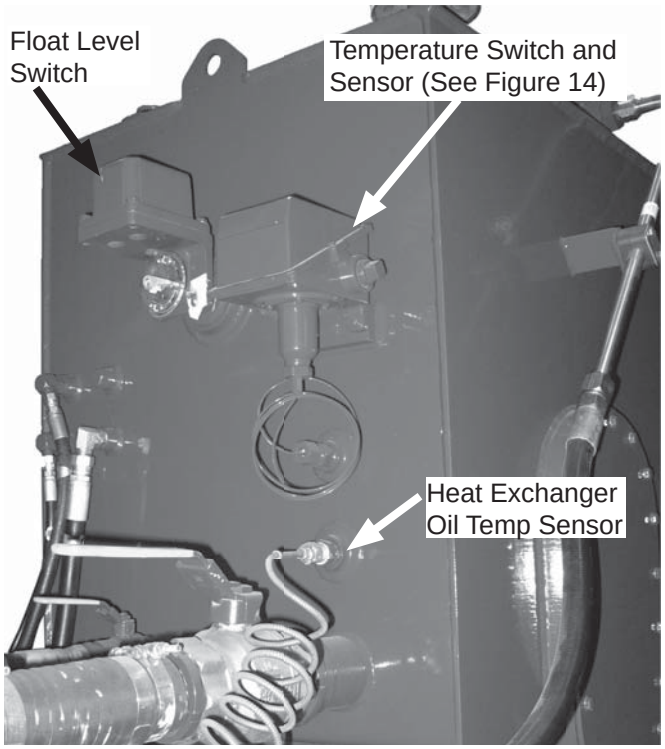


Figure 13. Temperature and Float Level Switch

Dual Oil Temperature Switches Installed in the WE-5 system to prevent damage caused by high temperatures. Temperature switch Dial #2 set at 120˚F (see Figure 14) turns the cooler fan motor on and off (if equipped). Dial #1 set at 150˚ F stops the pump motor at the high setting. The Oil Temperature Switch is connected (by others) as shown on wiring diagram 903501. See manufacture's manual in your document pack for settings. Dial #3 is not used.

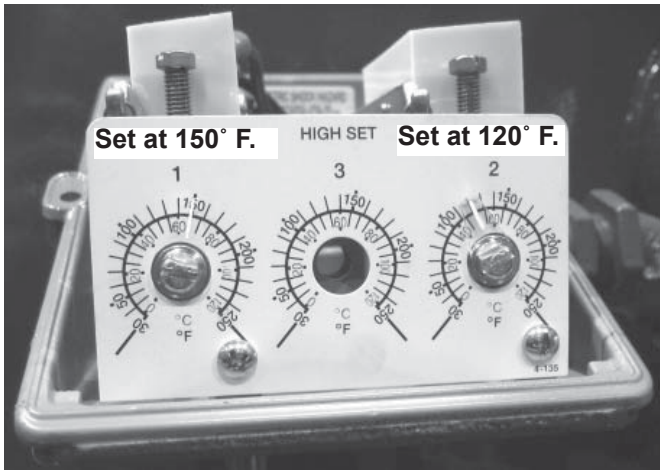


Figure 14. Temperature Switch

Oil Cooler / Oil To Water Heat Exchanger The Hydraulic system operates more accurately when the oil viscosity is consistent. Since oil viscosity varies with temperature, your power unit is equipped with an Oil Cooler (see Figure 15) or Oil to Water Heat Exchanger (see Figure 16) to automatically maintain the oil temperature from 110˚F to 150°F.

The optional Oil Cooler uses the Temperature Switch sensor Shown in Figure 13. The Oil to Water Heat Exchanger uses the Heat Exchanger Oil Temperature Sensor shown in Figure 13.

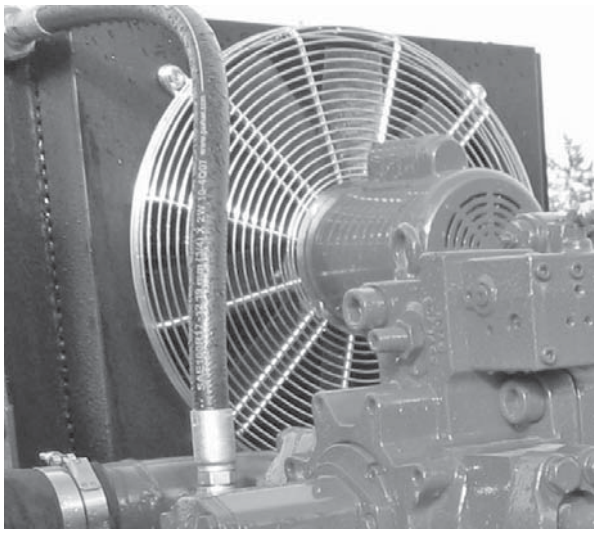


Figure 15. Optional Oil Cooler

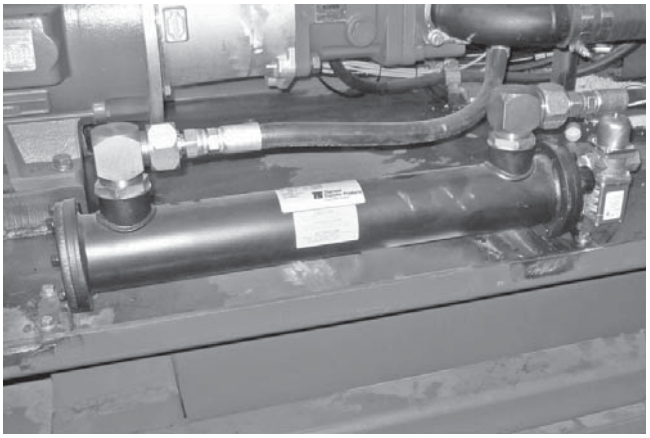


Figure 16. Heat Exchanger

Power Unit

Directional Control Valve is for controlling the direction of the plunger (see “Manual Operation - Place the control box:” on page 10). The Main System Pressure gauge is located on the Directional Control Valve (see Figure 17). The Manual control Lever can also be used to relieve pressure in the plunger cylinder when the HPU is shut down.

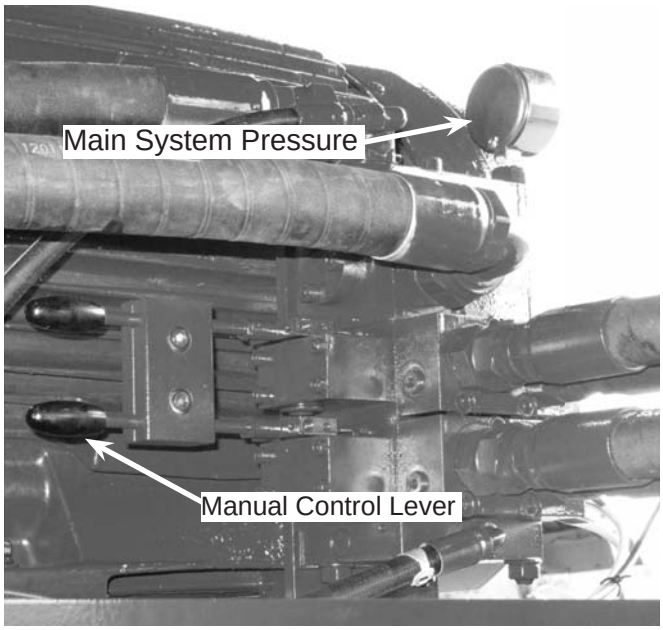


Figure 17. Directional Valve

Hydraulic Pump Controls The hydraulic pump has 3 different adjustments (Cut off Pressure, Differential Pressure and Torque Limit) and is pre-adjusted at the factory. **DO NOT make any adjustments unless directed by the factory. Readjustment without the approval of Allied Systems Co. voids the warranty.**

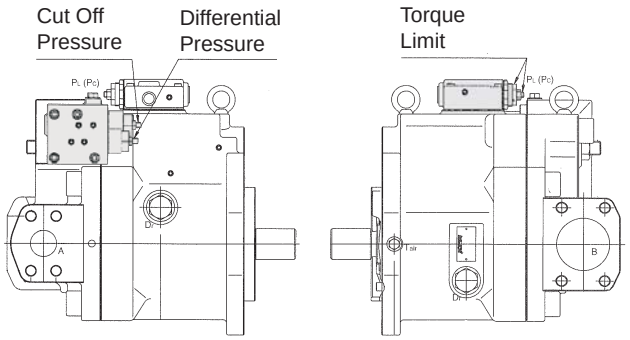


Figure 18. Hydraulic Pump

Proportional Valve Manifold Consists of Restriction Pressure Gauge, Main Pressure Valve, Restriction Valve and Anti Plug Valve.

System Proportional Valve The Main Pressure Min-Max pot #2 (see Figure 29 on page 14) located in the panel provides a control signal which varies the pressure output from the system proportional valve. When the pot is set at Min, the main system pressure will be at its minimum (approximately 150 to 500 psi). When the pot is set at Max, the main system pressure will be at its maximum (approximately 3000 psi).

Main System Pressure Limits (approximate)
Minimum pressure: 150 to 500 psi
Maximum pressure: 3000 psi

Restriction Proportional Valve The Restriction Min-Max pot #3 (see Figure 29 on page 14) located in the panel provides a control signal which varies the pressure output from the Restriction Proportional Valve. When the pot is set at Min, the pressure in the restriction rail system will be at its minimum of approximately 75 psi. When the pot is set at Max, the pressure in the restriction rail will be equal to system pressure. The restriction pressure will never exceed main system pressure.

Restriction Pressure Limits (approximate)
Minimum pressure: 75 psi
Maximum pressure: 2000 psi

Anti Plug Valve The Anti Plug Valve is used to relieve pressure to the restriction rail cylinders, allowing the rails to temporarily open enough to let the plunger fully extend (see “Auto Anti Plug” on page 11).

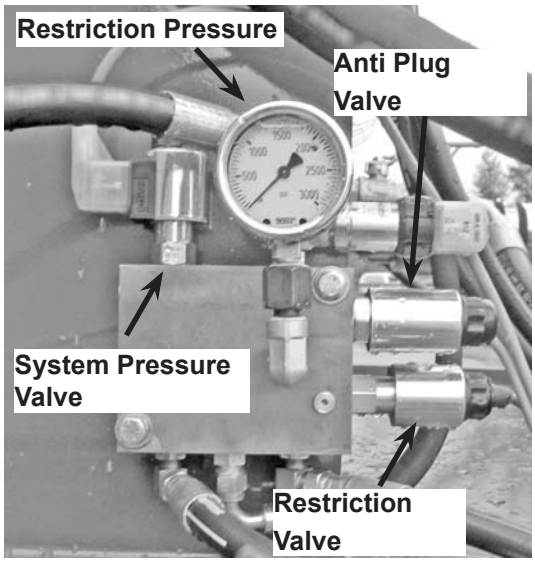
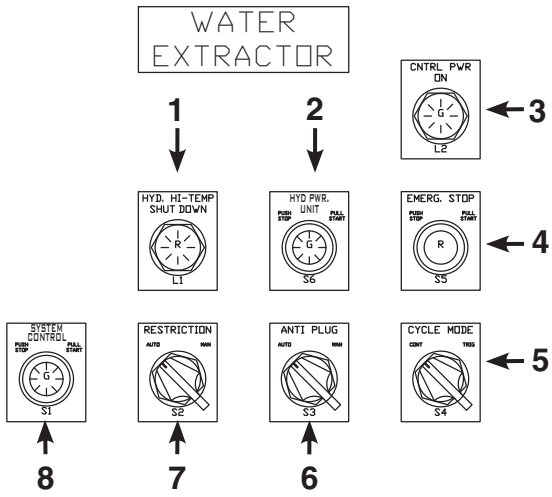


Figure 19. Proportional Valve Manifold

Control Box

The Control Box is used to control the WE-5. There are controls on the front panel as well as on the inside of the box.



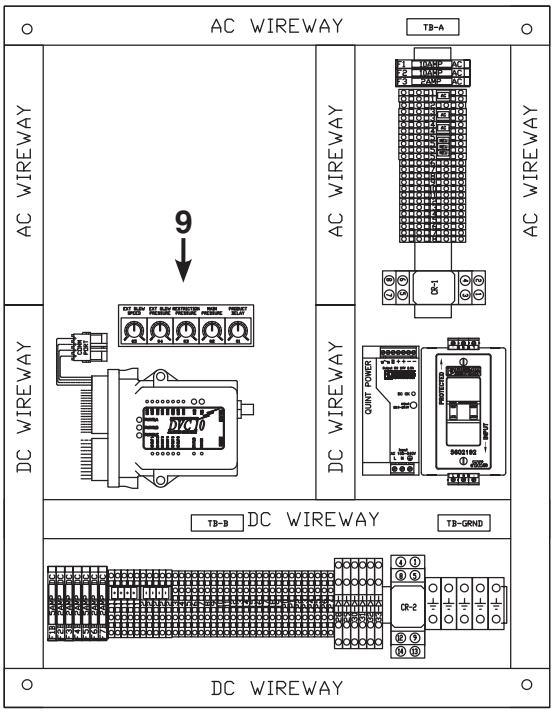


Figure 20. Control Box

1. HYD HI-TEMP SHUTDOWN (Hydraulic High Temperature Shutdown) Indicator Light (L-1) illuminates when the high temperature switch activates (150˚ F) and the machine shuts down (see Dual Oil Temperature Switches page 6).

2. HYD. PWR UNIT (Hydraulic Power Unit) Button (S-6) START and STOP the Hydraulic Power Unit electric motor. Make sure there is oil in the reservoir, suction valve in open position and pump is primed (see page 4) before turning on the motor.

3. CNTRL PWR (Control Power) Indicator light (L-2) illuminates when the system is on. CNTRL PWR Light and SYSTEM CNTRL light (L-1) need to be on for the plunger to cycle.

4. EMERG STOP (Emergency Stop) Switch (S-5) Shuts down all power to the control panel when in STOP mode. EMERG. STOP button needs to be pulled in the START position to start the WE-5.

5. CYCLE MODE Switch (S-4)
   - In CONT with the SYSTEM CNTRL switch in START the plunger will continuously cycle with the option of delaying plunger retract using the Potentiometer Pot #1 (see “Potentiometer” on page 14). The In-feed chute level detector is ignored.
   - In TRIG. the machine will cycle the plunger when the level detector (PROX 1) on the in-feed chute is triggered (see “Level Detector Adjustments” on page 15).

6. ANTI-PLUG Switch (S-3)
   - AUTO raises restriction rail.
   - MANUAL Anti-Plug valve opens and restriction pressure is zero (0) allowing restriction rail to gradually drop. Use MANUAL mode when unplugging the chamber (see “Unplugging The Chamber” on page 17).

7. RESTRICTION PRESSURE Switch (S-2)
   - AUTO is the normal operating setting for the switch.
   - MANUAL setting is only used to either set the system operating and restriction pressures or to allow for manual actuation of the plunger (via the directional valve) at system pressure when the System Control Switch is set to “STOP”.

8. SYSTEM CNTRL (System Control) Switch (S-1)
   - START loads the pump to pressure set by Pot 2 (MAIN SYSTEM PRESSURE). Plunger starts to cycle.
   - STOP main system pressure will go to minimum (150 to 500 psi). Restriction pressure will not exceed main system pressure. Plunger stops and can be controlled manually using the directional valve (see Figure 17 on page 7).

9. POTENTIOMETER Located inside the control box (see page 14). Adjustments for:

   - pot #1 PRODUCT DELAY.
   - pot #2 MAIN PRESSURE.
   - pot #3 RESTRICTION PRESSURE.
   - pot #4 SLOW DOWN PRESSURE.
   - pot #5 EXTEND PLUNGER SPEED.

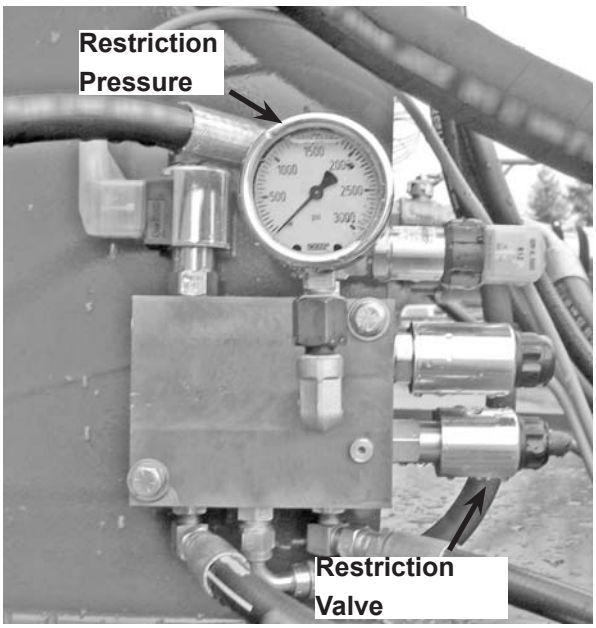


Figure 21. Restriction System Solenoid Valve

Restriction System

The pressure in the restriction system is set using the Restriction Pressure pot (see potentiometer on page 13) connected to the valve controller. This pot will vary the restriction pressure from approximately 75 psi to 2000 psi. Turning the pot to Min. will decrease the restriction rail cylinder pressure. Turning the pot to its Max setting will increase the restriction rail system pressure. The valve controller will then limit the pressure across the proportional valves (SV-3).

The restriction rail (see Figure 22), provides a variable restriction (modulation) on the passage of product to the discharge. This restriction regulates the force required from the plunger to push the product toward the discharge. It is the compressing action of the plunger that forces the water from the product. The water is evacuated through drain holes in the frame.

The restriction rail is located at the bottom of the discharge chute. The automatic restriction rail control system controls two hydraulic cylinders that operate the restriction rail. The restriction system proportional valve (see Figure 21) controls the force applied by the restriction rail to the product (dewatering pressure), and is adjusted to obtain the desired water content of the discharged product.

The force requirement depends on the products characteristics. The “freeness” and frictional characteristics should be taken into account when adjusting the restriction system proportional valve setting.

Note: Moving the control box RESTRICTION Switch (S-2) (see #7 on page 8) from “AUTO” to “MAN” allows the automatic restriction control system feature to be bypassed. In Manual mode, the Restriction Rail cylinder pressure is zero (0) and the Restriction Rail will fully open (lower) (see Figure 22).

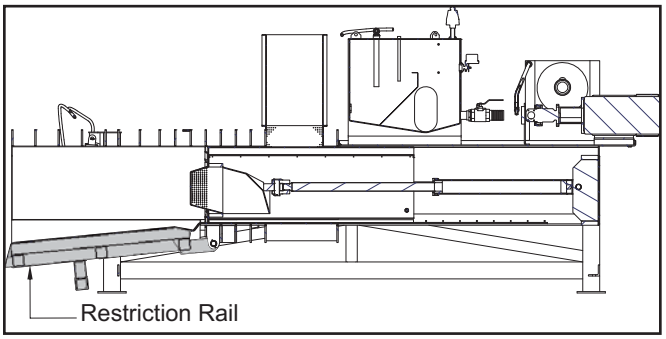


Figure 22. Restriction Rail Lowered

Operation

Starting the WE-5

⚠ CAUTION

Do not start the equipment until you are certain everyone is clear of the machine and all safety shields are in place.

Follow the steps below when starting your Water Extractor. Always make sure SYSTEM CNTRL switch is in STOP position before starting the WE-5. This will prevent the pump pressure from exceed approximately 500 psi, adding longevity to the hydraulic system.

1. Please read this manual in its entirety before start-up.

2. Make sure the hydraulic reservoir is filled with oil, oil float level switch shipping bracket has been removed, suction valves are locked in the open position and the pump is primed (see page 4).

3. Hydraulic oil temperature must be over 40 °F (5 °C) before starting the motor, and over 80 °F (27 °C) before operating the plunger.

4. Freeman recommends setting the potentiometers to the following settings after installation, the first time the water extractor is started:

PRODUCT DELAY ..... MIN
MAIN PRESSURE..... MIN
RESTRICTION PRESSURE 50%
SLOW DOWN PRESSURE..... MIN
PLUNGER SPEED.....25%

5. Push SYSTEM CNTRL switch to STOP (system pressure approximately 150 to 500 psi for idle start).

6. Pull EMERG. STOP switch to START position.

7. Turn RESTRICTION switch to AUTO.

8. Turn ANTI-PLUG switch to AUTO.

9. Turn CYCLE MODE switch to TRIG.

10. Pull HYD. PWR UNIT switch to START.

11. Wait at least 2 seconds, to reduce load on electric motor.

12. Pull SYSTEM CNTRL switch to START (system pressure will equal MAIN PRESSURE pot #3, page 14).

13. Load material into the feed chute. The plunger will retract according to Product Delay pot #1 when the level detector has sensed product for more than 1 second (see “Level Detector Adjustments” on page 15 and “” on page 12).

Turning Off the WE-5

1. Push the SYSTEM CNTRL switch to STOP.

2. Push the HYD. PWR UNIT switch to STOP.

Emergency Shut Down

1. Push the EMERG STOP switch (see Figure 20 on page 8). This stops the plunger and turns off all power to the water extractor.

⚠ WARNING

The EMERGENCY STOP switch has no load locks, the Water Extractor will coast to a stop.

Automatic and Manual Operation

Automatic Operation - On the control box, place:

1. SYSTEM CNTRL switch to START.

2. RESTRICTION switch to AUTO.

3. CYCLE MODE switch to TRIG (Activates Level Detector) or CONT (Using Potentiometer settings).

4. ANTI PLUG switch to AUTO.

Manual Operation - Place the control box:

1. SYSTEM CNTRL switch to STOP.

2. RESTRICTION switch in MAN.

3. Operate lever on directional valve to operate plunger (see Figure 17 on page 7).

Note: System should be restarted using the SYSTEM CNTRL switch (S-1) to reset system after any manual operation. RESTRICTION switch back to AUTO.

Auto Anti Plug

When the ANTI PLUG switch is set to AUTO, the anti-plugging function is controlled by the system controller. The Anti-Plug function provides for automatic clearing of a jammed plug when the restriction pressure is too high. This is a timed function that differs based on whether or not the plunger goes into Slowdown Mode (see "Adjustments" on page 14).

1. When the plunger begins to extend, an internal timer begins counting.

2A. If the plunger does not go into Slowdown Mode, Auto Anti Plug system starts if the plunger has not fully extended within 10 seconds.

2B. If the plunger does go into Slowdown Mode, the internal timer is re-set and begins counting again. Auto Anti Plug system starts if the plunger has not fully extended within 6 seconds of Slowdown Mode being activated.

3. When Auto Anti Plug system starts, the command signal to the Restriction System Proportional Valve is ramped down to approximately 75 psi. The pressure in the restriction system will then begin to bleed down and allow the plunger to force the restriction rail open and move the plug forward.

4. The Restriction System returns to the operating pressure when the plunger reaches full extension (home position).

Plugging The Chamber

Forming a plug in the chamber is the first step and important part of dewatering your product. The application that you are feeding into the machine will be pushed out the discharge end if there isn't a plug formed first. Each application (vegetable waste, paper pulp, etc.) may act differently when trying to form a plug. Sometimes using loose product is the only way to start a plug. Keep an eye on the volume of product feeding into the In-feed chute while forming the first plug, the machine may overflow.

1. Adjust RESTRICTION PRESSURE Pot #3 to approximately 300 psi (see Figure 29 on page 14). It may be necessary to adjust this pressure up or down to successfully build a plug.
2. Follow **Starting the WE-5** procedures 1 - 12 (see page 9)
3. Start feeding material into in feed chute. The chamber should start forming a plug after 7 or 8 plunger strokes. Observe the discharge area where the restriction rail should be in its up most position, restricting large volumes of product from exiting the machine.
4. Once the plug is formed, it may be necessary to adjust RESTRICTION PRESSURE Pot #3 up or down to help keep dewatering consistent after the initial startup plug has been pushed out the discharge end.

If a plug couldn't be formed following steps 1 through 4, try using loose hay or similar material to help form a plug, or call Freeman service department at: 1-800-285-7000

Operation Sequence

CYCLE MODE Switch: TRIG

1. **START-UP** SYSTEM CNTRL switch in START extends the plunger. AUTO PLUG switch in AUTO raises the restriction rail. Product falling through the in-feed chute falls onto the plunger top surface (see Figure 23).

2. **MATERIAL REACHES LEVEL DETECTOR** The level detector (see "Level Detector Adjustments" on page 15) will send a signal to the system controller when PROX 1 has been activated by product being sensed for more then 1 second (see Figure 24). The plunger will retract according to PRODUCT DELAY pot #1 (see "Potentiometer" on page 14 for adjustments). When the plunger activates PROX 4, the plunger speed is reduced.

3. **PRODUCT FALLS INTO CHAMBER** Plunger retracted and the product falls into the chamber. PROX 4, PROX 3 and PROX 2 activated (see Figure 25).

4. **PLUNGER EXTENDS** The plunger extends according to the settings of PLUNGER SPEED pot #5 and SLOW DOWN PRESSURE pot #4 (see "Potentiometer" on page 14 for adjustments).

5. **AUTO ANTI PLUG** starts if the plunger isn't fully extended in a preset amount of time (see "Auto Anti Plug"). The chamber is most likely plugged if this occurs (see "Unplugging The Chamber" on page 17). When the plunger passes PROX 3, the restriction rail pressure returns to pot #3 (Restriction Pressure) setting.

6. **PLUNGER STOPS** The plunger stops at full extension (home position), product piling on plunger. PROX 4, PROX 3 and PROX 2 are deactivated (see Figure 26).

7. **DEWATERING STARTS** Good dewatering starts when product has formed a plug in the chamber with the restriction rail up and the plunger pushing product forward.

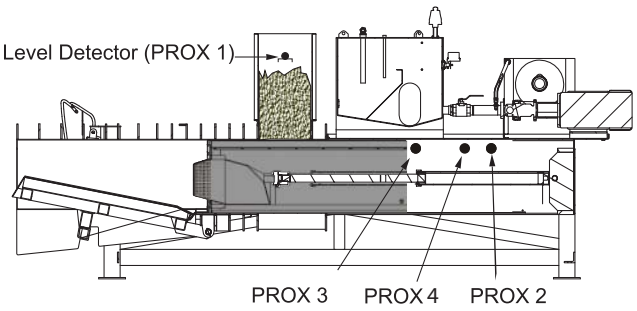


Figure 23. Product Piling On Top Of Plunger. Plunger In Home Position (fully extended).

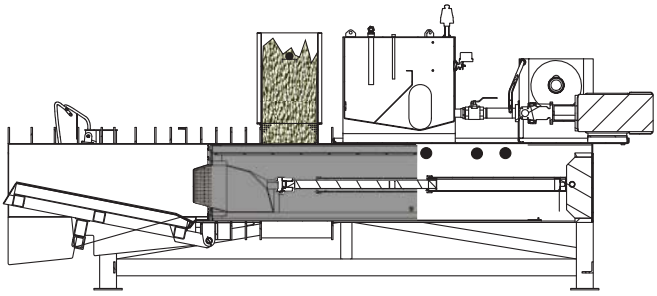


Figure 24. Product Reaches Level Detector

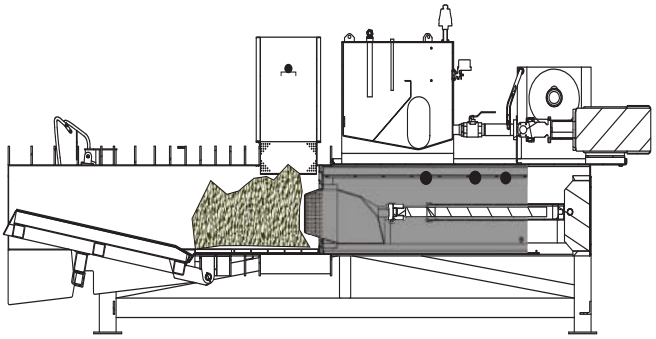


Figure 25. Plunger Retracts, Product Falls Into Chamber

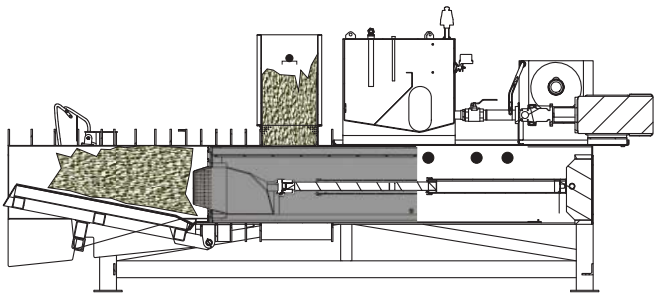


Figure 26. Plunger Extends, Product Falling On Top Of Plunger

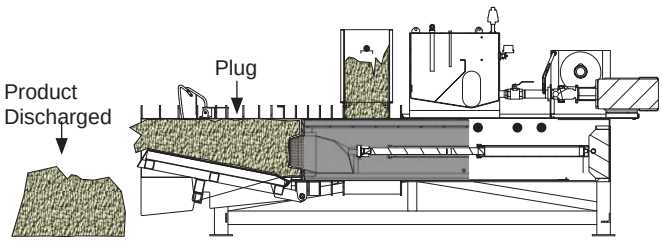


Figure 27. Plug Formed

NOTE: Any time the system is stopped with the EMERG STOP or the SYSTEM CNTRL Switch, when re-started the plunger will return to home position (see Figure 23).

CYCLE MODE Switch: CONT

1. **START-UP** At start-up the plunger is extended and restriction rail is raised. SYSTEM CNTRL switch in START extends the plunger. AUTO PLUG switch in AUTO raises the restriction rail. Product falling through the chute falls onto the plunger top surface.

2. **PLUNGER RETRACTS** The plunger retracts according to PRODUCT DELAY pot #1 (see “Potentiometer” on page 14 for adjustments). When the plunger activates PROX 4, the plunger speed is reduced.

3. **PRODUCT FALLS INTO CHAMBER** The plunger retracts and the product falls into the chamber. The plunger is fully retracted. PROX 4, PROX 3 and PROX 2 are activated (see Figure 25).

4. **PLUNGER EXTENDS** The plunger extends according to the settings of PLUNGER SPEED pot #5 and SLOW DOWN PRESSURE pot #4 (see “Potentiometer” on page 14 for adjustments).

5. **AUTO ANTI PLUG** starts if the plunger isn’t fully extended in a preset amount of time (see “Auto Anti Plug” on page 11). The chamber is most likely plugged if this occurs (see “Unplugging The Chamber” on page 17). When the plunger passes PROX 3, the restriction rail pressure returns to pot #3 (Restriction Pressure) setting.

5. **PLUNGER STOPS** The plunger stops at full extension (home position), product piling on plunger. PROX 4, PROX 3 and PROX 2 are deactivated (see Figure 26).

6. **DEWATERING STARTS** Good dewatering starts when product has formed a plug in the chamber with the restriction rail up and the plunger pushing product forward (see Figure 27).

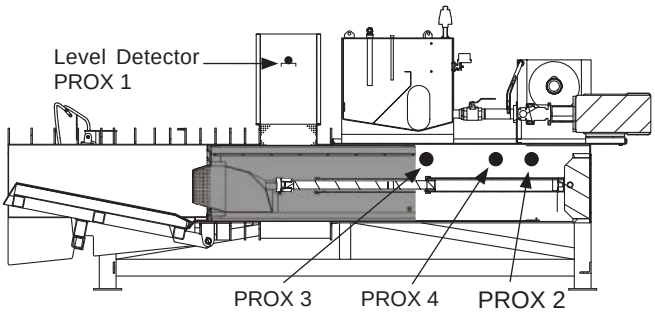


Figure 28. PROX 4, PROX 3 and PROX 2 Deactivated

Operating Tips

- Any adjustments to pressure or speed settings will take 6-10 plunger strokes before results will be noticed.

Forming the Initial Plug

- Start Up - When starting the machine and forming the initial plug, lower the restriction pressure to about 300 psi to help the initial plug form. Once the plug has been formed, the pressure can be increased to about 1000 psi to begin de-watering.

Restriction Pressure

- Adjust the restriction pressure as needed to achieve the amount of de-watering required. Always wait at least 6 - 10 plunger strokes after making a change to judge the affects of the change and before making further adjustments.

- To increase de-watering, increase restriction pressure to create more resistance, and/or slow down the plunger speed to allow more time for water to be squeezed out of the product. Your final setting will depend greatly on the product you are dewatering.

CYCLE MODE set to TRIG

- Form the initial plug with the CYCLE MODE set to TRIG. This will ensure that there is a full load in each stroke, making it easier to form the plug.

- The WE-5 is designed for a full load to be in front of the plunger on each stroke. In TRIG mode, the height of the level detector on the infeed chute should be adjusted to accommodate this.

  If the sensor is too high, too much product will be allowed into the infeed chute before the plunger cycles. If this occurs, some of the product will remain in the infeed chute where it will be sheared off by the plunger wipers. This will result in premature wearing of the top wipers.

Plugging, Unintentional

- If the machine becomes plugged, and the Auto Anti Plug mode has been selected, the system will sense the problem and temporarily dump pressure from the restriction cylinders, allowing the restriction rails to lower and the offending material to get pushed out of the chamber. The restriction cylinder pressure will then return to normal position for the next stroke. If this does not clear the jam, the machine must be stopped, and manually unplugged.

⚠ WARNING

Always turn off system control and lockout the electrical supply to the machine before inspecting, adjusting or servicing the machine.

Potentiometer Adjustments

The Potentiometer (see Figure 29) located in the control box has 5 adjustments; Product Delay, Main Pressure, Restriction Pressure, Extend Slow Pressure, and Extend Slow Speed.

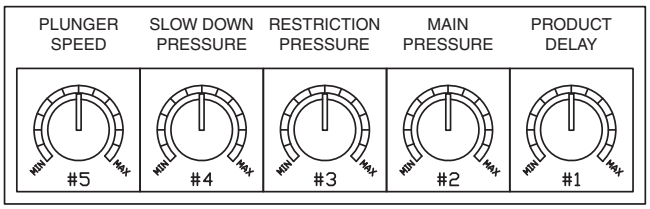


Figure 29. Potentiometer

PRODUCT DELAY Pot #1. (This adjustment increases or decreases the time that the plunger remains in the fully extended position in CONT. or TRIG. CYCLE MODE. This setting can be adjusted between 2 and 20 seconds.

Turning pot #1 fully CCW will set the delay to 2 seconds and will allow the plunger to cycle continuously. Turning pot #1 CW will increase the time delay up to a maximum of 20 seconds.

MAIN PRESSURE Pot #2 This adjustment varies the Main System Pressure between approximately 500 and 3000 psi. Pressure can be read on the main system pressure gauge (see Figure 17 on page 7).

RESTRICTION PRESSURE Pot #3. This adjustment varies the pressure to the restriction rail cylinders from approximately 75 psi to 2000 psi of the Main Pressure. Pressure can be read on the restriction pressure gauge (see Figure 19 on page 7). Pressure won't exceed main system pressure.

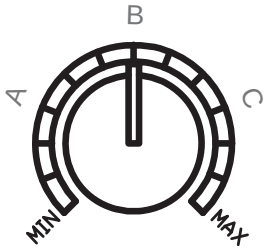
SLOW DOWN PRESSURE Pot #4. This adjustment sets the pressure at which the plunger goes into slow extend mode. When the pressure in the plunger cylinder exceeds this setting, the plunger will enter slow extend mode, reducing the plunger's extend speed to the PLUNGER SPEED setting. This setting can be adjusted from 0 - 100% of the MAIN PRESSURE setting.

PLUNGER SPEED Pot #5. This setting is only activated when the plunger cylinder exceeds the SLOW DOWN PRESSURE (pot #4) setting. This adjustment sets the speed with which the plunger extends and compresses the product by varying the flow of hydraulic fluid to the plunger cylinder on the compression stroke. The actual speed depends on the Main Pressure pot setting and the Plunger Speed pot setting. The retract speed is not adjustable.

Note: there is always about a 2 second delay in the plunger when it changes direction. Pot #1 will add to this delay.

PRESSURE AND TIME DELAY

APPROXIMATE VALUES



	Pot #1	Pot #2	Pot #3	Pot #4
	Product Delay	Main Pressure	Restriction Pressure	Slow Down Pressure
MIN	2 sec	500 psi	75 psi	0 psi
A	6 - 8 sec	1000 - 1200 psi	25% Main Pressure	25% Main Pressure
B	11 - 13 sec	1700 - 1900 psi	50% Main Pressure	50% Main Pressure
C	15 - 17 sec	2300 - 2500 psi	75% Main Pressure, up to 2000 psi	75% Main Pressure
MAX	20 sec	3000 psi	100% Main Pressure, up to 2000 psi	100% Main Pressure

Figure 30. Pot, Pressure and Delay. (Values are Approximate)

Level Detector Adjustments

The Level Detector that is located on the side of the in-feed chute (see Figure 31) is active only when CYCLE MODE switch is in TRIG position. The level detector will detect product that sits in front of it for more than 1 second. The level detector will send a signal to the system controller and the plunger will move according to pot #1 (PRODUCT DELAY) setting (see “Potentiometer” on page 14).

Freeman recommends adjusting Product Delay pot #1 to MIN for no delay on initial startup. Once the product is detected, the plunger will retract with no delay.

⚠ CAUTION

Always turn off system control and lockout the electrical supply to the machine before inspecting, adjusting or servicing the machine.

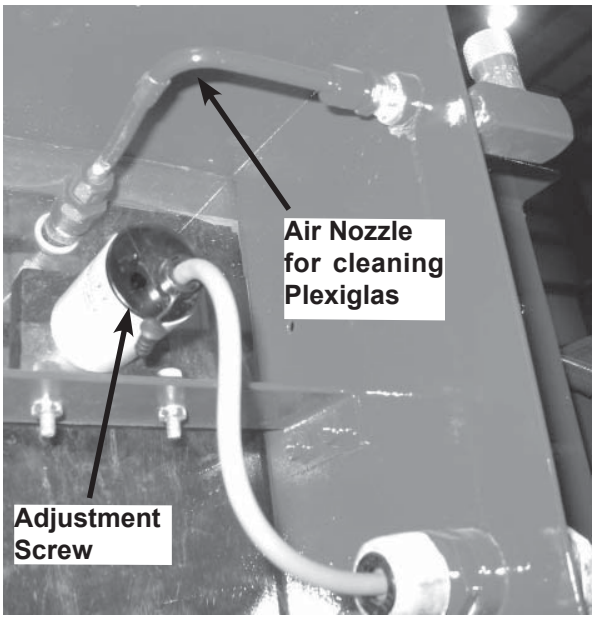


Figure 31. Level Detector (PROX 1) / Air Nozzle

Air Nozzle For cleaning the Plexiglas in front of the Level Detector. Connect to a compressed air source (supplied by others) with 50 - 100 PSI and approximately 5 CFM.

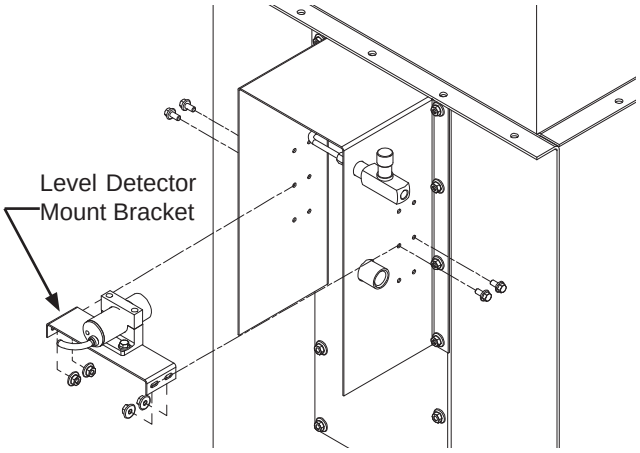


Figure 32. Level Detector

Level Detector Vertical Position There are three (3) vertical positions the level detector can be adjusted to (see Figure 32). Remove mounting hardware and adjust to the preferred level. Maintain 1/16” clearance between the sensor and the window. Tighten hardware.

Adjust Level Detector Sensitivity The cover plug at the back of the level detector covers the sensitivity adjustment (see Figure 31). Remove the cover plug. The plug provides a seal against dirt and moisture.

Note: The level detector sensitivity adjustment screw has no stop. The resistance change of this potentiometer occurs over approximately 16 turns.

Rotating the sensitivity adjustment clockwise increases the detecting distance. Turn the exposed sensitivity adjustment clockwise (+ direction on the detector marking) until the detector switch is turned on (detector light on). Note the position of the screwdriver slot.

Rotating the sensitivity adjustment counterclockwise decreases the detecting distance. Turn the exposed sensitivity adjustment counterclockwise (- direction arrow on the detector marking), noting the number of turns, until the detector switch is turned off (detector light off). Note the number of turns difference between the on and off position.

Now check the sensitivity range of the detector by holding something (piece of cardboard) in front of it. Start out at 3” away from the sensor inside the in-feed chute and slowly move closer to it while watching for the level detectors red light to shine. The plunger will retract once the red light has been on for more than 1 second.

Replace Cover Plug Replace the rubber plug at the back of the level detector. The plug provides a seal against dirt and moisture.

Water Throttling Valve

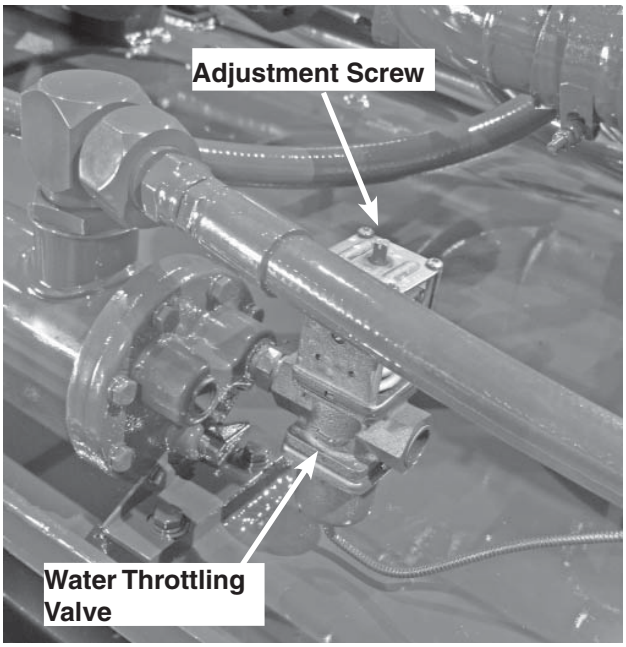


Figure 33. Throttling Valve

Adjustment: The temperature at which the valve begins to open is adjustable. Turn the adjusting screw clockwise to DECREASE opening temperature; turn counterclockwise to INCREASE opening temperature. The opening point range of temperatures is 75° F (24°C) to 135° F (57° C). Valve is fully open 36˚ F (2° C) above the opening point.

NOTICE

This valve is not calibrated before shipping, so final desired temperature setting must be established experimentally upon installation.

Factory Settings

Plunger retraction delay: Not pre-set.

Maximum main system pressure: approximately 3000 PSI.

NOTICE

An adjustment of the plunger system relief valve to over 3,000 psi could cause damage to the system.

Minimum main system pressure: approximately 150 to 500 PSI.

Maximum restriction pressure: approximately 2000 PSI (will not exceed maximum system pressure).

Minimum restriction pressure: approximately 75 PSI (see Auto Anti Plug page 10).

Water Throttling Valve: Must be set at installation. Recommend setting to OPEN at 110˚ F (54° C).

Temperature Switch: Set to SHUT DOWN system at 150˚ F (65° C) reservoir temperature.

Unplugging The Chamber

Chamber plugging should never occur unless foreign material gets into the chamber and causes the chamber to plug up.

Anti-plug system operation The control box anti-plug switch energizes the anti-plug solenoid valve (SV-4). The restriction system then reduces the pressure to the restriction rail cylinders to approximately 75 psi, permitting the plunger to more easily discharge the product.

Unplugging steps There are two ways to unplug the chamber:

1. ANTI-PLUG switch in MAN. with Potentiometer Pot #1 set to MIN., SYSTEM CNTRL switch in START. and CYCLE MODE switch in CONT. The restriction cylinder pressure will be reduced to approximately 75 psi and will open. Feed product to the machine while the plunger cycles to push the plug out the discharge end.

2. HAND REMOVAL. Move the Anti-Plug switch to MANUAL to fully open the restriction rail. Turn off water extractor. Use high pressure water or hand tools to manually remove the plugging material.

⚠ CAUTION

Crush Hazard - Always turn off system control and lockout the electrical supply to the machine before inspecting, adjusting or servicing the machine.

Safety Precautions

If maintenance or repairs are to be performed on machine, the following precautions should be observed.

Shut down the system and lock out the hydraulic pump motor and the cooling fan motor at the disconnect switch.

On some machinery, cylinders hold heavy loads. Opening the hydraulic lines with the load raised may permit the load to fall. Hydraulic lines can inadvertently be opened by disconnecting a hose, pipe, or by removing a high pressure filter bowl to change the element. On such machinery, the load should be lowered to rest position before disturbing the hydraulic circuit.

Maintenance Precautions

Think clean!!! The worst enemy of a hydraulic system is contamination. As long as your system is intact, it is nearly impossible for dirt to get into the oil. Dirt gets into the oil when you provide an opening. It can enter through holes left uncovered when you remove some component such as a valve, breather or cap.

If you adhere the following procedures, you will minimize the risk of contamination.

Clean and wash down the entire area that is going to be worked on. Before removing any component or disconnecting any line, be sure you have the right caps, plugs and cover plates to close the openings that will be exposed.

Thorough cleaning of pipe and hoses before installing or reconnecting is essential. Whenever a pipe or hose is disconnected, or a system component is removed, the system may have to be flushed. Whenever field repairs on the components are made, flushing the components is necessary. For flushing instructions see page 19.

Disassembly of components will void any warranty considerations. Components must be shipped to Allied Systems Co. fully assembled.

Once you have replaced hoses or components, air and contaminants have a chance to enter the system. You must purge the pump for at least 10 minutes to get air out of the system. You may run your pressure up to 3000 psi only after all air is out of the system.

Maintenance

Reservoir Oil Level

Sight Gauge An oil level gauge is installed on the reservoir. It will indicate oil level and approximate oil temperature.

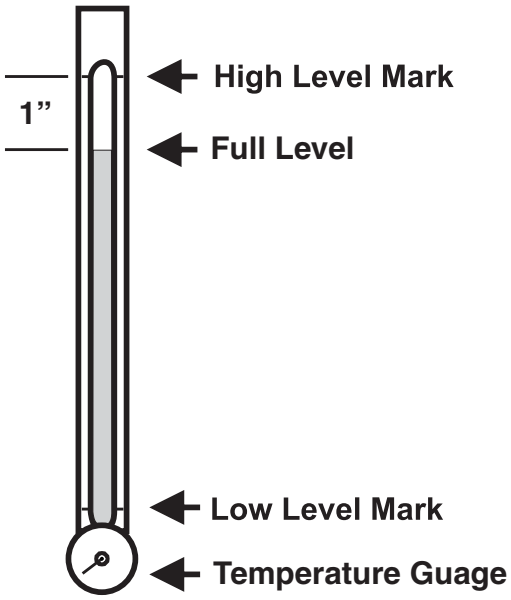


Figure 34. Oil level sight gauge

Reservoir Oil Level Oil Level Float switch is installed to detect the oil level. Motor starter shuts off when oil level is 1” below the low level mark. The reservoir is full when the Oil level is 1” below the High Level Mark with the plunger cylinder extended and the restriction cylinders retracted (see Figure 34).

Oil Temperature A dual set point temperature switch is installed to detect oil temperature in the system. If the oil reaches the temperature set on the high circuit adjustment, the switch will automatically shut down the system and turn on an indicator light. The lower setting controls operation of the fan motor and the oil cooler (if so equipped).

⚠ WARNING

High-Pressure Fluids. Escaping fluid under pressure can penetrate the skin, causing serious injury. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure.

Use a piece of cardboard to search for leaks. If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene can result.

Pump and Motor Coupler The coupling alignment must be within 0.003 total indicator reading on the horizontal, vertical, and angular planes. Adjust as necessary.

Procedure To Fill an Empty Reservoir Reference “Lubrication” on page 2, for hydraulic oil recommendations.

1. Clean the area around the power unit “fill port”.
2. Install a clean filter element in the return line filter.
3. Pump one gallon of oil into a waste container to flush the filter pump and hose. **Do not use this oil.**
4. Remove the cap from the “fill port”.
5. Fill the reservoir until oil in the sight gauge is 1” below the High Level Mark (see Figure 34).
6. Replace cap on fill port.
7. Open the return line shut-off valve.

Procedure to Add Oil to the Reservoir Reference "Lubrication" on page 2, for hydraulic oil recommendations.

1. Lockout the pump at the disconnect switch.

2. Clean the area around the power unit "fill port".

3. Pump one gallon of oil into a waste container to flush the filter pump and hose. **Do not use this oil.**

4. Remove the cap from the "fill port".
5. Fill the reservoir until oil in the sight gauge is 1" below the High Level Mark with the plunger cylinder extended and the restriction cylinders retracted.

6. Close the "fill port" valve and disconnect the filler hose. Replace cap on fill port.

7. Remove lockout from the disconnect switch.

To Change Oil and Clean a Contaminated Reservoir

1. Lockout the pump at the disconnect switch.

2. Completely drain the reservoir, return line filter housing and return lines.

DO NOT attempt to reuse this oil if it does not conform to original manufacturer's specifications. This oil MUST be filtered and then tested by the original manufacturer. The oil **must** conform to the original manufacturer's specification before reusing. If it does not conform to original manufacturers' specifications, catastrophic failure may occur.

3. Remove the end cover, clean debris out of reservoir and wipe inside completely clean. Install a new gasket and replace cover.

4. Install a clean element in the return line filter.

5. Fill reservoir with new oil (see Figure 11 on page 5).

Flushing
Allied Systems requires a complete system flush after installation, after intrusion into the system or after a catastrophic failure. Actuator flushing is required when prescribed in certain actuator repair procedures and after catastrophic failure.

Most systems can be properly flushed by utilizing the power unit system pump (s) to circulate fluid out through the fluid lines and back through the filter into the reservoir.

Verify the proper amount and type of filtered oil is in the reservoir.

Verify enough spare filter elements for all filters are on site before beginning the flushing process. Note: Use only the Allied Systems Co. specified brands and types of filter media.

Avoid flushing through any valves or actuators. These items are pre flushed by Allied Systems Co. or the manufacturer. Loop the existing field installed hose assemblies around these components using unions, with the exception of the power unit blocking valve. Once flushing has started, it is common to get surges of air from the fluid lines into the reservoir, which may cause the pumps to be noisy as air bubbles are drawn into the pump. If the noise persists for long periods of time, and the fluid is aerated or foamy, stop the flushing process and allow the fluid to settle out overnight. If the noise persists beyond a reasonable period of time, consult the manufacturer.

Turbulent flow is essential to all flushing procedures. To achieve this, the Reynolds number (Re) must exceed 4,000 throughout the system. It is calculated as follows:

(Re)=(14,646 x Q)/(v x d)
Where Q = flow rate in GPM, d = pipe I.D. in inches, v = viscosity of fluid in SSU.

Flush only one branch of the system at a time to insure that the proper flow velocity and Reynold's Number (Re) is achieved in each branch. Cap off the other legs.

If necessary, tie multiple pumps together to achieve proper (Re) in each branch of the circuit.

Turbulent flow may also be achieved by vibrating or flexing the lines. Back off the pilot chokes and allow the blocking valve to suddenly open, causing the accumulator oil to surge through the system, giving a temporarily high Reynolds Number (Re).

Maintenance

The system must be flushed so the oil cleanliness meets Allied Systems ISO cleanliness codes 20/17/14. A starting rule of thumb is to flush for a minimum of one hour per 100 ft. of pipe and hose (total of pressure and return lines). While flushing, strike all welds with a hammer to dislodge any scale created as a result of welding.

Before the system may be started-up, the oil **must** be sampled and tested to meet Allied Systems ISO cleanliness codes 20/17/14. This includes every component in the system, especially servo valves and pumps.

If the oil does not meet the ISO cleanliness codes 20/17/14, it could reduce component life or cause catastrophic failure. Continue flushing the system until this cleanliness code is met.

After flushing is completed, first verify that the oil cleanliness meets Allied Systems ISO cleanliness codes 20/17/14, then verify that no filters are indicating impending bypass. Also verify a supply of spare filter elements are on hand.

Reconnect hoses to actuators & valve packages. Start the pump motor and check for leaks in the entire system.

Be sure the machinery is clear of all objects and people.

⚠ WARNING

When the pump is restarted after the flushing procedure has been completed, the actuators may move suddenly.

Preventative Maintenance

Daily

- Check oil level in hydraulic power unit reservoir.
- Check oil temperature at temperature gauge. Do not start the motor if the hydraulic oil is below 40 °F (5 °C).
- When the hydraulic oil is between 40 °F and 80 °F (5 °C and 27 °C) the motor may be started and used to warm the oil to over 80 °F (27 °C) before putting any load on the machine.
- Check heat exchanger for any debris that may be blocking the fins, and use air to blow the debris out.
- If the system is operating, the temperature should be between 120 °F and 150 °F (48 °C and 65 °C).
- Check for leaks around hydraulic power unit.

Weekly

- Perform daily service.
- Check entire system for leaks.
- Check pressure gauge settings.
- Check all visual dirt indicators on all filters (Note: Most indicators work only when under full flow condition).

Monthly

- Perform Daily & Weekly service.
- Clean up any oil that may be in the drip pan.
- Check the electric motor to pump coupling insert for alignment and wear and lubricate.

Every Six (6) Months

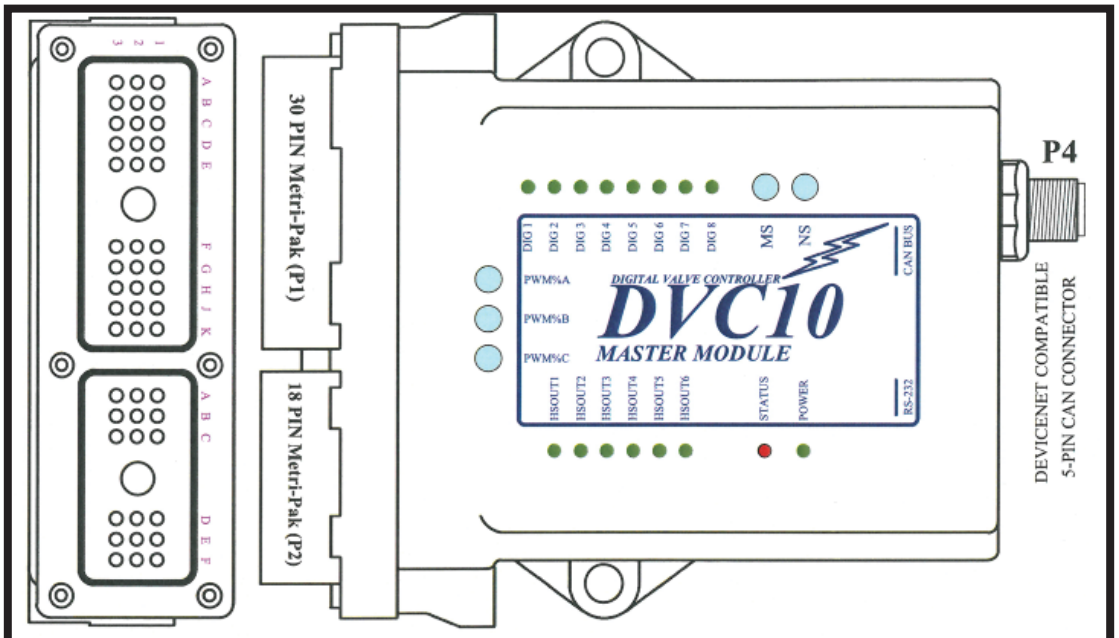
- Perform Daily, Weekly, and Monthly Service.
- Sample the oil for cleanliness, viscosity and additives. Oil must meet Allied Systems ISO cleanliness Codes 20/17/14. Change oil accordingly.
- If oil is not being tested every six (6) months, then change the oil yearly.
- Check for lubrication of the electric motor.

System Controller

If any solenoids are disconnected, the system controller will detect an open circuit and will not operate these valves after reconnected until the system controller power is cycled. Power may be cycled using the Emergency Stop switch.

Proximity sensors should be adjusted between 3/16” and 1/4” from triggers.

Properly working sensors must provide a signal back to the system controller. If there is not a light indicating operation on the system controller body, this may be checked most easily at the terminal block. The plunger sensors are normally open and provide a 20 - 24 v signal to the system controller when activated, while the product sensor is normally closed and removes it’s 20-24 v signal when triggered.



30 PIN Metri-Pak (P1)

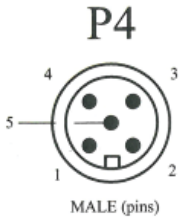
PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
A1	RXD	D2	UNIV. 2 INPUT	G3	DIGITAL IN 2
A2	TXD	D3	SIG COM	H1	ANALOG IN 3 POT REF
A3	RTS	E1	UNIV. 3 POT REF	H2	ANALOG IN 3
B1	SIG COM	E2	UNIV. 3 INPUT	H3	DIGITAL IN 3
B2	SIG COM	E3	SIG COM	J1	DIGITAL IN 4
B3	SIG COM	F1	ANALOG IN 1 POT REF	J2	DIGITAL IN 5
C1	UNIV. 1 POT REF	F2	ANALOG IN 1	J3	DIGITAL IN 6
C2	UNIV. 1 INPUT	F3	DIGITAL IN 1	K1	+POWER IN
C3	SIG COM	G1	ANALOG IN 2 POT REF	K2	DIGITAL IN 7
D1	UNIV. 2 POT REF	G2	ANALOG IN 2	K3	DIGITAL IN 8

18 PIN Metri-Pak (P2)

PIN	FUNCTION	PIN	FUNCTION
A1	+POWER IN	D1	HS OUT 5
A2	+POWER IN	D2	HS OUT 6
A3	PWM OUT 1	D3	PWM OUT 2
B1	HS OUT 1	E1	PWR COM
B2	HS OUT 2	E2	PWM OUT 3
B3	PWM OUT 1	E3	PWM OUT 3
C1	HS OUT 3	F1	PWR COM
C2	HS OUT 4	F2	PWR COM
C3	PWM OUT 2	F3	PWR COM

5 PIN CAN (P4)

PIN	FUNCTION
1	DRAIN
2	** V+ (NC)
3	** V- (NC)
4	CAN_H
5	CAN_L



**Power & GND are not supplied to the CAN Bus by the DVC10.

Figure 35. System Controller

Troubleshooting

System Controller Continued

	Function	Normal (Powered) Condition
MS	Module Status	Lit (green) after power-up. While downloading a program to the module, MS and NS LED's will flash in an alternating fashion.
NS	Network Status	Lit or flashing after power-up. While downloading a program to the module, MS and NS LED's will flash in an alternating fashion.
DIG1	Ramp Sensor	Green light on.
DIG2	Cycle Mode	CONT. Green light on.
DIG3	Product Level Detector (PROX 1)	MANUAL Green light on.
DIG4	Plunger Retracted Proximity Switch. (PROX 2)	Green light on.
DIG5	Plunger Extended Proximity Switch. (PROX 3)	Green light on.
DIG6	SYSTEM CNTRL Switch	START Green light on.
DIG7	RESTRICTION Switch	AUTO Green light on.
DIG8	Anti-Plug Switch	AUTO Green light on.
PWM%A	Not Used	N/A
PWM%B	Restriction Pressure	Green light on when pressure at 75 psi. and gradually turns solid red at 3000 psi.
PWM%C	Main System Pressure	Green light on when pressure at 75 psi. and gradually turns solid red at 3000 psi.
HSOUT1	Plunger Retract	Green light on.
HSOUT2	Plunger Extend	Green light on.
HSOUT3	Restriction Solenoid	Green light will be on if Anti-Plug is inactive and plunger is extending (switch in auto mode) or Anti-Plug is inactive and restriction is in manual mode
HSOUT4	Anti-Plug Solenoid	Green light on when in Manual or 90% of system pressure.
HSOUT5	Pump Control Power	Green light on only when pump is on.
HSOUT6	Not Used	N/A
STATUS	Not Used	N/A
POWER	Power Indicator	Lit after power-up

HS1 – HS6 are all outputs. If one of these is slowly blinking there is an open circuit to that output. If it is blinking rapidly there is a short circuit to that output. Under normal trouble free operation the LED will either be on or off. If it is on that output is active, and if the LED is off the output is inactive.

Dig 1 – Dig 8. These show the state of the digital inputs. If the LED is on the system controller is receiving a signal from the input. If the LED is not on there is no signal from the input.

The three LED's labeled PWM%-A – PWM%-B – PWM%-C change color based on how much current is flowing through that output. If there is no light, the output is currently not in use. If the light is fully green, the system controller is driving full current through that output. If it is fully red it is driving minimum or no current through the output. When driving current between min and max the color will change from (minimum to maximum) bright red to lighter red to orange to light green to bright green. When driving from maximum to minimum it does the opposite. If one of these LED's is blinking red there is a short circuit on that output. If it is blinking green there is an open circuit to the output.

The power LED will flash if there is too much voltage being delivered to the unit. If there is no light at the power LED or it is blinking erratically there is not enough voltage to power it up, or it has shut down due to too much voltage. In normal operation this light should be steadily on.

Note: Plunger Retract Slow Down Proximity Switch (PROX 4) uses Univ Input 3.

Pump

Symptom	Probable Cause	Remedy	Reference
Excessive pump noise	1. Pump/motor coupling mis-alignment.	Re-align pump & motor accurately. Align to within .003” total indicator reading. Note: Couplings should not be forced tight against each other. Leave a small amount of end play.	
	2. Oil level low.	Fill reservoir so that surface of oil is 2 to 3” below the full mark with cylinders extended.	See “Reservoir Oil Level” on page 18
	3. Air leak in suction line, air leak in case drain line, or air leak around shaft packing.	Apply packing grease on joints & around shaft while listening for change in sound of operation. Tighten or replace.	
	4. Direction of pump rotation not correct.	A licensed electrician should check the Input Phase.	See “Electrical Con-nection” on page 3
	5. Air bound pump.	Air is locked in pumping chamber & has no way to escape. Stop pressure line or install special by-pass line back to tank so that air can pass out of the pump. An air bleed valve need is indicated.	
	6. Restricted flow through suction piping.	Check suction piping & fittings to make sure full size is used throughout. Make sure suction line is not plugged with rags or other foreign material.	
	7. Pump case drain does not terminate below oil level.	Extend slip line piping so that it terminates below the oil surface when oil is at its lowest during any part of one machine cycle.	
	8. Pressure ring is worn.	Replace. This condition caused by hot, thin, dirty oil or no oil at all. An air bound condition will also con-tribute to the worn pressure ring.	
	9. Restricted filter or strainer.	Clean filter or strainer.	See “Hydraulic Power Unit” on page 5
	10. Worn or broken parts.	Replace.	
	11. Reservoir air vent plugged.	Air must be allowed to circulate in the reservoir. Clean and /or replace breather.	See “Hydraulic Power Unit” on page 5

Troubleshooting

Pump Continued

Symptom	Probable Cause	Remedy	Reference
Bearing failure	1. Chips or other foreign matter in bearings (contamination).	Make sure clean oil is used. Essential for efficient operation & long life of bearings.	
	2. Coupling misalignment.	Re-align pump & motor.	
Pump not delivering oil	1. Wrong direction of pump rotation.	Observe arrow on pump case of name-plate. Direction of rotation must correspond.	See “Electrical Connection” on page 3
	2. Oil level low in reservoir.	Fill reservoir so that surface of oil is 2 to 3” below the full mark with cylinders extended.	See “Reservoir Oil Level” on page 18
	3. Air leak in suction line.	Apply good pipe compound non-soluble in oil & tighten joints.	
	4. Suction filter or plugged line.	Filters must be cleaned of lint or dirt soon after first start of unit. Periodic checks should be made as a preventive maintenance precaution.	
	5. Bleed-off in other portion of circuit.	Check for open center valves or other controls connected to tank.	
	6. Oil viscosity too high for proper priming.	Thinner oil should be used per recommendations for given temperatures & service.	
	7. Sheared key at rotor or coupling	Check and replace.	
	8. Pump cover too loose.	Tighten bolts on pump cover.	
Pump not delivering pressure	1. Pump pressure not set high enough	Contact Allied Systems Co. Service Department.	
	2. Oil by-passing to reservoir.	Inspect circuit pressure progressively. Watch for open center valves or other valves open to reservoir.	
	3. Defective pressure gauge or gauge line is shut off. Dirt may plug gauge orifice.	Install good pressure gauge in a line open to pump pressure.	

Pump Continued

Symptom	Probable Cause	Remedy	Reference
System excessively hot	1. Pump operates at higher pressures than required	Contact Allied Systems Co. Service Department.	
	2. High ambient temperature.	Relocate power unit or baffle against heat source.	
	3. Oil in reservoir low.	Raise oil level to recommended point.	See “Reservoir Oil Level” on page 18
	4. Internal System leakage excessive.	Check progressively through the system for losses.	
Leakage at oil seal	1. Seal installed incorrectly.	Correct installation.	
	2. Pressure in pump case.	Observe case drain line for restriction. Check drain line circuitry for excessive back pressure arrangement.	
	3. Poor coupling alignment.	Re-align pump & motor shafts. Align to within .003” total indicator reading.	
	4. Seals damaged during installation. Damaged or scratched shaft seal.	Contact Allied Systems Co. Service Department..	
	5. Abrasives on pump shaft.	Protect shaft from abrasive dust & foreign material.	
Bearing failure	1. Abuse during coupling installation to pump	Most pumps are not designed to handle end thrusts against the drive shaft. Eliminate excessive force when installing coupling. Couplings should be a slip fit onto the pump shaft.	
	2. Overhung load.	Many pumps are not designed to handle any overhung load or side thrust on the drive shaft. Contact Allied Systems Co. Service Department.	
	3. Incorrect fluid	See manufacture’s oil recommendations.	See “Hydraulic Power Unit” on page 5
	4. Excessive or shock load	Contact Allied Systems Co. Service Department.	

Troubleshooting

Filter

Symptom	Probable Cause	Remedy	
Dirty Oil	1. Plugged Cartridge.	Replace Cartridge.	
	2. Partial bypass continuous.	Correct filter size and oil viscosity.	
	3. Improper micrometer rating.	Check particle size and switch to proper size rating.	
	4. Improper changes.	Correct maintenance procedure or add bypass indicator.	

Gauges

Symptom	Probable Cause	Remedy	
Incorrect indication	1. Gauge defective	Check zero pressure & remedy or replace broken tube, broken movement, tube spring, broken needle, pegged needle or gauge pinion gear.	
	2. Check accuracy	Check gauge against calibration standard.	
Poor gauge life	1. Gauge subject to mechanical shock.	Isolate shock by switching to glycerin filled gauge.	
	2. Bourdon tube fatigue	Use gauge isolator to remove continuous pressure on tube.	
	3. Pegged needles	Add pressure flow snubber to restrict needle movement in addition to glycerin (or fluid filled gauge).	
Broken housing	1. Too much pressure	Remove downstream restriction or change to corresponding higher pressure or flow rated filter.	
	2. Too much mechanical shock.	Add shock absorbing material.	
Broken Lens	1. Some degreasers will scratch or “fog” up lens	Replace gauge.	

Machine Function

Symptom	Probable Cause	Remedy
Adjustments don't seem to work	Not enough time for adjustments to be noticed.	Wait for a minimum of 10 plunger strokes before beginning to judge the effect of the adjustment.
Plugging	Plunger stalls and motor overload device is tripped.	Reduce restriction pressure.
Jerky plunger stroke	Air in oil.	The air is most likely between the reservoir and the pump. Replace reservoir filter and make sure fittings are tight between reservoir and pump.
	Worn or defective plunger piston seals.	Replace piston seals.
	Intermittent solenoid valve action.	Loose electrical connection. Bad solenoid. Check electrical connection. Replace solenoid.
	Defective pump.	Replace or have factory service the pump.
Slow plunger stroke	Extend Slow Speed Pot #5	Extend Slow Speed pot #5 can be set low enough to not allow the plunger to move. Turn pot #5 CW until the plunger reaches the desired speed.
	Air in oil.	The air is most likely between the reservoir and the pump. Replace reservoir filter and make sure fittings are tight between reservoir and pump.
	A nonstandard size pump.	Only use a pump recommended from Allied Systems.
	Worn or defective plunger piston seals.	Replace piston seals.
	A restriction in the hydraulic system.	Replace filter in reservoir.

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