Reclaim Water Skid

085010 / 085020 - Reclaim,5Hp Pump(s),110/220 GPM

Specifications	
Production	110 / 220 GPM
Process Pump(s)	5 HP
Motor Voltage	480V 3Phase
FLA per Motor	6.1 A
Frequency	60 Hz
Control Voltage	120V Single Phase
Control Breaker Size	20 A
Air Input (for Tank Dump Option)	8 CFM @ 55 PSI
Debris Trap	8" SS Basket
Inlet Plumbing - Suction Lines	3" PVC SCH80
Output Line	3" PVC SCH80
Re-Circulation Line	1" PVC SCH80
Return Line to Trench or Pit	3" Drain
Repress Pump Outlet (FNPT)	1-1/4" FNPT
Dimensions	48"W x 76"H x 34"D

General Info

The purpose of this manual is to provide the necessary information to install and operate the Hydro-Chem equipment to exceed your defined expectation.

The Reclaim system will include a compact stainless steel constructed skid frame. A frame-mounted instrument panel will include flow meters, pressure gauges, and an electrical control panel. This unit includes either one or two 5HP process pumps, each with a flow of 110 GPM. Optional tank dump and odor control upgrades are available for each reclaim unit.

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System Overview

Figure 1 outlines the overall flow of the HCS Reclaim System while Figure 2 breaks down skid components.

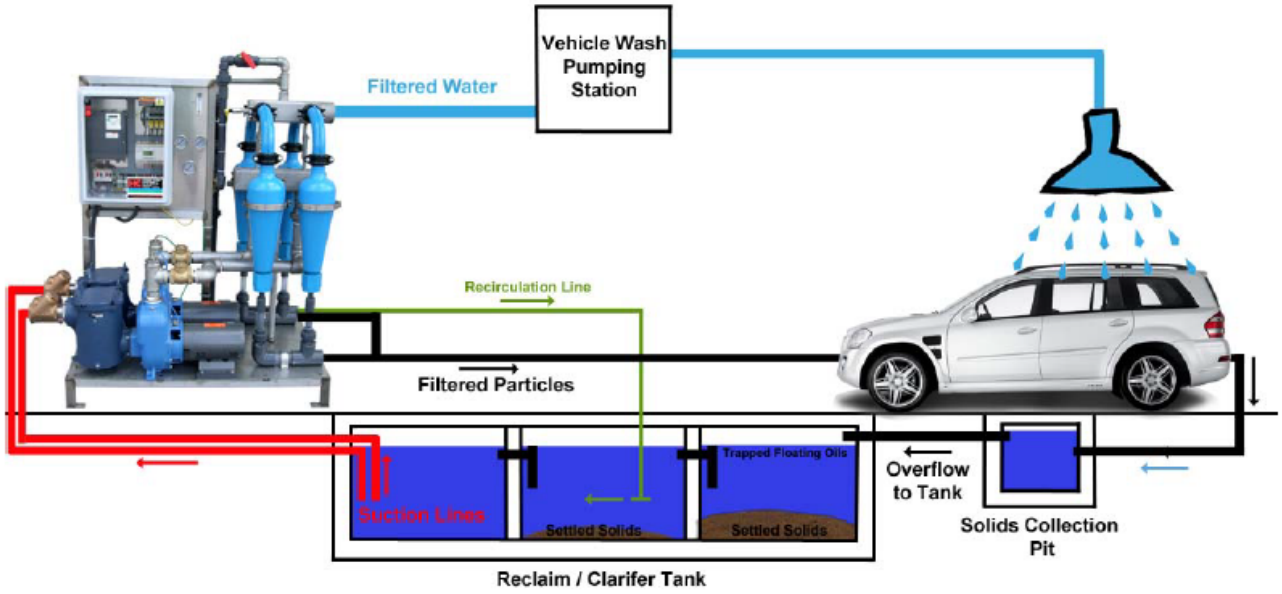


Figure 1. Reclaim Flow Concept

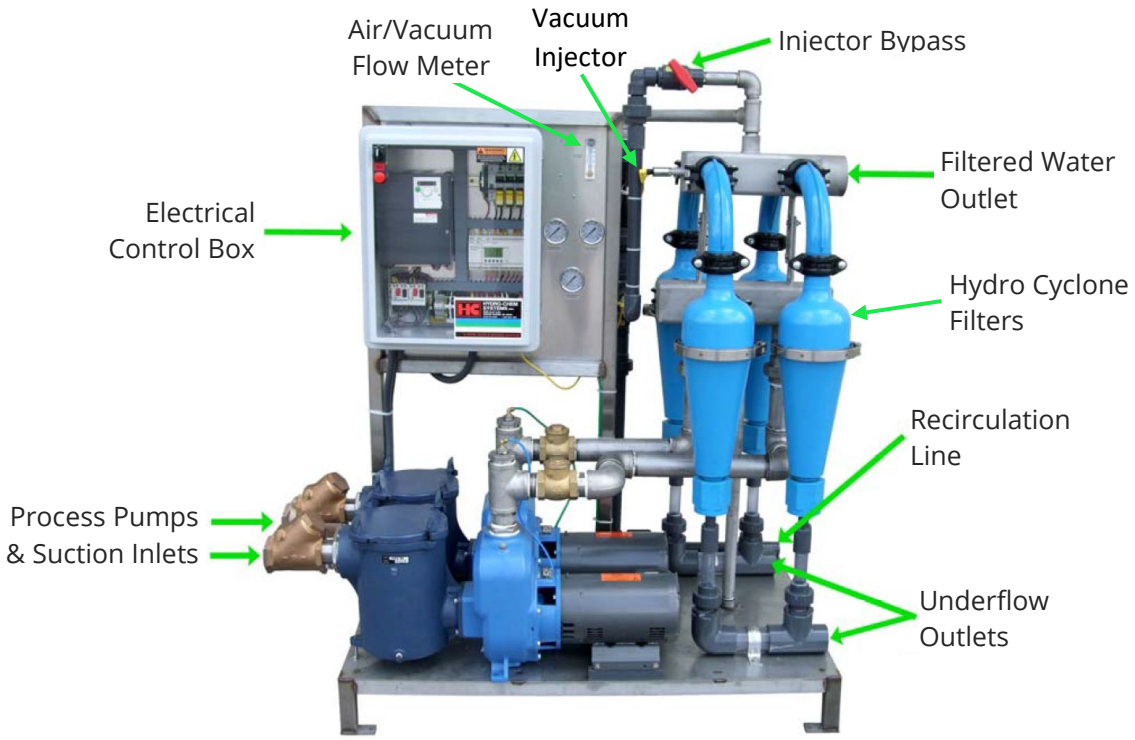


Figure 2. Reclaim Skid System

The Reclaim system incorporates one or two process pumps to recover water to manage cost associated with water and sewer consumption, to satisfy a mandate, or other various factors. Each process pump operates at an ideal flow of 110 gallons per minute for a total of 220 GPM of reclaim water for a two pump system.

This Reclaim system utilizes the previously mentioned process pumps to pull water that was reclaimed from the wash into settling pits. Suction lines from the pits supply the system at the provided flapper check valves. 8" debris traps within strainer baskets then catch any remaining particles that may have made it from the reclaim water settling pits before the pumps. Float sensors are to be installed in the settling pits to let both the main wash and the reclaim system know when the settling pits are low on water so that the process pumps are not run dry. Operating the pumps without sufficient water will cause damage and void warranty.

Filtration takes place in the hydro cyclones after the process pumps. Here the dirty water is pushed into the side of each cyclone, creating a vortex causing the solids to fall to the underflow and filtered water to be pushed up the outlet. A steady stream of water should be flowing through the underside tubes. If this is not the case, then the hydro cyclones will need to be separated at the band clamp and cleaned.

On all reclaim units, the filtered water from the hydro cyclones has an output that should be plumbed to a coned-bottom rinse water tank. A solenoid fill valve is plumbed in line to control when reclaim or fresh water is supplied to the tank. A separate recirculation line is also ran to the tank in order to prevent the water and any remaining sediment from becoming stagnant. Water from the underflow of the hydro cyclones is drained back to the trench or settling pits.

The Pretreatment System on the reclaim skid unit is composed of injector bypass assembly. This is downstream of the filtered water outlet and is fed by reclaim water controlled by the VFD of the process pump. The injector creates a vacuum by the passing of water through its venturi. The ball valve located to the left of the injector regulates the amount of water flow from the injector. That injector introduces ambient air to the reclaim tanks. Its vacuum performance is measured on the vacuum flow meter. The measurement is in standard cubic feet per hour.

Additional features on the reclaim skid unit include an automatic tank dump system, ozone system, and a biological system upgrade. The tank dump system features an air actuated knife valve that allows timed automated purging of the cone-bottom tank. A PSA oxygen concentrator is supplied with both the ozone and biological system upgrades along with an ozone generator and a peristaltic enzyme metering supply for each respective upgrade.

Set-up

Reclaim Settling Pit Plumbing Connections

- **Inlet from Settling Pits –** 3" PVC SCH80 connections are made from the reclaim settling pits to the flapper check valves on the skid unit. A threaded male to slip adapter is required here. If the flapper check valves were removed for shipping purposes, they can typically be found in the strainer baskets and are to be installed to the baskets. An additional spare suction line is typically specified for each system in case of failure of the plumbed suction lines. A threaded male to slip adapter is required here.

- **Underflow and Tank Dump Drain Outlet –** A 3" PVC SCH80 drain from the hydro cyclone underflows will be plumbed to the settling pits or a primary solids collection area. Typically, this is also plumbed into the tank dump plumbing from the bottom of the cone bottom rinse water tank.

Reclaim to Rinse Water Tank Plumbing Connections

- **Filtered Water Outlet –** The filtered water should be carried in a 3" PVC SCH80 manifold to the rinse water tank. A 3" solenoid fill valve is typically supplied to be installed at a serviceable height. The valve allows the wash system to control the flow of reclaim water to the tank.
- **Recirculation Outlet –** A 1" PVC SCH80 pipe should be terminated at the skid and brought into the top of the rinse water tank down to the cone in the tank. An elbow is typically added at the bottom of this pipe drop in the tank.

Control Panel Connections

The skid unit will come pre-wired and tested. All terminations are shown on Figure 4. The incoming power is listed below.

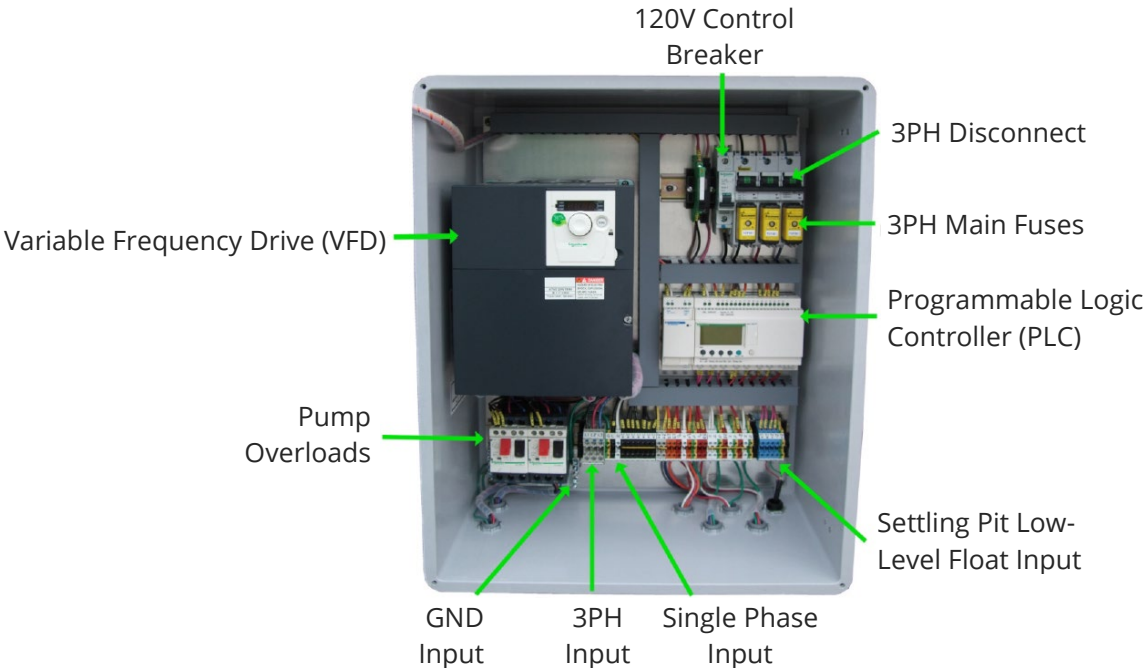


Figure 3. Control Panel Layout

- **Three Phase –** 480V 60 Hz to be terminated on the terminal strip
- **Single Phase –** 120V 60Hz to be terminated on the terminal strip
- **Ground –** Termination of Ground

The Control Panel also includes the following:

- **PLC –** The Programmable Logic Controller retains its own memory and executes all functions of the skid unit. It possesses a display screen that will present a notification of a fault condition. Modifications to the programming can be made through the function keys but will not be warranted by Hydro-Chem Systems.
- **Three Phase Main Disconnect –** Disconnects three phase power and prevents an overload of current
- **Single Phase Control Breaker –** Disconnects single phase power and prevents an overload of current
- **VFD –** The Variable Frequency Drive controls the frequency output to the process pump(s) for pump motor speed control. The unit is programmed with normal operating modes in the range of 40.0 to 60.0 Hz.
    - If phase sequence adjustments are required due to incorrect pump motor rotation, the wire sequence must be modified on the output side of the VFD.
- **Low Level Float –** Signals the system that the settling pit is low on water and to not activate the process pump

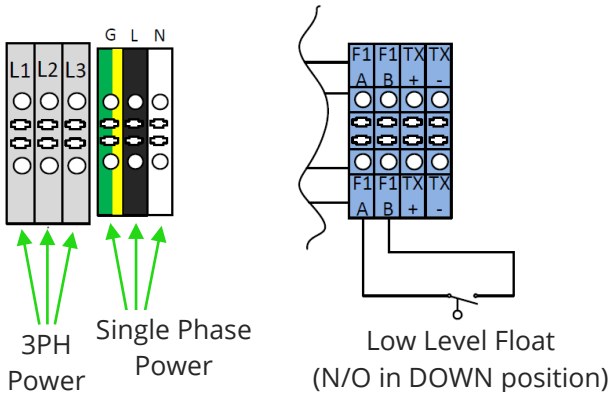


Figure 4. Terminal Strip Connections

- **L1, L2, L3 –** Three Phase Power In
- **G, L, N –** Single Phase Power In
- **F1A, F1B –** Settling Pit Low Float N/O

Reclaim System Start-Up

The following start-up procedure should be performed to ensure proper operation of the system:

1. Fill all reclaim settling pits with fresh water. Ensure that the final pit or tank is full.
2. Fill / prime the debris catching baskets and suction lines.
    - Filling the suction lines full will require a long flat screwdriver. Insert the screwdriver into the trap basket and left the flap of the angled check valve. Start filling the basket until it overflows. The termination of the suction line will have a full flow flapper check valve holding the water in the pipe via the trap basket.
    - Replace the cover and 4 wing bolts on the baskets.

3. Check the rotation of the process pumps. The stainless-steel motor shaft is visible between the pump housing and motor. A rotation arrow is engraved in the front portion of the pump. Counterclockwise rotation is proper when viewing from the front side of the pump.
    - Turn the Start Switch on the pump to *Hand* or *ON Momentarily* and view the direction of rotation on the shaft.
    - If rotation is not proper, open the electrical control box and swap two legs of the three-phase power on the output side of the VFD by removing the VFD cover.
4. Turn the Start Switch to the *Hand* or *ON Momentarily and begin priming the pump.*
    - Pump priming will be complete when the System Input and Output pressure gauges read the same, evidencing a continuous flow of water.
    - If a continued read of zero pressure is seen on the gauges, restart the priming process. The pump always pulls available water but cannot pump air (zero pressure). This process may be repeated to eliminate air trapped in the suction line to the settling pit.

Transducer Settings

The Pump Output Pressure is set and run at 32 psi. To adjust the pump output pressure:

1. Turn the Reclaim System to **OFF**. The VFD will display **rdy**, press **Enter**.
2. Use the down arrow until the VFD displays **set**, then press **Enter**.
3. Use the down arrow until the VFD displays **rPI**, then press **Enter**.
4. Use the up or down arrow on the VFD to adjust the setting. The rpi setting on the VFD display is not the pressure of the pump, but the percentage value of the input scale to be correlated against the speed scale of the VFD. The higher the number, the higher the sustained pressure. Lower percentage results in lower pressure.
5. When the proper setting is found – press **Enter** to save the setting.
6. Press **ESC** until **rdy** is displayed.
7. Turn the system back to **ON** and check the pressure gauge.

Pretreatment System Adjustments

1. Read the Air/Vacuum Flow Gauge. This is a true reading of the amount of vacuum generated by the injector.
2. Adjust the ball valve on the bypass assembly. Closer the ball valve forces more water by the injector and creates a greater air vacuum.

Ozone Unit Overview

These units provide the constant transfer of ozone gas into the reclaimed water system. Ozone is a non-selective oxidizer that helps to eliminate the odor causing anaerobic bacteria found naturally in water.

Biological Enzyme Unit Overview

These units provide the constant doping of enzymes into the reclaimed water system. Enzymes are the catalysts that speed up the biodegradation process and consume emulsified oils.

Tank Dump System Overview & Set-up

The tank dump upgrade features a 2" PVC socket connection knife valve that is controlled by a pneumatic solenoid. The valve should be plumbed to the bottom of the cone bottom tank per

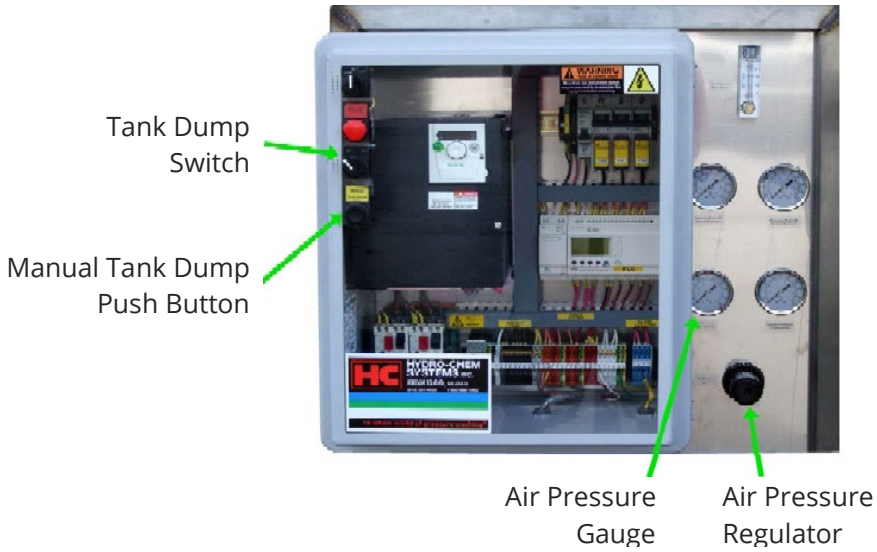
instructions in the project MEP packet. The valve can be set in either direction and does not have a set inlet or outlet.

Figure 5. Tank Dump Valve

- **Tank Dump Valve Air Line Setup –** ¼" Flexible air line should be run to the open port on the Tank Dump solenoid valve to the open port on the Tank Dump Valve. ¼" Flexible air line also must be run from the close port on the solenoid to the close port on the Tank Dump Valve.

Figure 6. Tank Dump Solenoid on Skid

- **Tank Dump Solenoid Air Line Setup –** A continuous air supply is required to the unit in this application. The air supply must be terminated to the quick release connection provided on the rear of the skid unit. A shut-off valve is recommended before the termination for service.
- Once all connections are made, the regulator on the skid should be set to 55 psi. This is a standard push/pull regulator shown in Figure 7.
- **To Manually Dump Tank –** The tank dump switch on the control panel must be in the **ON** position. Press and release the Manual Tank Dump Push Button to open the Tank Dump valve. Press and release the button again to close the valve. If the Tank Dump Valve is left open for more than 2 minutes, the PLC in the control panel will automatically close the valve.



Tank Dump Control Settings

The tank dump has four preset times for the duration and four preset times for the interval that it is active. To adjust the preset times, the control box must be open with only the 120V power breaker needing to be on. First, the tank dump switch must be turned to the **OFF** position. Then, push and hold the manual tank dump button.

- **To adjust the Duration –** Press the Down Arrow on the PLC while holding the manual tank dump button pressed. There are four presets to choose from – 30 sec, 45 sec, 60 sec, and 90 sec. Every time the Down Arrow is pressed, the preset duration time shown on the screen is active.
- **To adjust the Interval –** Press the Up Arrow on the PLC while holding the manual tank dump button pressed. There are four presets to choose from – 30 min, 45 min, 60 min, and 90 min. Every time the Up Arrow is pressed, the preset interval time shown on the screen is active.
- Once the duration and interval adjustments have been made, return the tank dump switch to the **ON** position.

Maintenance

The following preventive maintenance should be followed to ensure trouble free operation.

On a **weekly** basis:

- Inspect and clean the debris catchers located within the Strainer Baskets. These debris catchers protect the pump impellor from clogging with debris. After cleaning these, restart and/or re-prime the unit.

On a **monthly** basis:

- Inspect or clean the Hydro Cyclone(s). Inspect the underflow of the hydro cyclone filter. If no flow can be seen in the underflow then the hydro cyclone must be cleaned.
- Inspect of clean the Mazzei injector on the pretreatment system. This is the vacuum device that allows the transfer of oxygen gas into the water stream and into the water storage tanks. Cleaning this involves removing the injector by opening the unions on the system.

Clean the device with warm, soapy water, noting the input and output surfaces should be clean and smooth. Replace the clean injector and follow instruction for adjusting the pretreatment system in the start-up procedure.

Troubleshooting

Issue	Potential Cause or Solution
Motor Not Running	Is the thermal protector or overload tripped?
	Check for an open circuit breaker or blown fuse
	Check for impellers binding
	Motor may be improperly wired
	Is the motor defective?
Little To No Water Moved	Check that basket filters are cleaned and not plugged
	Look for water flow in the underflow tubes from the hydro cyclones. If little to none - clean the hydro cyclone(s)
	Check for impellers binding
	Motor may be improperly wired
	Pump is not primed - air or gas in the line
	Discharge or suction line may be plugged, or valve closed
	Incorrect pump rotation - switch legs of power supply to the motor.
	Low voltage or phase loss
	Impellers may be worn or plugged
	System head is too high
	Excessive suction lift or losses
	End of suction line piping not submerged
	A check valve may be damaged
Excessive Noise and Vibration	Check for impellers binding
	Pump is not primed - air or gas in the line
	Discharge or suction line may be plugged, or valve closed
	Impellers may be worn or plugged
	Excessive suction lift or losses
	Discharge head too low / excessive flow rate
	Pump, motor, or piping may be loose.