Pulsar® System

INSTALLATION MANUAL

Model # PS-45 **Model # PS-500** **Model # PS-140**

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Everyone involved with the product has responsibilities to address society's interest in a healthy environment and in products that can be used safely. We are each responsible for providing a safe workplace. All who use and handle products must follow safe and environmentally sound practices.

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Dealer Contact:

Instructions for Pulsar® Booster Pump Installation

To Simplify Installation: Please read this installation manual completely before going to the pool site.

Tools & Equipment Needed for Install:

Drill – Cordless Recommended	Tube cutters or Utility Knife
1-3/4” hole saw and 1-1/2” NPT tap (Optional)	RTV silicon seal
PVC Primer/Cleaner	2 Pipe Wrenches or Gas Pliers
PVC Glue	Water tight connectors for pump wiring
Saw to cut PVC Pipe	Wire for pump (14 gauge minimum required)
Electricity for the Pulsar® Control Panel and Pump (115V; 15 Amp)	Pressure gauge
PTFE (Plumbers) Tape	Saddle clamps (optional)
11/16” hole saw or paddle bit	1/2” NPT tap

The Following Parts are to be Supplied by the Installer to Complete Installation:

Two 1-1/2” PVC ball valves (socket)	1-1/2” X 1/2” Schedule 80 PVC T SXF NPT
1-1/2” sch 40 PVC pipe fittings required to install Booster pump/Venturi loop	1-1/2” PVC sch 40 Pipe

Instructions for Pulsar® Booster Pump Installation

The Following Parts are Included with the Installation Kit

Part #	Operator Manual Diagram #	Description	Quantity
71811	33	Venturi for **Pulsar® Systems** (1585X)	1
71627	24	1/2” Ball Valve MF	2
71588	34	1/2” Tube x 1/2” Female Connector (W8FC8)	1
71626	NS	20ft 1/2” O.D PE Tubing	1
79214	35	PUL BOOSTER PUMP	1
71916	5	1/2” x 1-1/2” PVC Nipple	1
71907	36	1-1/2” Thread x Slip PVC Union	2
79218	6	PUL CHECK VALVE 1/2” CEPEX USA PVC/EPDM	1
79222	7	PUL DISCHARGE VALVE ELBOW	1
79810	8	PUL DISCHARGE VALVE FLOAT	1
79805	9	PUL DISCHARGE VALVE ARM	1
79806	10	PUL DISCHARGE VALVE BODY	1
71583	11	Discharge Valve Locknut for Feeders	1
71576	12	1-1/2” x 3/4” x 1/8” Silicone Washer	1
71898	19	1/2” Tube x 1/2” Male Elbow (W8ME8)	4
79664	20	SOLENOID DC Valve (ASCO 8212A519S0100F1)	2
79812	21	LINE STRAINER ASSEMBLY (Small Ron-Vik)	1
71890	22	1/2” Tube x 1/2” Male Connector (W8MC8) (Standard, Feeder ONLY)	3 & 2
76255	23	MUN NIPPLE 1/2” PVC (2” L) NSF61 SCH	1
71912	26	1/2” Threaded Tee	1
71617	28	Spray Nozzle for PS-45 (1), PS-140 (3)	1 & 3
79660	30	AGITATION NOZZLE (1/2” SCH 40 PVC PLUG)	1
79817	31	WASHDOWN NOZZLE (460.644) **(PS-45 & PS-140 Only)**	1
71888	28	Spray Nozzle for Spray Tree **(PS-500 Only)**	4
71548	25	1-1/2” x 12” PVC Nipple	1
79669	NS	Flow Switch 24VAC/DC, SS 1/2” NPT (SC050R)	1
79670	NS	Galvanized washer for 5/16” lag Bolt **(PS-500 Only)**	4
79671	NS	Zinc Alloy lag Shield 5/16” short (1-1/4”) **(PS-500 Only)**	4
79672	NS	Galvanized 5/16” x 2-1/2” lag bolts **(PS-500 Only)**	4

NOTE: For Feeder only install, proceed to page 7.

Instructions for Pulsar® Booster Pump Installation

Overview:

A 1-1/2" loop is going to be added to the main pool recirculation line. The loop will have an in-line **Pulsar®** pump to drive a venturi. The **Pulsar®** inlet line will get water from the discharge of the **Pulsar®** pump. The discharge valve of the feeder will be hooked up to the venturi.

The **Pulsar®** pump provides the correct pressure (~ 35 psi) to drive the spray and wash-down nozzles in the **Pulsar®** feeder. It also provides required flow through the venturi to create vacuum to evacuate the solution from the base of the feeder. This installation method gives optimal performance of the **Pulsar®** feeder in most above and below grade installations.

The use of a pressure gauge on the discharge side of the pool pump after the filter is recommended for correct installation of the system.

Site Assessment

Electrical:

The **Pulsar®** feeders require minimum electrical service that is outlined in the Booster pump section. The electrical service must be installed by a licensed electrician according to the local electrical code.

Hydraulics:

It is critical to determine the effluent pressure of the system prior to installation. This pressure must be measured immediately after backwashing when it will be at its highest level. Refer to the appropriate system diagram in the back of this manual (pages 26-28) to determine where to measure this pressure (P1).

Take a pressure reading and refer to the graph on page 13 to determine the suction capacity of the system assuming that there is no suction lift correction. Record this suction capacity as F1.

Next, determine where the **Pulsar®** pump and venturi loop will be installed. It may be preferable to install this loop across the heater bypass valve to use this pressure differential to enhance system performance.

Always minimize the backpressure on the venturi. Avoid use of elbows after the venturi if possible. Never install an elbow within 3 feet of the venturi outlet. Always use elbows on the inlet to the **Pulsar®** pump or prior to the venturi if possible. After the evacuation system has been laid out, measure the height differential (in feet) between where the venturi will be installed and discharge valve of the **Pulsar®** feeder. Use this height differential to calculate the suction lift factor in the formula that follows. The greater the height differential the more suction you will lose from the venturi. Next calculate the outlet flow using F1 and the suction lift factor. The minimum outlet flow required is 2.3 gpm.

Suction lift factor = (34 – height differential in feet) / 34

Example: height differential is 6 feet, therefore

Suction lift factor = (34-6) / 34
= 28 / 34
= 0.82

Take the suction capacity F1 and multiply it by the suction lift factor to get the actual outlet flow.

The formula is:
F1 x suction lift factor = actual outlet flow

Site Assessment

Example #1: Assume that the pressure measured in the pipe is 14psi.

Using the graph 1 in this manual the outlet flow (F1) is determined to be 3.8gpm.

F1 x suction lift factor = actual outlet flow
3.8gpm x 0.82 = 3.1gpm = actual outlet flow

(This flow is acceptable) It is above 2.3gpm which is the minimum.

Example # 2: Assume that the pressure measured in the pipe is 25 psi. Using the graph on page 13, the outlet flow (F1) is determined to be 2.7gpm.

F1 x suction lift factor = actual outlet flow 2.7gpm x 0.82 = 2.2gpm = actual outlet flow

(This flow is insufficient to drain feeder)

A larger pump will be required to generate sufficient outlet flow. Consult with your dealer.

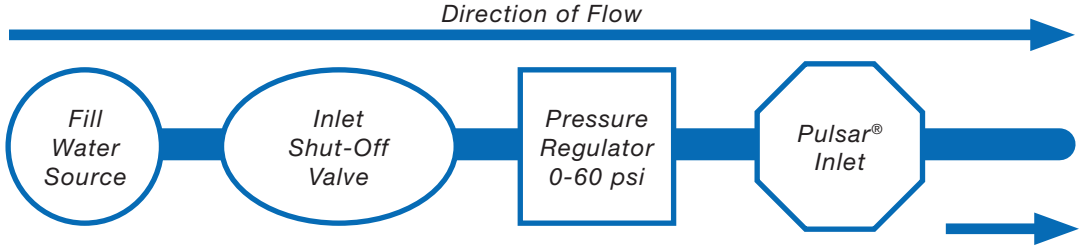
Now determine where the power source will come from for the **Pulsar®** Control Panel. These considerations will help determine the length and gauge of wire needed.

The last consideration for the site assessment is the fill/tap water source and the type of pH control system to be used. If Carbon Dioxide will be used for pH control, it may be preferable to provide the inlet flow to the feeder from the fill water source. Typically, Carbon Dioxide pH control systems will raise the Total Alkalinity of the pool water to well over 100ppm. This TA level will increase the tendency for scale formation in the feeder. Consequently, it is recommended that the inlet flow be provided from the fill water source if the TA of the fill water is below 100ppm.

NOTE: The Fill water source method can only be used with the booster pump in Econo Mode and not when the booster pump is running constantly.

The use of fill water to the feeder inlet will add water to the pool on a daily basis in relatively small amounts. A typical indoor 100,000 gallon pool will use approximately 20 gallons of chlorinated solution from the **Pulsar® System** per day. A typical outdoors 100,000-gallon pool will use approximately 60 gallons of chlorinated solution from the **Pulsar® System** per day. The **Pulsar® System** also **puts additional 200 gallons water a day** in the pool from the washdown system (when in Econo Mode). If you use this installation method make sure that the pool has that amount of water being removed as to not cause the pool to overflow.

Fill water systems typically operate at pressures between 50-80 psi. This pressure is too high for the **Pulsar® System** valves to operate properly. It is therefore necessary to install a pressure regulator on the inlet flow to the **Pulsar® System**. This regulator must be installed directly at the fill water source. This will insure a reduced pressure in the flexible polyethylene tubing and solenoid valve on the inlet side of the feeder. Adjust the pressure regulator to provide between 30-35 psi inlet water pressure. See diagram below for proper fill water plumbing hook-up.



Installation of the Pulsar® Control Panel

General Description:

The **Pulsar®** Control Panel must be plugged into a 115V/15A(minimum) dedicated outlet. The 115V powers the controller as well as the booster pump to optimize energy usage. A step down transformer converts the voltage to 24VDC for powering the low voltage solenoids.

There are two input signals to the **Pulsar®** Control Panel. They are:

A. REQUIRED - Flow (existence of flow in the pool return line). See figure A & B, page 8.

B. OPTIONAL - Chlorine Demand. The chlorine demand signal is generated by an ORP controller. If an ORP controller is not used, the Control Panel uses an integrated timer for chlorine output control.

There is a specialized cable that connects the **Pulsar®** Control Panel to the feeder junction box (J-Box). This cable carries the signals to the Control Panel from the lid and level switches and from the Control Panel to the solenoids.

Important: The power and signal cables (figure C, page 8) must be considered when laying out the equipment installation. The length of wire for:

A. Power cable – 8 feet (2.44m)

B. Flow switch cable – 32 feet (10m)

C. Control Panel to Feeder cable – 16 feet (4.9m)

D. Power from Control Panel to Booster Pump – TBD (wire provided by Installer)

E. ORP Controller to Control Panel – 2 feet (0.6m) (extension cable supplied by Installer)

Refer to Appendix C for information on extension cables.

Note: The Pulsar® Control Panel must not be located in direct sunlight or where temperature will exceed 115°F.

Danger: Leave the Pulsar® Control Panel unplugged until all connections are made and the front panel of the Control Panel is closed. Maintain control of the plug at all times during the wiring of high voltage.

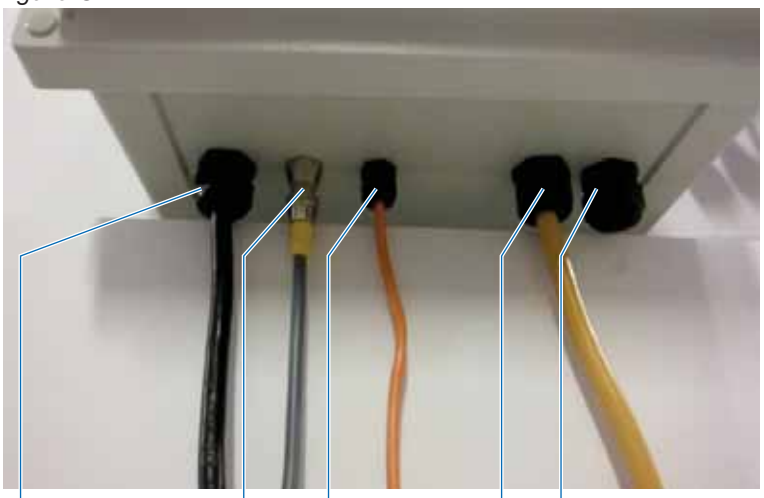
1. Mount the **Pulsar®** Control Panel on a wall (within 8 feet of dedicated outlet) that will allow for installation of the flow switch and feeder in the desired locations.
2. The flow switch must be installed in the pool return line near the inlet to the booster pump loop.
3. The feeder should be located in an area with ample room for filling with chemical and access for maintenance.
4. The cables should be routed to stay out of contact with water and not create any trip hazards.
5. If an ORP controller output (115V, NEMA 5-15R) is used with the **Pulsar®** feeder the connection of the ORP controller to the **Pulsar®** Control Panel is made with an extension cable of the proper length. See figure F, page 8.
6. The appropriate gauge wire should be used to connect the Booster pump to the **Pulsar®** Control Panel.
7. Connect the cable from the J-Box (on the back of the feeder) to the **Pulsar®** Control Panel. See figures D & E, page 8.
8. Connect the flow switch cable from the **Pulsar®** Control Panel to the installed flow switch. See figure C, page 8.
9. Make sure the front panel is closed securely and plug in the power cable for the **Pulsar®** Control Panel to a dedicated 115V outlet. See figure G, page 8.

Installation of the Pulsar® Control Panel

figure A

figure B

figure C



Power Cable to 115V Outlet

Flow Switch Cable

115V power out to Booster Pump

Feeder Cable to J-Box

Chlorine Demand from ORP

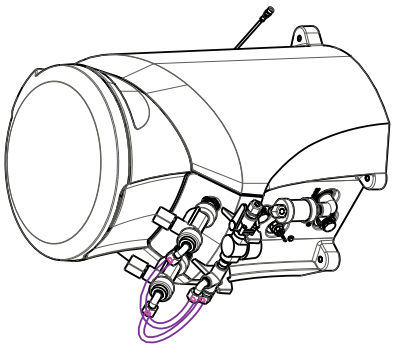
figure D

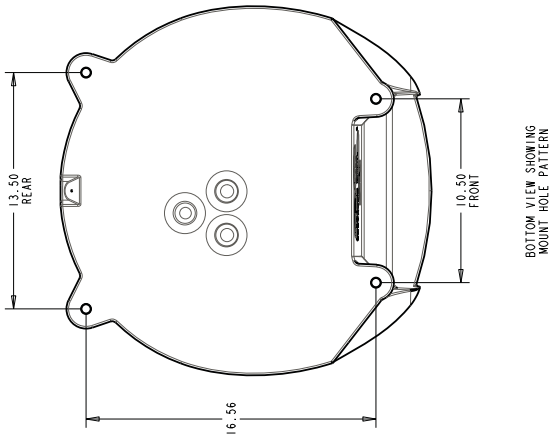
figure E

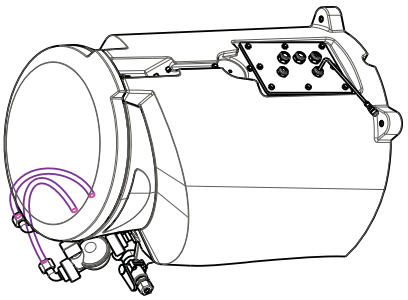
figure F

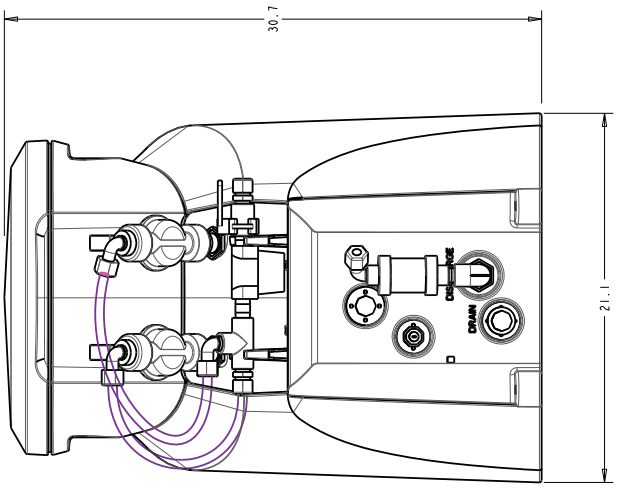
figure G

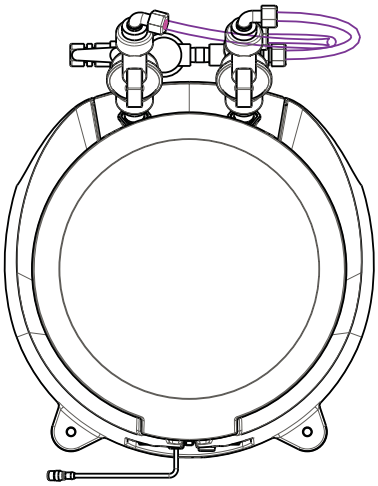
Pulsar® Footprint - Model PS-45

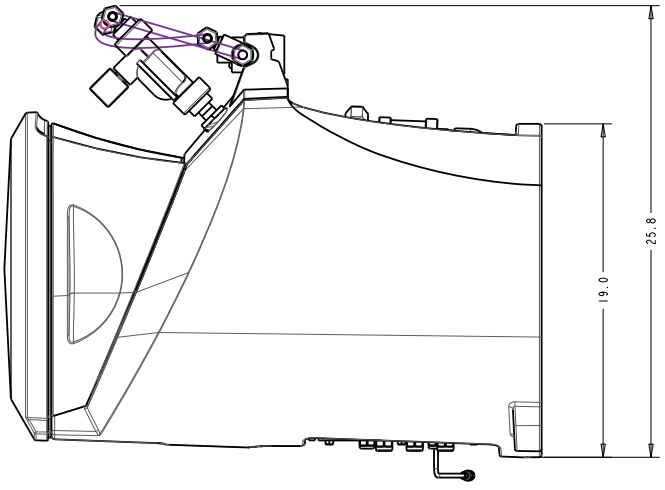




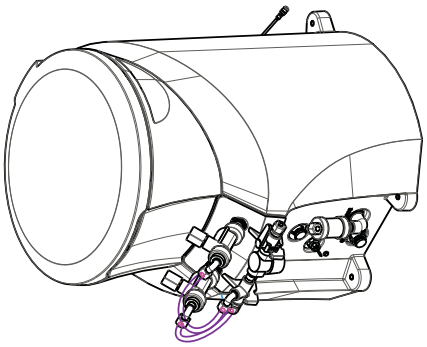




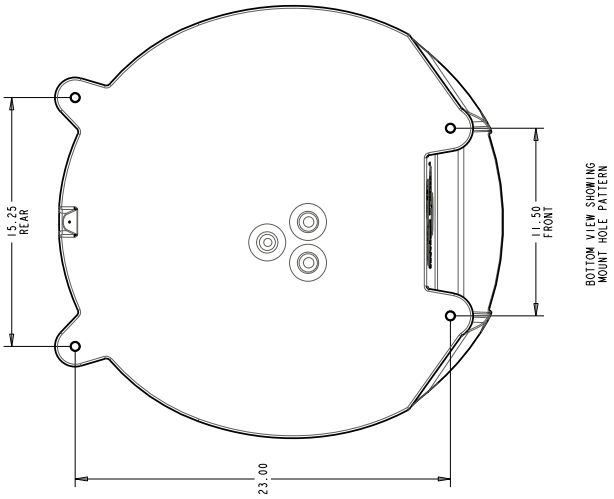


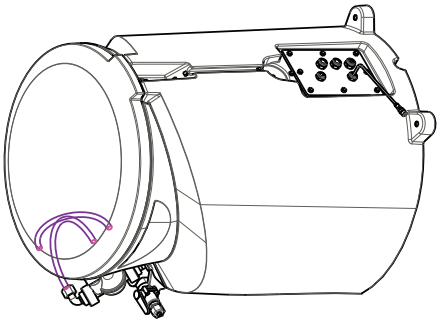


Pulsar® Footprint - Model PS-140



REFERENCE VIEW FRONT





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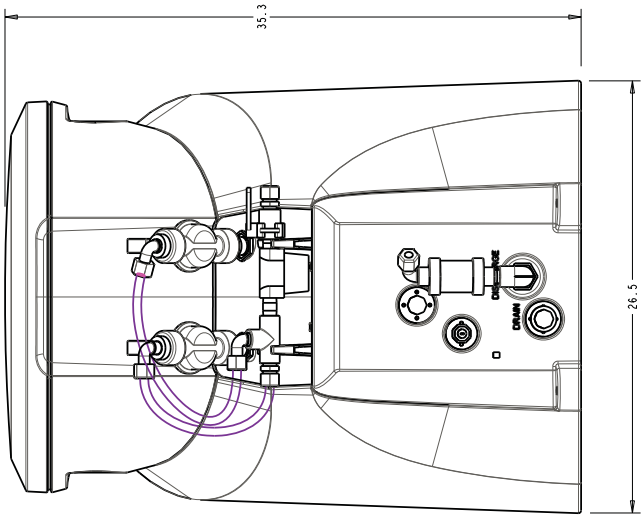
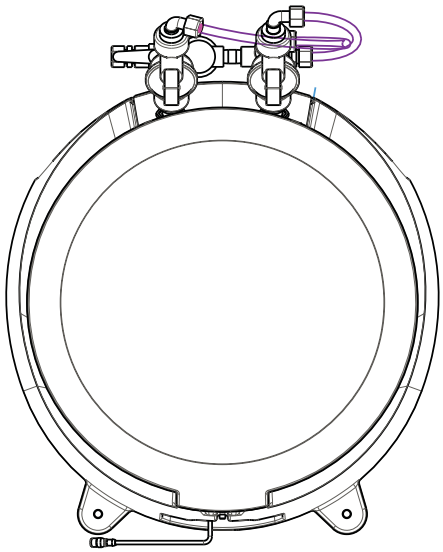
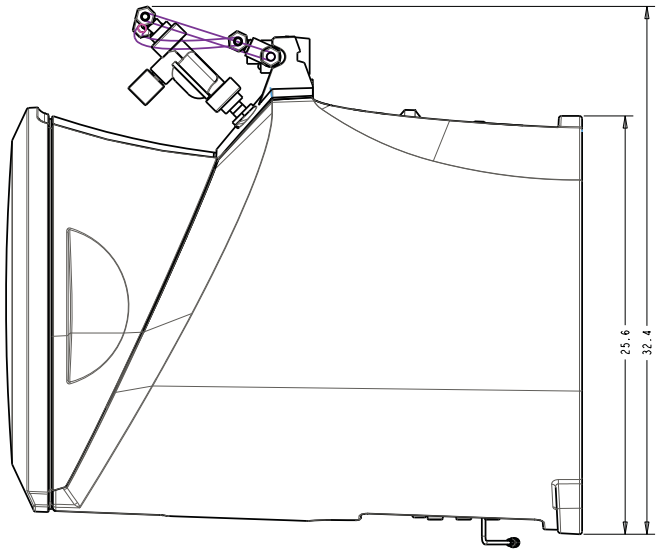
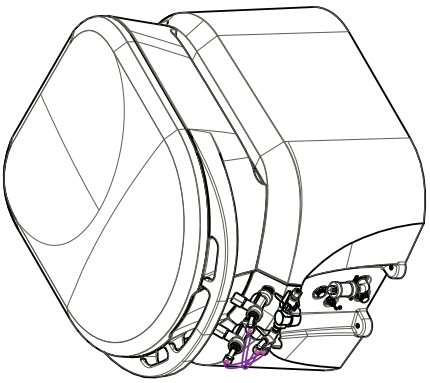






Pulsar® Footprint - Model PS-500



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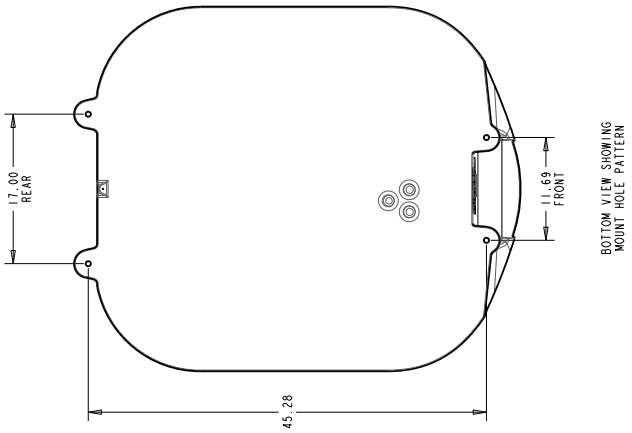
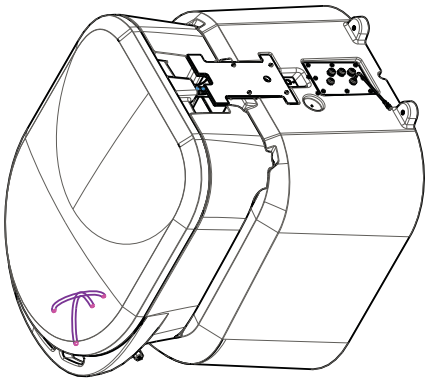


BOTTOM VIEW SHOWING
MOUNT HOLE PATTERN



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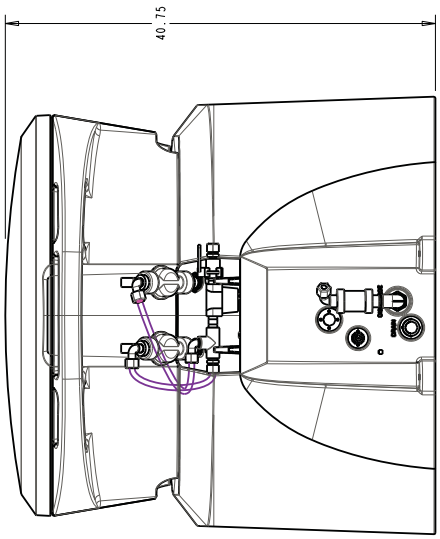
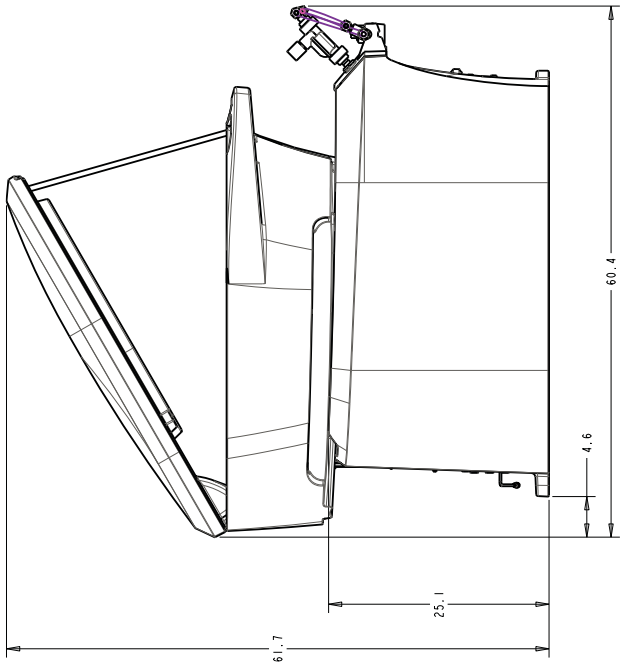




REFERENCE VIEW SHOWING
LID PROPPED AND HOPPER SLID REARWARD

Booster Pump

The 1 H.P. pump is to be wired for 115V single-phase service only. The pump is shipped for 230V single-phase installation. Move the jumper to configure pump for 115V operation. 208V service is not adequate and will harm the pump. Use 115V service with a minimum 15 amp breaker. **Important: The booster pump electric service must be installed by a licensed electrician according to the local electrical code.**

It is recommended to have the power supply to the Pulsar® pump interlocked to the pool recirculation pump through an external relay shut-down. The **Pulsar®** Control Panel receives a signal from the flow switch mounted in the Pool return Line (near the inlet to the Booster pump). If no flow is detected, the controller will not energize the Booster pump. This is to prevent the Booster pump from running dry when the filter is being backwashed or the pool pump is shut down.

NOTE: It is critical to always have water flow to the booster pump before starting up with a new or existing installation. Failure to have water in the booster pump during start-up can result in seal failure. To prevent seal failure on start-up, crack open the union fitting on the booster pump discharge until water runs out freely. This will indicate that the booster pump has water in the volute and it is safe to start the pump.

Tighten union after pump is primed with water.

Installation of equipment

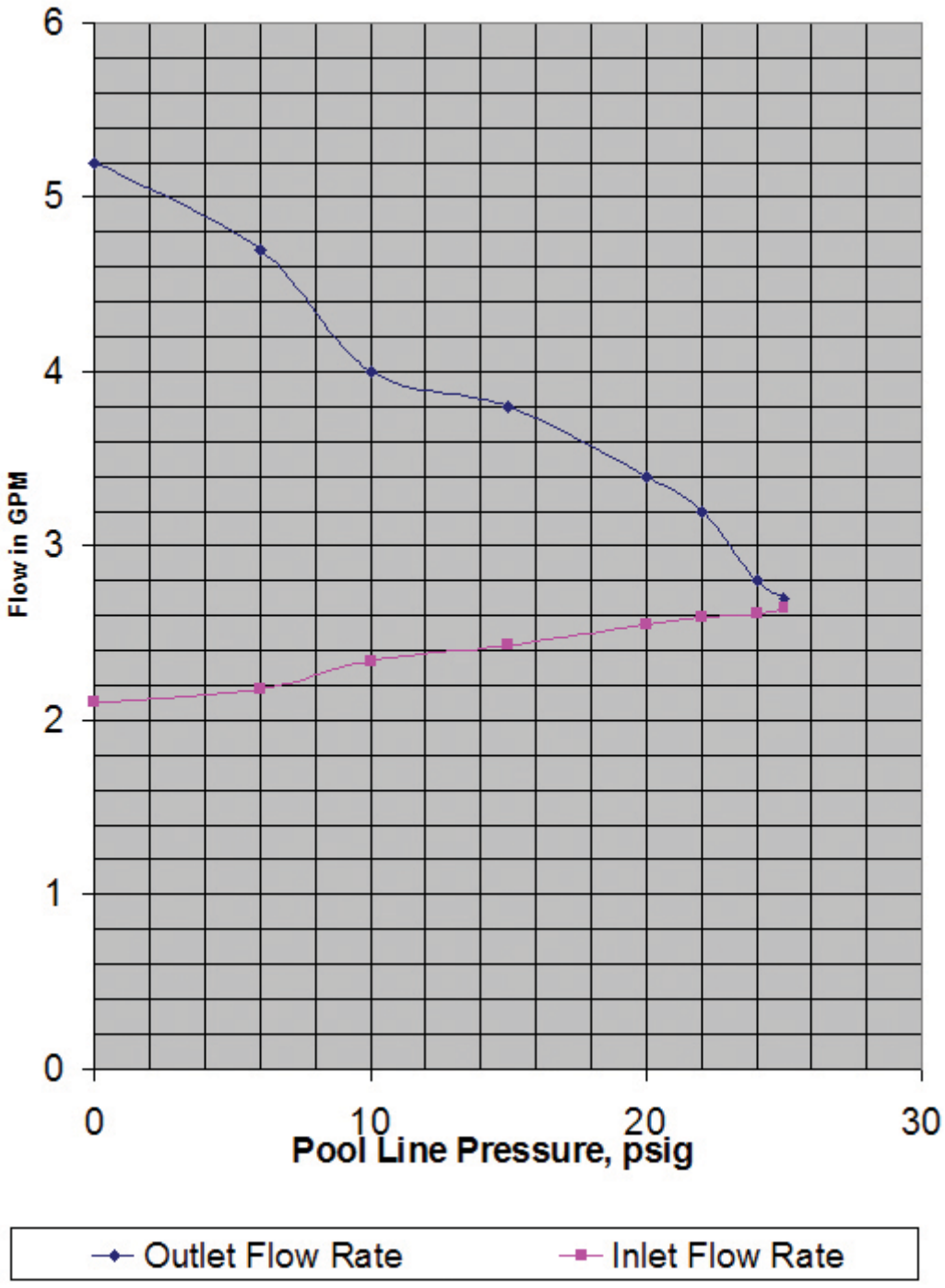
Place the equipment, pump and feeder, in the poolroom in a convenient location.

Shut off the pool recirculation equipment before proceeding with the installation. Review the installation diagram prior to installation.

Refer to “Footprint” dimensions on pages 9-11 to determine placement in pump room.

PS-500 ONLY: The feeder must be bolted to the floor using provided lag bolts, washers and shields.

Pulsar® Installation 1 HP Booster Pump and 1585X Venturi



Installation

1. Based on your site assessment, drill and tap a 1-1/2” NPT hole down stream of the pool filter. **NOTE: Saddle clamps or tee’s can be used as an alternative.** This is one of two holes that will be needed in the installation. The hole should be drilled on the side or bottom of the pipe, if the pipe is horizontal. **NOT ALL PIPES RUN FULL**.

2. Cut the 12” x 1-1/2” PVC nipple (#71548) in half. (2 pieces). Take one of the pieces and apply PTFE (plumbers) tape to the threads. On top of the PTFE tape add a silicon seal bead around the threads. The silicon seal helps to make a good seal. Wipe off any excess.

3. Thread the nipple into the 1-1/2” tapped hole or saddle clamp.

4. Glue the 2” x 1-1/2” reducer bushing into the inlet of the **Pulsar®** pump.

Installation

5. Take the 1-1/2” ball valve and glue it onto the nipple that has been screwed into the pool piping in step #3. This is what makes the connection from the pool recirculation system to the **Pulsar®** pump inlet using 1-1/2” PVC piping.

6. Drill and tap another 1-1/2” NPT hole downstream of the first hole that was drilled and tapped. This hole accommodates the discharge side of the **Pulsar®** pump. **NOTE: If automated controllers are used in the system, the drilled and tapped hole must be placed downstream of the ORP and pH probes location. This is to avoid problems that may occur with the controller operation. See installation diagram.** Thread one of the cut 1-1/2” nipples into the 1-1/2” tapped hole or saddle clamp.

7. Take a 1-1/2” ball valve and glue it onto the nipple installed in Step 8. Please make sure that there is a straight connection back into the pipe, no elbows. This is to connect the pool recirculation system to the discharge side of the **Pulsar®** venturi.

8. Tie in the electrical to the **Pulsar®** pump **making sure you have the pump configured for the correct voltage.**

9. Using 1-1/2” PVC pipe, connect the inlet side of the **Pulsar®** pump to the 1-1/2” ball valve installed in step #7.

10. Piping the discharge side of the **Pulsar®** pump will involve installing a venturi and reducing tee. See **Pulsar®** diagram on Page 25 for reference. Place and glue the 1-1/2” x 1/2” reducing tee on the 1-1/2” cut nipple on the discharge side of the pump. This reducing tee will have a 1/2” male tubing fitting screwed into it that will provide the inlet water to the feeder.

11. Take the black venturi and PTFE (plumbers) tape all the threaded ends. Take the two unions (makes for easy removal of venturi, for cleaning, after installation) and screw one on each end and tighten. Take and thread the 3/4" x 1/2" reducing coupling onto the venturi.

12. Connect the venturi as close as possible to the ball valve installed in step 8 using a short section of 1-1/2" PVC pipe.

NOTE: Make sure the flow through the venturi is in the proper direction. Connect the other end of the venturi to the discharge side of the Pulsar® pump using 1-1/2" PVC pipe.

15. The recirculation loop is now complete.

Feeder Assembly

Note: Some components may come pre-assembled.
Note: Refer to Appendix A & B for additional information regarding installation of the wash down and agitation nozzle upgrades as well as check valve orientation.

A. Remove the Hopper, Lid, Valve Plate with Manifold and Spray Shield and place on a clean dry surface.

B. Wrap the Discharge Valve Body (#79806) threads with at least 5 wraps of PTFE (plumbers) tape before installation in the feeder base.

C. Put together the Discharge Valve Assembly: First, install the Discharge Valve Arm (#79805) on the Body (#79806). Place the Discharge Valve Gasket (#71579) over the taped threads and install the DV Float (#79810).

NOTE: Do not install the DV Float before installing DV Arm on Body as this will place excess stress on the Arm.

Feeder Assembly (cont'd)

D. Install the Discharge Valve Assembly in the Base of the Feeder and use the DV Nut to secure the DV in place making sure it is upright as indicated by the marks on the Feeder Base.

Note position of Gasket inside Feeder Base

E. Replace the Spray Shield.

F. Install the Spray Nozzle(s) in the Spray Manifold and orientate facing straight up.

G. Wrap both the Wash-down and Well Agitator Nozzles with PTFE (plumbers) tape.

H. Install the Wash-down and Well Agitator Nozzles in the Wash-down Manifold.

NOTE: Do not use PTFE tape on the Valve Body Union. There is an o-ring that forms the water tight seal.

I. Replace the Valve Plate with Manifolds on the Feeder Base.

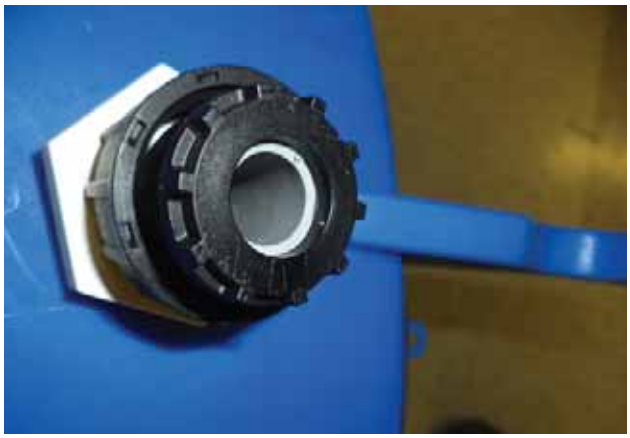
J. Orientate so that the Wash-down Nozzles point towards the center of the Spray Shield.

K. Replace the Hopper and Lid on the Feeder Base.

PS-500 ONLY: Push Hopper back to provide room for installing solenoids.

L. Wrap the threads on the valves mounts with at least 7 wraps of PTFE (plumbers) tape.

M. Hand tighten solenoid union connector on valve mount as shown below.



N. Locate the flow arrow *(figure 1, page 18)* on the Solenoids (#79664) and make sure the outlet port of each Solenoid is mounted on the valve mount. Orientate the valve so the coil is on top of the valve and closest to the feeder *(figure 1a, page 18)*.

Feeder Assembly (cont'd)

O. Note the label on the DIN connector and connect the DIN connector to the appropriate Solenoid with the Feed Solenoid on the left and the Wash-down solenoid on the right when facing the feeder.

P. Wrap all the male ends of the ball valves, nipples and tube fittings received with the kit with PTFE tape.

Q. Assemble the Inlet Manifold as shown *(figures 1b - 1c)*. Install the elbow tube fittings in the Solenoid and orientate as shown *(figure 2, page 19)*.

NOTE: Do not overtighten Line Strainer. Use the longer piece of tubing (24") to connect the top inlet fitting to the Wash Solenoid (right). Use the shorter piece of tubing (18") to connect the bottom inlet fitting to the Feed Solenoid (left) *(figure 3, page 19)***.**

R. Install the Check Valve Assembly on the DV as shown *(figures 4 - 4a, page 19)*. Make sure Check Valve flow arrow points away from feeder.

NOTE: See arrow on Check valve *(figure 5a)* **and install threaded connectors** *(figure 5b)***.**

NOTE: Refer to diagram of DV Assembly on page 33 of Operator's Manual.

NOTE: PVC elbow can be 45° or 90°. There is an extra close nipple (#71916) with Feeder Only Installation Kit.

figure 1

figure 1a

figure 1b

figure 1c

Installation

figure 2

figure 3

figure 4

figure 4a

figure 5a

figure 5b

figure 6

figure 7

Connect Feeder to Booster Pump/ Venturi Loop

A. **NOTE: Locate the feeder so that the outlet tubing length is as short as possible.**

B. Connect the inlet manifold to the Tubing connector on the Tee above the booster pump using the 1/2” tubing provided with the feeder *(figure 6, page 19)*.

C. Install female Parker fitting on ball valve as shown below.

Connect the 1/2” tubing from the venturi to the discharge valve of the feeder *(figure 7, page 19)*.

D. Open the 1-1/2” ball valves and prime the **Pulsar®** pump.

WARNING: Never start booster pump without priming the pump.

Start and run the **Pulsar®** pump for 3-4 minutes. Open the 1/2” gray valves and allow water to flow into the feeder, checking for leaks.

E. Refer to the Operators Manual for **Pulsar®** feeder operation.

Power Up Programming Directions

1. When powered up for the first time, tap anywhere on the **Pulsar®** logo screen *(figure 1)* to reach the main screen *(figure 2)*.
2. On the main screen *(figure 2)*, press 'CRS & WASH TIMERS' to set up the timers, as well as the idle feeder wash settings.
3. On the wash screen *(figure 3)*, press the UP and DOWN arrows next to the wash timer readout to raise or lower the wash by one minute. (Default is 5 minutes. Minimum is 1 minute. Maximum is 30 minutes.)
   a. Skip steps 4 & 5 if a CRS system is not installed.
   b. Go to Appendix D if a CRS system will be installed.
4. On the wash screen *(figure 3)*, press 'CRS' to enter the **Pulsar CRS™** System programming screen *(figure 4)* and (after initial 'LOG IN') press the right arrow to enter the idle feeder wash screen *(figure 5, page 22)*. **Both need to be setup for the feeder to function properly.**
5. On the **Pulsar CRS™** System programming screen *(figure 4)*, input the pool size in gallon. If **Pulsar CRS™** Clarifier is in use, it is necessary to press 'CRS SETUP', then select from the popup options *(figure 6, page 22)*.
6. To program the idle feeder wash screen *(figure 5)*, it is necessary to set the timers for proper operation of the feed and wash spray during times of non-use. The idle feeder wash (min) is the delay time from the time of the last operation of the feed or wash spray to when the feeder is considered Idle, and will Wash and/or Feed to keep the basin moist. Minimum value is 1, Maximum is 300. The Wash Timer (min) is the same as the wash timer on the wash screen.

figure 1

figure 2

figure 3

figure 4

Power Up Programming Directions (cont'd)

7. After programming the idle feeder wash, the rest of the feeder settings need to be engaged. From the main screen *(figure 2, page 21)*, press 'SET UP' to enter the feed selection screen *(figure 7)*. The feeder signal must be set up for either external signal or feed rate timer to engage the chlorinator feed cycle. If neither are green, please select the feeder control type desired. *(figures 8, at right and figure 9, page 23)*.

8. Figure 8 shows that an external signal (i.e. from either an ORP or chlorine controller) will control the feed. When the **Pulsar®** control panel received a signal from an external source, it will engage the feed cycle.

9. Figure 9 *(page 23)* shows that the internal feed rate timer has been selected, and now the feed rate dial page *(figure 10, page 23)* is available to dial up or down the chlorine to the desired setpoint.

10. Figure 10 *(page 23)* shows the feed rate dial. Pressing 'FEED –' or 'FEED +' will decrease or increase the feed rate in increments of 5%, from 0% to 100%. The red line indicates the current feed rate percentage. The 'FEED TABLE' button opens a table *(figure 11, page 23)* which correlates the feed rate percentage to a pounds per day of chlorine, based on 24 hours. If this button does nothing, then the feeder model size needs to be set up *(figure 12, page 23)*. The 'Arrow Bar' button on the right of the screen returns the operator to the main control screen.

11. Figure 11 *(page 23)* is the feed table for a given feeder. It correlates the feed rate percentage on the previous screen to a pounds per day usage. The table shown is specific to the **Pulsar®** 140 Feeder. Close the window by pressing the 'X' in the top right. This will return to the feed rate dial screen.

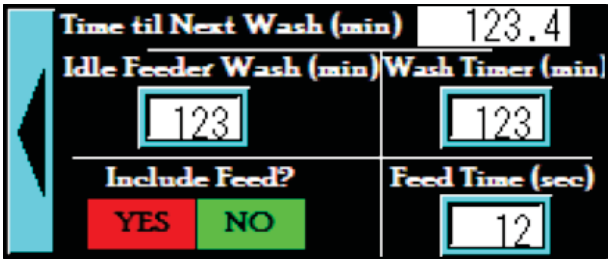


figure 5

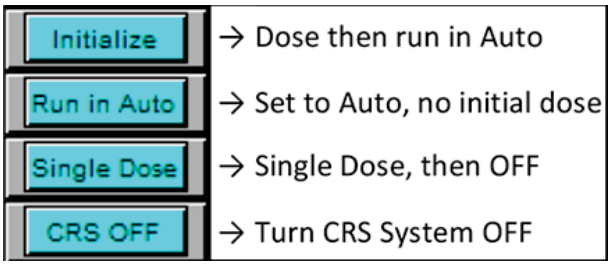


figure 6

figure 7

figure 8

Power Up Programming Directions (cont'd)

12. Press the 'Right Arrow' button on the feed selection screen *(figure 9)*, to enter the feeder model selection screen *(figure 12)*. **A feeder model size and booster pump mode must be selected for the feeder to operate. (LOG IN to select.)**
    a. **Econo Mode** Runs the booster pump for 20 seconds after the last valve activation (whether feed or wash), then shuts off the Booster Pump to conserve energy. The minimum runtime is 5 minutes.
    b. **Always On** runs the Booster Pump continuously while the flow switch is on and when the alarm state is OK. Push the pump start button to toggle the booster pump ON/OFF. If the pump has not run for a minimum time of 5 minutes, the pump will not turn off when the button is pressed.
    c. **Remember that the E-STOP and FLOW SWITCH pre-empt any activation of the pump. If the E-STOP is activated (manually pressed) or the Flow switch doesn't sense flow, the pump will not turn on.**
13. Figure 13 *(page 24)* shows that a **Pulsar®** 140 Feeder has been selected and that the booster pump is in 'Econo Mode'. This will turn on the booster pump when chlorine feed is required and will turn off the pump 20 seconds after the wash cycle has ended when feed is no longer required. **Using econo mode requires the use of the check valve in the discharge tubing to the venturi.**
14. Figure 14 *(page 24)* shows that a **Pulsar®** 45 Feeder has been selected, and that the booster pump is in 'Always On' mode. When in 'Always On' mode, the 'PUMP START' button must be pressed only once, and will show 'PUMP ON' when running.

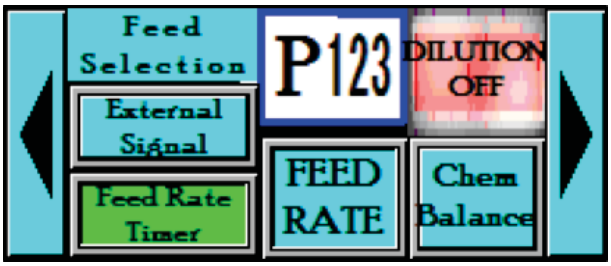


figure 9

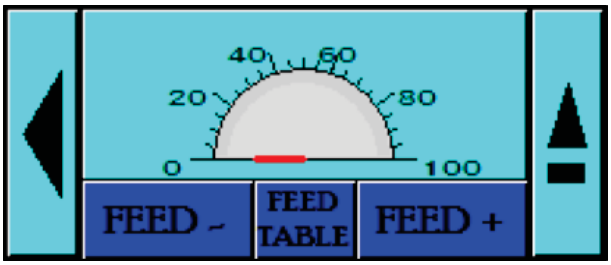


figure 10

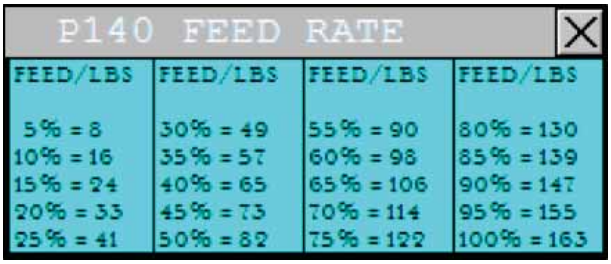


figure 11

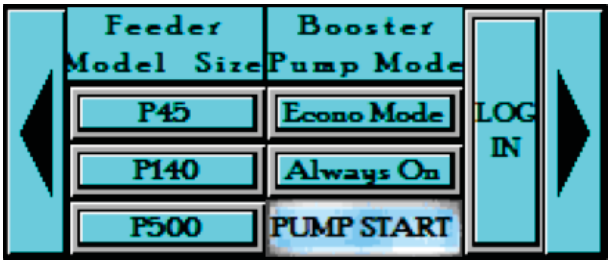


figure 12

Power Up Programming Directions (cont'd)

15. **IMPORTANT!! Once the feeder setup is complete, go back to the main screen and press the "Feed Start" button to start the feed process - This button is on a 2 second delay and must be touched for 2 seconds for it to toggle on or off.** *(figure 2, page 21)*

16. The ALARM PAGE can be accessed by pressing the alarm button on the main control screen. The last active alarm will be shown. Each alarm can be highlighted by pressing the scroll up and scroll down buttons. Pressing the Last Alarm button will highlight the most recent alarm. Pressing ALARM HELP will open a pop up window with a troubleshooting guide for that particular alarm.

17. Figure 15 shows the alarm page, showing an alarm history of all alarms that are not acknowledged, as well as the time of occurrence, description, and recovery time. (When logged in as tech, press 'ACK' to clear a recovered alarm.)

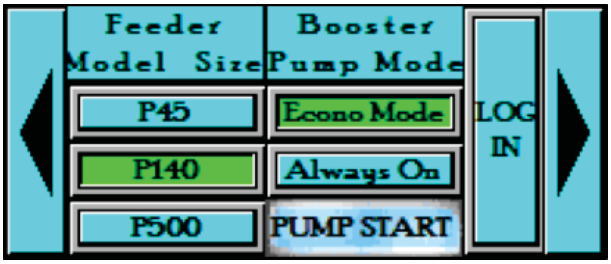


figure 13

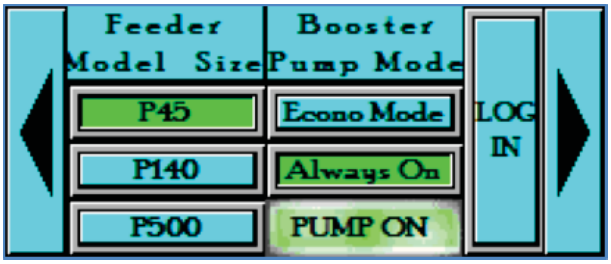


figure 14

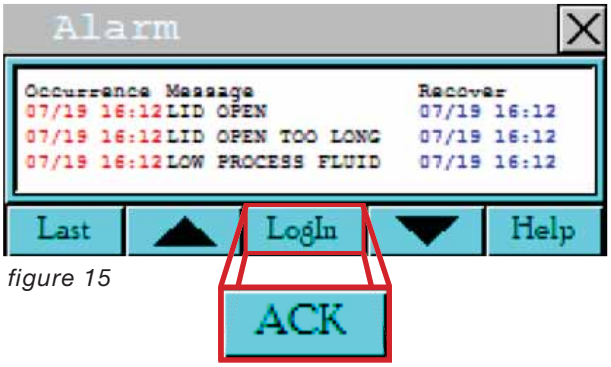
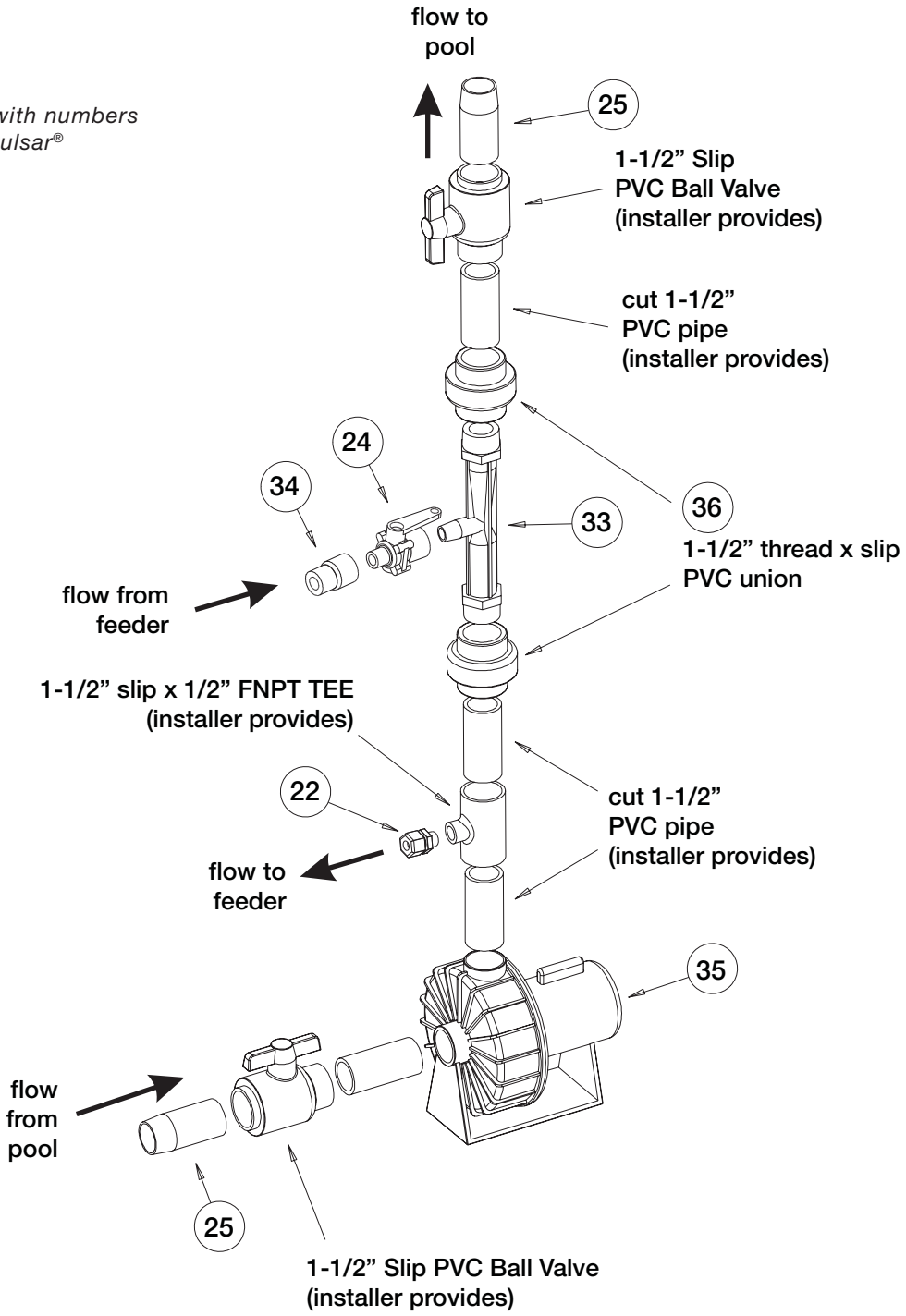
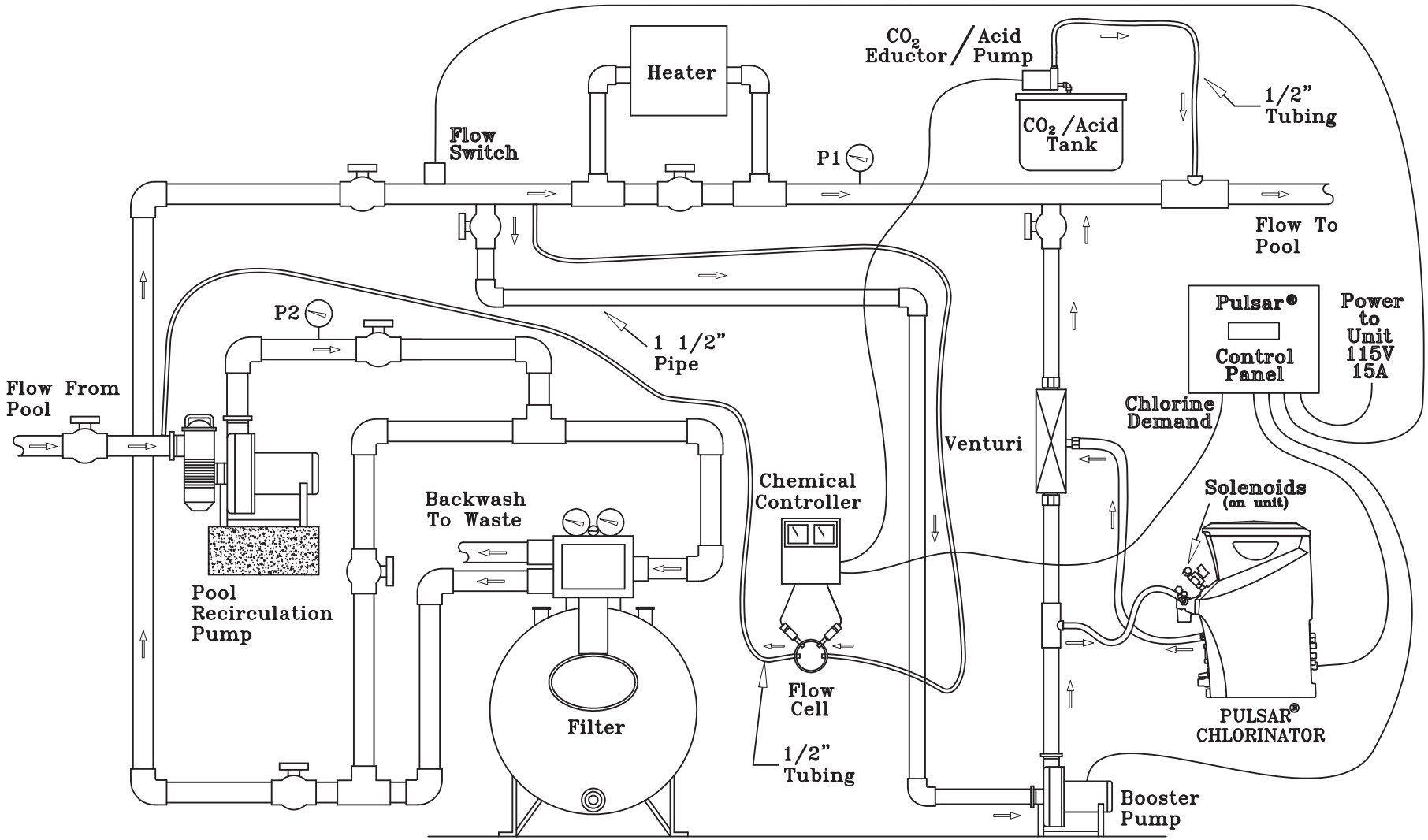


figure 15

Pulsar® Installation Kit

NOTE: All parts with numbers are included in Pulsar® Installation Kit.





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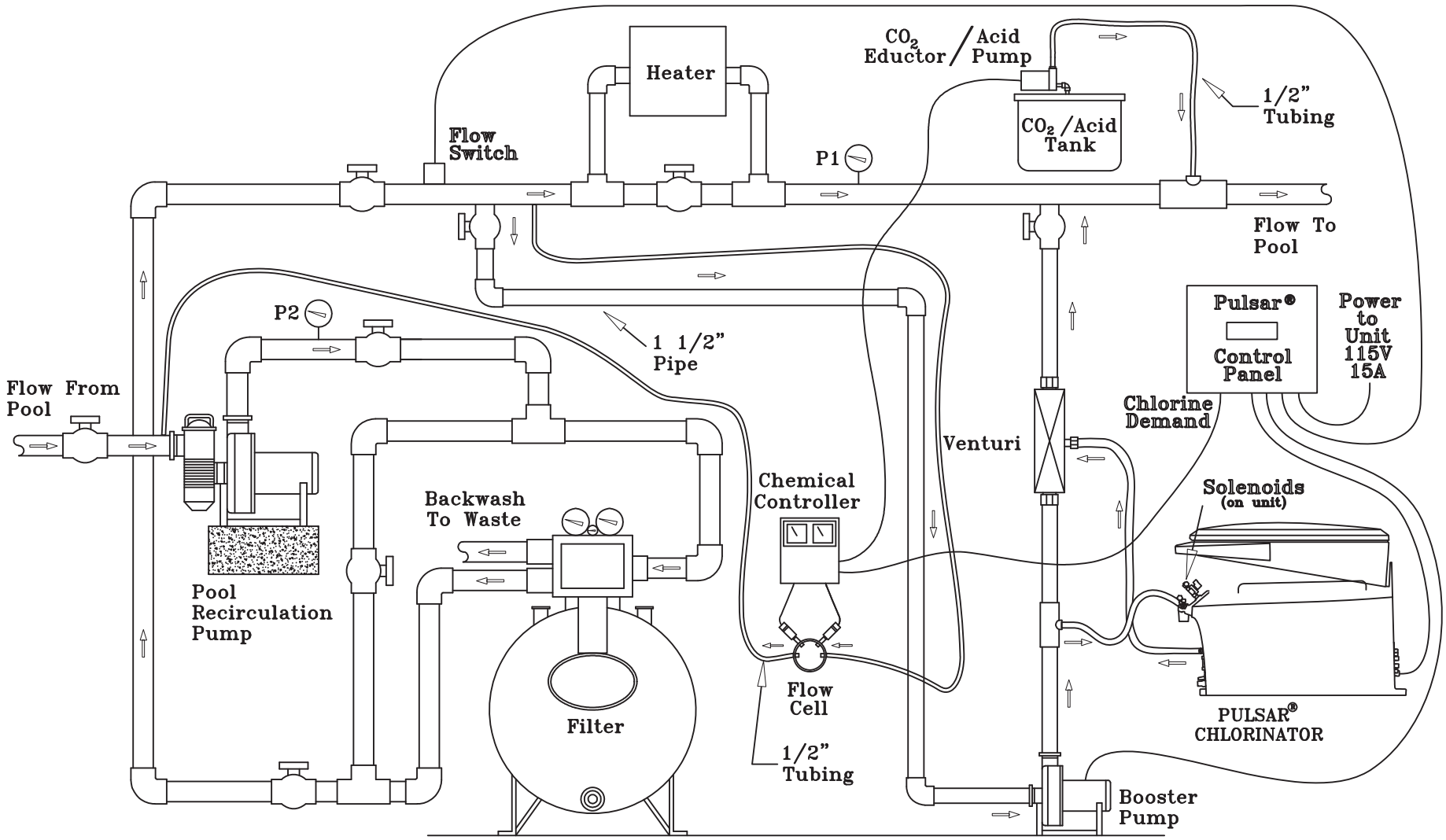
SCALE:	NTS	1 HP PUMP & VENTURI INSTALLATION	
CHECKED BY:	DT		
DRAWN BY:	DB		

NO.	REVISION	DATE	BY
1	NEW MANUAL	03/01/16	DB
2			
3			
4			
5			
6			



DWG. NO.	PS-500-IN01
SCALE:	NTS
CHECKED BY:	DT
DRAWN BY:	DB

PULSAR SYSTEM CAL-HYPO FEEDER PS-500 INSTALLATION SCHEMATIC

1 HP PUMP & VENTURI INSTALLATION

NO.	REVISION	DATE	BY
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3			
4			
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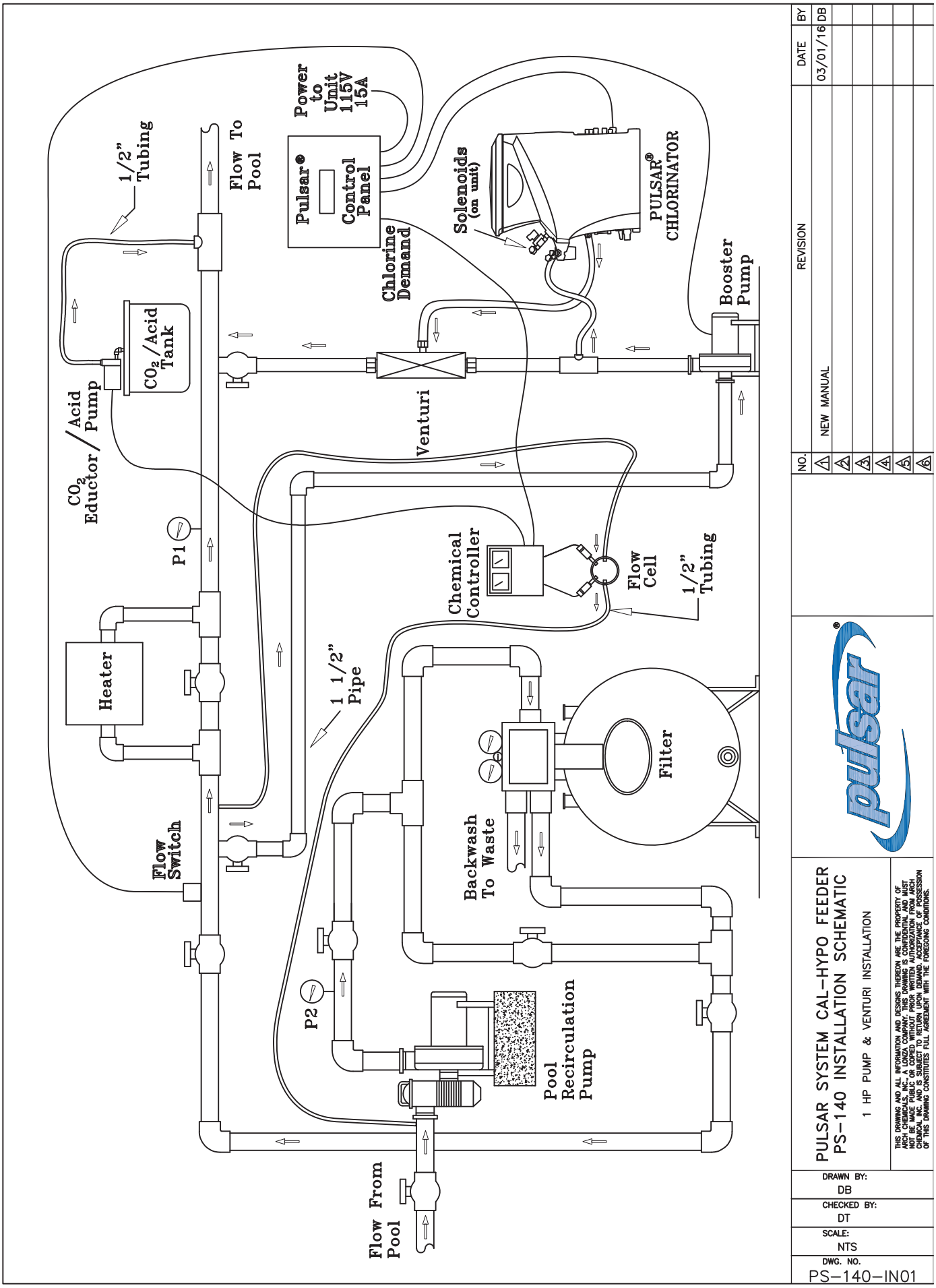
6			



NO.	REVISION	DATE	BY
1	NEW MANUAL	03/01/16	DB
2			
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6			

PULSAR SYSTEM CAL-HYPO FEEDER
PS-140 INSTALLATION SCHEMATIC
1 HP PUMP & VENTURI INSTALLATION

DRAWN BY: DB
CHECKED BY: DT
SCALE: NTS
DWG. NO. PS-140-IN01

Appendices

Pulsar® Technical Bulletins

Appendix A – Pulsar® New Wash Agitation Nozzles

Pulsar® Upgrades Part Numbers

Part Description	New Part Numbers	Existing Part Numbers
Agitation Nozzle Assembly	73057	—
PS-45 Washdown Manifold	73058	—
PS-140 Washdown Manifold	73059	—
Wash Nozzle (120° full cone)	73060	—
PS-45 Washdown kit (manifold & nozzle)	73062	—
PS-140 Washdown kit (manifold & nozzle)	73063	—
Handle-less Grid PS-45*	—	79651
Handle-less Grid PS-140*	—	79652
Handle-less Grid PS-500*	—	79643

**Existing part is modified and is ordered using the current part number*

Pulsar® Feeder Upgrades

Background

During the 2016 **Pulsar®** Dealer Meeting, a concern was expressed that some of the new feeders require substantial cleaning and maintenance. In addition, some dealers indicated that they observed drastic drops in chlorine residue after only a few weeks of use, possibly as a consequence of frequent clogging of the rapid grid, nozzle, discharge line and venturi, all of which can be caused by briquette “mushing”.

With focused analysis and testing of feeders in the field, the **Pulsar®** engineering team identified a few key operational features to be adjusted to address these issues. The washdown nozzles, agitation nozzles and grids on all three feeders are among some of the components that have been modified to improve performance and to reduce maintenance and cleaning frequency.

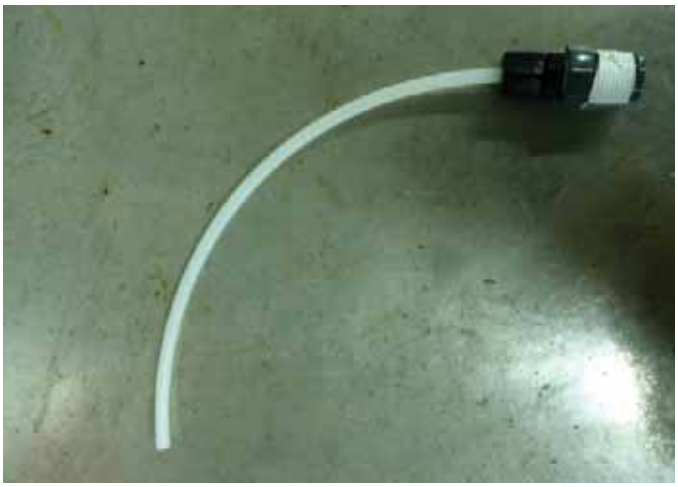
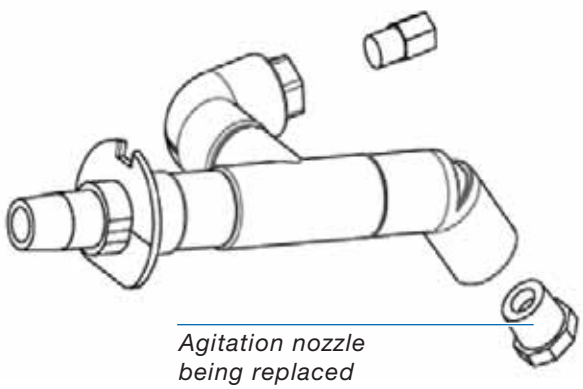


figure 1



Agitation nozzle being replaced

figure 2

Appendix A – Pulsar® New Wash Agitation Nozzles

New Agitation Nozzle

The agitation nozzle of the **Pulsar®** feeders is applicable to all three feeder sizes (PS-45, PS-140, and PS-500). The agitation nozzle is meant to spray a focused stream of water during every wash cycle to the bottom of the discharge tank in order to "agitate" the solution and not allow any heavy solids and scale to build up and form big clumps that can eventually clog the discharge valve inlet or downstream components such as the check valve or venturi.

Recent field testing has shown that directing the flow of water right to the bottom of the discharge tank using 1/8" ID tubing provides much better direct agitation of solids and helps reduce the level of scale formation. The updated agitation nozzle will be located in the same position as the previous version, but instead consist of an 11" long poly tubing (¼"OD x 1/8" ID) *(figure 1, page 30)*.

New Agitation Nozzle Installation

Prior to installation, straighten the tubing as best as possible so that it is pointed straight down when installed. The nozzle is a direct replacement of the old agitation nozzle. After screwing into the 45° elbow, verify that the tubing is directed so that it sits right next to the discharge valve (DV) *(figure 3)*. This optimizes its performance and increases the chances that big clumps of scale will break down prior to getting pulled into the DV by the venturi vacuum.

PS-45, PS-140 Washdown Nozzle Upgrades

A new washdown nozzle was developed to help reduce premature briquette mushing. The washdown nozzle aims the flow directly downwards onto the feed nozzles and spray shield.

The new nozzle also has a 120° full cone spray which provides better overall coverage of the feed nozzle and spray shield area. The nozzle is also assembled with ½" schedule 40 pipe in lieu of ¼" piping that the old washdown nozzle had *(see figures 4 & 5)*. The bigger piping allows more water flow to the nozzle providing more pressure upon discharge increasing flow impingement. This improves the scale growth mitigation action on the feed nozzles and spray shield.

figure 3

figure 4

figure 5

Appendix A – Pulsar® New Wash Agitation Nozzles

Installation Steps for the PS-45 Washdown Nozzle

Prior to placing the valve plate assembly onto the base, remove the elbow *(figure 6)* from the 1/2" nipple and replace it with the new washdown assembly.

Disassemble the DV nut and washdown solenoid from the valve plate if more room is required to screw on the new washdown nozzle on onto the 1/2" nipple *(figure 7)*.

Rotate and angle the nozzle slightly (approximately 15° - 20°) as necessary to provide maximum coverage to the entire spray shield and feed nozzle *(figure 8)*. Activate the wash nozzle while adjusting to verify coverage.

figure 7

figure 8

Installation Steps for the PS-140 Washdown Nozzle

Disassemble the DV nut and washdown solenoid from the valve plate *(figure 9*). Prior to placing the valve plate assembly onto the base, remove the 1/2" to 1/4" bushing *(figure 10)* from the tee and replace it with the new washdown assembly by screwing the 1/2" nipple into the tee.

Orientation steps for the PS-140 washdown nozzle are similar to the PS-45 installation. The main objective is to make sure the flow coming from the nozzle covers all three feed nozzles. Angle the stem slightly upwards in order to provide maximum coverage to all three nozzles *(figures 11 & 12)*. Activate the wash nozzle while adjusting the angle in order to physically verify complete coverage with your hands.

figure 9

Appendix A – Pulsar® New Wash Agitation Nozzles

figure 10

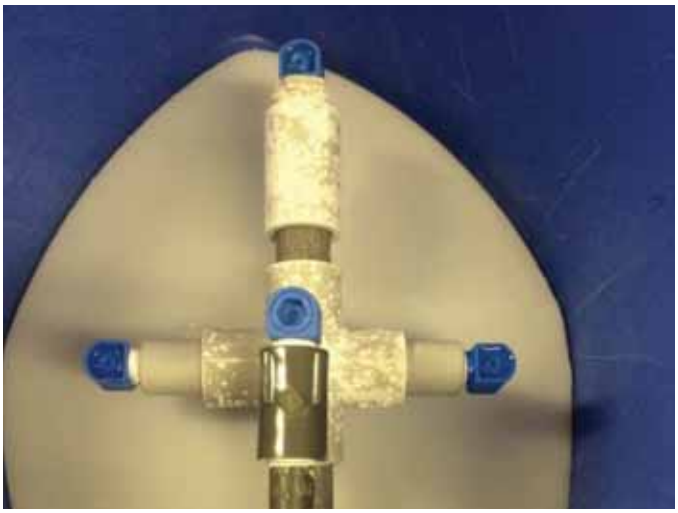


figure 11

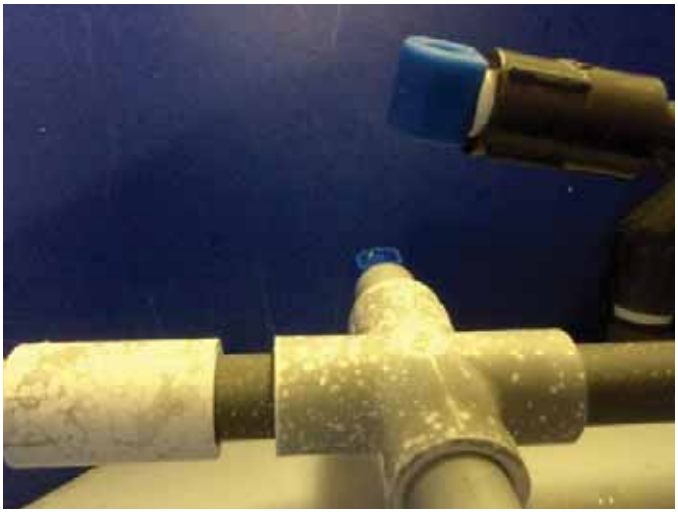


figure 12

Handle-less Grids

During close monitoring of PS-140 feeders identified as having excessive cleaning requirements, a potential correlation was observed between clogged nozzles and scaling collecting on the handle nuts of the grid *(figure 13)*. Removing the handles from the grid completely reduced the rate of clogging of the nozzles during subsequent feeder operation.

Excess scaling appears below handle nut; may be dropping bigger scale deposits on feed nozzles

figure 13

figure 14 PS-140 Handle-less Grid

Appendix B – Check Valve Orientation

Discharge Assembly Check Valve

Background

Data taken at installation sites have shown better performance in the discharge piping when the check valve is installed on the outlet of a 45 degree elbow as opposed to the 90 degree elbow provided as part of the installation kit.

- With the check valve to be positioned vertically, any solids not completed dissolved can deposit easily within the check valve components when there is no suction.

Orienting the check valve at a 45 degree angle decreases backpressure in the suction line and increases venturi performance.

Check Valve Installation at Venturi End of Discharge Tubing

Installing the check valve at the venturi end of the discharge tubing also improves maintenance by reducing solids build up at the outlet of the feeder and in the check valve.

Optional Check Valve Installation

Sites that have the **Pulsar®** Booster Pump set to “Always On” have the option not to install the check valve at all. This dramatically improves flow rate and reduces maintenance and cleaning requirements.

figure 1

figure 2

Appendix C – Pulsar® Cable Length Guide to Control Panel

Cable Length Guide

Background and Purpose

This technical bulletin is to call out the exact cable lengths and part numbers that are recommended by Lonza for extending the flow switch signal cable, manufactured by IFM Efector, and the feeder control cable, manufactured by Turck.

Recommendation

The recommendation for extending the cable, for either situation, is to purchase the "patch cable" style, which is like an extension cable, and requires no wiring internally in the **Pulsar®** Control Panel or **Pulsar®** Feeder Junction Box.

Flow Switch Cable

Feeder Control Cable

Flow Switch Extension Cable

- Part Number 79663, **Pulsar®** Flow Switch Extension Cable (10 meters)
- Orange PVC sheath
- Current PCP Cable (printed on cable near plug end): EVT001 – 5 meters, or EVT002 – 10 meters.
- Maximum manufacturer-approved length for unshielded cable for flow switch is 10 meters.
- Running cables beyond the 10 meter limit must be shielded and run away from large electrical sources, including HVAC systems and pump motors.

Feeder Control Extension Cable

- Part Number 79662, **Pulsar®** Turck Extension Cable (5 meters)
- Gray PVC sheath
- Feeder Control Cable

Appendix D – Pulsar CRS™ System Upgrades

Pulsar CRS™ System Upgrade

Part Number	Description	Quantity
79620	**Pulsar CRS™** PCP Installation Kit	
79621	**Pulsar CRS™** PCP Pump	x1
79622	**Pulsar CRS™** PCP Pump Mounting Kit	x1
79608	**Pulsar®** 1/4" NPT Cord Grip for Flow Switch Cable	x2
79609	**Pulsar CRS™** Flow Switch Cable	x1
79669	**Pulsar®** Flow Switch	x1

Description of System Upgrade

This system is an upgrade to the previously released **Pulsar CRS™** System. It integrates into the new **Pulsar®** control panel and eliminates the complexity of programming an external timer, improving system efficiency.

- Feed timer controlled by **Pulsar®** control panel
- Feed based on exact pool size
- Feed clarifier only when needed based on actual backwash
- Automatically feed clarifier after backwash
- Improve clarification of pool water for sand filtered pools

This new installation of the **Pulsar CRS™** System utilizes the ECON FP pump by Stenner Pumps. It is a peristaltic pump, mounted above the **Pulsar CRS™** System chemical reservoir (55 gallon drum or 5 gallon bucket) and connected to an external outlet for power, and the blue terminal blocks inside of the control panel. The control panel uses a second flow switch, included in the **Pulsar CRS™** PCP Installation Kit (79620). When the control panel senses a backwash flow of at least ten seconds, it triggers an event timer which will turn on the pump 30 minutes after the backwash flow has stopped. The 30 minute delay is to ensure that all maintenance is completed and that the pool is back into normal filtration mode. If another backwash event is sensed during the 30 minute delay, then the timer does reset back to 30 minutes. The timer is designed to slowly pump in one ounce per 5,000 gallons, which is equivalent to 1 minute per 1,000 gallons, based on the ECON FP pump by Stenner Pumps. This will generate an even coating of clarifier across the sand filter bed to remove additional contaminants from your pool water. Be aware that after the first application or two, you will need to backwash more frequently due to the enhanced filtration achieved by the **Pulsar CRS™** Clarifier. Also note the increased turbidity of your backwash water. This is also due to the enhanced filtration generated by the **Pulsar CRS™** Clarifier.

Appendix D – Pulsar CRS™ System Upgrades

Tools & Equipment Needed for Install:

Adjustable Wrench for 1/2” nut	Wire cutters and wire strippers for 22AWG wire
Drill bits – 7/16” and 23/32” for drill and tapping	Phillips screwdriver
Thread taps for ¼” and ½” pipe threads	Precision straight slot screwdriver 2.5 x 0.4mm and a 3.5 x 0.5mm blade

Installation Instructions

1. Ensure that backwash is turned off. Drill and tap a 1/2” hole on the bottom side of the backwash pipe. Thread tape the flow switch and thread into backwash line. This will be the sensor for automating the **Pulsar CRS™** System *(figure 1)*.

For Steps 2-7, see Figure 2.

2. Turn off the **Pulsar®** control panel and unplug it from the wall outlet. You will need to drill one or two holes, depending on the number of open penetrations available in your control panel. These holes will be used for: 1) Orange Flow Switch cable, and 2) Gray signal cable from the Stenner Pump. Install the cord grips as shown.

3. Once the penetrations are made and the cord grips have been installed. Thread the cords as shown. The orange cord should be landed to either the gray terminal blocks on the bottom row, if available, or directly to the PLC on the back of the panel door. If you have one plugged penetration in the panel, you will only drill one hole and will land the Orange Flow Switch Cable to the gray terminal blocks. If you must make two penetrations, then you will have to land the Orange Flow Switch Cable directly to the back of the PLC as shown.

figure 1


figure 2

Appendix D – Pulsar CRS™ System Upgrades

4. If you do not have the extra gray terminal blocks, the Orange Flow Switch Cable should be landed as follows:
   a. Blue Wire lands to a spare opening in Terminal Block 2 (next to motor starter on top row)
   b. Brown Wire lands to a spare opening in Terminal Block 1 (next to the power supply on top row)
   c. Black Wire lands to Input I7 on the PLC directly.
   d. The White Wire is not used *(figure 3)*.

5. If you have the extra gray terminal blocks: the Orange Flow Switch Cable land the cables in the order of Blue, Black, Brown from left to right, on terminal blocks, 3, 4, 5 respectively. The white wire is not used.

6. The Gray Pump Signal Cable should be landed on the Blue Terminal Blocks on the bottom row inside the **Pulsar®** control panel. Use the colors.

7. Tighten the cord grip nuts around the cables to ensure that they will not move and put strain on the landed wires.

8. Set up the chemical in a nearby location, such that the pump can be mounted above it.

9. Mount the Stenner Econ FP pump mount as shown *(figure 4)*.

10. Plug the 10 foot power cable of the Stenner Econ FP pump into a NEMA 5-15 outlet to power on the pump as shown *(figure 5)*.

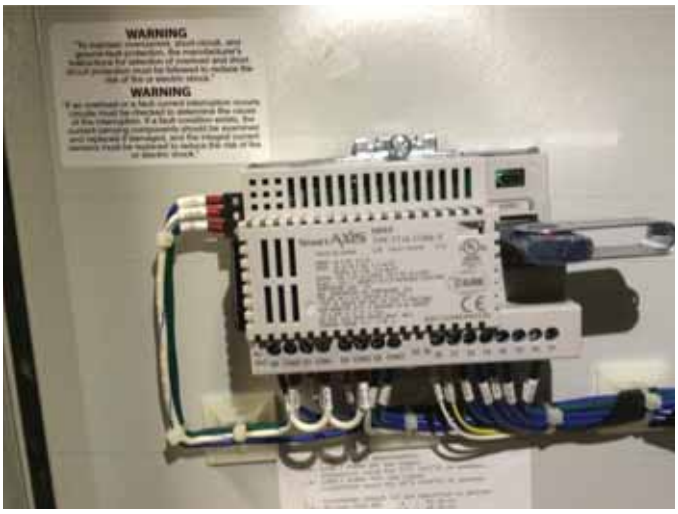


figure 3


figure 4

figure 5

11. Program the Stenner Econ FP pump per the Stenner Pumps manual using the following settings.
    e. Unscrew the cover plate set screw
    f. Remove the cover and unlock the keypad by pressing and holding 'MODE' and %simultaneously for 5 seconds.
    g. Set the signal type to flow switch by pressing and holding 'MODE' then the 'UP' or 'DOWN' arrow to scroll through the Modes.
    h. Set the output to 100% by pressing and holding & then the 'UP' arrow.
    i. Turn the keypad off STANDBY by pressing the 'STBY' button once.
    j. Replace the cover and set screw.
12. Land the Black and Red Wires on the blue terminal blocks on the bottom rail inside the **Pulsar®** control panel *(figure 2, page 37)*.
13. Hook up the suction and discharge of the Stenner pump per the Stenner installation manual *(figure 6)*.
14. Follow the **Pulsar CRS™** System Specific Programming Instructions for programming the pool size and complete setup.

figure 6

Appendix E – ORP Leakage Current Tech Bulletin

Personal Protective Equipment and Parts Needed

Safety

Leather Gloves

Safety Glasses

Tools

Wire Cutters

Background

The **Pulsar®** Control Panel ORP interface relay is an electro-mechanical relay which has a very low amperage requirement for holding in the coil once energized. Some ORP controllers use solid state relays which have an inherent leakage current when not actively energized. This leakage current may keep the ORP relay inside of the **Pulsar®** Control Panel active, and thus continually feeding, even when the ORP is not calling for chlorine. To date, there have been two specific brands of controllers that have caused this type of failure, based on feedback from the field: ChemTrol brand programmable controllers, and BECSys controllers.

Chemtrol Programmable Controllers

The PC3000/ PC2000 leak voltage as you know and have seen. The voltage leak comes through the RF network across the points on either side of the relays.

You will want to clip either side of all the 100 ohm resistors for each relay that activates a valve. So, on the OXY relay it will be R86, R87, R88, and R89. For the Sanitizer, it will be R92, R93, R94, and R95. Again you will clip one leg from each side and pull it away from the board so you could re solder it if you needed to. For further information, please contact Chemtrol directly at www.sbcontrol.com, or toll Free at 800-621-2279.

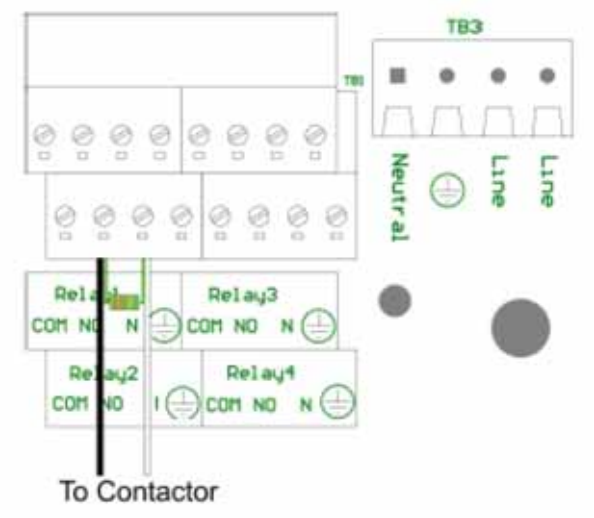
BECSys Controllers : Operating a Contactor Using a Solid State Relay

There have been applications where Contactors (relays used to switch a large amount of eletrical power through their contacts) connected to a solid state relay on a BECSys controller will not turn off when the controller indicates that the relay should de-energize. A Contactor requires more current to start up than it does to maintain its “ON” state (drop-out current). Solid state relays have some leakage current associated with them which may be enough to continue operating the Contactor even after the controller has signaled the relay to turn off.

Using a 33k Ohm, 2 Watt resistor (8120621) will bleed approximately 3.6 milliamps of current from the relay output (assuming the load is operated at 120VAC). Adding this resistor in parallel with the Contactor should take enough of the leakage current to allow the Contactor to shut off. This bleed resistor can be installed either at the Contactor or inside the controller, whichever is most convenient. If the resistor is being installed inside the controller, then connect one lead of the resistor to the solid state relay’s normally open (NO) terminal and the other lead to the corresponding neutral (N) terminal. The example *(page 41)* shows a bleed resistor installed for a Contactor connected to Relay1 in a BECSys7 controller.

Appendix E – ORP Leakage Current Tech Bulletin

WARNING! All power must be removewd from the system before installation of the bleed resistor.



Part Number	Description
8120621	33K ohm Carbon Film 2W Resistor 5%

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Lonza Emergency Action Network (LEAN)

Emergency Contact Information

The Lonza Emergency Action Network ("LEAN") is Lonza's emergency action system. Call the LEAN system at 1-800-654-6911 in North America, and at 1-423-780-2970 elsewhere in the world to reach the International Emergency Hotline. The LEAN system is available 24 hours a day, 7 days a week for assistance with spills, injuries and emergencies of any kind. It uses computers and other systems to make Lonza's environmental, technical transportation, toxicological and other expertise about its products readily available to anyone needing assistance.

1-800-654-6911

(Outside North America, call 1-423-780-2970, International Emergency Hotline)

Additionally, in the event of an emergency, CHEMTREC (Chemical Transportation Emergency Center) should be contacted. CHEMTREC is a national center established by the Chemical Manufacturers Association (CMA) in Washington, DC, to relay pertinent emergency information concerning specific chemicals on request.

CHEMTREC has a 24-hour toll-free telephone number intended primarily for use by those who respond to chemical transportation emergencies, 1-800-424-9300 in North America, and at 1-703-527-3887 elsewhere in the world. CHEMTREC may also be accessed through the CMA website at www.cmahq.com.

Safety Data Sheets (SDS) can be obtained by contacting the following number: 1-800-511-MSDS in North America, and at 1-423-780-2347 elsewhere in the world.

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