

OWNER'S MANUAL



For the installation, operation and service of

PWCE16P12

PWCE35P12

PWCE54P12

Should you the installer or owner be unfamiliar with the correct installation or operation of this type of equipment you should contact the distributor/manufacture for the correct advice before proceeding with the installation or operation of this product.

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1. PRECAUTIONS AND GENERAL NOTES

General Warnings and Safety Information

Electrical

There are no user-serviceable parts in the AC adapter, motor, or controller. In the event of a failure, these should be replaced.

- All electrical connections must be completed according to local codes.
- Only use AC power adapter supplied with the unit.
- The power outlet must be grounded.
- To disconnect power, unplug the AC adapter from its power source.

Mechanical

- Do not use petroleum based lubricants such as Vaseline, oils, or hydrocarbon based lubricants. Use only 100% silicone lubricants.
- All plastic connections should be hand tightened. Teflon* tape may be used on connections that do not use an O-ring seal. Do not use pliers or pipe wrenches.
- All plumbing must be completed according to local codes.
- Soldering near any plastic fittings should be done before connecting fittings to the valve. Excessive heat during soldering may damage to the valve.
- Observe drain line requirements.
- Do not use lead-based solder for sweat solder connections.
- Do not support the weight of the system on the control valve fittings, plumbing, or the bypass.
- Do not use sealants on the threads. Use Teflon* tape on all threaded connections.

*Teflon is a trademark of E.I. duPont de Nemours.

General

- Observe all warnings that appear in this manual.
- Keep the unit in upright position. Do not turn on side, upside down, or drop. Turning the tank upside down or laying the tank on its side will cause softener media to enter the valve.
- Ambient operating temperature is between 35.6°F (2°C) and 120°F (49°C).
- Operating water temperature is between 39.2°F (4°C) and 100°F (38°C).
- Working water pressure range is 0.14 to 0.35 MPa (20 – 50 PSI).
- Use only salts designed for water softening. Do not use ice melting, block, or rock salts.
- This system is not intended to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.
- Do not allow this water conditioning system to freeze. Damage from freezing will void this water softener system's warranty.
- The materials used will fade or discolor over time in direct sunlight. The integrity of the materials will degrade to cause system failures.
- The water softener removes only hardness from water. It does not remove any organic pollutants or odor. Therefore, it does not provide safe and reliable potable water.
- Avoid incoming water source that contains large amount of iron or organic pollutants, or water of high turbidity and color . If the incoming water is of poor quality, it is recommended that a carbon filter be installed before the softener system.
- Do not allow the media in the softener system to become dehydrated for an extended period of time, as this may result in failure of the softener media due to dryness.

- Under normal operating conditions, it is recommended that once the rated regeneration cycle (depending on model) is reached, the system should be regenerated with NaCl by adding salt (not containing iodine) into the brine tank. The control valve will automatically complete the action of resin flushing and regeneration. The resin must be replaced when the system's total capacity (depending on model) is reached. Please contact your local Pentair authorized distributor for replacement of resin.
- Do not power off the water softener indiscriminately, as backwash duration must be reset upon each power outage.
- If the water softener will not be used for an extended period of time, please disconnect the power and water source. To start using the water softener after a period of non-usage, perform one regeneration before it is used normally.

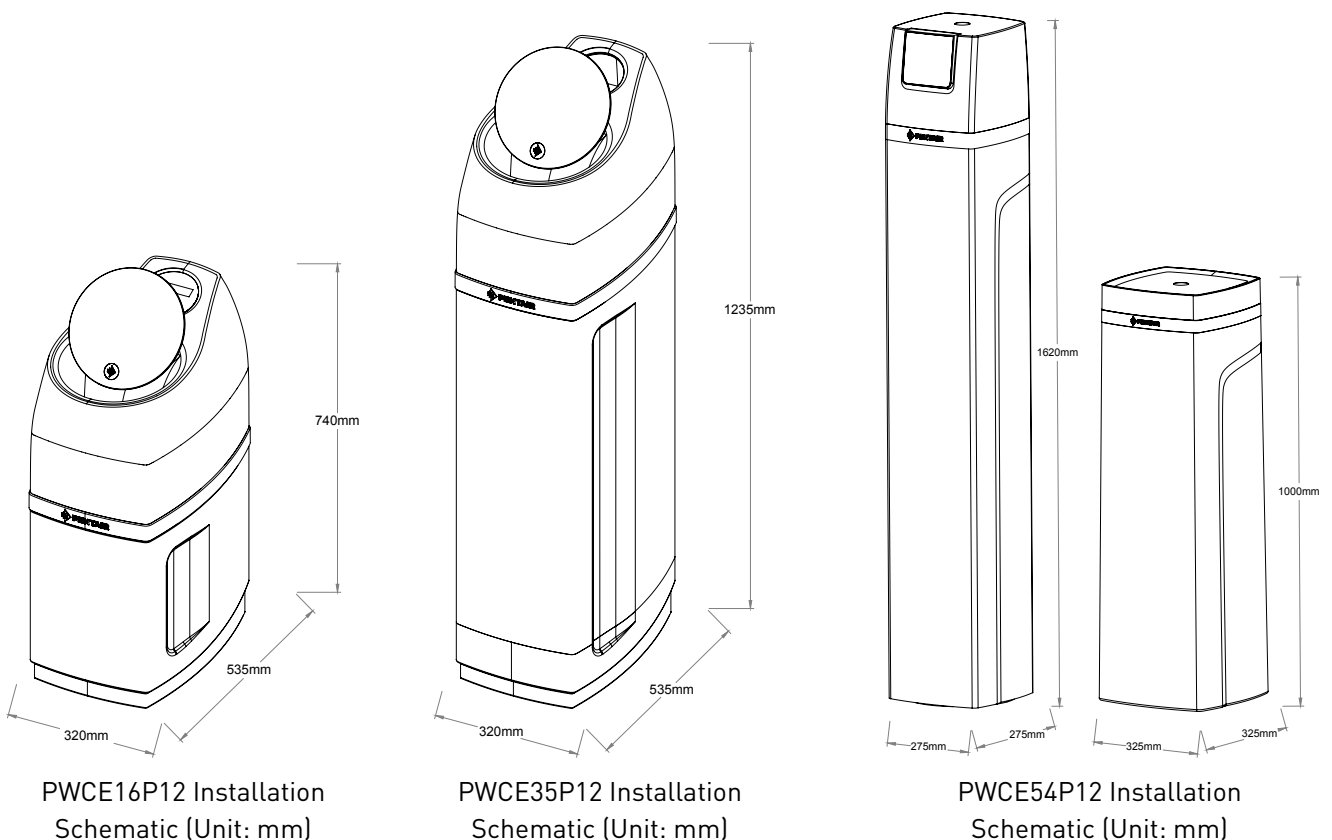
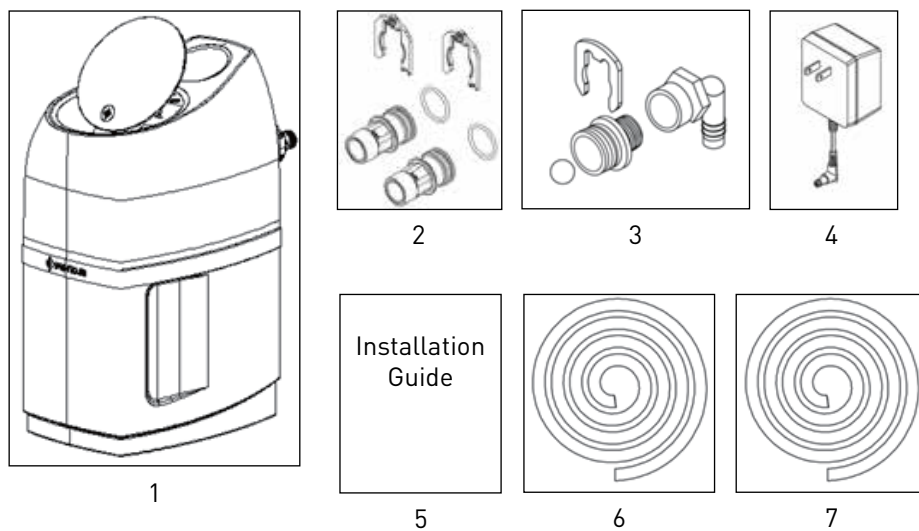
Proper use and operation of this water softener system will extend the life of the equipment:

- Regeneration of resin requires the use of brine. The water for dissolving salt is directed into the salt tank by the water softener system. Therefore, you should ensure that the brine tank is filled with salt before operating the water softener. Only granular or pelletized special softener salt should be used as the salt for regeneration. Do not use poor quality industrial salt as it contains abundant impurities and sediments which will contaminate the resin and severely reduce the operating capacity of the water softener. Please also do not use table salt as it contains additives which may poison the resin.
- Some regenerants contains relatively more impurities which accumulate after an extended period of use. Such accumulated impurities should be cleaned and removed to prevent blockage. When cleaning the brine tank, first remove the brine well; followed by the salt grid plate ; wash them with clean water. Do not wash with any organic solvents.
- In humid regions, salt bridge may form inside the brine tank. The salt bridge can cause a space to form between the water and salt, resulting in salt not dissolving in water to form brine. This affects the regeneration of resin and thereby the availability of soft water. To break up the salt bridge, insert a stick into the brine tank to feel for hardened salt bridge. If salt bridge is found, it can be broken up with the stick. Do not hit the external wall of the brine tank.
- If the water softener system will not be used for an extended period of time (for more than six months), one should try, within six months (or lesser), to run the system for several hours and to regenerate once. This is to ensure optimal performance when restarting the softener.

2. PARTS INCLUDED

Open the package and ensure that all parts are provided. All models of water softener contain the following:

1. Water softener with automatic control valves and bypass valve
2. Inlet and outlet connector kit
3. Drain flow controller and connector kit
4. Power adapter
5. Installation Guide
6. Drain hose
7. Overflow hose
8. 3/8" PE Salt Tank Tubing (for PWCE54P12)



3. PRODUCT INFORMATION

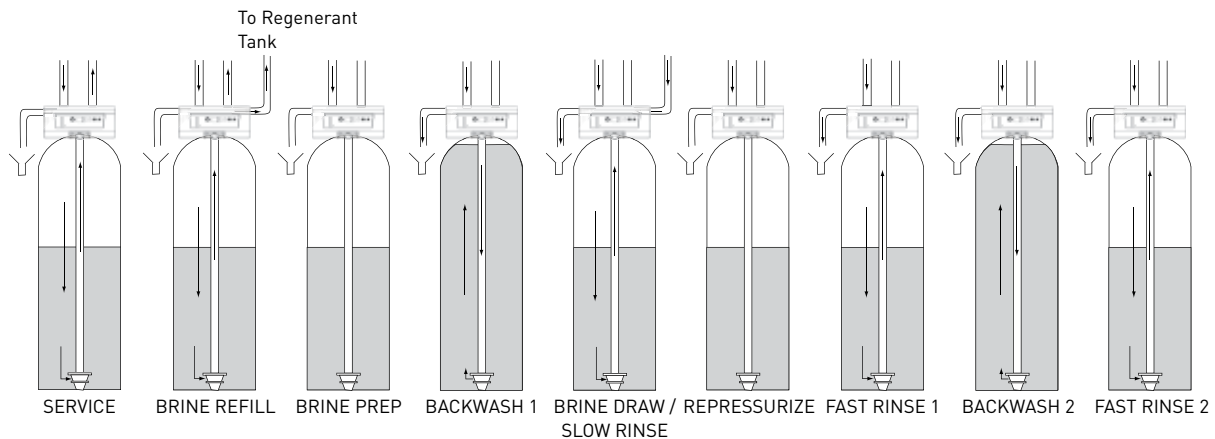
3.1. Product Features

Pentair water softener uses chlorinated city water as the source to effectively reduce hardness in the water. The water softener is suitable for softening of potable water in homes, hotels, guesthouses and restaurants.

3.2 Specifications

Model	PWCE16P12	PWCE35P12	PWCE54P12
Inlet Water Condition	Chlorinated City Water OR Filtered Water from HydraSmart POE KC-1040/KC-1054		
Inlet Water Max. Dissolved Iron	< 0.3 mg/L		
Inlet Water Max. Turbidity	< 5 NTU		
Inlet Water Max. Total Hardness	≤ 400 ppm as CaCO ₃		
Inlet/Outlet Pipe Size	1" BSP (25.4mm)	1" BSP (25.4mm)	1" BSP (25.4mm)
Operating Pressure	20~50 PSI	20~50 PSI	20~50 PSI
Flowrate	1.1 m ³ /h	2.0 m ³ /h	3.0 m ³ /h
Total Capacity	10,000m ³	15,000m ³	20,000m ³
Resin Volume	12L	30L	40L
Salt Amount	20kg	50kg	60kg
Power Supply	220V/50Hz	220V/50Hz	220V/50Hz
Power	6W	6W	6W
Inlet Water Temp	4~38°C	4~38°C	4~38°C
Ambient Temp	2~49°C	2~49°C	2~49°C
Dimensions (L X W X H)	535*320*740mm	535*320*1235mm	Main Unit: 275*275*1620mm
			Brine Tank: 325*325*1000mm
Drain Line Pipe Size	1/2" (12.7mm)	1/2" (12.7mm)	1/2" (12.7mm)
Salt Inlet Pipe Size	3/8" (9.525mm)	3/8" (9.525mm)	3/8" (9.525mm)

3.3. System Recharge Cycles (8-Cycle Operation)



Service (Downflow):

Untreated water is directed down through the resin bed and up through the riser tube. The hardness causing ions attach themselves to the resin and are removed from the water. The water is conditioned as it passes through the resin bed.

1. Brine Refill:

Water is directed to the salt tank at a controlled rate, to create brine for the next recharge.

2. Brine Prep (Dissolve Salt):

After the refill cycle fills the salt tank with water, this cycle allows time for the salt to dissolve into the water.

3. Backwash 1 (Upflow):

The flow of water is reversed by the control valve and directed down the riser tube and up through the resin bed. During the backwash cycle, the bed is expanded and the debris are flushed to the drain.

4. Brine Draw & Slow Rinse (Downflow):

The brine draw cycle takes place during the slow rinse cycle. The control directs water through the brine injector and brine is drawn from the salt tank. Brine draw is completed when the air check in the salt tank closes. The brine is directed down through the resin bed and up through the riser tube to the drain. The hardness ions are displaced by sodium ions and are sent to the drain. The resin is recharged during the brine cycle.

5. Repressurize Cycle (Hard Water Bypass Flapper Open):

This cycle closes the flappers for a short time to allow the air and water to hydraulically balance in the valve before continuing the recharge.

6. Fast Rinse 1 (Downflow):

The control directs water down through the resin bed and up through the riser tube to the drain. Any remaining brine residual is rinsed from the resin bed.

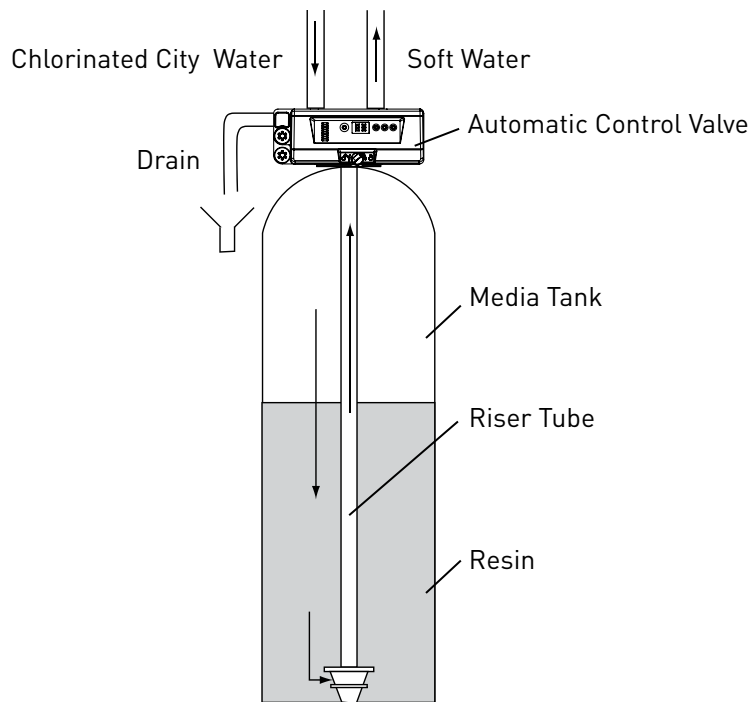
7. Backwash 2 (Upflow):

The flow of water is reversed by the control valve and directed down the riser tube and up through the resin bed. During the backwash cycle, the bed is expanded and the debris are flushed to the drain.

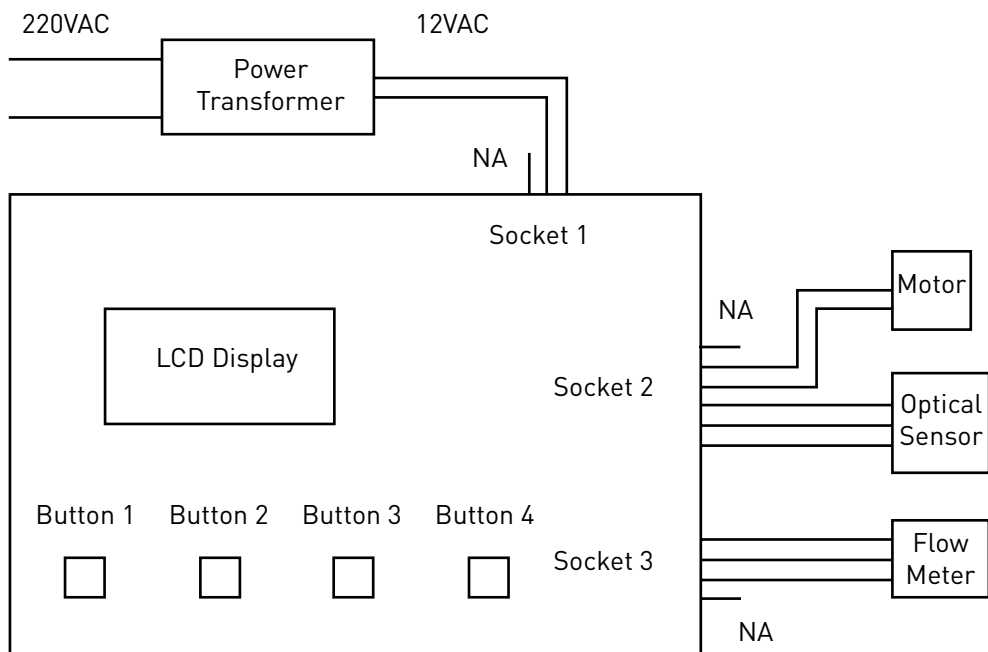
8. Fast Rinse 2 (Downflow):

The control directs water down through the resin bed and up through the riser tube to the drain. Any remaining brine residual is rinsed from the resin bed.

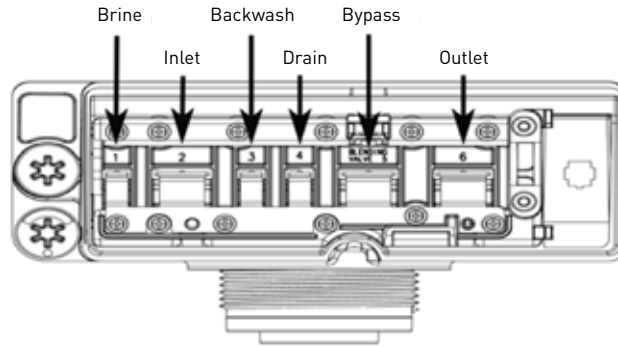
3.4. Schematic Diagrams



Electrical Control Diagram



VALVE LAYOUT – 368



3.5. Introduction to Main Parts

Part Name	Material	Specification	Quantity
Polyphenylene Oxide (PPO) Water Inlet and Outlet Control Valve	30% fiberglass + Polyphenyl ether	222mm x 222mm x 119mm	1 piece
Polyethylene (PE) Media Tank	Lining: Polyethylene	Diameter: 250mm	1 piece
	Housing: Fiberglass	PWCE16P12 Model: 400mm PWCE35P12 Model: 889mm PWCE54P12 Model: 1372mm	1 piece
Polyethylene Brine Tank	Polyethylene	PWCE16P12 Model: 25L PWCE35P12 Model: 35L PWCE54P12 Model: 70L	1 piece
Cation Exchange Resin	Polystyrene Sodium-form Cation Exchange Resin	Granular Diameter: 1mm	PWCE16P12 Model: 12L PWCE35P12 Model: 30L PWCE54P12 Model: 40L
PVC Riser Tube	PVC	PWCE16P12 Model: Φ 25 x 300mm PWCE35P12 Model: Φ 25 x 780mm PWCE54P12 Model: Φ 25 x 1265mm	1 tube
ABS Water Distributor	ABS	Φ 25	1 set

4. INSTALLATION INSTRUCTIONS

4.1 Installation Precautions

The following conditions are required for the installation of the water softening system:

- Level platform or floor.
- Constant electrical supply to operate the controller.
- Total minimum pipe run to water heater of ten feet (three meters) to prevent backup of hot water into system.
- Local drain or tub for discharge as close as possible.
- Water line connections with shutoff or bypass valves.
- Must meet any local and state codes for site of installation.
- Valve is designed for minor plumbing misalignments. Do not support weight of system on the plumbing.
- Be sure all soldered pipes are fully cooled before attaching plastic valve to the plumbing.
- Room to access equipment for maintenance and adding salt to tank.
- The floor area should not be less than 70cm x 70cm
- Height of work space for equipment installation: 70 – 170cm; for ease of equipment maintenance and salt addition
- Height from ground level to the centers of inlet and outlet: 50 – 160cm (model dependent)
- Distance between centers of inlet and outlet: 10.2cm
- Distance between power source and Water Softener: Not more than 2m.
- Generally, the water softener is installed after the water meter at the entrance of municipal tap water; the water meter can then be used as a gauge for determining the amount of water treated.

It is recommended that the equipment be installed indoors. When the water conditioning system must be installed outdoors, below conditions must be considered:

- Moisture —The system is not designed to withstand extreme humidity or water spray from below. Examples are: constant heavy mist, near corrosive environment, upwards spray from sprinkler.
- Direct Sunlight — The materials used will fade or discolor over time in direct sunlight. The integrity of the materials will degrade to cause system failures.
- Temperature — Extreme hot or cold temperatures may cause damage to the valve or controller. Freezing temperatures will freeze the water in the valve. This will cause physical damage to the internal parts as well as the plumbing, not covered by warranty.
- The water softener should be installed close to a drainage outlet. The drainage outlet should open upwards to facilitate shortest route for direct discharge from the water softener. Ensure a smooth discharge of drainage to prevent overflow from the sewer network.
- The water softener has three openings: a water inlet and a water outlet, parallel to each other, located at the same height at 50 -160cm above ground. Distance between centers of inlet and outlet is 10cm. In addition, just below the abovementioned inlet and outlet openings, there is a drain opening which has a smaller diameter and opens downward.
- Keep the media tank in the upright position. Do not turn upside down or drop. Turning the tank upside down or laying the tank on its side can cause media to enter the valve.

- Hot water can cause damage to the internal system of the water softener. Users who connect hot water boiler or instant water heater after the water softener must install a check valve between the water softener and their water heating system, and ensure that their water heating system is equipped with temperature and pressure control safety devices.
- When installing water softener in newly renovated premises where water has not been used before, first open the water faucet to discharge the water for at least 10 minutes to completely flush away any construction debris, rust and dirt. This will prevent dirt and debris from entering the connected water softener during installation and cause damage to resin.
- It is recommended that a Y-strainer be installed before the inlet to prevent possibility of unwanted solids from entering the water softener system, thus affecting its operation.
- As much as possible, reduce the length and curvature of the drain line, and ensure the distance from control valve to the drainage outlet shall not exceed 6m. Always allow an air gap between the drain line and the wastewater to prevent the possibility of wastewater being back-siphoned into the water softener system. No valve of any type should be installed along the drain line.
- All pipes must have their own support brackets, the weight or stress exerted by such pipes must not be carried by the controllers of the water softener system.
- Users of this water softener system are advised to have some understanding of the quality of their source water. Under certain circumstance, using the water softener system to treat source water with severe quality defects (high content of metal ions such as iron or manganese) may cause “poisoning” of the softener media within the system. The result may be inevitable replacement with new media. Generally, influent water iron ion content should be controlled at less than 0.3mg/L.
- After some maintenance work on pipe network, the initial effluent from the faucet often contains a lot of rust and pollutants. Therefore, after each occasion of water supply stoppage, please open the bypass valve or bypass pipe to drain out dirty water; or install a prefilter before this softener system to ensure that only clean water will enter the water softener system. Generally, influent turbidity should be controlled at less than 5NTU.
- Do not allow the softener resin media to become dehydrated for an extended period of time, as this may result in failure of the media due to dryness.
- Generally, with stable water pressure and power voltage, the water softener system should perform optimally. The control valve of the system will require a minimum of 0.14MPa and a maximum water pressure of 0.8MPa for inlet water. If the pressure of incoming water is greater than the maximum pressure, please install a pressure reducing valve before the system.

Ensure safe AC power transmission.

- The system comes with a power transformer; the user needs to provide a stable 220V/50Hz AC power supply. The automatic control feature of this product requires a continuous and stable power supply. In the event of power outage when the system is in use, the system’s original setting will be maintained by data protection feature of the built-in electronic controller, and the system can continue to operate for 8 hours. Information related to volume processed will also be maintained for 8 hours. If power outage exceeds 8 hours, you will need to reset the system time to enable it to operate in accordance with its original setting.
- It is recommended that the user operate the system below its rated system capacity. Exceeding the rated system capacity will result in overload operation. In no circumstances should the system be operated beyond 1.5 times the rated system capacity.
- If the controller is not equipped with external water proofing cover, one should ensure that the controller is kept in dry condition to prevent short-circuit in the electrical components of the controller.

4.2 Installation Preparation

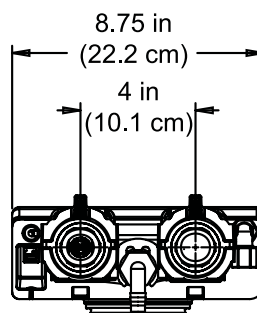
Typical Tools and Materials Required

- Pipe Cutter
- Tubing Cutter
- File
- Pliers
- Tape Measure
- Soldering Tools
- Lead Free Solder
- Bucket
- Towel
- Plumbers Tape
- Adjustable Wrench
- Tube 100% Silicone Grease

4.3 Installation Steps

Open the water supply tap and flush the inlet water pipe network to ensure water pipes are clean and free of debris . Turn off the main water supply incoming valve.

Determine the installation position of the water softener and lay the connecting pipes to match the various diameters of the three openings of the water softener.



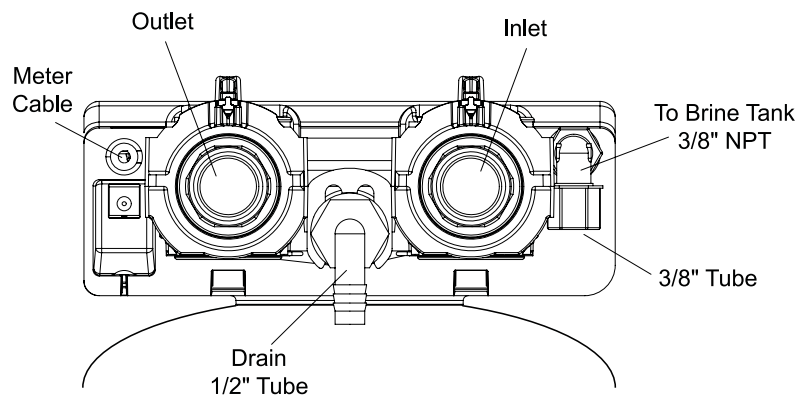
Grounding the Plumbing

It is important that the plumbing system be electrically grounded. When a water softener is installed, a nonmetallic bypass valve may interrupt the grounding. To maintain continuity, a grounding strap can be purchased at a hardware store. When it is installed, the strap will connect the water inlet and water outlet of the water softener.

If you have other water treating equipment such as; chlorinator, sediment filter, neutralizer, iron filter, or taste & odor filter, they should be installed upstream of the water softener.

You may wish to consult a water professional if additional water treating equipment is to be installed.

Valve Layout



Drain Line Flow Control

The drain line flow control (DLFC) requires assembly (Figure 1).

1. Locate parts and a roll of plumber's tape. The plumbing adapters should be removed (Figure 3 Connector Assembly).
2. Wrap the tape over threads of the flow control.
3. Screw the flow control and the 90° elbow together. Hand tighten.
4. Place the ball into the flow control and insert the assembly into the drain line opening.
5. Push the assembly in and secure with the drain line clip.

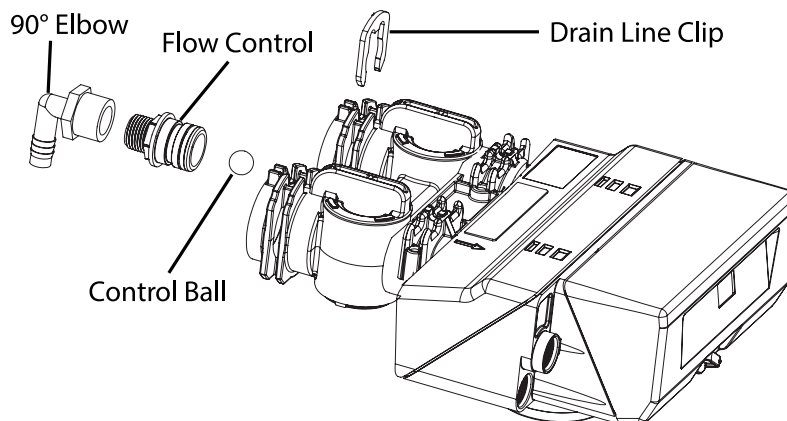


Figure 1: Drain Line Flow Control

Water Line Connection

Once you have selected your location, check the direction of the water flow in the main pipe.

Inspect the main water pipe. Write down the type of pipe (copper, plastic, galvanized etc.). Record the size of the pipe. Plastic style pipes usually have the size printed on the outside. Other pipes can be measured for the outside diameter and converted into the pipe size at the store. Do not use pipe that is of smaller diameter than the main water pipe.

If the main plumbing is galvanized pipe and you are installing copper pipe, then you must use dielectric insulating connectors between the two styles of pipe.

WARNING: If pipes will be sweat soldered, do not connect adapters to the bypass until the pipes have cooled.

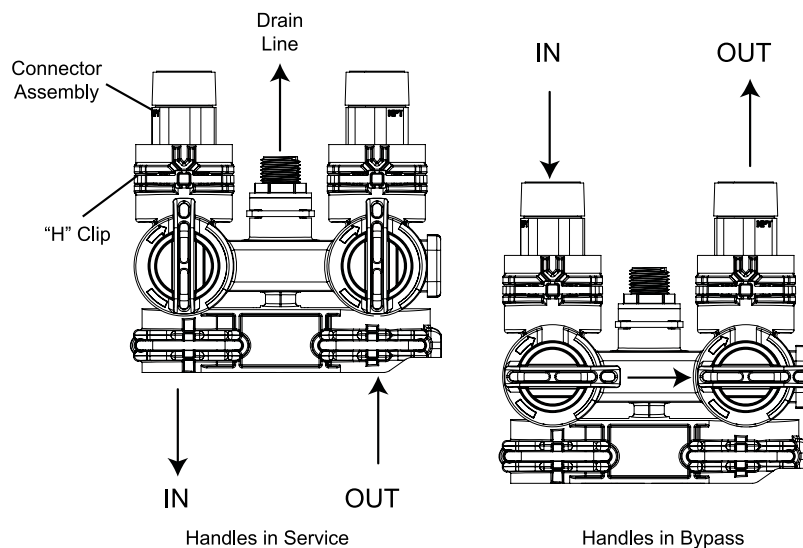


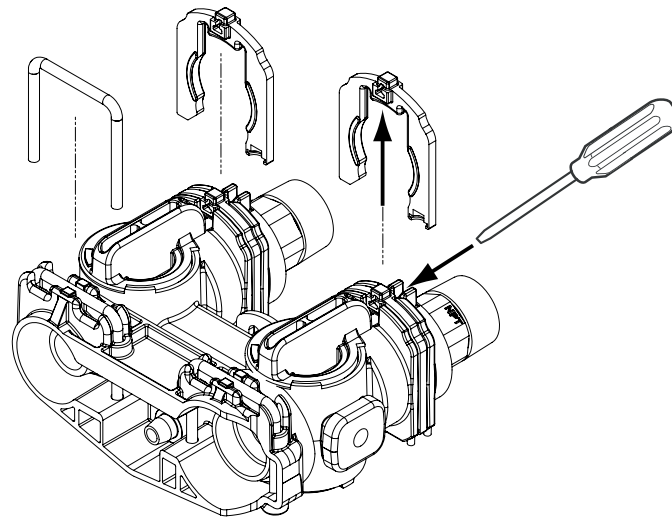
Figure 2: Service and Bypass modes

IMPORTANT: When the valve is in bypass mode, water will not enter the softening tank. The water in the building will not be treated. Figure 2 shows the handle positions for Service and Bypass modes of water softener.

WARNING: The inlet water must be connected to the inlet port of the valve. When replacing a water valve, it is possible that the inlet and outlet plumbing is installed in a reversed position. Be certain the inlet connection on the valve is connected to the incoming water fitting from the water supply. Do not solder pipes with lead-based solder.

WARNING: Do not use petroleum grease on gaskets when connecting bypass plumbing. Use only 100% silicone grease products when installing any plastic valve. Non-silicone grease may cause plastic components to fail over time.

The bypass assembly connects to the water system by means of a connector assembly. The connector is secured to the plumbing and then inserted into the bypass. A clip is used to hold it in place.



Connector Assembly

Figure 3: Connector Assembly

Before inserting the connector:

- Check that all O-rings are in place and not damaged.
- O-rings are pre-lubricated. Sliding surfaces should be lubricated with 100% silicone grease.

Firmly insert connector into bypass. Press locking clip into position. Make certain the clip is fully engaged.

NOTE: Before turning on the water to the valve, rotate the two handles on the bypass valve 2-3 times. This will help seat O-rings and prevent leaking.

To remove a clip:

1. Turn off water and release water pressure at the valve.
2. Push the water line connectors into the bypass and valve. This will help release O-rings that may have seated in place.
3. Remove the clip by inserting a flat blade under the top center of the clip and lifting (prying up) (Figure 3 Connector Assembly).

WARNING: Do not use pliers to remove a clip. It is likely the clip will break.

Drain Line Connection

NOTE: Standard commercial practices are expressed here. Local codes may require changes to the following suggestions. Check with local authorities before installing a system.

1. The unit should be above and not more than 20 feet (6.1 m) from the drain. Use an appropriate adapter fitting to connect 1/2-inch (1.3 cm) plastic tubing to the drain line connection of the control valve.
2. If the unit is located 20-40 feet (6.1-12.2 m) from drain, use 3/4-inch (1.9 cm) tubing. Use appropriate fittings to connect the 3/4-inch tubing to the 3/4-inch NPT drain connection on valve.

3. The drain line may be elevated up to 6 feet (1.8 m) providing the run does not exceed 15 feet (4.6 m) and water pressure at the softener is not less than 40 psi (2.76 bar). Elevation can increase by 2 feet (61 cm) for each additional 10 psi (.69 bar) of water pressure at the drain connector.
4. Where the drain line is elevated but empties into a drain below the level of the control valve, form a 7-inch (18-cm) loop at the far end of the line so that the bottom of the loop is level with the drain line connection. This will provide an adequate siphon trap. Where the drain empties into an overhead sewer line, a sink-type trap must be used.

NOTE: *The drain line connects to the elbow previously installed. It is located between the water line connections at the rear of the valve.*

5. Use pliers to expand a clamp. Slide the clamp up one end of the longer length drain line tubing about 1-2 inches and release.
6. Push the tubing over the ribbed drain line fitting.
7. Expand the clamp and move it up the tube to pinch the tube to the fitting.
8. Secure the discharge end of the drain line to prevent it from moving.

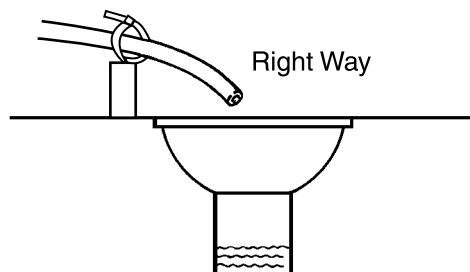


Figure 4: Drain Line Connection

NOTE: *Waste connections or drain outlet shall be designed and constructed to provide for connection to the sanitary waste system through an air-gap of 2 pipe diameters or 1 inch (22 mm) whichever is larger.*

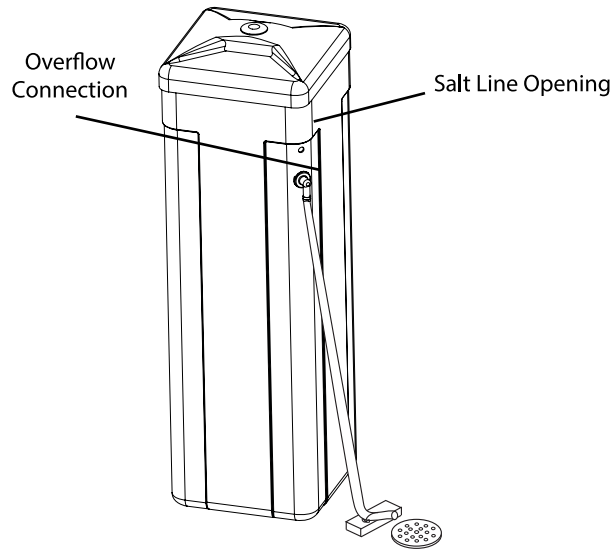
WARNING: *Never insert drain line directly into a drain, sewer line, or trap (Figure 4 Drain Line Connection). Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the softener.*

Overflow Line Connection

In the event of a malfunction, the salt TANK OVERFLOW will direct “overflow” to the drain instead of spilling on the floor. This fitting should be on the side of the cabinet.

To connect the overflow line, locate the tubing connector on the side of the tank (Figure 5 Tubing Connections). Attach length of 1/2-inch (1.3-cm) I.D. tubing to fitting and run to drain. Do not elevate overflow line higher than overflow fitting.

Do not tie into drain line of control unit. Overflow line must be a direct, separate line from overflow fitting to drain, sewer or tub. Allow an air gap as per drain line instructions.



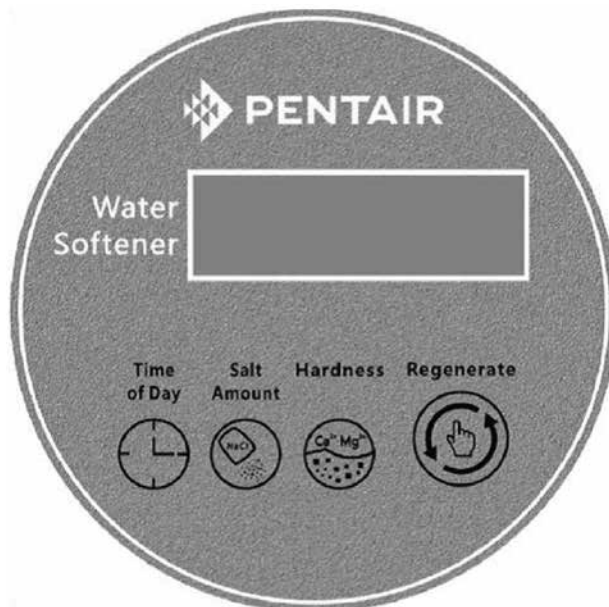
Tubing Connections

Figure 5: Tubing Connections

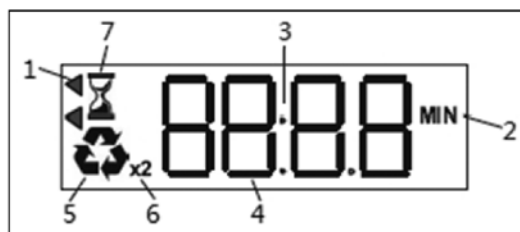
5. OPERATING INSTRUCTIONS

5.1. Commissioning and Setting

Control Valve panel



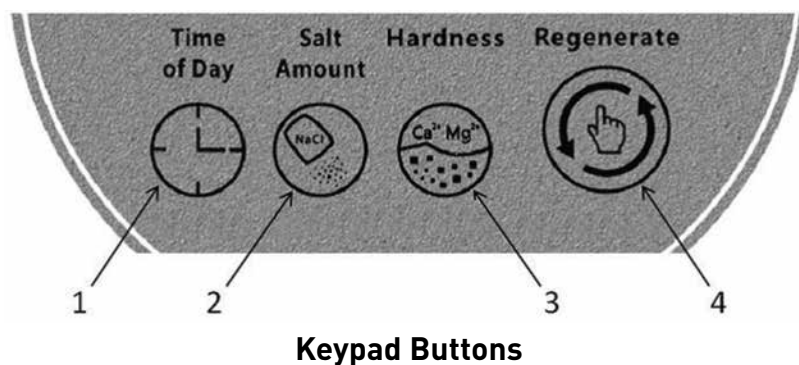
Description of Control Valve panel display



Display Icons

1. Indicates water flow when displayed. Arrows alternate faster as flow increases.
2. When "MIN" is displayed, the value in minute increments. "MIN" is displayed during regenerate; the value displayed is the minutes of regenerate remaining.
3. Colon (double dots) flashes as part of the time display. It indicates normal operation.
4. Four digits used to display the time or program value. It is also used for error codes.
5. The recycle sign is displayed (flashing) when a next regenerate has been called for. Also displays (continuously) when in regenerate.
6. When "x2" is displayed, a second regenerate has been called for.
7. The hourglass is displayed when the motor is running.

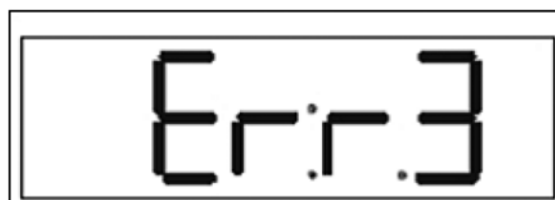
NOTE: During normal operation (Service mode) the display will show the current time of the day with the colon blinking. This will alternate with a display of the volume remaining to be treated before regenerate.



1. Time of Day: to set the current time
2. Salt Amount: to set the mode to salt dosage
3. Hardness: to set the current hardness
4. Regenerate: To start recharge at the next scheduled time of recharge or for an immediate recharge. To start a second manual (delayed) recharge. To stop a second manual recharge.

Regenerate

- The water supply valve should be off or be in by-pass mode.
- At initial power-up, the camshaft may need to rotate to the HOME (in service) position.
- Camshaft may take 1 to 2 minutes to return to HOME position.
- Err 3 will be displayed until the camshaft returns to HOME position (Initial Power-Up Display).
- If more than 2 minutes lapse, verify that the motor is turning the camshaft. If not, check the "Troubleshooting" section.



Initial Power-Up Display

When the camshaft has reached the HOME (service) position the display will show "- :- -". If the time of day alternating with remaining capacity is displayed, then the controller has used its short term memory to load settings. Short term memory will hold settings for approximately eight hours.

Settings include:

- Water used on the day
- Water used since the last regeneration
- Current time
- Regenerate status

DIRECTIONS

Un-programmed controls will have the following settings.

Default settings:

- Hardness - 250 ppm
- Salt setting - HE(High Efficiency)
- System will regenerate every 7 days (calendar override) even if no water is used. Unplug system during long period of no water use. Calendar override is not programmable.

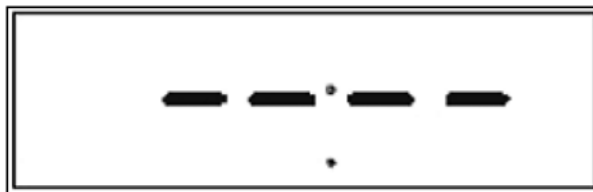
In addition:

- Water used is set to 0
- The internal system clock is set to 8:00 AM. The display continues to show “- :- -” until the internal clock is updated manually.
- A regeneration will initiate when the internal system clock reaches 2:00 am. The regenerate icon will flash.

INITIAL START UP INSTRUCTIONS

Set the time

Press the Time of Day button. Press it again within 5 seconds and the time will increment. Press and hold for 2 seconds to rapidly increase the settings. Release the button and the time will save in 5 seconds. Time and the remaining water production (in tons) displays alternately.



Pick the salt setting

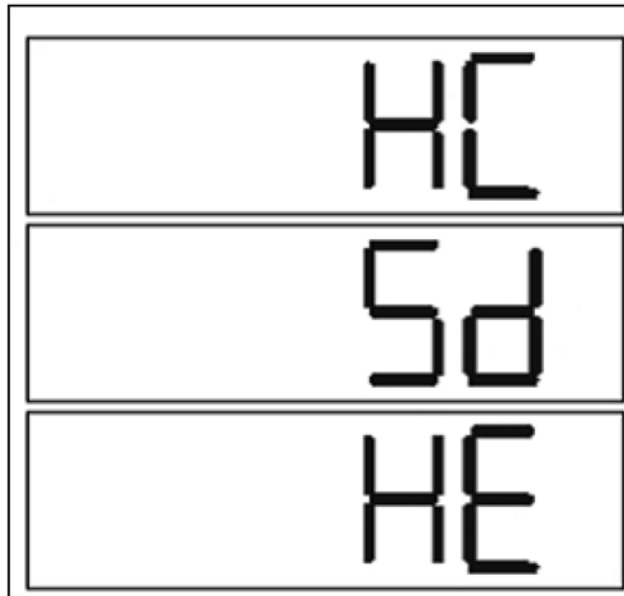
The controller starts (defaults) with the HE (high efficiency) setting. If you want to check or change the setting, press the Salt Amount button to display the current setting. To change it, press the Salt Amount button again within 5 seconds. The new setting will save in 5 seconds.

HC (High Capacity): This setting maximizes the system capacity between regenerations and will also use the most salt. This setting can be used for high water hardness or high water usage.

Sd (Standard): This setting will provide a mid-range capacity. Less salt is used than the HC (High Capacity) setting. More water between regenerations is provided than when the HE (High Efficiency) setting is used. Use this setting if the softener is running out of capacity in HE setting. This setting is also used if the HC setting is providing too much capacity. Use this setting if usage or water hardness falls between the HC and HE examples.

HE (High Efficiency): This setting minimizes salt used for a regeneration (uses the least amount of salt) and provides the least amount of water between regenerations. This setting can be used if you have low water hardness or low water usage.

INITIAL START UP INSTRUCTIONS



Initial Power-Up Display

According to the table below on water hardness and a water cycle yield, you can choose the salt consumption mode.

PWCE16P12				PWCE35P12				PWCE54P12			
Entry Hardness (ppm)	Water yield/ per cycle (T)			Entry Hardness (ppm)	Water yield/ per cycle (T)			Entry Hardness (ppm)	Water yield/ per cycle (T)		
	Mode				Mode				Mode		
	HE	SD	HC		HE	SD	HC		HE	SD	HC
50	8.00	16.00	20.00	50	22.00	38.00	52.00	50	30.00	54.00	72.00
100	4.00	8.00	10.00	100	11.00	19.00	26.00	100	15.00	27.00	36.00
150	2.67	5.33	6.67	150	7.33	12.67	17.33	150	10.00	18.00	24.00
200	2.00	4.00	5.00	200	5.50	9.50	13.00	200	7.50	13.50	18.00
250	1.60	3.20	4.00	250	4.40	7.60	10.40	250	6.00	10.80	14.40
300	1.33	2.67	3.33	300	3.67	6.33	8.67	300	5.00	9.00	12.00
350	1.14	2.29	2.86	350	3.14	5.43	7.43	350	4.29	7.71	10.29
400	1.00	2.00	2.50	400	2.75	4.75	6.50	400	3.75	6.75	9.00

Note: The above data is based on testing under standard conditions. This may vary due to environmental and other factors.

INITIAL START UP INSTRUCTIONS

Enter Water Hardness

The controller starts (by default) at a hardness of 250 ppm. Check the source water for actual hardness. Press the Water Hardness button to display the current settings. To change the settings press the button again within 5 seconds. To rapidly increase the settings push and hold the 'Water Hardness' button. Release the button and the setting will be saved in 5 seconds. A too high hardness setting will cause the system to regenerate more often and use more salt and water than what is needed to soften the water. A hardness setting too low will cause the system to regenerate less often. The softener may pass hard water shortly before it regenerates.



Programming complete

The controller will begin normal operation if no button is pushed for 5 seconds. During normal operation (Service mode) the display will show the current time of the day with the 'colon' (double dots) blinking. This will alternate with a display of the volume remaining to be treated before regeneration.

Manually Initiating the Regeneration Cycle

Delayed Regeneration Cycle: Press and release to program a delayed regeneration cycle. The system will regenerate at the next regeneration cycle time (2:00 AM). Repeat procedure to disable the scheduled regeneration cycle. The display indicator dot blinks when a delayed regeneration cycle is scheduled. Press and release the 'Regenerate' button again, to stop the scheduled delayed regeneration cycle

Immediate Regeneration Cycle: Press and hold for three seconds to initiate an immediate regeneration cycle. The control cycles to the regenerate cycle step. The control will proceed through a complete regenerate cycle. A cascading symbol (- -) will be displayed when the cycle is complete.

To Advance Regeneration

- Simultaneously press 'Time of the Day' and 'Regenerate' to advance to the next cycle. An hourglass will display while cam is advancing. When cam reaches the next cycle, 'Time Remaining' will be displayed.
- Repeatedly press 'Time of Day' and 'Regenerate' to advance through each cycle.
- Simultaneously press and hold for three seconds during any regenerate cycle step. The control will skip the remaining cycle steps and return to service position. The 'time of day' will be displayed when the control reaches the service position.

NOTE: If a button is not pushed for five seconds, the controller returns to normal operation mode. Pushing the regenerate button immediately returns the controller to normal operation.

After you have performed the previous initial power-up steps, you will need to place the softener into operation. Follow these steps carefully:

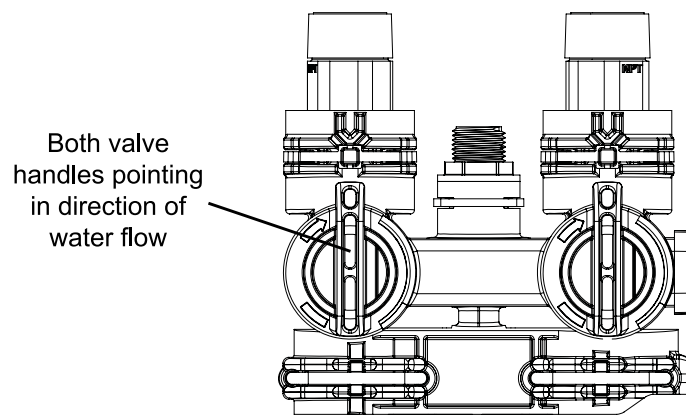
- Add 4-5 litres of clean water in the salt tank.
- If the inlet water valve is opened too rapidly or too fast, softener media may be dislodged from the tank and find its way into the valve or the plumbing. In the 1/4 open position; you should hear the air slowly escaping from the valve drain line.
- Once the test finishes the system can be used after adding NaCl. (only for SFT salt tank).

START-UP

The softener will now need to be placed into operation. Please review Quick Cycling the Control procedure before attempting start-up.

DO NOT put regenerant material into the brine tank.

1. With the supply water for the system still turned off, position the bypass valve to the “not in bypass” (normal operation) position.



2. Press and hold the “Regenerate” button on the controller for 3 seconds. This will initiate a manual regeneration, and cycle to the regenerate position.
3. Filling the media tank with water.
 - A. With the softener in regeneration, open the water supply valve very slowly to approximately the 1/4 open position. Water will begin to enter the media tank. Air will begin to be purged to drain as the media tank fills with water.

WARNING: If opened too rapidly or too fast, media may be dislodged from the tank and find its way into the valve or the plumbing. In the 1/4 open position, you should hear air slowly escaping from the valve drain line.

- B. When all of the air has been purged from the media tank (water begins to flow steadily from the drain line), open the main supply valve all of the way. This will purge the final air from the tank.
- C. Allow water to run to drain until the water runs clear from the drain line. This purges any debris from the media bed.
- D. Pour water into the brine tank. Advance to Cycle 1 (Brine Refill) by pressing the “Regenerate” and “Time of Day” buttons at the same time. The water in the brine tank should be drawn into the valve. If the water is not receding from the tank, refer to Troubleshooting.
- E. Press “Regenerate” and “Time of Day” to cycle the control to C6 (Fast Rinse 1). Place salt in brine tank. Allow this cycle to finish and the control to move to service. The brine tank will have the correct amount of water.

WARNING: Ensure that the system has been properly disinfected per the water softening system manufacturer’s recommendations.

The water softening system is now fully operational.

The display will show the hour of the day. The decimal point at bottom center of the display will blink when water is flowing.

Cycle Step	Description of Step	Cycle Standard
1	Brine Refill	Observe whether water is drawn into the brine tank; skip to next cycle step if yes.
2	Brine Prep	Check for water leakage; if no leakage, move on to next cycle step
3	Backwash 1	Check for bubbles or small particles within the water; If water is clear, move on to the next cycle step
4	Brine Draw & Slow Rinse	If water flow from drain hose slows down and water level in the brine tank lowers, move on to the next cycle step
5	Re-pressurize	Allow the system's internal pressure to stabilize, move on to the next cycle step after 1-2 minutes
6	Fast Rinse 1	Wait for the program to automatically move to the next cycle step
7	Backwash 2	Wait for the program to automatically move to the next cycle step
8	Fast Rinse 2	Wait for the program to automatically move to the next cycle step
9	Return to service mode	Wait for the program to automatically move to service mode

Softener Settings

PWCE16P12 Model		Cycle Duration			Remaining Time at End of Cycle		
Cycle	Description	HE(min)	Sd(min)	HC(min)	HE(min)	Sd(min)	HC(min)
1	Brine Refill	1.34	3.74	7.75	184	192	207
2	Brine Prep	120	120	120	182	188	199
3	Backwash 1	8	8	8	62	68	79
4*	Brine Draw	4	10	21	54	60	71
5*	Slow Rinse	40	40	40	50	50	50
6	Re-pressurize	3	3	3	10	10	10
7	Fast Rinse 1	3	3	3	7	7	7
8	Backwash 2	1	1	1	4	4	4
9	Fast Rinse 2	1	1	1	3	3	3

*Between cycle step 4 and 5, the cam shaft does not move. When the brine in salt tank is used up and the air check valve is closed, cycle step 5 begins.

PWCE35P12 Model		Cycle Duration			Remaining Time at End of Cycle		
Cycle	Description	HE(min)	Sd(min)	HC(min)	HE(min)	Sd(min)	HC(min)
1	Brine Refill	3.68	9.36	19.39	185	200	224
2	Brine Prep	120	120	120	181	190	204
3	Backwash 1	8	8	8	61	70	84
4*	Brine Draw	5	14	28	53	62	76
5*	Slow Rinse	38	38	38	48	48	48
6	Re-pressurize	3	3	3	10	10	10
7	Fast Rinse 1	3	3	3	7	7	7
8	Backwash 2	1	1	1	4	4	4
9	Fast Rinse 2	1	1	1	3	3	3

*Between cycle step 4 and 5, the cam shaft does not move. When the brine in salt tank is used up and the air check valve is closed, cycle step 5 begins.

PWCE54P12 Model		Cycle Duration			Remaining Time at End of Cycle		
Cycle	Description	HE(min)	Sd(min)	HC(min)	HE(min)	Sd(min)	HC(min)
1	Brine Refill	5.15	13.1	27.14	205	225	259
2	Brine Prep	120	120	120	199	211	231
3	Backwash 1	8	8	8	79	91	111
4*	Brine Draw	7	19	39	71	83	103
5*	Slow Rinse	54	54	54	64	64	64
6	Re-pressurize	3	3	3	10	10	10
7	Fast Rinse 1	3	3	3	7	7	7
8	Backwash 2	1	1	1	4	4	4
9	Fast Rinse 2	1	1	1	3	3	3

*Between cycle step 4 and 5, the cam shaft does not move. When the brine in salt tank is used up and the air check valve is closed, cycle step 5 begins.

Installation and Commissioning Checklist

- Have you read or used the Owner's manual / Installation manual?
- Have you followed all the safety guidelines in the manual?
- If metal pipes are used, is electrical ground restored?
- Are the two drain hoses securely installed to an approved drain?
- Did you perform a commissioning procedure?
- Is the bypass valve in the normal service position?
- Is salt added to the brine tank?
- Have you correctly set the control valves according to your need?
- Have you started regeneration?

5.2. Accessing History Values

The control features a review level that displays the operation history of the system. This is a great troubleshooting tool for the control valve.

To access history values, press Regenerate followed by the Salt Amount button and hold for 3 seconds to view the Diagnostic Codes.

NOTE: If a button is not pushed for 30 seconds, the controller will exit the history table.

Press the Time of Day button to increment through the table. When the desired code is reached, Press the Salt Amount button to display the value.

Some of the values have four digits 1, 2, 3, 4. Press the Salt Amount button to display the first two (1, 2). Press the Water Hardness button to display the last two (3, 4).

When the Salt Amount button is pressed to view H2, the current flow rate will be displayed but not updated. Continue to press and release the Salt Amount button every 5 seconds to update the display. The flow dot on the display will flash when there is flow thru the softener.

Code	Description	Notes
H1	Days since last regeneration	Days since last regeneration
H2	Current flow rate	Litres per minute
H3	Current day of week	Current day of week
H4	Water used today since 0200	In Tons, max value displayed 9999 max value stored 65,535.
H5	Water used since last regeneration	
A0	Average water usage for day 0	
A1	Average water usage for day 1	
A2	Average water usage for day 2	
A3	Average water usage for day 3	
A4	Average water usage for day 4	
A5	Average water usage for day 5	
A6	Average water usage for day 6	

5.3. Error Diagnosis and Troubleshooting

604-606 Control - Error Codes

Problem	Possible Cause	Solution
Err 1 is displayed.	Program settings have been corrupted.	Press any key. If Err 1 does not clear, replace control.
Err 3 is displayed.	Control does not detect the camshaft position and is returning to the service position.	Wait until the control returns to the service position.
	Camshaft is not turning during Err 3 display.	<p>Check that motor is connected. Verify that the motor wire harness is connected to motor and controller module. Verify that optical sensor is connected and in place. Verify that motor gear has engaged the camshaft.</p> <p>If everything is connected, replace components in this order:</p> <ol style="list-style-type: none"> 1. Motor Assembly, Optical Sensor 2. Control
	Camshaft is turning more than five minutes to find Home position:	<p>Verify that optical sensor is in place and connected to wire. Inspect for debris in the camshaft slots.</p> <p>If motor continues to rotate indefinitely, replace the following components in this order:</p> <ol style="list-style-type: none"> 1. Motor Assembly, Optical Sensor 2. Control

System

Problem	Possible Cause	Solution
Salt tank overflow.	Loose salt line connection.	Ensure all salt line connections are tight.
	Drain line restricted with debris.	Clean drain control.
Flowing or dripping water at drain or salt line after recharge.	Debris is preventing #3 or #4 valve disc from closing.	Remove debris.
	Worn #3 or #4 valve disc.	Replace valve discs.
Hard water leakage after recharge.	Improper recharge.	Repeat recharge after making certain correct salt dosage was set.
	Leaking of external bypass valve.	Replace bypass valve.
	O-Ring around riser pipe damaged.	Replace O-ring.
Control will not draw salt.	Restricted drain line.	Remove restriction.
	Injector plugged.	Clean injector and screen.
	Debris is preventing valve discs from closing.	Remove foreign matter from valve discs.
Control will not recharge automatically.	AC adapter or motor not connected.	Connect power.
	Defective motor.	Replace motor.
	Meter clogged with debris.	Remove and clean meter.
Control recharges at wrong time of day.	Time of Day set incorrectly.	Set the correct Time of Day.
Intermittent salt draw.	Low water pressure.	Maintain a minimum of 20 psi (1.3 bar) feed.
No conditioned water after recharge.	No salt in salt tank.	Add salt to salt tank.
	Injector plugged.	Clean injector and screen.
Backwashes or purges at excessively low or high rate.	No drain line flow control.	Install drain line flow control.
	Restricted drain line.	Remove restriction.
Runs out of conditioned water between recharges.	Control improperly programmed.	Verify salt dosage.
Flow indicator on control does not display service flow.	Bypass valve in bypass position.	Remove bypass valve from bypass.
	Meter cable dislodged from valve.	Fully insert meter cable into valve.
	Meter clogged with debris.	Remove and clean meter.

6. TERMS AND CONDITIONS OF WARRANTY

1. The warranty period is 1 year from the date of purchase. During the warranty period, Pentair (Company) is responsible for providing free warranty for faults arising from normal operation and use according to the installation manual and user's manual. Pentair will charge repair and maintenance fees after the warranty expires.
2. The user should keep valid purchase invoice, which serve as the basis for after-sales service.
3. Installation, maintenance and repair services will be provided by Pentair's authorized distributors. In the event that the user is unable to present the warranty card or valid purchase invoice, Pentair will deem the warranty to have expired and charge the relevant fees.
4. Warranty will be void in the following conditions:
 - Installation by personnel who are not authorized by the Pentair;
 - Product malfunction or damage resulted from the user's failure to follow the instructions described in the user's manual to operate the system;
 - Error or damage caused by the user's self-repair or modification of the equipment;
 - Error or damage caused by major force (including but not limited to natural disasters such as fires, floods, earthquakes, lightning strikes, etc.);
 - Error or damage caused by human factors (including but not limited to drop, knock, etc.);
 - Where the user is unable to present the warranty card or purchase invoice, or the content of the invoice has been altered;
 - Any problems caused by using parts that are not approved by Pentair.
5. The repair parts replaced during the warranty period are owned by Pentair.
6. Warranty does not cover for all consumables, such as filter element and materials, in water treatment equipment.
7. Pentair reserves the right to charge a certain service fee for maintenance or repair service provided on-site in remote areas.

7. MAINTENANCE RECORDS

DATE	CAUSE OF ERROR	REPLACEMENT PART	MAINTENANCE PERSONNEL

NOTES

Dotted lines for writing notes.

IMPORTANT

Please attach your sales invoice/docket here as proof of purchase should warranty service be required.
Please do not return warranty form to Pentair - Retain for your records.

Purchased from :.....

Purchase date :..... Serial No :..... Model No :.....



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