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Culligan[®]



**AQUA-CLEER[®]/GOOD WATER MACHINE[™]
DRINKING WATER SYSTEMS
Technical Manual
AC Models from 1995**

⚠ WARNING! IF INCORRECTLY INSTALLED, OPERATED OR MAINTAINED, THIS PRODUCT CAN CAUSE SEVERE INJURY. THOSE WHO INSTALL, OPERATE, OR MAINTAIN THIS PRODUCT SHOULD BE TRAINED IN ITS PROPER USE, WARNED OF ITS DANGERS, AND SHOULD READ THE ENTIRE MANUAL BEFORE ATTEMPTING TO INSTALL, OPERATE OR MAINTAIN THIS PRODUCT.

Attention Culligan Customer:

Your local independently operated Culligan dealer employs trained service and maintenance personnel who are experienced in the installation, function and repair of Culligan equipment. This publication is written specifically for the purpose of training and guiding these individuals and is intended for their use.

We encourage Culligan users to learn about Culligan products, but we believe that product knowledge is best obtained by consulting with your Culligan dealer. Untrained individuals who use this manual assume the risk of any resulting property damage or personal injury.

This system is intended for use on potable water supplies or disinfected water containing cysts. Do not use where water is microbiologically unsafe or with water of unknown quality. If bacterial contamination is present, a recognized method of water disinfection is required.

Check with your public works department for applicable local plumbing and sanitation codes. Follow your local codes if they differ from the standards used in this manual.

For installations in Massachusetts, Massachusetts Plumbing Code 248 CMR shall be adhered to. Consult your licensed plumber for installation of this system. The use of piercing valves is not permitted in Massachusetts.

The Aqua-Clear[®] system contains a replaceable reverse osmosis membrane filter which is critical for the effective reduction of Total Dissolved Solids. The filtered water should be tested periodically to verify that the system is performing properly.

SAFE PRACTICES

Throughout this manual there are paragraphs set off by special headings.

NOTICE: Notice is used to emphasize installation, operation or maintenance information which is important, but does not present any hazard.

Example: *NOTICE: The nipple must extend no more than 1 inch above the cover plate.*

⚠ CAUTION: Caution is used when failure to follow directions could result in damage to equipment or property.

Example: **⚠ CAUTION: Disassembly while under water pressure can result in flooding.**

⚠ WARNING: Warning is used to indicate a hazard which could cause injury or death if ignored.

Example: **⚠ WARNING! ELECTRICAL SHOCK HAZARD! UNPLUG THE UNIT BEFORE REMOVING THE TIMER MECHANISM OR COVER PLATES!**

Serial Numbers

The serial number is located on the rear of the R.O. module.

NOTICE: Do not remove or destroy the serial number. It must be referenced on requests for warranty repair or replacement.

This publication is based on information available when approved for printing. Continuing design refinement could cause changes that may not be included in this publication.

CULLIGAN INTERNATIONAL COMPANY
One Culligan Parkway
Northbrook, Illinois USA 60062-6209
708/205-6000

AQUA-CLEER®/GOOD WATER MACHINE™ DRINKING WATER SYSTEMS Technical Manual AC Models from 1995

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System Specifications

System Flow Sequence	Particle Filter, Activated Carbon Filter, Reverse Osmosis Membrane Filter, Storage Tank, Polishing Filter, Dispensing Faucet
Particle Filter	5 Micron Spun Polypropylene
Activated Carbon Filter	Cullar [®] G Activated Carbon
Reverse Osmosis Membrane Filter	Culligan [®] Aqua-Cleer [®] Thin Film Composite
Production Rate ¹ - AC-15 Models	15 gpd (57 L/day)
AC-30 Models	30 gpd (119 L/day)
LC-50 Models	50 gpd (189 L/day)
Ratio of Product to Flush Flow ²	
Soft Water Applications	2:3 ³ (AC-15 & AC-30 models only)
Hard Water Applications	1:3 - 1:5
Polishing Filter	Cullar G Activated Carbon
Dispensing Faucet	Culligan Aqua-Cleer Faucet: Rotary Operation, Stainless Steel and Resin Flow Passages, with Built-in Siphon Break
Colors	Polished Chrome, White
Storage Capacity	
Standard Tank	2 gallons (7.5 L)
Medium Tank	3 gallons (10.5 L)
Large Tank	9 gallons (34 L)
Dimensions	
Filter Assembly	7.5"W x 3"D x 16.5"H (20 cm W x 8 cm D x 42 cm H)
Storage Tank - Std.	9" Diameter x 15"H (23 cm Diameter x 38 cm H)
- Med.	11" Diameter x 15"H (28 cm Diameter x 38 cm H)
- Lge.	15.5" Diameter x 22"H (40 cm Diameter x 56 cm H)

¹ Rating at 50 psi, 77°F, 500 mg/L TDS influent, without storage tank.

² May vary with pressure. See "Adjust Capillary Length", page 8, for all hard water applications and applications where TDS exceeds 1000 mg/L (ppm).

³ Except Nitrate models.

Suggested Installation Equipment

Sink Cutting Tools

Porcelain Cutter Kit, 1-1/4 inch diameter, PN 00-5916-25
Greenlee Hole Punch, 1-1/4 inch diameter
Plumbers Putty
Heavy Duty Drill with speed control to 400 rpm

Tools

Screwdriver, blade and Phillips (#1)
1/8 inch diameter pilot drill for #10 screws
Center Punch
Razor Blade Knife
Faucet Installation Tool, PN 00-4033-75
Aqua-Cleer[®] H Series or “System” series filter housing

Accessories/Hardware

Tubing, Plastic, 1/4-inch, PN 00-4021-84 Blue
Tubing, Plastic, 3/8-inch, PN 01-0002-87 Blue
Tubing, Drain, PN 00-4037-30
Piercing Valve, PN 00-5714-02
Drain Saddle Kit, PN 01-0003-29
Silicone Lubricant, PN 00-4715-07
Thread Sealing Tape
TDS Meter, PN D0-4705-04
Graduated Measuring Cylinder, PN 00-4705-03
Thermometer, PN 00-4705-01
Stopwatch, or wristwatch with second hand
Chlorine Bleach (Clorox* household, 5-1/4% strength)
Eye dropper (available at drug store)
Pressure Gauge (0-120 psi) with section of 1/4" OD tubing connector
#10 Screws, type determined by mounting surface and material
Tee, PN 01-0047-28, if system will be connected to icemaker

*Clorox is a registered trademark of the Clorox Company.

Miscellaneous

Extension Work Light
Air Pressure Gauge (automatic type with 1 psi increments, Milton Industries, Chicago, IL, Model S-921 or equivalent.)
Air Pump (bicycle tire pump)
Furniture pad for Back Protection
Small Portable Blower for Ventilation

Product Information

This manual covers the technical aspects of the Culligan® Aqua-Clear® Good Water Machine™ AC model drinking water systems. It is important to read this manual thoroughly so that you can properly apply, install, and service these systems.

The substances removed by this system are not necessarily in your untreated water. See Performance Data Sheet for exact percentages of contaminant removal.

Packaging

The Aqua-Clear system is shipped from the factory in two cartons:

- | | |
|---|----------------|
| Carton 1: | Carton 2: |
| • Filtration Assembly | • Storage Tank |
| • Reverse Osmosis Membrane Filter Element | |
| • Particle Filter Element | |
| • Activated Carbon Filter Element | |
| • Polishing Filter w/Mounting Pad | |
| • Parts Package, including: | |
| • Faucet | |
| • Tank Valve | |
| • Mounting Bracket | |
| • Product Literature | |

Note that the filter elements are shipped in their own sealed packaging. This will help to simplify in-plant preparation of the system and to maximize the shelf life of the RO membrane filter element.

If the Aqua-Clear system will not be installed immediately, refrigerate the RO membrane filter element at 35°/40°F (2°/5°C). **DO NOT ALLOW TO FREEZE.**

Warranty

A limited warranty is extended to the original end user from Culligan. This warranty is printed on the back cover of the Owner's Guide.

Application Guidelines

The Aqua-Clear/Good Water Machine system is designed for use on potable water supplies meeting the guidelines outlined in Table 1. The system should be installed on your home's cold water line. The flushing stream should discharge through an approved siphon break. Installation of this system must comply with state and local laws and regulations.

TABLE 1

Influent Water Characteristic	
Pressure ¹	40-120 psi (280-827 kPa)
Temperature	33-100°F (1-38°C)
Total Dissolved Solids (TDS) ²	0-4000 ppm (0-4000 mg/L)
pH	5-10
Chlorine ³	0-3 ppm (0-3 mg/L)
Chloramine	0-3 ppm (0-3 mg/L)
Turbidity	0-10 NTU
Iron	0-1 ppm (0-1 mg/L)
Bacterial Quality	Potable

¹ Nitrate units are not certified for nitrate reduction in water supplies with a pressure less than 40 psi (280 kPa). A booster pump is strongly recommended.

² See the "Performance & Technical Information" section of this manual for all applications where TDS exceeds 1000 ppm (1000 mg/L). A booster pump is strongly recommended.

³ The reverse osmosis membrane filter used in this system may be damaged by chlorine. This system includes an activated carbon filter which protects this element by reducing chlorine. Influent chlorine should not exceed 3 mg/L.

High Efficiency Operation

The Aqua-Clear system is designed for high-efficiency operation. Soft water use is strongly recommended. For maximum RO membrane filter life on all hard-water installations, adjust the capillary length as described in the "In-Plant Preparation" section of this manual. (Not required for LC-50)

Component Description

Tubing Connectors

The Aqua-Clear®/Good Water Machine™ system features reliable and convenient push-to-connect (Fig. 1) tubing connectors. Tubing is easily connected and disconnected from these fittings as follows.

Connect:

Cut the tubing squarely with a sharp knife. Be careful not to crush the tubing. To avoid leaks, make sure the tubing end is smooth and free of burrs and abrasions. Lubricate the end of the tube with water or a light coat of silicone and push the tube end firmly into the fitting. You should feel it push past the O-ring. Avoid bending the tubing sharply away from the fitting.

Disconnect:

Hold the collar against the fitting body and pull the tube from the fitting.

In the unlikely event that the connection leaks, remove and recut the tubing. Check the inside of the fitting for debris or O-ring damage. Reconnect.

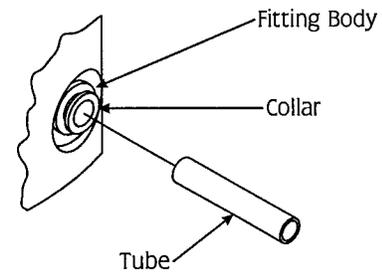


FIG. 1

Push-to-connect tubing connectors grip the outside diameter of the tube. To help assure a reliable connection, it is important to use high quality tubing with a consistent outside diameter. Culligan recommends that the tubing listed in the “Suggested Installation Equipment” section of this manual be used with the Aqua-Clear/Good Water Machine system.

Manifold/Main Filter Assembly

• Manifold Assembly

The manifold assembly Fig. 2 item (1) serves as the functional hub (Fig. 2) of the Aqua-Clear/Good Water Machine system by directing the flow through each of the system’s main components.

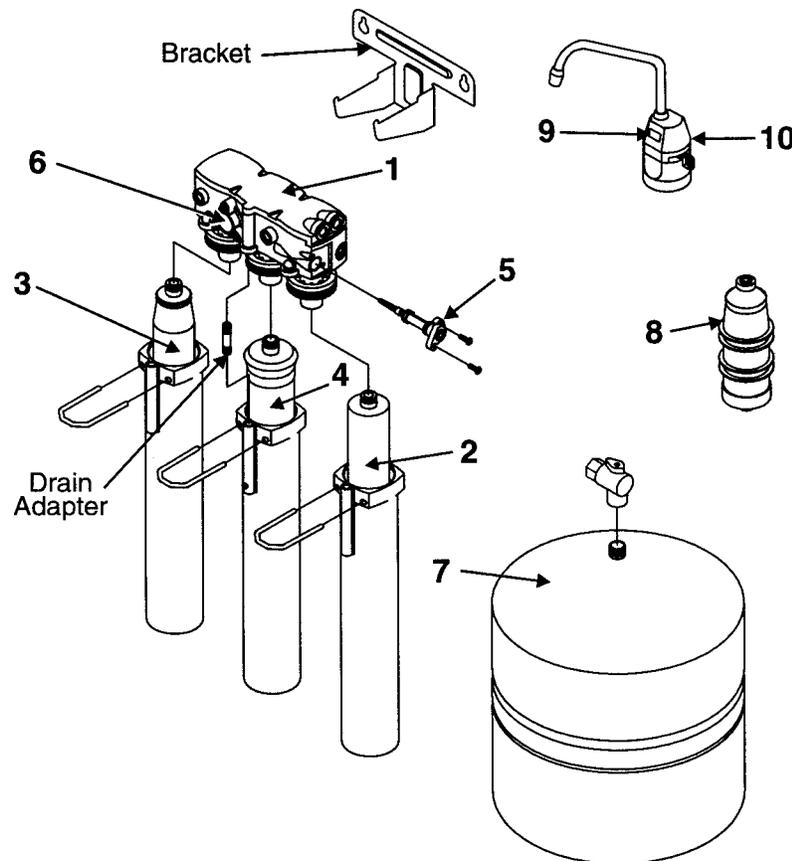


FIG. 2

- **Particle Filter**

The particle filter (2) screens out particulate material, such as dirt, sand, or rust, which may clog the other filters in the system.

- **Activated Carbon Filter**

The activated carbon filter (3) reduces chlorine which may damage the RO membrane filter. It must be maintained properly to prevent premature membrane failure.

- **Reverse Osmosis Membrane Filter**

The RO membrane filter (4) reduces dissolved substances and other microscopic impurities such as asbestos, lead, sodium, and others. It consists of a membrane envelope wound around a perforated tube. Product water passes through the membrane to the inside of the envelope where it flows to and is collected by the tube. Impurities are flushed away in the concentrate stream.

The RO membrane filter featured in the Aqua-Clear®/Good Water Machine™ system offers exceptional contaminant rejection, application versatility, and long life. The membrane material is highly sensitive to attack by chlorine. The activated carbon filter must be maintained properly to prevent premature failure of the RO membrane filter.

The RO membrane filter is shipped wet in a preservative solution. It must not be allowed to dry out or freeze as damage will likely result.

- **Capillary Assembly**

The capillary assembly or concentrate flow control (5) regulates the flow rate of the flushing (concentrate) stream to maintain pressure in the RO membrane filter vessel. It is located in the end of the manifold assembly.

- **Automatic Shutoff**

The automatic shutoff (6) automatically stops the flow of water through the Aqua-Clear/Good Water Machine system when the storage tank is full.

Storage Tank

The storage tank (7) collects and stores the water produced by the Aqua-Clear/Good Water Machine system. A compressed air diaphragm drives the water to the polishing filter and faucet. The tank valve provides a convenient way to lock water in the tank during transport and filter changes.

Polishing Filter

The polishing filter (8) adsorbs any residual tastes and odors just before the water is delivered through the faucet.

Aqua-Clear Sentry™ Monitor

This optional monitor (9) accessory (standard on Premier™ models) checks the TDS level of the drinking water each time the dispenser faucet is used. A green LED indicator (Fig. 3) mounted in the faucet signals if the TDS level is below the setpoint, an amber signal appears if it is above.

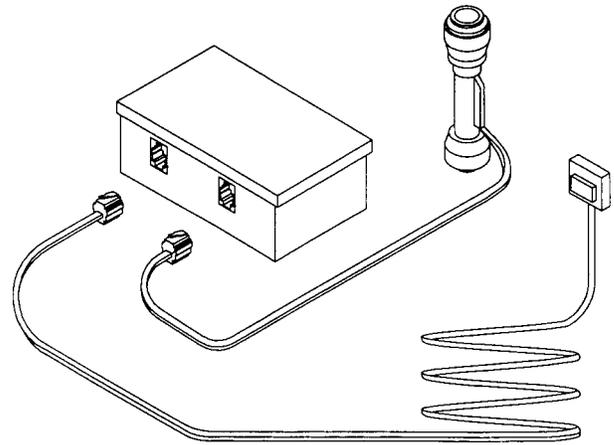


FIG. 3

Dispenser Faucet

The Aqua-Clear faucet (10) allows the product water to be drawn from the system with a simple rotation of the handle. It features a built-in siphon break for concentrate discharge as required by most plumbing codes.

In-Plant Preparation

To help assure quick and trouble-free installation of the Aqua-Clear® system, the following preparation steps should be performed in the dealer facility. Refer to Fig. 2. Cleanliness is essential in the In-Plant Preparation procedure. Be sure to wash your hands thoroughly before handling filters. The use of surgical gloves is strongly recommended.

Filter Assembly Preparation

• Activated Carbon Filter

The activated carbon filter must be thoroughly flushed to remove carbon dust which can plug the manifold or RO membrane filter. To perform this procedure, it is necessary to use a clean, spare Aqua-Clear H-83 (or H-82, 52, 53) series or “System” series filter housing (Fig. 4) as a service housing.

1. Install the activated carbon cartridge into the service housing.

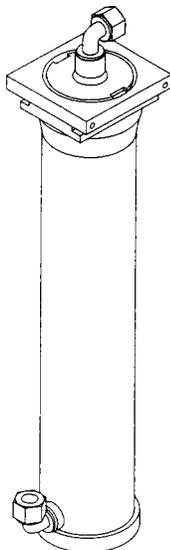


FIG. 4

2. Connect the outlet of the service housing to a source of clean, filtered water.
3. Connect the inlet of the service housing to a suitable drain.
4. Slowly turn on the water and back-flush the filter for 5 minutes at a rate of 1-2 gpm (4-7 L/min). Turn the water on and off several times during flushing to help loosen carbon particles from the filter.
5. Reverse the connections and forward flush the filter briefly until the water runs clear.
6. Remove the activated carbon filter cartridge from the service housing and set it aside in a clean location for installation into the Aqua-Clear system.

• Sanitize Filter Assembly

The Aqua-Clear system may be sanitized with either 5-1/4% liquid chlorine bleach or a fresh bottle of consumer grade hydrogen peroxide.

NOTICE: Chlorine will damage the RO membrane filter in this system. Remove the RO membrane filter when using chlorine bleach to sanitize.

NOTICE: Do not use hydrogen peroxide if iron is present in the raw water supply. This combination will damage the RO membrane filter.

1. Pull the u-clip from the rear of the particle filter housing ①
2. Insert the u-clip into the two square holes at the bottom rear of the manifold. Push up to release the filter housing.

3. Pour: two tablespoons liquid chlorine bleach or 3 ounces hydrogen peroxide into the particle filter-housing.
4. Assemble the housing to the manifold and replace the u-clip.
5. Using 1/4" OD plastic tubing, connect the inlet of the system (Fig. 5) to a source of clean filtered water.
6. Install short lengths (2-3") of 1/4" OD and 3/8" OD plastic tubing into the concentrate and product water outlets.
7. Turn on the supply valve and allow the system to fill with water. Once water begins to drip or flow from the filter assembly, turn off the supply valve and allow the system to sit for ten minutes.
8. Turn on the supply valve and flush the sanitizing solution from the system.

• Install Filter Cartridges

1. Pull the u-clip from the rear of the particle filter housing. ①
2. Insert the u-clip into the two square holes at the bottom rear of the manifold. Push up to release the filter housing.
3. Lubricate the cartridge o-ring with silicone lube and insert the particle filter cartridge into the manifold.
4. Assemble the housing to the manifold and replace the u-clip.
5. Repeat steps 1-4 and install the flushed activated carbon filter cartridge into housing ② and the RO membrane filter element into the center housing. ③ Be sure the drain adaptor is in place.

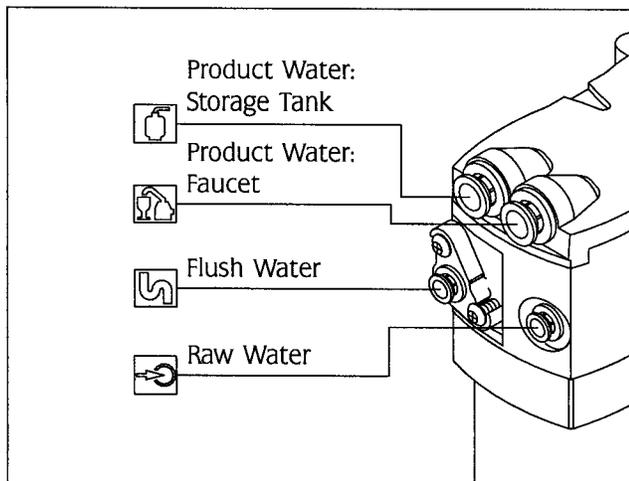


FIG. 5

• Adjust Capillary Length

The Aqua-Clear®/Good Water Machine™ system (except Nitrate models) is designed for maximum efficiency on most soft water installations. On hard water installations and applications where TDS exceeds 1000 mg/L (ppm), it is necessary to increase the flushing water flow to maximize RO membrane filter life. This is done by shortening the length of the capillary tube (Fig. 6) in the concentrate flow control.

If the system is to be installed on hard water or where TDS exceeds 1000 mg/L (ppm), proceed as follows:

1. Loosen the capillary retaining screws 1/4 - 1/2 turn.
2. Rotate the capillary assembly free of the retaining screws and pry it from the manifold.
3. Remove the white capillary retaining sleeve and unroll the capillary tube from the spool.
4. With a new razor blade, cut the capillary tubing squarely in half, being careful not to crimp the end.
5. Replace the capillary sleeve and rewind the capillary tubing onto the spool.
6. Reinstall the capillary assembly into the manifold and retighten the retaining screws.

• Flush RO Membrane Filter

The RO membrane filter must be flushed prior to use.

1. Turn on the supply valve to the system.
2. Allow the product water and flushing water to flow to a suitable drain for six (6) hours.

• Check Performance

Check the performance of the system according to the procedure beginning on page 17 of this manual.

Storage Tank Preparation

• Check Air Pressure

Using a tire gauge with 1 psi increments, check the air pressure in the empty storage tank. The air pressure should be between 5 and 15 psi, 7 psi is recommended. Use a bicycle-type hand pump to increase the air pressure, depress the stem of the air valve to decrease the pressure.

The storage tank capacity decreases with increasing air pressure. Refer to page 18 to select the best air pressure for your installation.

• Install Tank shut-off valve

Use a high quality, food-grade thread sealant or PTFE tape to assemble the valve onto the tank. To avoid future leaks, do not overtighten the plastic valve onto the tank.

• Sanitize the Storage Tank

The reservoir must be flushed and sanitized prior to installation as follows:

1. Connect a length of 3/8" OD plastic tubing to the tank valve.
2. With an eyedropper or similar device, inject 1 tablespoon of Hydrogen Peroxide or 1 teaspoon of 5-1/4% liquid chlorine bleach into the tube.
3. Connect the tubing to a source of clean, filtered water (RO or DI water, if available) at no more than 40 psi.
4. Turn on the water supply, open the tank valve, and allow the tank to fill.
5. Turn off the water supply, close the tank valve, and allow the tank to sit ten minutes.
6. Disconnect the tubing from the supply, open the tank valve, and drain the storage tank.
7. The water coming from the storage tank should have a chlorine odor. If not, repeat steps 2-6 until it does.
8. Fill and empty the tank (steps 3,4,6) until only a faint chlorine odor remains. The polishing filter will remove any residual chlorine taste once the system is installed.

• Fill the Storage Tank (optional)

So that your customers can begin using their new Aqua-Clear®/Good Water Machine™ system immediately upon installation, you may wish to fill the storage tank with RO product water. Once the in-plant preparation of the Filter Assembly (prior section) is complete, proceed as follows:

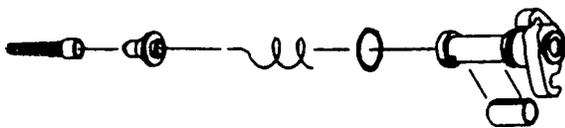


FIG. 6

1. Connect a length of 3/8" OD plastic tubing between the tank valve and (Fig. 5) the product water fitting  on the manifold.
2. Insert a 3/8" OD tubing plug into the faucet product water fitting on the manifold. 
3. Using 1/4" OD plastic tubing, connect the system inlet  to a water source meeting the characteristics listed in Table 1.
4. Using 1/4" OD plastic tubing, connect the concentrate outlet  to a suitable drain.
5. Turn on the water supply, open the tank valve, and allow the tank to fill (3-4 hours).
6. Once the tank is full, close the tank valve and disconnect the system so that it can be transported to the installation site.

⚠ WARNING! DO NOT USE THE TANK VALVE TO LIFT OR CARRY THE TANK.

Faucet Preparation

The Aqua-Clear/Good Water Machine faucet may be assembled prior to installation in the customer's home. Refer to the faucet installation section beginning on page 12 for details.

Polishing Filter Preparation

The polishing filter must be flushed prior to use to remove any carbon dust generated during shipment.

1. Using 3/8" OD plastic tubing, connect the inlet of the filter to a source of clean filtered water (RO or DI water, if available). Observe the direction of flow arrow on the filter.
2. Turn on the water supply and flush the filter with at least 2 gallons of water.
3. Turn off the water supply, disconnect the filter, and set aside for final installation.

Installation

The exact placement of the components will vary by installation. Although shown beneath a sink, it may be installed in a basement, crawl space, or in an adjacent cabinet. Regardless of where the system is installed, the flow sequence described by (Fig. 7) must be observed.

The Aqua-Clear®/Good Water Machine™ drinking water system is designed to be mounted near a sink for easy access to cold water and drain lines. Lengths of 1/4-inch and 3/8-inch OD plastic tubing will be required to make this installation. A length of Culligan® drain tubing is required to install the air gap siphon break.

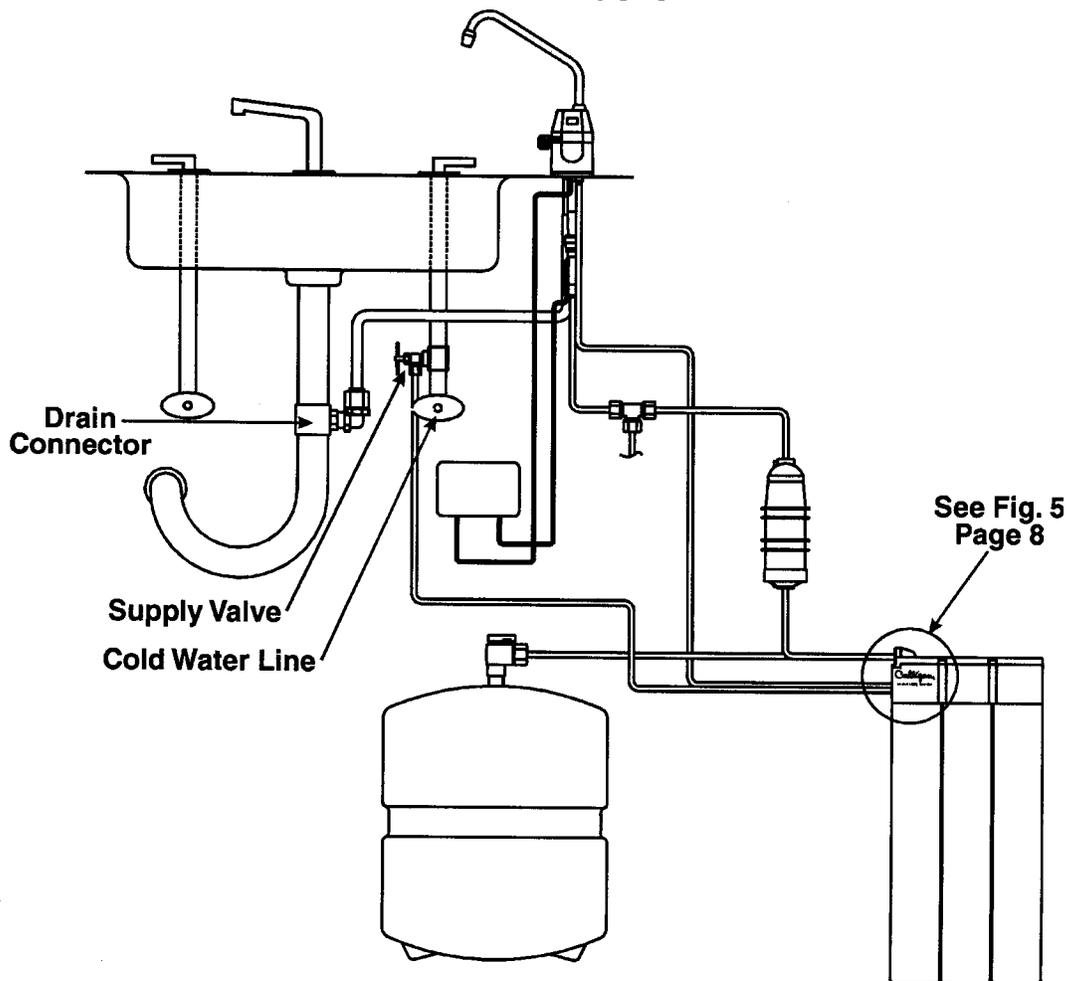


FIG. 7

Evaluate the installation site to determine the easiest path for the plumbing to follow. Take care to make the installation as neat as possible.

NOTICE: *Install the drain line so that it runs downward with no loops or low spots. Otherwise the unit will overflow at the air gap siphon break built into the faucet, or make irritating gurgling sounds. The concentrate line that leads to the faucet should be installed in a straight vertical path to avoid making a gurgling noise.*

The following steps will enable you to install the system quickly and orderly. Some variation may be necessary depending on the installation. See page 3 for a check list of tools and materials.

The flat-bottom design of the filter housings allows the option of standing the filter system assembly on the cabinet floor rather than mounting it to the wall. The filter assembly is reversible on the mounting bracket.

Typical installations follow this sequence:

- Select Component Installation Locations.
- Clear and Prepare Area.
- Install Faucet.
- Provide Inlet Water Supply.
- Provide Drain Connection
- Install Reservoir Tank.
- Install Filter System Assembly.
- Connect All System Components.
- Start-Up
- Performance Check
- Clean up Work Area.
- Review Operation with Customer.

Select Component Installation Locations

- **Dispenser Faucet** - The Culligan® faucet is designed to be mounted on the rear lip of the sink. It may be installed in an existing sprayer attachment hole or in a hole drilled at the time of installation. It may also be mounted to an adjacent counter top. It should be positioned so that water

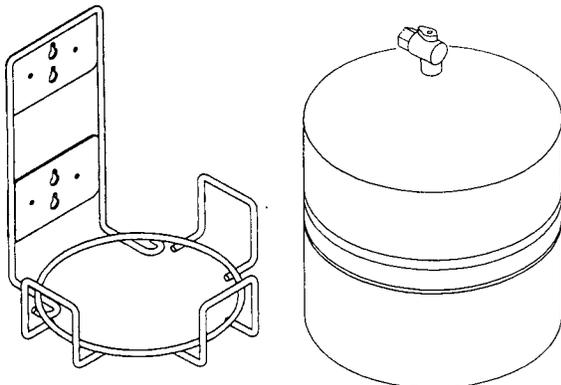


FIG. 8

is dispensed over the sink. A minimum 1-1/4" diameter hole is required.

When installing the Aqua-Clear Sentry™ water quality monitor, refer to the installation instructions packaged with the monitor. Make certain the TDS level setting corresponds to the customer's water supply.

Important considerations:

- Access to the bottom (undersink) of the faucet is required for attachment of product water line.
- The faucet can be installed for left- or right-handed operation.
- There should be no undersink obstructions which would prevent smooth tubing runs to the drain connection, carbon postfilter, or RO module assembly.
- **Filter System Assembly** - The filter system assembly is designed to be mounted on any rigid vertical surface such as a cabinet sidewall or basement rafter. It should be positioned such that there is access to an inlet water source and drain. The installation should also allow convenient access for servicing.

• Inlet Water Supply Connection

Once a location is chosen for installation of the filter system assembly, select a nearby cold water line to provide the water source for the system. For undersink installations, the cold water faucet line can usually be tapped.

• The Reservoir Tank

Position the reservoir tank near the faucet for optimum customer convenience. The standard & medium reservoir tank will weigh about 28 pounds (13 kg) when full of water, so it must be positioned on a stand or held securely by the optional mounting bracket, PN P1-0040-61 (medium) PN P1-0060-26 (standard) (Fig.8).

The reservoir operates best in the vertical position, but it will operate on its side. However, air will not escape readily and foaming may occur at the faucet nozzle. This should be explained to the customer prior to installation.

• Drain Connection

The most convenient entry to the drain is directly above the P-trap of the kitchen sink. However, the concentrate water from the system can be connected to adjacent sinks or a floor drain. Extra care should be taken when entering drains near dishwashers or garbage disposals as back flow may occur through the air gap and cause flooding.

Clear and Prepare Area

Since this product is more likely to be installed within the customer's daily living space than other water conditioning

products, the installation area should be kept neat and clean. If possible, consult with the customer as to how the installation site is used.

Faucet Installation

The Aqua-Clear®/Good Water Machine™ drinking water faucet was designed by Culligan to compliment the RO drinking water system. Properly installed, it will help to maximize your customer's product satisfaction. To simplify its access and installation, we suggest you install the faucet on the rear lip of the sink. It should be evenly positioned with the sink faucet and spray attachment. Should the spray faucet hole not be available for the installation, the sink must be drilled.

Sink Drilling Instructions

Stainless Steel Sink

- Select the proper faucet location.
- Center punch hole to provide a starting point for your drill.
- Drill a 1/2-inch hole to accept the shank of a 1-1/4-inch Greenlee Hole Punch.

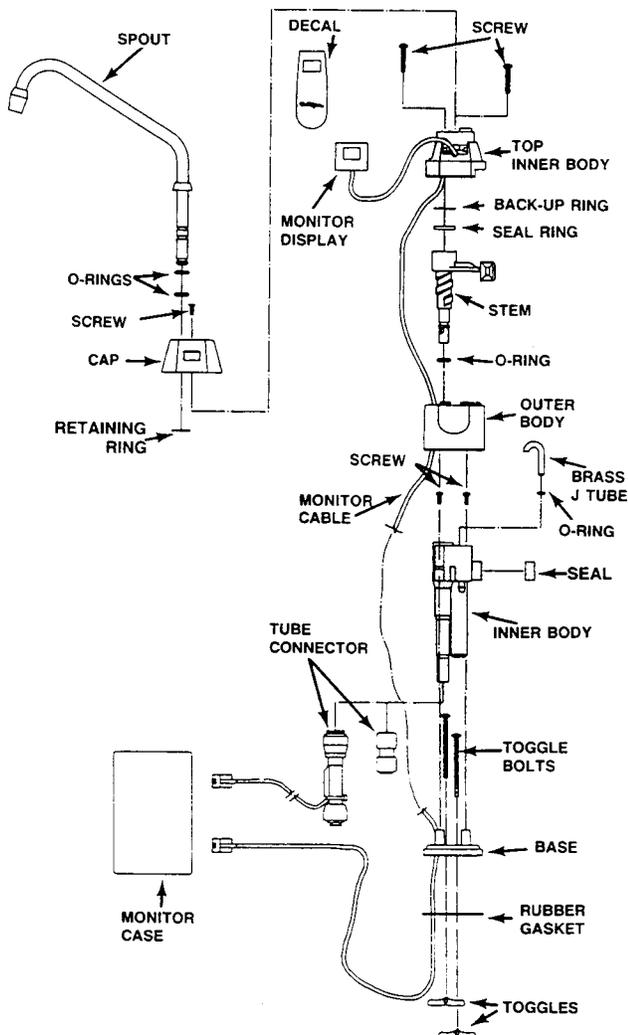


FIG. 9

- Insert the punch. Cut the hole by tightening the drive screw.
- Remove any roughness with a file and clean up metal chips.

Porcelain Enamel Sink

Follow these basic guidelines when drilling a porcelain sink:

- Penetrate the porcelain to the base material.
- Protect the surrounding porcelain material
- Use the appropriate tool to drill the base material.

One proven tool is the Relton porcelain cutter kit, PN 00-5916-25, when used with a slow speed drill (300-400 rpm).

- Drill a pilot hole through the porcelain and base material with the carbide tip drill.
- Build a putty dam around the drill area. Add enough water to lubricate cutters and reduce cutting noise.
- Insert the porcelain cutter into the drill.
- Place the drill tip in the pilot hole. Check for free movement.
- Apply light pressure to the cutter tool and start the drill motor at low speed (300-400 rpm). When the initial cut has been made in the porcelain, speed may be increased. After a complete ring has been cut through the porcelain, change over to the metal cutter.

CAUTION: Avoid high drill speed during penetration of porcelain. A single speed drill can be used at a slow speed by switching it on and off quickly.

- Avoid contacting the outer rim of cut porcelain when drilling.
- Use a slow speed and light pressure to cut away the porcelain.
- Stop when you reach the metal under the porcelain. Remove the cutter and clean the porcelain chips from the surface. Continue cutting through the metal. *NOTICE: Ceramic tile counters should be treated like porcelain when penetrating the surface, then treated as metal to complete the hole with carbide drills. Formica countertops can be drilled with a high-speed wood drill.*

Preassembly

For in-shop preassembly (Refer to Fig. 9), complete Preparation Steps 1-5 and Installation Assembly 6-12.

Preparation

1. Install the toggle bolts loosely onto the faucet base. Adjust to approximate thickness of the sink.
2. Make sure the brass J tube inside the top of the inner body is centered over the drain hole. Press firmly to seat. Push the air gap seal over the air gap port on the inner body.
3. Determine whether the installation is right or left handed.

When used, feed the monitor cable through the top inner and outer bodies. Do not position the monitor display at this time. **NOTICE:** *Monitors preassembled to a faucet require working with close assembly tolerances. All twists must be eliminated from the cable to properly align and assemble faucet body components.*

4. Chrome Faucet Only - Based on whether the installation is right or left handed and if a monitor is to be used, insert the spout through the top cap and install the retaining ring into the top groove of the spout.
5. Lubricate the stem seal ring and the o-ring with food grade lubricant, PN 00-4715-07. Push the stem seal ring firmly into the stem. Install the stem seal back up ring on top of the seal.
6. For in-shop preassembly, complete Installation/Assembly steps 6 through 12. Otherwise, begin the **INSTALLATION/ASSEMBLY** sequence with step 3 at the installation site.

Installation/Assembly

NOTICE: *If the faucet has not been preassembled, begin the INSTALLATION/ASSEMBLY sequence with step 3 at the installation site.*

⚠ CAUTION: Plastic parts will break if screws are overtightened.

1. Remove the top cap/spout (preassembled faucets only).
2. Insert a #1 Phillips screwdriver through the clearance slots and remove the faucet base (preassembled faucets only).
3. Center the gasket over the 1-1/4" sink hole. Orient the notches in the 3, 6, 9 and 12 o'clock positions. Place the faucet base on top of the gasket and push the toggle bolts through the sink hole. The cable notch in the base should be on the opposite side of the desired handle position and should line up with one of the notches in the gasket.
4. Slide the installation tool into the base. The "T" on the tool will be on the handle side of the faucet. Align the base by making the stem of the "T" line up with the back of the sink, and the crossbar of the "T" point straight out of the sink. Hold the assembly tool down and tighten the toggle bolts. Remove the installation tool and check that the toggles are firmly seated on the sink.
5. Connect drain inlet and drain outlet tubing to the black inner body. Push the 1/4" (blue is recommended) concentrate inlet tube securely onto the concentrate inlet barb. Be sure to use enough tubing. Slide the 1/2" black concentrate tube snugly onto the concentrate outlet nipple. Feed these tubes down through the faucet base.

6. Feed the monitor cable, if used, down through the faucet base. Be sure that all twists are eliminated from the cable.
7. Position the monitor cable in the notch of the base; locate the air gap port on the inner body opposite the cable notch, slide the inner body or faucet assembly onto the base. Fasten to the base using two #6-32 x 3/8" Phillips round head screws.

NOTICE: *Skip steps 8 through 11 if the faucet has been preassembled.*

8. Align the air gap hole in the outer body with the air gap port and slide the outer body over the inner body until it meets the base. Position the monitor cable in the notch on the outer body closest to the final position of the display.
9. Screw the stem into the large hole in the inner body until the handle on the stem is lined up with the air gap port.
10. Position the lever clearance slot over the lever and slide the top inner body over the stem until it contacts the outer body. Secure the top inner body using two #6-32 x 7/8" Phillips round head screws. Check to make sure that the handle operates smoothly.
11. Push excess monitor cable back through the faucet assembly and position the display on the top inner body so that it is readable. It may be necessary to pull gently on the monitor cable from below the sink.
12. Slide the cap/spout onto the faucet assembly until the circular boss on top of the inner body is flush with the top of the cap. If a monitor is installed, be sure that the display is visible through the window in the cap. Fasten the cap to the faucet assembly using the #4-40 x 3/8" Phillips flat head screw. Be careful not to damage the head of this screw as it is always visible.

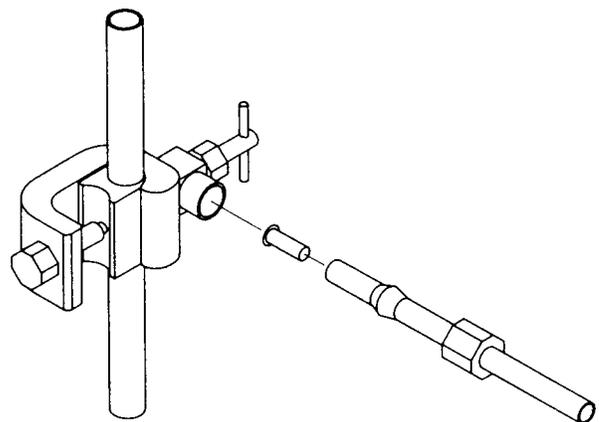


FIG. 10

13. Slide the ferrule down the spout so that it rests on top of the faucet cap.
14. Push the 3/8" product water tube firmly into the 3/8" x 3/8" union connector. From beneath the sink, slide the connector firmly onto the 3/8" product water nipple of the faucet inner body. **NOTICE: To disconnect tubing from the product water fitting, hold the gray collet firmly against fitting body and pull the tube from the fitting. Repeated assembly and disassembly will cause wear to the inner body. Visually inspect for excessive wear and replace the inner body as needed to protect against any leaks.**
15. Complete the faucet installation by carefully applying the face decal to the faucet face. Decals are supplied for units with or without the monitor. The decal cannot be reapplied, so ensure position is correct before affixing it to the faucet base.

Provide Inlet Water Supply

A wide variety of plumbing circumstances and choices exist to provide the feed water supply. The first connection in the system is at the prefilter where a 1/4-inch connection is supplied. The supply water plumbing should therefore terminate in a 1/4-inch tube fitting. Copper tubing or galvanized iron pipe is the typical plumbing used in most homes.

Piercing Valve

A special piercing valve (Fig.10), is available which makes its own hole as it is tightened down.

Connecting Aqua-Clear® System Drains

Plumbing codes require that the drain from reverse osmosis drinking water systems be discharged through an air gap siphon break. The Aqua-Clear faucet incorporates an air gap into its body. The discharge from the air gap must be connected to the plumbing system for proper drainage. This connection can usually be made beneath the sink. Incorrect installation may result in overflow of the air gap or excessive noise. If the concentrate water is discharged to an open drain, the air gap may not be necessary.

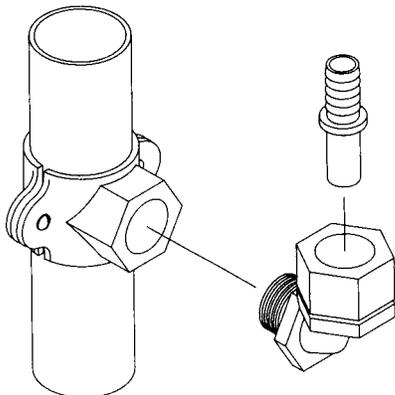


FIG. 11

The air gap feature of the Culligan® faucet requires a special .46-inch ID flexible black poly drain tube. This special size is necessary to meet the space and performance requirements of the faucet design. The exclusive use of Culligan tubing is required to provide a reliable drain connection.

Connections to undersink plumbing can be made with a saddle clamp designed to accept the drain tubing from the faucet. Culligan offers a saddle kit, PN 01-0003-29, designed for 1-1/2" undersink drain plumbing (Fig. 11). Be sure to check and follow local plumbing codes prior to installation.

Many homes are equipped with disposals and dishwashers. Special care must be taken when these appliances are present to prevent improper air gap performance. **Home drain plumbing must be free of any blockage since this may cause a backup of dishwasher and disposal waste into the air gap outlet tube and result in improper air gap performance.**

To perform a simple drain check, fill the sink basin with several inches of water, pull the plug, and observe the drainage. If water backs up into the second sink (if present), or if drainage is slow or there is excessive gurgling, drain blockage may be present.

Undersink drain plumbing usually resembles one of the following descriptions. In all cases, the drain tubing from the air gap (RO outlet) should run downward, free of dips and loops. The air gap outlet must not be connected to the effluent side of the trap. This can vent sewer gas, which will produce foul odors.

Single basin sink without disposal:

- Connect the RO outlet to the tailpiece directly beneath the sink.
- If a dishwasher drain connection is present, the RO outlet must be connected above it.

Single basin sink with disposal:

- Connect the RO outlet to the dishwasher drain port on the disposal if available.
- If the dishwasher drain port is not available, other arrangements must be made such as running the RO outlet to a basement sump.
- Do not connect the RO outlet to the plumbing below the disposal.

Double basin sink with disposal, single trap:

- The fitting which joins the drains from the disposal and second sink should be directional. If not, then Culligan recommends that it be replaced.
- Connect the RO outlet to the tailpiece just below the second sink.
- If a dishwasher drain is present and cannot be relocated, the RO outlet must be connected above it.

- Do not connect the RO outlet to the horizontal plumbing between the two sink drains.

Double basin sink with disposal, double trap:

- Connect the RO outlet to the tailpiece just below the second sink.
- If a dishwasher drain is present and cannot be relocated, the RO outlet must be connected above it.

Reservoir Tank Placement

Place the reservoir tank in the location previously selected.

Install Filter System Assembly

The mounting bracket contains two mounting slots. The holes are sized to accept #10 round head wood screws (not supplied). Some types of surfaces such as particle board or drywall, may require the use of plastic screw anchors or toggle bolts to provide adequate support for the unit.

- Using the mounting bracket as a template, mark the two mounting screw locations.
- Drill a 1/8-inch hole at each mounting screw location.
- Thread a wood screw into each of the holes, leave a 1/2-inch space between the screw head and the mounting surface.
- Hang the bracket on the mounting screws and tighten.

Connect System

When cutting plastic tubing, use a sharp razor blade. Cut the tubing squarely.

1. Connect 1/4-inch OD plastic tubing from the feed water supply source to the system inlet on the manifold. 
2. Connect the product water outlet on the manifold  to the storage tank valve using 3/8" OD plastic tubing.
3. Connect the 3/8" OD product water tube from the faucet to the outlet of the polishing filter.
4. Connect the product water outlet on the manifold  to the inlet of the polishing filter using 3/8" OD plastic tubing.
5. Connect the 1/4" OD tubing from the air gap inlet of the

faucet to the concentrate outlet on the manifold  (capillary assembly).

6. If an icemaker is to be installed, a tee must be installed between the manifold and the tank.
7. Place the filter assembly onto the mounting bracket.

Start-Up

The following procedure should be performed during the plant pre-delivery check out and again after installation:

- Turn on the inlet feed water valve and open the tank valve.
- Check system thoroughly for leaks.
- Run product water from faucet to flush carbon dust out of the carbon postfilter.
- Verify proper module performance.

Overall System Check

- Turn on the inlet feed water valve and open the tank valve. A complete systems check can be performed when the reservoir tank has been precharged with water.
- Move the faucet lever to the full open position. A steady stream of product water should be observed if the tank was filled earlier.
- Make a complete system check and adjust as needed to correct any leaks.
- Run product water through the faucet to flush out any remaining carbon dust from the post filter.
- Perform a final module check to verify proper product performance.
- Thoroughly clean up the equipment and the installation site.

Review Operation With Customer

Review the operation of the Culligan® drinking water system with the customer. Explain that the unit will require routine maintenance of the prefilters, reverse osmosis membrane filter, and the polishing filter. Advise the customer how often these items will need to be serviced based on your past experience. Discuss the product and module warranties.

Performance and Technical Information

The performance of the Aqua-Cleer[®]/Good Water Machine[™] system can be characterized and judged by the quality and quantity of the water produced by the system. By measuring the contaminant removal performance and flow rates of the system, its operating status can be easily evaluated.

Factors Which Affect Performance

Performance of the reverse osmosis membrane filter is affected by several factors which must be considered when judging the condition of the system. The main factors which affect system performance are pressure, temperature, total dissolved solids level, recovery and pH.

Pressure

Water pressure affects both the quantity and quality of the water produced by the RO membrane filter. Generally, the more water pressure, the better the performance of the system. Be careful not to exceed 120 psi, the maximum operating pressure of the Aqua-Cleer system.

Temperature

The reverse osmosis process slows with decreasing temperature. To compensate, a temperature correction factor is used to adjust the actual performance of the RO membrane filter to the standard temperature of 77°F (25°C). This allows the performance of the unit to be accurately gauged against Culligan's published standards. Temperature does not affect the concentrate flow rate.

Total Dissolved Solids

The minimum driving force which is necessary to stop or reverse the natural osmosis process is termed osmotic pres-

sure. As the total dissolved solids level of the feed water increases, the amount of osmotic pressure increases and acts as back pressure against the reverse osmosis process. Osmotic pressure becomes significant at TDS levels above 500 mg/L (ppm).

Recovery

Recovery is the ratio of the amount of product water "recovered" by the system to the total amount of water which passes through the system.

Performance Measurements

When collecting water samples from the manifold, insert a short 2"-3" length of tubing into the fitting on the manifold to catch the water sample. It may be necessary to plug the second product water fitting on the manifold while the sample is being taken.

Measuring TDS Levels

This procedure requires the use of a Total Dissolved Solids (TDS) meter (Fig. 12). PN D0-4705-04 On a triple-range meter, always set the instrument on its highest scale and work down until the proper scale is reached. The meter can be damaged if the needle is allowed to run off the scale.

To accurately check RO membrane filter performance, water samples should be taken directly from the product water outlet on the manifold assembly. Avoid taking samples from the faucet.

Measure and record the TDS level of the feed water and product water as follows:

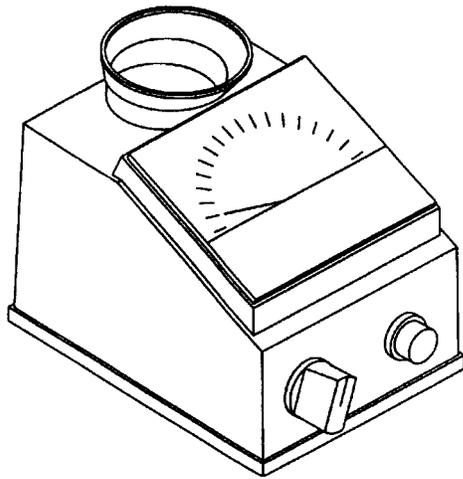


FIG. 12

- Rinse the cell cup twice with water to be tested, then fill to the top.
- Press the button on the front of the meter and read the dial for the dissolved solids content of the product water in parts per million (ppm).

Measuring Flow Rates

To measure flow rates, it is necessary to use a graduated cylinder (100 ml suggested), and a watch or stopwatch with a second hand. Measure and record the product and concentrate flow rates as follows:

- Collect the water sample directly from the manifold for exactly one minute or exactly two minutes.
- Convert the measured flow rate to gallons per day (gpd) as follows:

one minute sample: $\frac{\text{ml}}{\text{min.}} \times 0.40 \text{ conversion} = \text{gpd}$

two minute sample: $\frac{\text{ml}}{2 \text{ min.}} \div 5 \text{ conversion} = \text{gpd}$

Measuring Temperature

Use a thermometer to measure the temperature of the product water. It is most convenient to take this reading when the product water flow rate is checked.

Checking System Performance

Procedure

The following procedure is summarized on the Performance Worksheet printed on page 19. It details the measurement and evaluation of the key aspects of Aqua-Clear®/Good Water Machine™ system performance:

- Quality of water produced
- Quantity of water produced and stored
- Efficiency of operation

This procedure should be used to evaluate and record the performance of a new system and to check the performance of an operational system. The results of the new system performance evaluation should be retained as a benchmark of system performance in the years to come.

Checking Quality

Measure and record the TDS level of both the product water and the feed water. Calculate the percent removal of TDS as follows:

$$\text{Removal} = \frac{(\text{Feed Water TDS} - \text{Product Water TDS})}{(\text{Feed Water TDS})} \times 100\%$$

As an example, consider a system which is producing 50 mg/L product water from a 1000 mg/L source:

$$[(1000 - 50) \div 1000] \times 100\% = 95\% \text{ Removal}$$

Checking Quantity Produced

Measure and record both the flow rate and temperature of the product water. Record the temperature correction factor from

TABLE 2 - TEMPERATURE CORRECTION FACTORS

(77°F (25°C) rating multiplied by correction factor equals capacity)

Feed Water Temperature		Correction Factor	Feed Water Temperature		Correction Factor	Feed Water Temperature		Correction Factor
°F	°C		°F	°C		°F	°C	
36	2	0.33	52	11	0.56	68	20	0.83
38	3	0.34	54	12	0.59	70	21	0.87
40	4	0.37	56	13	0.63	72	22	0.90
42	6	0.40	58	14	0.65	74	23	0.94
44	7	0.43	60	16	0.69	76	24	0.96
46	8	0.46	62	17	0.72	77	25	1.00
48	9	0.50	64	18	0.76	78	26	1.03
50	10.0	0.52	66	19	0.79	80	27	1.06

Table 2 which corresponds to the measured flow rate to the 77°F (25°C) standard as follows:

$$\text{Adjusted Flow Rate} = \frac{\text{Measured Flow Rate}}{\text{Temperature Correction Factor}}$$

As an example, if the above system is producing 8 gpd at 60°F, the Temperature Correction Factor from Table 2 is 0.69.

$$8 \text{ gpd} \div 0.69 = 11.6 \text{ gpd @ } 77^\circ\text{F}$$

The TDS levels of the product and feed water were measured in the previous section. To accurately predict the performance of the RO module, the feed water pressure must be adjusted to account for osmotic pressure. Calculate osmotic pressure as follows:

$$\text{Osmotic Pressure} = 1 \text{ psi for every } 100 \text{ mg/L TDS}$$

From the previous example system:

$$1000 \div 100 = 10 \text{ psi Osmotic Pressure}$$

Since osmotic pressure acts as back pressure against the RO process, it is subtracted from the measured feed water pres-

sure to determine the effective module pressure. Measure the feed water pressure and calculate the effective module pressure as follows:

$$\text{Effective Module Pressure} = \text{Measured Pressure} - \text{Osmotic Pressure}$$

If the pressure measured from our example system is 60 psi:

$$60 - 10 = 50 \text{ psi Effective Module Pressure}$$

Using the effective module pressure, read the standard product flow rate from the flow graph in (Fig. 13). For our example system, we find the standard product flow is 35 gpd at 50 psi. Comparing this to the adjusted flow rate, we find the example system operating within the limits of the published standard.

Checking Quantity Stored

To predict the volume of water which will be stored by the system, it is necessary to determine the approximate product water pressure at which the system considers the tank full and the automatic shutoff actuates.

$$\text{Feed Water Pressure} \times 0.6 = \text{Shutoff Pressure}$$

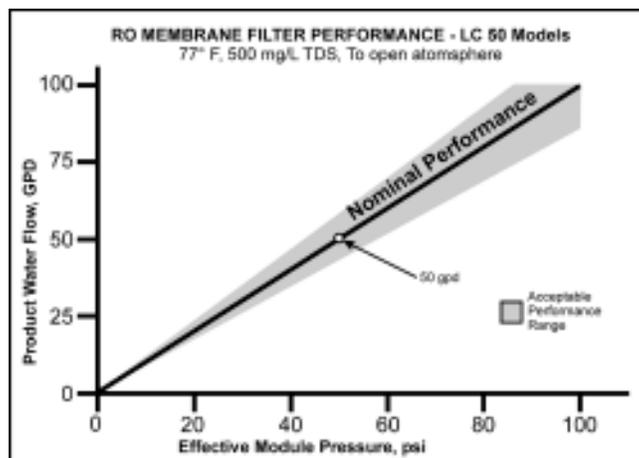
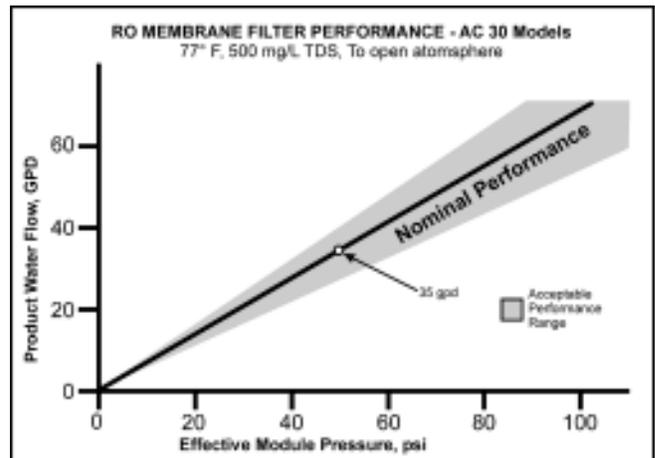
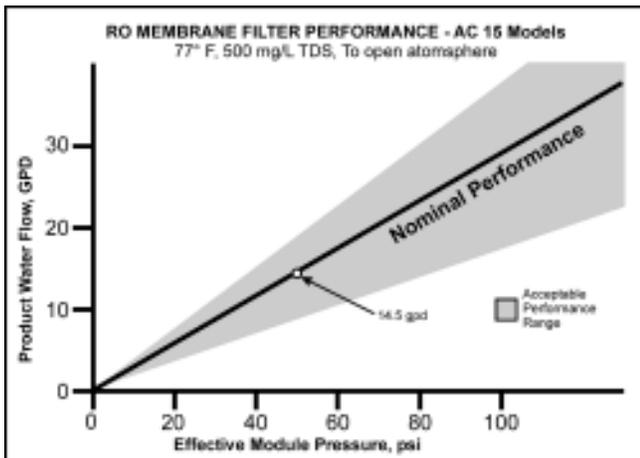


FIG. 13

Continuing the previous example:

$$60 \text{ psi} \times 0.6 = 36 \text{ psi}$$

Measure the storage tank air pressure using a tire gauge (w/ 1 psi increments) and read the corresponding storage volume. If our example system is equipped with the medium tank containing 5 psi air, from the graph (Fig. 14) we see that it can store approximately 2.7 gallons.

Checking Efficiency

Measure and record the product water flow and the concentrate water flow. Calculate the percent recovery as follows:

$$\% \text{ Recovery} = \frac{\text{Product Water Flow}}{\text{(Product Water Flow + Conc. Water Flow)}} \times 100\%$$

If the concentrate flow rate for the example system is measured at 66 gpd:

$$22 \text{ gpd} \div (22 \text{ gpd} + 66 \text{ gpd}) \times 100\% = 25\% \text{ Recovery}$$

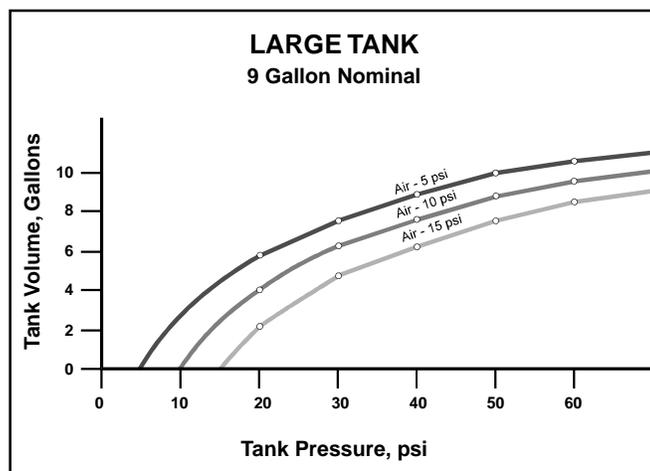
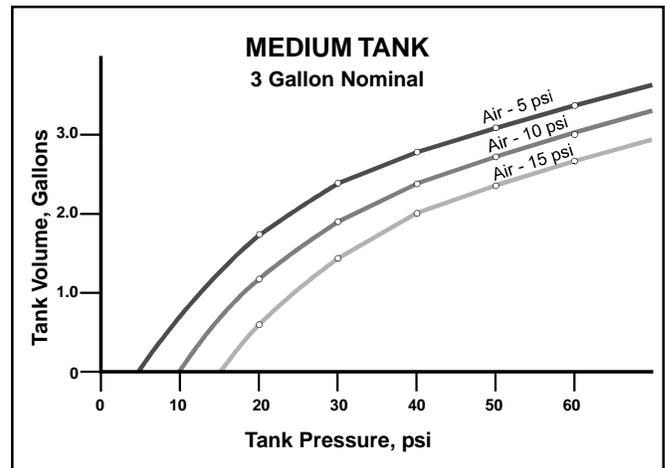
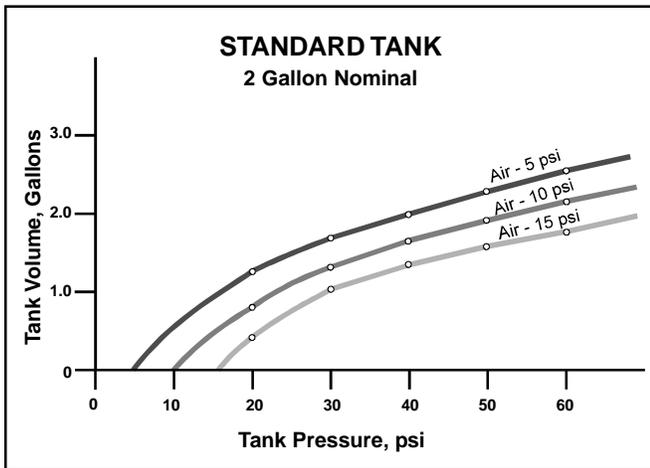


FIG. 14

Aqua-Cleer[®]/Good Water Machine[™] System Performance Worksheet

QUALITY

Feed Water TDS: TDS_{FEED} _____

Product Water TDS: TDS_{PROD} _____

$[(TDS_{FEED} - TDS_{PROD}) \div TDS_{FEED}] \times 100 =$ _____ % Removal

QUANTITY PRODUCED

Product Water Flow: F_{PROD} _____

Product Water Temperature: T _____

Temperature Correction Factor: TCF _____

$F_{PROD} \div TCF =$ _____ F_{CORR} (Corrected Product Flow)

Feed Water TDS: TDS_{FEED} _____

$(TDS_{FEED} - 500) \times 0.014 =$ _____ P_{OS} (Osmotic Pressure)

Feed Water Pressure: P_{FEED} _____

$P_{FEED} - P_{OS} =$ _____ P_{EFF} (Effective Pressure)

Read Theoretical Product Flow From Figure 13
at Effective Pressure, Compare to Corrected Product Flow.

Theoretical Product Flow: F_{THEOR} _____

QUANTITY STORED

Feed Water Pressure: P_{FEED} _____

$P_{FEED} \times 0.60 =$ _____ P_T (Tank Pressure at Shutoff)

Tank Air Pressure: P_A _____

Using P_T and P_A , Read the Volume of Water Stored When the Shutoff
Actuates from Figure 14.

Volume Stored: V_S _____

EFFICIENCY

Product Water Flow: F_{PROD} _____

Concentrate Water Flow: F_{CONC} _____

$F_P \div (F_{PROD} + F_{CONC}) \times 100 =$ _____ % Recovery

Service and Maintenance

Service Schedule

To keep the Aqua-Cleer®/Good Water Machine™ system operating properly, it is necessary to change the filters and sanitize the system periodically. Typically, this should be done on an annual basis. Service frequency may vary depending on local water conditions. High sediment, chlorine, turbidity, or hardness levels may require more frequent service. Use the following as a guide.

At least once per year

Replace:

- Particle Filter
- Activated Carbon Filter
- Polishing Filter

Check:

- RO Membrane Filter
- TDS Reduction Performance
- Flow Rates
- Capillary Assembly

Sanitize the System.

Cartridge Conditioning

The activated carbon, reverse osmosis, and polishing filter cartridges must be conditioned as follows prior to installation into the Aqua-Cleer/Good Water Machine system. Follow the procedures detailed in the “In-Plant Preparation” section of this manual.

Activated Carbon Cartridge - 5 gallon flush to remove carbon dust

RO Membrane Filter - 24 hour flush to remove preservative solution

Polishing Filter - 2 gallon flush to remove carbon dust

Filter Replacement and Sanitizing Procedure

Use the following procedure when servicing the Aqua-Cleer/Good Water Machine system. Refer to Figures 15 & 16.

NOTICE: You may want to fill a pitcher with drinking water before beginning service as it will take several hours for the system to refill after servicing.

The Aqua-Cleer/Good Water Machine system may be sanitized with either 5-1/4% liquid chlorine bleach or a fresh bottle of consumer grade hydrogen peroxide.

NOTICE: The reverse osmosis membrane filter used in this system may be severely damaged by chlorine. The membrane filter must be removed from the system if chlorine bleach is to be used for sanitizing.

NOTICE: Hydrogen peroxide should not be used if iron is present in the supply water as the RO membrane filter may be damaged.

Cleanliness is essential in the filter replacement procedure. Be sure to wash your hands thoroughly before handling filters. The use of surgical gloves is strongly recommended.

1. Locate the system's supply valve and turn off the system's water supply.
2. Open the dispenser faucet and drain the storage tank.
3. Lift the filter assembly from the mounting bracket and place it in a dish pan or similar vessel to catch any dripping water.
4. Pull the u-clip from the rear of the particle filter housing ①.
5. Insert the u-clip into the two square holes at the bottom rear of the manifold. Push up to release the filter housing.

6. Remove the filter cartridge with a downward twisting pull.
7. Clean the inside of the housing.
8. Lubricate the cartridge o-ring with water and insert the new filter cartridge into the manifold.
9. Pour: two tablespoons liquid chlorine bleach or 3 ounces hydrogen peroxide into the particle filter housing.
10. Assemble the housing to the manifold and replace the u-clip.
11. Repeat steps 4-7 and remove the activated carbon cartridge ② and, if using chlorine bleach, the RO membrane filter ③.
12. Assemble the empty housing(s) to the manifold and replace the u-clip(s).

NOTICE: When replacing the RO membrane filter housing, be sure the drain adaptor is in place.

13. Turn on the supply valve and allow the system to fill with water. Once water begins to drip or flow from the faucet, close the faucet and allow the tank to fill.
14. Turn off the supply valve and allow the system to sit for ten minutes.
15. Open the dispenser faucet and drain the storage tank.
16. Repeat steps 4,5,8 and 10 for replacement of the

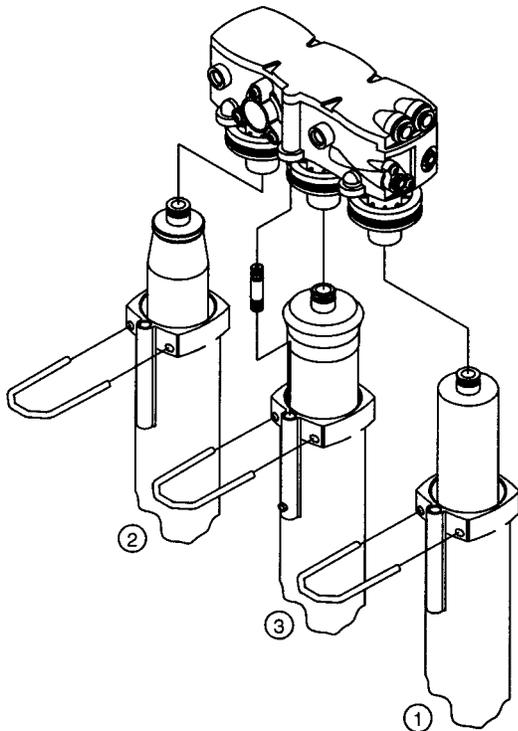


FIG. 15

activated carbon ② and RO membrane ③ filter cartridges.

17. Check the performance of the system according to the procedure outlined in the “Performance and Technical Information” section of this manual. Replace the RO membrane filter if necessary.
18. Remove the capillary assembly from the manifold and inspect for signs of clogging. Replace if required.
19. If using hydrogen peroxide, disconnect the storage tank tube from the manifold. With an eyedropper or similar device, inject one tablespoon of hydrogen peroxide into the tube and reconnect it to the manifold.
20. Note the direction of flow and disconnect the tubing from the polishing filter.
21. Note the direction of flow and install the new polishing filter.
22. Replace the filter assembly onto the mounting bracket.
23. Repeat step 13.
24. After the tank has filled (3-4 hours), open the faucet and drain the storage tank to flush the new postfilter and any remaining sanitizing solution from the system.
25. Allow the system to refill. Your system is now ready for use.
26. Record your service on the chart at the end of the Owner’s Guide.

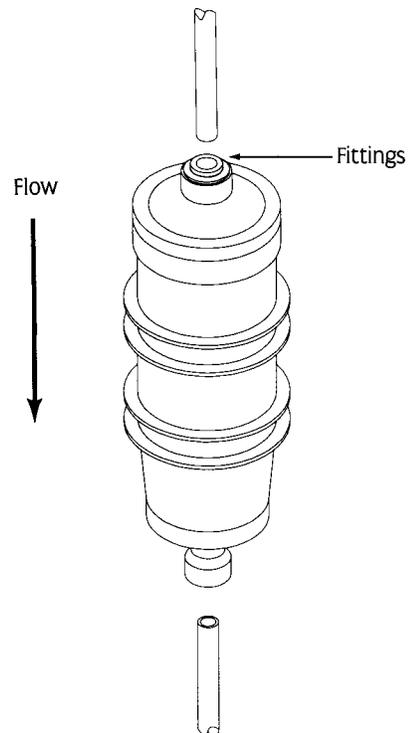


FIG. 16

Troubleshooting Guide

If a problem cannot be corrected through use of this Troubleshooting Guide and assistance from the factory is required, please have the following information available:

1. Product water flow rate (directly from module).
 2. Concentrate flow rate (from concentrate water outlet of module housing). Pressure relief valve must be closed when measuring concentrate flow rate.
 3. Feed water line pressure.
 - *4. Product water quality (directly from module).
 - *5. Reservoir water quality.
 - *6. Feed water quality.
 7. Feed water temperature.
 8. Reservoir precharge pressure.
- *Check with TDS meter PN D0-4705-04.

PROBLEM	POSSIBLE CAUSE	REMEDY
1. Insufficient quantity of product water available to service.	a. Service greater than unit's specified output.	a. Use optional large tank for more storage capacity.
	b. Insufficient feed water flow.	b. 1. Clogged shut-off valve or feed tubing; clean out or replace 2. Clogged prefilter; replace. 3. Clogged manifold; clean or replace.
	c. Insufficient feed water pressure	c. 1. Same as (b) above 2. Change in line pressure; install booster pump.
	d. Increase in feed water TDS.	d. 1. Same as (a) above. 2. Install booster pump.
	e. Reduced feed water temperature	e. Same
	f. Plugged prefilter.	f. Replace filter element.
	g. Plugged polishing filter.	g. Replace polishing filter.
	h. RO membrane filter fouled with sediment.	h. Replace RO membrane filter and prefilter elements.
	i. Shutoff malfunction.	i. Clean or replace shutoff.
2. Poor product water quality	a. All of (1) above except (a) and (e)	a. All of (1) above except (a), (e), and (g).
	b. RO membrane filter worn out.	b. Replace RO membrane filter.

- | | | |
|--|---|---|
| | c. Bad O-ring on RO membrane filter. | c. Replace O-ring |
| | d. Shutoff malfunction. | d. Replace shutoff. |
| 3. Bad tasting product water | a. Decrease in product quality; see (2) above. | a. Same as (2) above. |
| | b. Foreign matter in storage tank. | b. Clean, sanitize, and flush storage tank. |
| | c. Polishing filter exhausted. | c. Replace polishing filter |
| | d. Leakage around membrane filter O-rings. | d. Replace O-rings |
| | e. Plugged capillary tube. | e. Replace capillary tube; replace prefilter, if necessary. |
| | f. Storage tank bladder is ruptured. | f. Replace storage tank and check precharge pressure. |
| 4. External leakage. | a. Tubing not fully seated in fitting | a. Check all fittings for tightness. |
| | b. Tubing abraded in seal area. | b. Recut tubing and redo connection. |
| 5. Overflow at faucet air gap (gurgling sounds). | a. Concentrate tubing plugged. | a. Clean concentrate tubing of debris. |
| | b. Air gap plugged. | b. Clean with vinegar and/or soap. |
| | c. Concentrate tubing not in continuous downward slope. | c. Eliminate loops or low spots in tubing. |
| | d. Obstructed home drain pipe. | d. Free obstruction. |
| 6. Foaming at faucet tip. | a. Storage tank is positioned on side (Dissolved air cannot escape.) | a. Place tank in vertical position. |
| 7. Foaming at air-gap | a. Concentrate tubing connected to same drain line as dishwasher, etc. | a. Find different drain for system. |
| | b. When sink is full of soapy water and plug is pulled, can back up at air-gap. | b. Obstructed home drain, free obstruction. |
| | c. Obstructed home drain | c. Free obstruction |

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| 8. Bad smell from product water. | a. Polishing filter exhausted. | a. Replace polishing filter. |
| | b. Prefilter element | b. Replace filter element. |
| | c. Unit needs disinfection. | c. Sanitize unit. |
| 9. Fast flow to drain. | a. Defective capillary tube. | a. Replace capillary tube. |
| 10. Black specks in product water. | a. Carbon fines. | a. Flush polishing filter. |
| 11. Low faucet pressure | a. Low precharge in storage tank. | a. Increase storage tank precharge. |
| | b. Polishing filter plugged. | b. Replace polishing filter. |
| 12. Capillary tube plugging | a. Excessive turbidity. | a. Install another 5 micron filter in series with existing one or substitute carbon block filter for granular activated carbon filter. |
| | b. Iron fouled. | b. Pretreat for iron removal. |
| | c. Iron-bacteria fouled. | c. Sanitize plumbing. |