Pure Water
XQ-7000 System

For Part Numbers:
31999XQ-7000

Manual #14027XQ

Pure & Secure LLC
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Lincoln, NE 68524
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SPECIFICATIONS

PRE-TREATMENT (SERVICE UNIT)

Electrical	120V, 1 Phase, 60 Hz, with Neutral
Feed	3/4” PVC Hose
Drain	1/2” PVC Hose
Softener	3/4 cubic foot, 6 Lbs setting, 15,750 Grains Capacity
Softener Head	Fleck 5600
Carbon	10” Carbon Block Part #9589
Sediment Filter	10” 5 Micron Part #229-0119

TREATMENT (DISTILLATION UNIT)

Distillation	C-60/75
Specifications	See Separate Manual

POST-TREATMENT (SERVICE UNIT)

Electrical	120V, 1 Phase, 60 Hz, with Neutral
Feed	1/2” LDPE Tubing
Monitor	Resilite (14043)
Monitor Range	Go/No Go (Green Red LED)
Fixed Setpoint	200K Ohms
DI Filter	Part #25501

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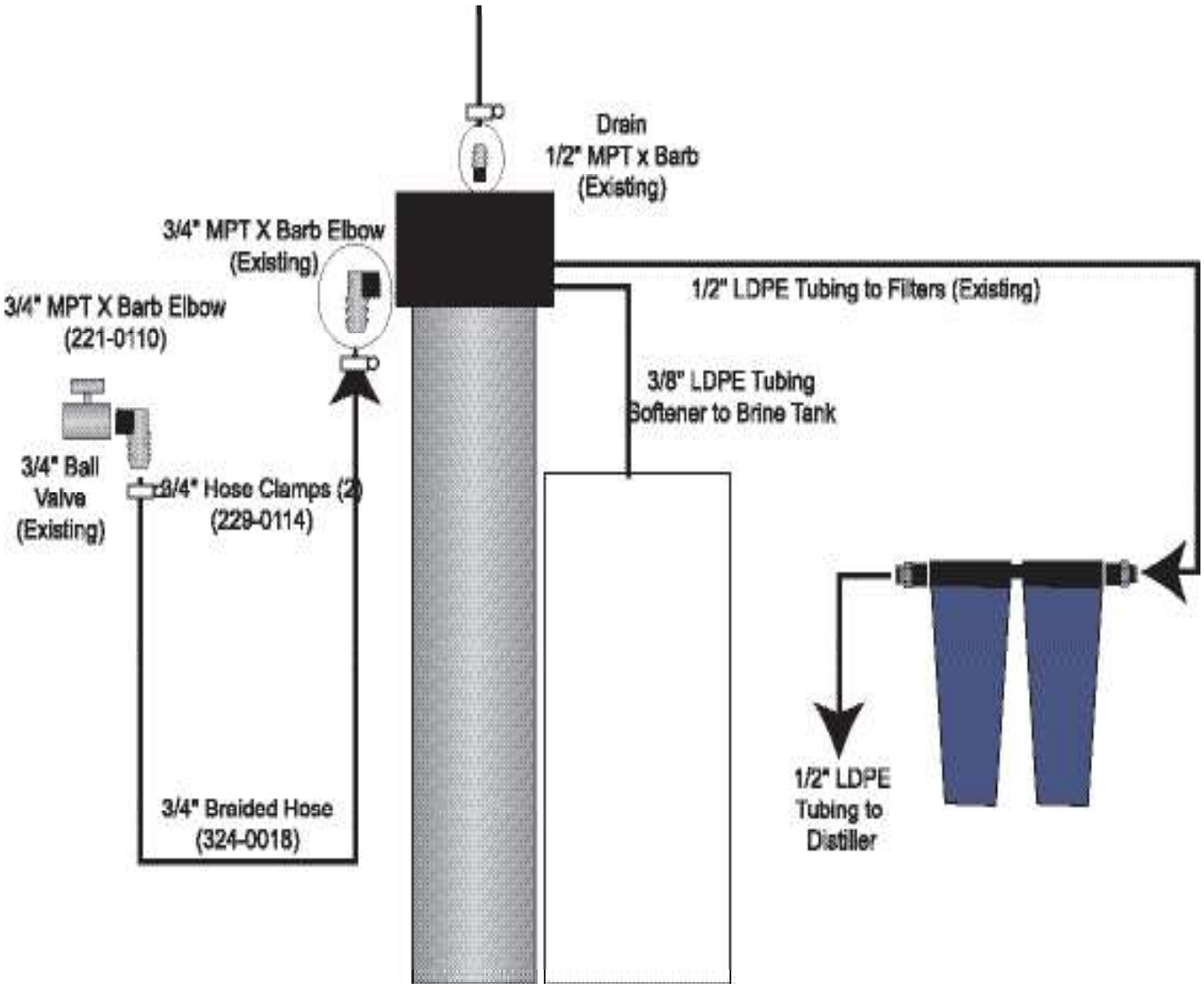
SYSTEM FLOW



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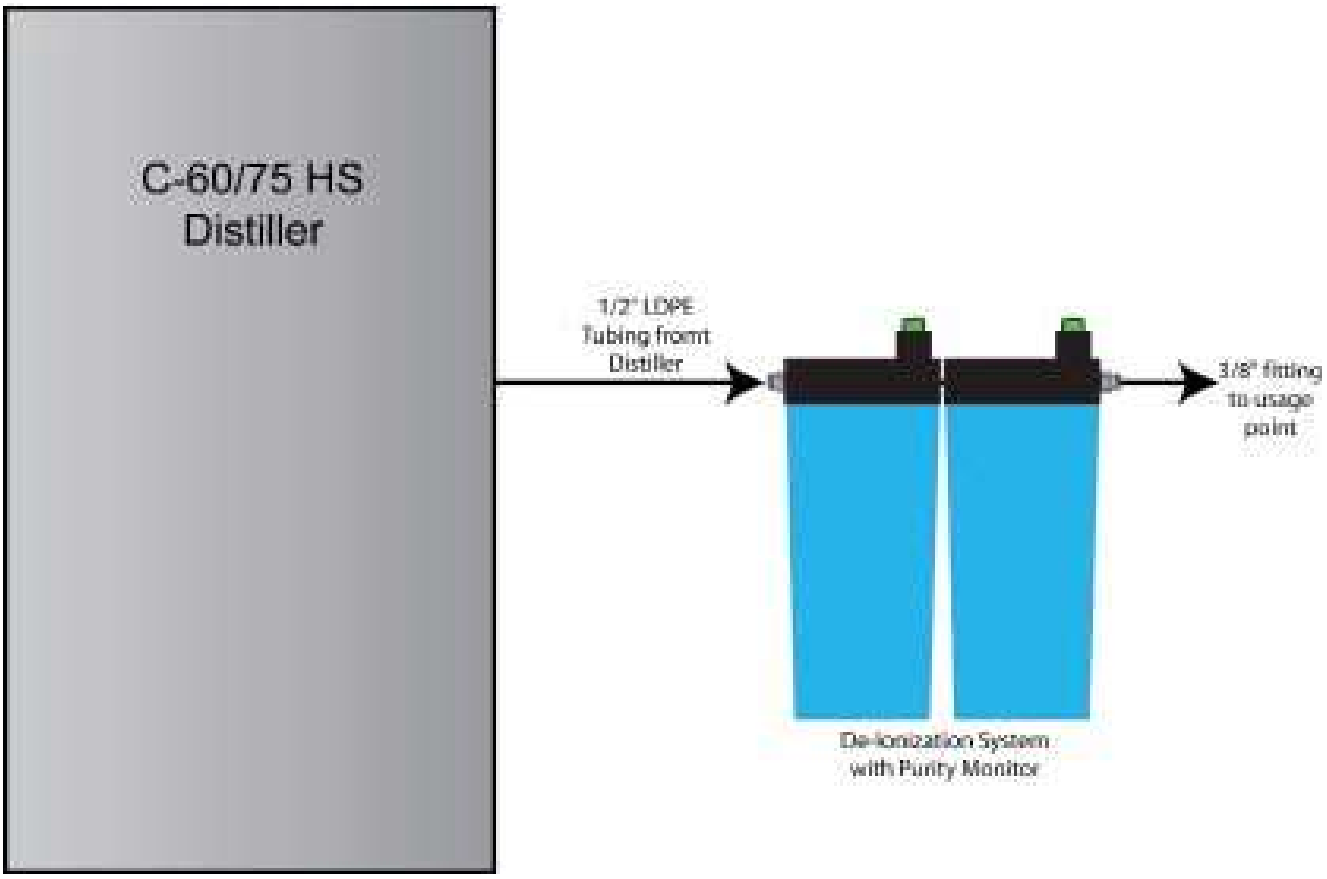
SYSTEM FLOW



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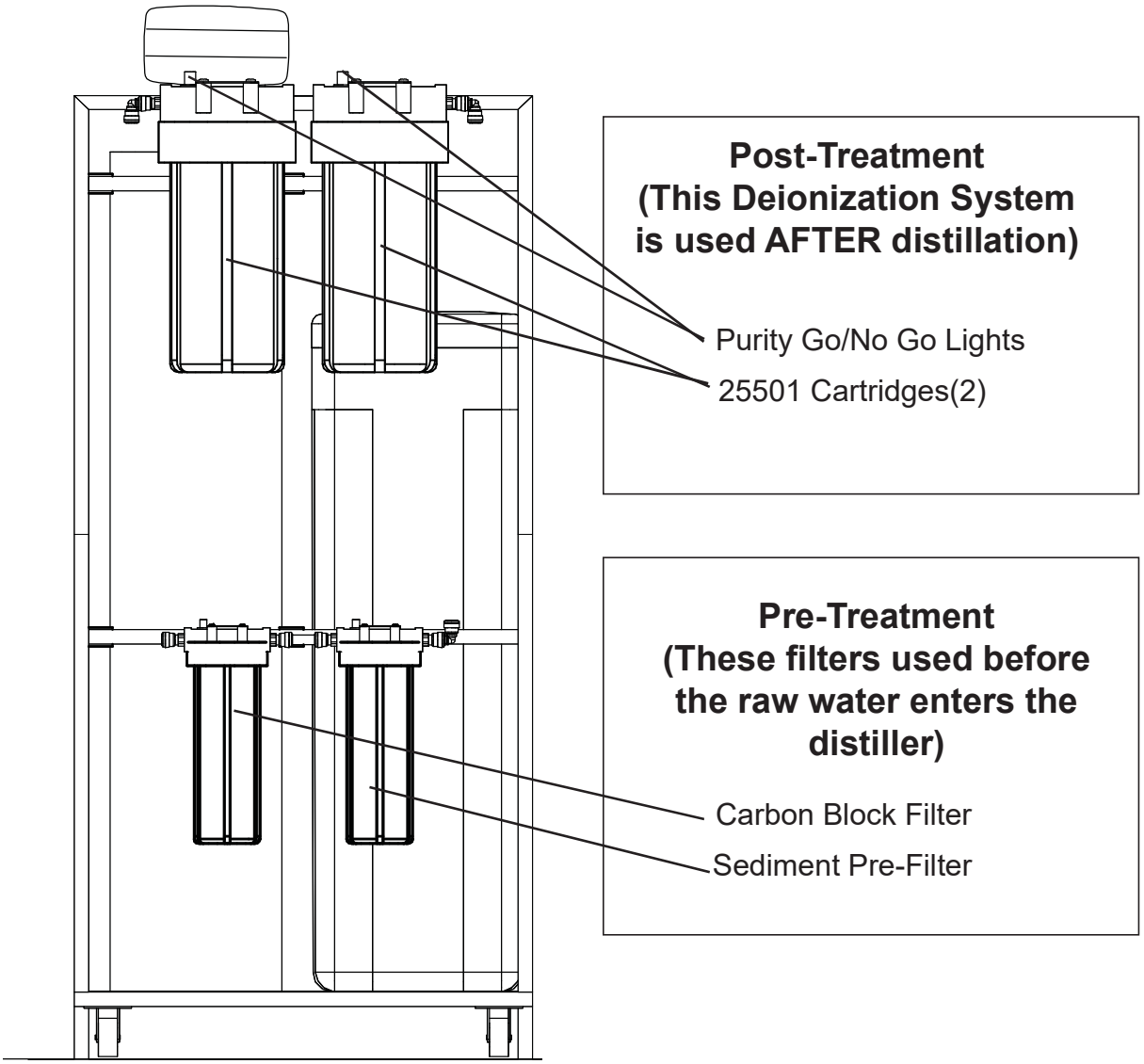
COMPONENT IDENTIFICATION

(SERVICE UNIT)



Front View

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COMPONENT IDENTIFICATION



Rear View

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COMPONENT IDENTIFICATION

Softener Head
(without Cover)



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COMPONENT IDENTIFICATION

(Service Unit)

Pre-Treatment System (Prior to Distillation):

The pretreatment system is designed to treat the water to remove any contaminants that can be difficult for the distillation unit to remove, or that can cause damage or malfunction to the distiller or components on the distillation system.

Water Softener

The water softener is designed to remove hardness minerals from the water before it enters the distillation unit. While distillation is completely effective in removing these contaminants, the residues of removal can cause scaling of the distillation system boiling tank and components. Scaling will result in reduced physical performance of the components in the distillation unit.

The softener uses ion-exchange to remove the hardness minerals (Calcium and Magnesium) and exchange them with sodium. Sodium is easily removed by distillation, and will not cause scaling in the distillation boiling tank.

The water enters the softener at the rear of the unit.

Once the tank is “used” it must be regenerated in order to be usable again. There is a 4 stage process that consists of:

Backwash: Which removes any hardness from the tank and flushes it down the drain.
Brine and Rinse: Draws water from the brine tank and allows the salt molecules to adhere to the resin.
Rapid Rinse: Sends water through the tank and flushes any excess salt down the drain.
Brine Tank Fill: Adds water to the brine tank so that is can disolve salt for the next cleaning process.

The Brine tank must be filled with salt on a periodic basis. Also, the tank must be stirred once every three months so that a “salt bridge” or empty pocket does not form at the bottom of the tank.

5 Micron Sediment Filter

This filter will stop any sediment or particulate matter from reaching the distiller. The main concern is that a particle large enough to stop a valve from seating would reach the distiller. The sediment filter should be changed every 3-6 months.

Carbon Block Filter

This filter will remove chemicals and volatile organics. Volatile Organics are chemicals that have a lower boiling point than water, which could potentially carry over with the water vapor in the distillation process. The carbon block filter should be changed every 3-6 months.

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COMPONENT IDENTIFICATION

(Service Unit)

Post-Treatment System (After Distillation):

The post-treatment system is designed to take a pressurized line of distilled water from the distillation unit. The post-treatment system then uses the process of De-Ionization to further purify the water. ***The Post-Treatment system can be removed from the service unit frame and mounted closer to the location of usage if necessary by loosening the 8 nuts that hold the unit on the service unit.***

WARNING: De-Ionized water should never be consumed.

Twin Cartridge De-Ionization System

This system is designed to increase the purity of the distilled water and to ensure that all stray ions are removed from the water. Similar to the ion-exchange process used in the Water Softener, the De-Ionization removes ions and exchanges them for either hydrogen or oxygen molecules. Each cartridge is a “mixed-bed cartridge”. This means that half of the cartidge will remove positive ions, and half will remove negative ions. The ion-exchange for each of the sides of the cartidges will exchange either hydrogen, or oxygen to form water out of the resulting exchange.

The cartridges should be changed every 6 months, or if the purity lights are red and stay red when water runs for longer than 30 seconds.

Purity Monitoring System

The final step in the entire process is to ensure that the purity of the water is high enough for use. Based on the requirements for the helicopter program, the purity of the water must exceed 200,000 ohms-cm of resistivity. On the meter the reading would need to drop to 0.2 megohms before the de-ionization cartridges would need to be changed. For reference, each resilite is factory-calibrated to 200,000 ohms of resistance.

Note: *When water is not flowing through the de-ionization cartridge, the reading will lower. If the light turns red while inactive, a small amount of water can be drawn off until the light registers green. The cartridges should be changed when the light stays red when water is flowing through the system.*

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COMPONENT IDENTIFICATION

(XQ-7000 Distillation Unit)



Main Control Panel (See next page)

Lockable Door Latch

Front View

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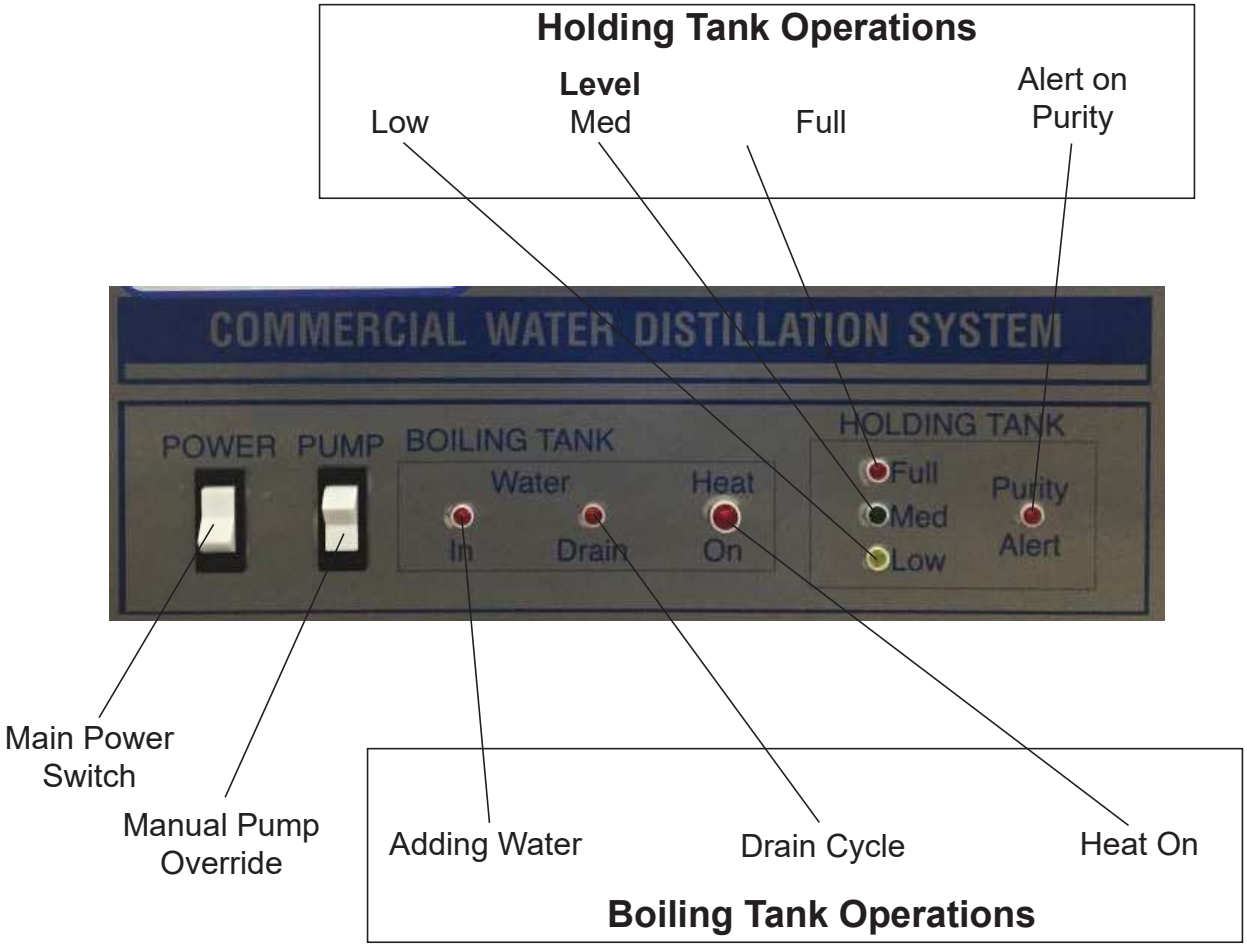
COMPONENT IDENTIFICATION

(XQ-7000 Distillation Unit)

Main Control Panel



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COMPONENT IDENTIFICATION

(XQ-7000 Distillation Unit)



- Drain/Cooling Tank Vent
- Distiller preheated water inlet tube
- Distiller drain connection
- Distillate Outlet
- Electrcial Conduit Inlet
- Electrical Access Panel
- Drain Tank Overflow to floor drain
- Drain cooling/Water Preheat Tank
- Main Raw water inlet
- Drain Plug

Rear View

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COMPONENT IDENTIFICATION



Internal View

- Condensing Coil
- Boiling Tank
- Dual Blowers
- Boiling Tank Heating Elements
- Holding Tank Full Level Probe
- Holding Tank Med Level Probe
- Post Filter (Not on C-60/75 HS)
- Electrical Enclosure
- 75 Gallon Holding Tank
- Pressure Tank
- Sight Tube
- Pump
- Distilled Water Supply Shutoff
- Holding Tank Low Level Probe
- Leak Safety Float

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COMPONENT IDENTIFICATION

(XQ-7000)

Lockable Door Latch:

Allows you to lock the distiller so that no one can access the electrical components or other parts of the distiller. The unit comes with 2 keys.

Main Control Panel:

Main Power Switch

This switch turns the power to the distiller on or off. Turn on for normal operations.

Manual Pump Override

The pump on the C-60/75 HS is a demand pump. The pump will automatically turn on when the water level in the holding tank is above the low level. Then the pump will pressurize the line and turn off when the pressure reaches 60 PSI. If a faucet is opened and the pressure drops below 45 PSI then the pump will turn on and stay on until it reaches 60 PSI again, or unitl the holding tank drops below the low level. If the purity of the water in the holding tank exceeds the setpoint, then the purity light will turn on and the pump will turn off. If the purity alert is on, connect the distilled water line to the drain. Press and Hold the Manual Pump Override to pump the impure water down the drain.

Boiling Tank Operations

Water In:

The boiling tank probe senses the whether water is touching it or not. When water is not touching the probe, the heat turns off, the Water In light illuminates, and the water inlet valve opens. When the water level touches the boiling tank probe, a timer is turned on and allows the water to continue entering the boiling tank for a few seconds. When the timer is done, the Water In light turns off, the water inlet valve turns off, and the heat

Water Drain:

As the distiller removes the pure water vapor, the water remaining in the boiling tank becomes more and more concentrated. The distiller will drain the concentrated boiling tank water automatically every 3.5-4 hours, and will also drain the boiling tank when the storage tank reaches the holding tank full level. The Heat On light will shut off, and the water drain light will illuminate until drained.

Heat On:

When the distiller is in normal operation the Heat On light will be illuminated. This indicates that the heating elements and the blowers are powered up, and the unit is currently distilling water.

Holding Tank Operations

Full Light:

This light will illuminate when the holding tank is full. The distiller will turn off when the holding tank is full.

Med Light:

This light will illuminate when the holding tank reaches the Medium level probe. If the water drops below the Medium Level Probe, then the distiller will start and will continue to run until the Full level is reached.

Low Light:

This light will illuminate when the holding tank reaches the low level probe. When this light illuminates, then the pump will turn on and stay on. The low level probe also determines the purity of the water in the holding

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tank. If the purity exceeds the preset setpoint, or if the water level drops below the low level probe then the pump power will be turned off.

Purity Alert:
This light will illuminate when the holding tank low level probe reads that the water in the holding tank exceeds the purity setpoint. When this light illuminates, the pump will turn off. The unit will continue to distill water until the holding tank reaches the full level. The purity alert setpoint is approximately 20 PPM, and is designed as a safety shut off if the boiling tank overfills, or if the boiling tank drain valve fails and the boiling tank starts to foam. Follow the instructions in the manual pump override description above.

Drain cooling/Water Preheat Tank
The water that drains out of the boiling tank is at 212 F/100 C and is too hot for many floor drains to handle. The drain cooling/water preheat tank allows the machine to both cool the drain water before it is sent to the drain and to preheat the incoming raw water before it is boiled. The tank will hold one full boiling tank of hot water. As the hot water sits in the tank, raw water passes through a stainless steel tube and draws the heat out of the drained water. The drain water will continue to lose heat as raw water passes through. When the distiller dumps water again, then the cool drain water is pushed out of the tank to the floor drain.

Drain/Cooling Tank Vent
This vent allows the water to drain out without syphoning.

Drain Tank Overflow to floor drain
Connect the drain tube from this fitting to your floor drain.

Drain Plug
Only used to drain unit before shipping

Main Raw water inlet
1/2” inlet connection for the raw water coming from the pretreatment system.

Distiller Drain Connection
(Already Connected) this connects the hot drain water from the C-60/75 HS to the Drain cooling/Water Preheat Tank.

Distiller preheated water inlet tube
(Already Connected) this connects the raw water inlet from the Drain cooling/Water Preheat Tank to the C-60/75 HS.

Distillate Outlet
1/2” bulkhead outlet (secondary outlet on the side of unit if needed) to pump distilled water from the C-60/75HS storage tank through the 3.3 GPM pump to the De-Ionization system.

Electrcial Conduit Inlet
Connect the electrical conduit to this hole in the back panel.

Electrical Access Panel
Remove this panel to access the main electrical connections for the C-60/75HS.

Boiling Tank:

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COMPONENT IDENTIFICATION

The raw water enters the boiling tank through the inlet solenoid valve. Water will continue to enter the boiling tank until it reaches the boiling tank probe. Then a timer on the circuit board will continue to allow water to enter until it times out. At that point, the water stops entering and the disiller will turn on the boiling tank heating elements and the dual blowers. The heating elements create steam which enters the condensing coil. The main concern in the boiling tank is that scale does not form on the heating elements and other surfaces. The softener on the pretreatment system will remove these minerals.

Boiling Tank Heating Elements The boiling tank has (2) heating elements that combine to provide 8000 watts of heating capacity at 240VAC, 60 Hz.

Condensing Coil:

The condensing coil is where the steam from the boiling tank is cooled by passing air across the coils. The coil center tube is stainless steel and the fins on the coil are aluminum. The water does not come in contact with the aluminum.

Dual Blowers:

Each of the dual blowers push 450 CFM of air through the condensing coil to remove heat from the steam condensing it to distilled water.

75 Gallon Holding Tank:

The stainless steel storage tank holds 75 gallons of distilled water.

Sight Tube Indicates the level of water in the storage tank.

Holding Tank Full Level Probe When the distilled water level reaches this point the distillation process will stop.

Holding Tank Med Level Probe When the distilled water reaches the full level, and water is used, casuing the water level to drop below the Med level, the distillation process will start and continue until the full level is reached again.

Holding Tank Low Level Probe The low level probe has 2 purposes. First, when the distilled water level is below this probe, then the pump will be disabled. Also, the probe tests the conductivity of the distilled water. When the conductivity is above the setpoint, then the pump will be disabled on a purity alert. The setpoint is approximately 20 ppm.

Post Filter (Not on C-60/75 HS):

Not installed on the C-60/75 HS model.

Electrical Enclosure:

Houses all of the electrical controls and the circuit board. On the side of the electrical Enclosure there are 3 circuit breakers, 2 switches, and an hour meter.

Dual 3 Amp Circuit Breakers These protect each of the Dual Blowers.

2 Amp Circuit Breaker Protects the pump.

Hour Meter Notes the total number of hours that the unit has been distilling water.

Function Switch Allows the user to change the operation of the distiller from the distillation process to a

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status that allows for cleaning of the boiling tank. See Installation Manual if needed.

Manual Water Fill Switch Allows you to add water to the boiling tank in the cleaning process.

Pump: This pump is a 3.3 gallon per minute maximum pump with a built-in pressure switch. When the water level in the holding tank is above the low level probe, and the purity is good, the pump will automatically turn on. The pump will continue to run until the pressure in the outlet line reaches 60 Pounds per Square Inch (PSI). The pump will then turn off until the pressure drops below 45 PSI. The pump will automatically turn on and off depending on the outlet line pressure.

Distilled Water Supply Shutoff: This shutoff valve can be closed to perform maintenance on the pump. This valve must remain open in normal operations. DO NOT CLOSE THIS VALVE IN NORMAL OPERATIONS, OR IF THE PUMP IS, OR CAN TURN ON.

Pressure Tank: This small pressure tank will hold pressurized water in the pump outlet line. This water will be used first, before the pump turns on. This will extend the life of the pump, and will prevent “pump cycling”.

Leak Safety Float: If a leak occurs inside the distiller filling bottom pan, the leak safety float will shut the distiller down.

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PRE-INSTALLATION

Place the unit in the desired location. The location needs to meet the following criteria:

a. A suitable source of water needs to be availible.
b. A 2” minimum floor drain is needed for regeneration of the softener and drainage for the C- XQ-7000.
c. An appropriate electrical supply with knife box should be located next to the unit.
   The XQ-7000 requires 220V, 1 Phase, 60 Hz.
   The Service Unit requires (2) 120V, 1 Phase, 60 Hz Outlets.

The XQ-7000 has wheels for easy transport. Once in place the wheels can be locked in position.

The service unit is designed to be tilted and rolled into place. When set upright, the frame will elevate the wheels off the ground. See illustration.





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INSTALLATION

This unit has been completely tested in the factory before shipping to your location. If you are not adequately trained and certified for plumbing or electrical installations, have the unit installed by a factory representative or other qualified personnel.

Plumbing Connections (Do not turn water on until instructed to do so):

Installing the Softener Plumbing:


Step 2

1. Install either the 3/4” elbow, or 3/4” straight fitting on the ball valve at the wall.

2. Connect the 3/4” raw water feed hose from the ball valve on the wall to the inlet of the Softener on the back of the service unit. See photo Step 2.

3. Install hose clamps on each end of the hose and tighten. See photo Step 3.

4. Connect the brine tank supply tube to the black fitting on the brine tank and tighten. This tube allows the softener to draw salt-saturated water from the brine tank. This line also allow the brine tank to be resupplied with a small amount of water to be used for the next brine tank draw. See photo Step 4.

5. Connect the other end of the brine tank supply tube to the brass fitting on the side of the softener head and tighten. See photo Step 5.


Step 3


Step 4


Step 5

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INSTALLATION



Step 7

6. Connect 1/2” braided hose to the softener drain fitting on the back of the softener head. See photo Step 6.

7. Install hose clamps on the hose and tighten. See photo Step 7.

8. Connect the other end of the drain line to the floor drain, or install an air gap at the floor drain per your local plumbing regulations.



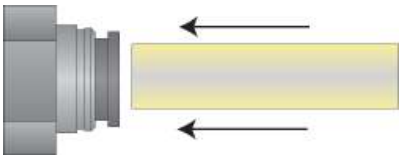
Step 6

Connecting to the Distiller:

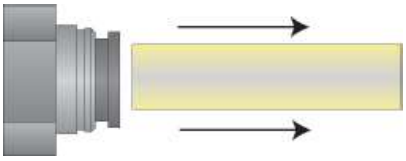
9. Install 1/2” low-density-polyethylene tubing (LDPE) from the outlet of the pretreatment filters to the raw water inlet on the XQ-7000. This tube will supply pretreated water from the softener, sediment filter, and carbon filter to the distiller. See photos Step 9a and Step 9b.

Note: *This tubing is held in position by push-in type fittings. See diagram 9c if you are not familiar with these fittings.*


Step 9a



To Install: Push tubing into fitting, pull to test that a good connection is made.



To Remove: Push on Grey Collet then pull on tubing

Diagram 9c



Step 9b

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INSTALLATION

10. Install 3/8” clear tubing from the distiller drain chamber to the floor drain. onnect the other end of the drain line to the floor drain, or install an air gap at the floor drain per your local plumbing regulations. See photo Step 10.

11. Install 1/2” low-density-polyethylene tubing (LDPE) from the distilled water outlet on the distiller. This tube will supply distilled water from the distiller to the Post-Treatment De-Ionization System.

12. Connect the 3/8” tubing from the Post-Treatment De-Ionization Outlet fitting to the desired location for usage.



Step 10



Step 11

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INSTALLATION

Installing the Electrical Connections:



Step 12

13. The distiller must be connected to 208V-240V, 1 Phase power. Connect the conduit to the conduit mounting hole and remove the electrical access panel. The distiller is designed to produce a rated production of distilled water depending on the local voltage and the heating elements that are installed in the distiller. The unit is shipped with a standard set of (2) 4000W 240V heating elements. Depending on the local voltage the production capacity will be approximately:

Local Voltage	Actual Wattage	Gallons/24hrs
240V	8000 Watts	60
220V	6750 Watts	54
208V	6000 Watts	48

If your water requirements are 60 gallons per day and the local voltage is under 240V, then different heating elements can be provided to increase the daily capacity. Note: the maximum capacity of this unit is 60 gallons in a 24 hour period.

14. The electrical connections for the Softener and the De-Ionization system are standard US 120V, 60 Hz electrical plugs. These will be plugged in at the appropriate time during the initial startup of the system.

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SYSTEM STARTUP

1. Open the top of the softener brine tank and fill it 1/2 to 3/4 full with salt. Pour 5 gallons of water into the brine tank.

2. Install the sediment and carbon filter in the blue filter housings.

3. Open the raw water supply valve a small amount and slowly fill the softener and filters. When the softener is full, open the valve fully.

4. Plug the softener electrical plug into the wall outlet.

5. Turn the distiller main power on and switch the power switch on.

6. Open the distiller doors and diconnect the wire clip that is from the pump to the electrical box.

7. Wait 24 hours for a sufficient quantity of water to be in the distiller storage tank.

8. Install the cartridges in the DeIonization system.

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STANDARD OPERATIONS

The distillation system stores water in a 75 gallon storage tank. When the water is needed, the pressure in the line drops and the pump automatically turns on. The water pumps through the DI system and the purity is read and displayed by the purity meter. When water purity reaches this high a level, it is very difficult to store the water and maintain the purity. When a DeIonization system is in operation, but water is not being moved through the system, the purity level will drop over time. So, before using or testing the product water the system and lines to the water outlet must be flushed.

To flush the lines to ensure the purity of the water:

1. Open the valve and allow the product water to flow through the De-ioization system, through the tubing and/or hoses to the drain.

2. Continue to flow water to the drain until the light on both DI cartridges turns green.

3. Allow water to flow to the drain until all of the water in the tubing and hoses on the outlet of the DI system have been flushed.

4. The water is now ready to use.

* If the purity reading does not turn green, then the De-Ionization Cartridges should be replaced. The distiller should also be checked for proper operation.

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MAINTENANCE

Scheduled maintenance for the system is very simple. Following are the recommended points of maintenance:

Service Unit:

Occurance	Part #	Description
Check Weekly	NA	Salt Level in Brine Tank (1/2 tank Min) Add Salt if Necessary
Every 3 months	9589	10” Carbon Block Filter
Every 3 months	229-0119	10” 5 Micron Filter
Every 6 Months OR lights consistently red.	25501	De-Ionization Cartridge

Distillation Unit:

Occurance	Part #	Description
Check Monthly	NA	Check for scale buildup in Boiling Tank.
Check Monthly	NA	Clean and dust/lint accumulation

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