

## JOB NAME, CITY STATE

### **2-CELL VERTICEL PRESSURE SAND With Electrically Actuated/Manual Linkage& Iso Valves**

#### **Introduction**

A pressure sand filter is one in which the water to be filtered is pumped through a layer of sand contained within a pressure vessel. High flow sand filters are designed for filtering rates of up to 20 gallons per minute per square foot of filtering area. This filter system will, with proper care and maintenance, give trouble-free and efficient operation.

The filtering principle is simple. Fine sand is used to filter out all of the dirt suspended in the water. Pool water is forced by the pump through a distributor system in the top of the filtering tank. This distributor system is designed to maintain a uniform flow downward through the sand and out a second collector system in the bottom of the tank.

In sand filtration, at these high rates, penetration or depth filtration occurs within the sand; the dirt entrapped in the water passes down several inches into the sand rather than being collected on the surface of the sand or in a bed of alum as in the lower rate rapid sand pressure filters.

The influent pressure increases as dirt accumulates in the sand. When the desired flow rate can no longer be maintained, the filter is cleaned by simply reversing the flow. High-rate sand filtration is possible through the proper internal design of the filter. So long as the flow, either upward or downward, is uniform without jets or eddy currents, these high rates may be maintained without disrupting the filter bed.

This system is designed to run 24 hours a day. Filter cycles will vary. Bathing loads, suntan lotions and wind conditions, among other things, create variances in filter cycles. Health departments in many areas maintain and exercise sanitary procedures; nevertheless, even though the flow rate is maintained, we recommend that the filters be put through the backwash cycle when the differential pressure between the influent and effluent reaches 10± psi or when the designed flow rate cannot be maintained (whichever occurs first). This will keep the filter in excellent, healthy, maintenance-free operation for many years. Any backwash requirements of local or state regulatory agencies should also be met. The filters are usually cleaned in two to four minutes by reversing the flow of the water.

## Operating Instructions

### Valve Legend:

All normal functions of the filter are controlled by wafer valves. It is good practice to stop the pump and motor before changing the position of the valves. For convenience in operation, all valves have been tagged and correspond with the filter valve legend on the filter drawings.

VALVE #	DESCRIPTION	Filter Mode	Backwash CELL #1	Backwash CELL #2
	Main Drain Valve (not shown)			
2	Return to Pool	O	X	X
3	CELL #1 Filter INFLUENT	O	X	O
4	CELL#1 BW EFFLUENT	X	O	X
5	CELL#2 Filter INFLUENT	O	O	X
6	CELL#2 BW EFFLUENT	X	X	O

O – OPEN    X – CLOSED

### Initial Start-Up:

The following steps are to be taken when you place your 2-Cell Verticel filter in operation for the first time:

1. Check pump strainer. Make sure it is clean and full of water.
2. Check pump rotation to ensure that the motor has been correctly wired.

**Note:** the impeller should rotate in a clockwise direction when viewed from the motor end. If rotation is opposite, the motor has been incorrectly wired.

3. Set the filter for backwash (see backwash instructions). Backwash a minimum of 3-5 minutes to clean the filter media or backwash until the sight glass runs clear.

In many areas when a new pool is filled, the water will appear green and/or cloudy. This green and/or cloudy appearance can be caused by plaster fines present in the water, traces of iron or organic matter, algae in the make-up water or by a combination of all. This type of contamination always will clog any type filter in a relatively short period of time.

If any appreciable amounts of iron or other metals are present, they may turn the pool water brown upon chlorination and stain the interior finish of the swimming pool. The pool water supply should be laboratory tested and the water should be treated to remove the iron or other materials found in it before filling and/or super-chlorinating.

It is recommended that the pool be super-chlorinated immediately after filling and that the filter be backwashed promptly when the differential pressure between the influent and effluent reaches 10 $\pm$  psi or when the designed flow rate cannot be maintained. If this procedure is followed, the pool will be cleaned up in a minimum of time. After super-chlorination, do not enter the pool until chlorine level has returned to normal.

The backwash operation may be required daily or several times a day for the first few days until the water becomes a sparkling blue. After the cloudiness and/or green appearance is gone, you need only backwash as instructed elsewhere in this manual. Check the pump strainer, the converter strainer basket and any skimmer baskets daily and clean as required, establishing regular schedules.

### **To Backwash Filter:**

**BACKWASH RATE IS: \_\_\_\_\_ REFER TO DRAWING**

As the filter becomes dirty and the flow rate drops, valve #2 should be opened as required to maintain flow.

The filter should be backwashed when the differential pressure reaches 10  $\pm$  psi, or the flow rate can no longer be maintained.

All chemical systems, heaters, and auxiliary pumping equipment should be shut off 15 minutes prior to backwash. Heater isolation valves should be closed just prior to backwashing.

### **Backwashing Cell #1 and Cell #2**

#### **TANK CELL #1 (TOP)**

1. Stop pump.
2. Close valves #2, #4 (using Linkage/Actuator), & manually close valve #6-Cell #2.
3. Open valves #3 & #5
4. Start pump.
5. Backwash Cell #1 for approximately two to three minutes or until the water in the sight glass is clean.

#### **TANK CELL #2 (BOTTOM)**

1. Stop pump.
2. Close valves #2, #4 & #5 (using Linkage/Actuator).
3. Open valves #3 & #6.
4. Start pump.
5. Backwash Cell #2 for approximately two to three minutes or until the water in the sight glass is clean.

The backwash flow rate is observed with the flow meter in the backwash line or in the pump discharge line. The proper backwash flow rate is controlled with valve #3 or with #6-1 and #6-2

**isolation valves.** Once the correct backwash flow rate is established, mark the notched valve plate on each valve to indicate the correct backwash rate.

**AFTER BOTH CELLS IN EACH TANK HAVE BEEN BACKWASHED:**

1. Stop pump.
2. Open valves #2, #3 & #5, (using Linkage/Actuator) filter mode.
3. Close valves #4 & #6 (using Linkage/Actuator) filter mode.
4. Restart pump.

**NOTE:** When linkage handle (refer to drawing for -Position) – Filter Mode.

When linkage handle (refer to drawing for -Position) – Backwash Mode.

When initially starting the filter system, record the normal influent and effluent pressures with a clean filter operating at the prescribed filter flow rate.

Influent Pressure : \_\_\_\_\_ psi      Effluent Pressure : \_\_\_\_\_ psi

**FLOW RATE:** \_\_\_\_\_

**To Filter Pool:**

Open **valves #2, #3 & #5**. The balance should be Close (**Valve #4 and valve #6**). With a clean filter, restrict valve #2 until the designed flow rate is achieved and mark its position.

In operation, flow is balanced from the perimeter overflow channel (PO) and the main drain. To balance flow, the minimum operating level (MOL) will need to be set, the **instructions can be found on page 5**.

As activity increases in the pool, more water will flow from the PO channel causing the water level in the balance line/tank to rise. This increase in water level in the balance line (balance tank) will increase the head on the main drain line and less water will flow through from the main drain and the system will balance.

**Checking the Flow Rate:**

The recirculating pump is designed to deliver the designated flow rate at a specified total dynamic head. Total head on the pump is the combination of the vacuum and discharge pressure losses. The conversion factors for the vacuum and pressure reading to feet of head are:

1. One inch of vacuum equals 1.13 feet of head.
2. One psi equals 2.31 feet of head.

**Procedure: - (Assume a newly backwashed filter)**

1. Set the system to filter position.

2. Read the vacuum gauge.
3. Convert vacuum reading to feet of head by multiplying by 1.13.
4. Subtract the results of no. 3 from the design head of your pump.
5. Divide the results of no. 4 by 2.31. This gives the pump discharge pressure to obtain the desired total dynamic head and, hence, the designed flow rate. (You will need to throttle valve #2 or pump discharge valve.)
6. Should the vacuum reading drop appreciably, repeat steps 2 through 5.

Like a properly installed flow meter, a pump performance curve is guaranteed accurate within 5%. Flow meter installations vary, thus when pump pressures are set as described here, the flow meter reading should be noted as the proper recirculation rate, regardless of its actual reading.

### **TO SET MOL:**

This level should be set with a clean filter when there is no activity in the pool and all water is being drawn from the main drain. The system should be set to filter and the proper flow rate established with valve #2.

**For a Balancing Line:** Restrict the Main Drain valve just upstream of the connection with the balancing line until the minimum operating level (MOL) is established.

**For closed balance tank:** Restrict Main Drain valve until the red line on the water level gauge (Indicating MOL) has been reached.

**For an open balance tank:** Restrict the Main Drain valve at its entrance to the balancing tank until there is about 6" of water covering the pump suction line.

As water enters the gutter and fills the balancing line, the pressure in will increase and water will be taken from this line. When the perimeter overflow channel is running nearly full, most of the water required for the full re-circulating rate will be taken from the surface of the pool through the balancing line.

### **To Filter Pool and Vacuum - Portable Vacuum:**

With valves in filter position, discharge portable pump into overflow channel. If a considerable amount of dirt is being vacuumed and the pressure builds up in the filter tank, it should be backwashed.

### **To Clean the Strainer:**

Slowly close isolation valve downstream of pump, then stop pump. Close isolation valve upstream of the strainer. Remove cover and clean basket. Be sure strainer is filled with water after cleaning. Replace cover tightly. Open upstream valve and start pump. Slowly open valve downstream of pump. Establish a regular schedule for checking the strainer.

### **To Empty Pool with Pump and Motor:**

Close valve #2 and open Valves #3, #4, #5, and #6 to bypass the filter. Maintain a positive pressure at all times with valves #4 and #6. Exercise every possible care in this operation to prevent air from entering the main drain line or other piping, as this will cause the pump to lose its prime. It is advisable, when emptying the pool (unless the pump is located beneath the lowest point of the pool); to complete the operation without interruption, inasmuch as turning off the pump and motor will normally result in loss of prime. However, if it becomes necessary to interrupt the emptying operation, Close valves #3, #5, and the valve upstream from the strainer basket before stopping the pump and motor. When continuing the operation, turn on the pump and motor; open downstream valve, then open valves #3 and #5 slowly.

For further information, please contact Paddock Pool Equipment Company customer service.

