



**Light Commercial
Reverse Osmosis System**

EE-1000 Manual

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EE-1000 Light Commercial Reverse Osmosis System

The Nimbus EE-1000 systems produce high quality reverse osmosis water for light commercial applications. These systems feature a compact, vertical design and low-maintenance powder coated frames. All systems are manufactured in the USA.

System Specifications - Table 1

GPD	1000	Voltage	110/220
Membrane Size	2.5" x 40"	Hertz	50/60
Membrane Type	Thin-film	Feed Connection	3/4"
Number of Membranes	1	Brine Connection	3/8"
Membrane Housings	PVC	Product Connection	3/8"
Pump	5.3 gpm	Dimensions	14" x 13" x 39"
Motor	3/4 HP	Weight	65 lbs.

Permeate flow and NaCl rejection specifications are based on 2000 ppm NaCl, 150 psi, 77°F (25°C), pH 7 and flow rate as indicated.

Operating Specifications - Table 2

Min Feed Pressure	25 psi	Iron	0.0 ppm
Operating pressure	150 psi	Manganese	0.0 ppm
Max temperature	105°F	Hydrogen Sulfide	0.0 ppm
Maximum TDS	2,000 ppm	Turbidity	<1.0 NTU
Max chlorine, continuous	0.1 ppm	Silt Density Index	<5.0 SDI
pH range, operating	3-11	Max hardness	15 grains/gal

System Components (Figure 1)

Pump/Motor Assembly (1, 2): The rotary positive displacement pump boosts water pressure in the desalinator to 150 psi (10.3 bar) for low energy membranes to ensure high solids rejection and high flow rates.

Clamp, V-Band (3)

System Pressure Gauge (4): A glycerin filled gauge that displays the operating pressure in the desalinator.

Membrane Desalinator (5): Separates dissolved solids from the feed water. This assembly consists of a PVC pressure vessel that houses the thin-film, reverse osmosis (RO) membrane.

Product Water Check Valve (6): A one-way valve that prevents pressurized product water from flowing back into the desalinator (and possibly damaging the membrane) when the system is off.

Low Pressure Switch (7): An electrical switch that shuts off the unit in the event of low feed water pressure. This is used as a pump protection device. This is factory set to cut off at 12 psi (0.8 bar).

Solenoid Valve (8): Electrically operated valve that prevents water from flowing through the system when it is not in operation.

Concentrate Recirculation Valve, option (9): A needle valve that controls the amount of concentrate from the desalinator to be recirculated back into the feed stream. This feature allows for higher recovery rates. Additionally, adjustment of this valve regulates the pump discharge pressure.

Sediment Pre-Filter Assembly (10): A spun polypropylene filter that prevents undissolved particles, larger than 10 μ , from entering the system.

Flow Control (11): A fixed orifice that controls the amount of water flowing across the membrane to drain.

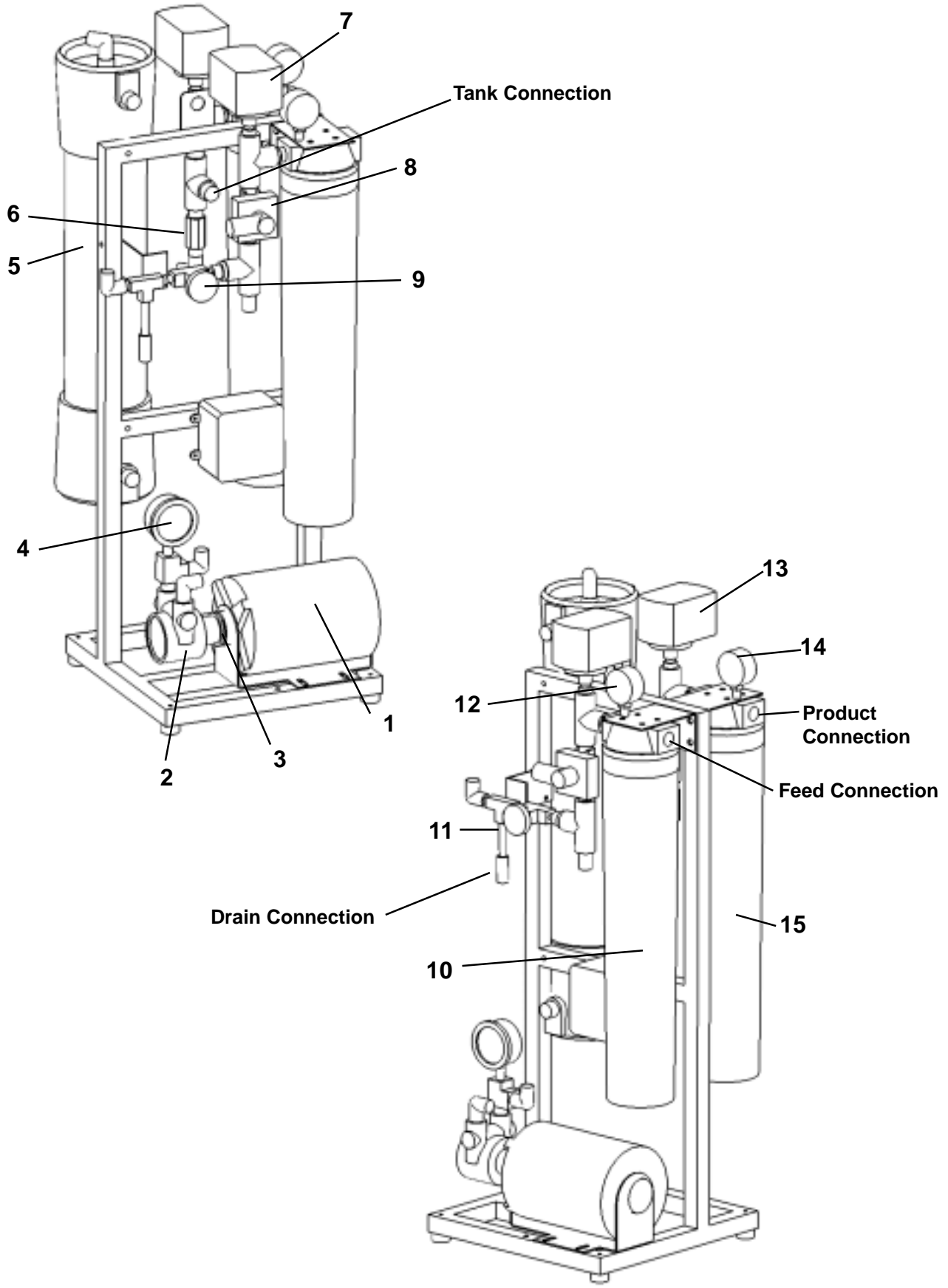
Filter Pressure Gauge (12): A gauge that displays the water pressure after the sediment pre-filter. This is used to observe the pressure drop through the sediment pre-filter (a means of detecting filter clogging or loading).

Tank Pressure Switch, option (13): An electrical switch, used with a pressurized storage tank, that controls the system operation based on the storage tank pressure. This is factory set to shut the system off when the tank pressure is 40 psi (2.8 bar) and turn the system on when the tank pressure is below 20 psi (1.4 bar).

Tank Pressure Gauge, option (14): A gauge that displays product water pressure when using a pressurized storage tank.

Carbon Post-Filter Assembly, option (15): A granular activated carbon (GAC) filter that helps to remove taste and odor. This option is used with pressure storage systems and may include a tank pressure switch and check valve.

Figure 1: System Components, EE-1000



Pre-Installation Procedures

PLEASE READ CAREFULLY. FAILURE TO FOLLOW THESE PROCEDURES CAN RESULT IN DAMAGE TO YOUR SYSTEM AND VOID YOUR WARRANTY.

Packaging

Upon delivery, inspect packaging and report any damage to your carrier immediately. After unpacking the system, inspect it carefully for signs of damage. All damage claims should be made to the delivery carrier.

Operating Parameters

The Nimbus EE-1000 systems are to be used on potable water only. The user must be sure that water to be treated is both microbiologically safe and non-toxic. Ensure that the operating parameters outlined in Table 2 are met at the installation site. Items of most importance are TDS, feed water pressure, flow rate, chlorine level and temperature range. A water analysis is helpful in determining if any pre-treatment is needed. If your water analysis shows levels of substances in excess of the maximums stated in Table 2, contact Nimbus for pre-treatment recommendations.

Pre-Treatment

10" or 20" carbon prefilters may be insufficient to adequately de-chlorinate feed water. A dual-carbon-bed back washing filter should be used to dechlorinate and will extend the life of membrane desalinators. Contact Nimbus for additional pre-treatment recommendations.

Installation

PLEASE READ CAREFULLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE PROCEDURES CAN RESULT IN DAMAGE TO YOUR SYSTEM AND VOID YOUR WARRANTY.

Location

Locate the system where it will be protected from harsh environments such as rain, snow, direct sunlight and extreme temperatures (both hot and cold). The EE-1000 system can be located just about anywhere there is a water and electrical supply. This can be on the floor, mounted on the wall with a shelf, or any other flat surface. Keep in mind, however, that the system should be out of normal traffic patterns and may be easily accessed for daily monitoring and service.

Plumbing (Figure 2 - Flow Diagram, EE-1000)

Always abide by local plumbing codes when installing the system.

Water Supply Connection

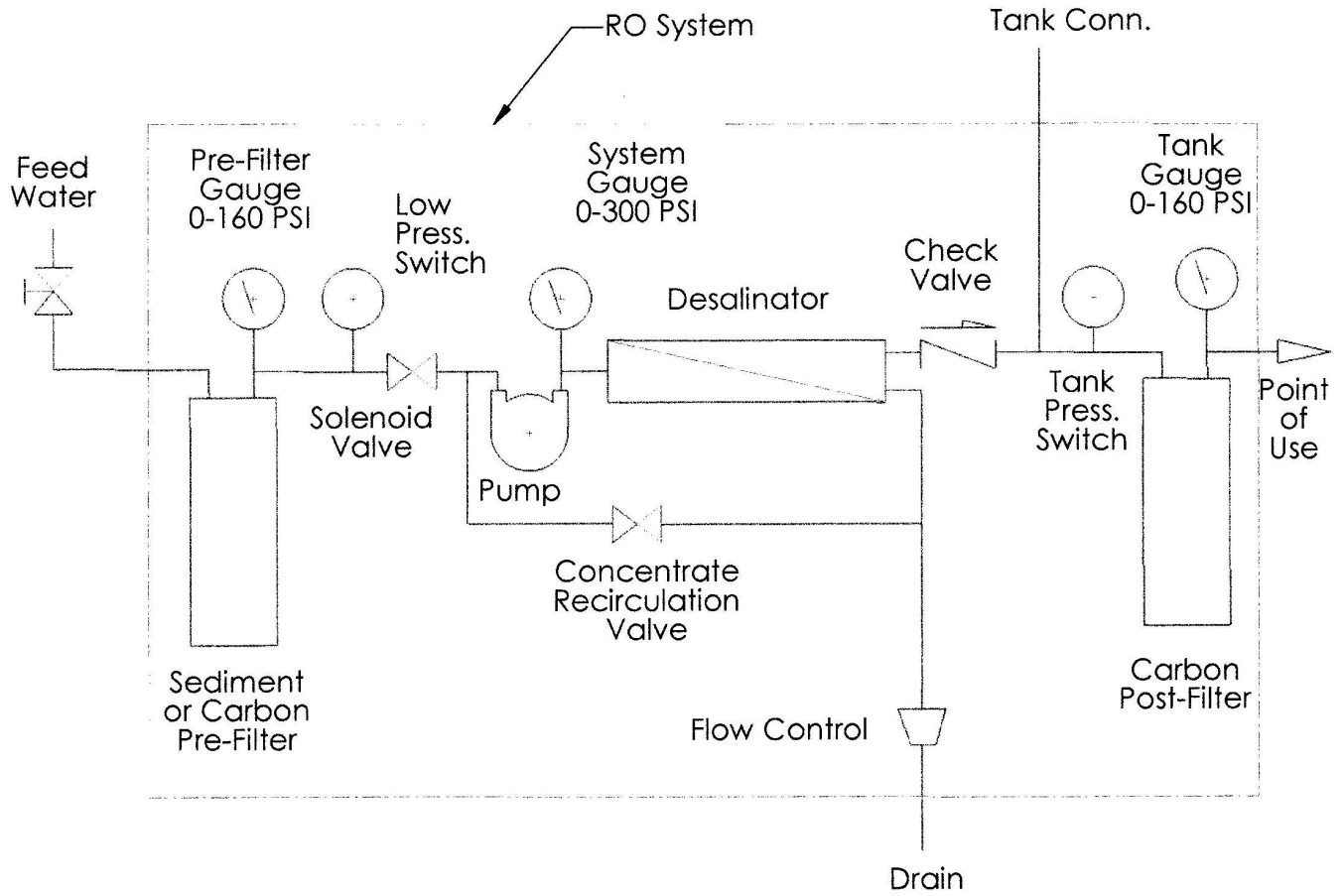
Connect feed water supply line to the $\frac{3}{4}$ " FNPT port marked "FEED". When using plastic tubing, use tubing insert and plastic ferrules. If the supply water is being drawn from a non-pressurized tank, contact the Nimbus for additional information.

Drain Connection

Connect a $\frac{3}{8}$ " line from the stainless steel union marked "DRAIN" to the drain. When using plastic tubing, use tubing inserts and plastic ferrules. Be sure to check your local plumbing codes to see if an air gap between the system and the drain is required.

The product water connection to the storage tank should not be made until the system is flushed and tested as outlined below.

Figure 2: Flow Diagram, EE-1000



Tank Connection (For Pressurized Tanks Only)

For units with the 20" GAC post filter option, connect a 1/2" hose from the barb fitting marked "TANK" to the inlet on a pressurized storage tank. Order Kit #104218 available for connecting to tanks with 1"MPT connections.

Tank Connection (For Non-Pressurized Tanks Only)

When using a non-pressurized storage tank, connect the tubing marked "PRODUCT" to the tank. Use a tank switch to shut down the system when the tank is full and start the system when water level is low (part #105030) See below for wiring instructions.

Product/Post Filter Outlet Connection

Connect a 1/2" line from the compression fitting marked "Product" to the point of use (i.e. faucet). When using a non-pressurized storage tank, a pressurizer will be used to feed the point of use faucet(s).

Electrical (Figure 3, Electrical Diagram)

WARNING! THE EE-1000 SYSTEM CAN START AT ANY TIME WHEN POWER IS CONNECTED. DO NOT CONNECT POWER UNTIL THE SYSTEM IS COMPLETELY INSTALLED AND READY TO RUN.

EE-1000 systems are built with a standard 115V three-prong plug. Be sure the receptacle you use is on a circuit that has a Ground Fault Interrupter (GFI) and has sufficient capacity for the operating current as listed in the system specifications. It is recommended that the system be installed on a dedicated circuit to prevent overloading on system start-up.

External Float Switch Wiring (For non-pressurized tanks only)

There is a black wire and a white wire wire-nutted together at the upper right of the gray electrical enclosure in the back of the unit. Remove the wire nut, separate the 2 wires, and attach the 2 float switch wires to these wires.

Remove the enclosure cover, pull the 2 wires down into the enclosure, feed the float switch cord through the strain relief, wire nut the wires as described above, tighten the strain relief on the float switch cord and replace the enclosure cover.

System Flush and Performance Verification

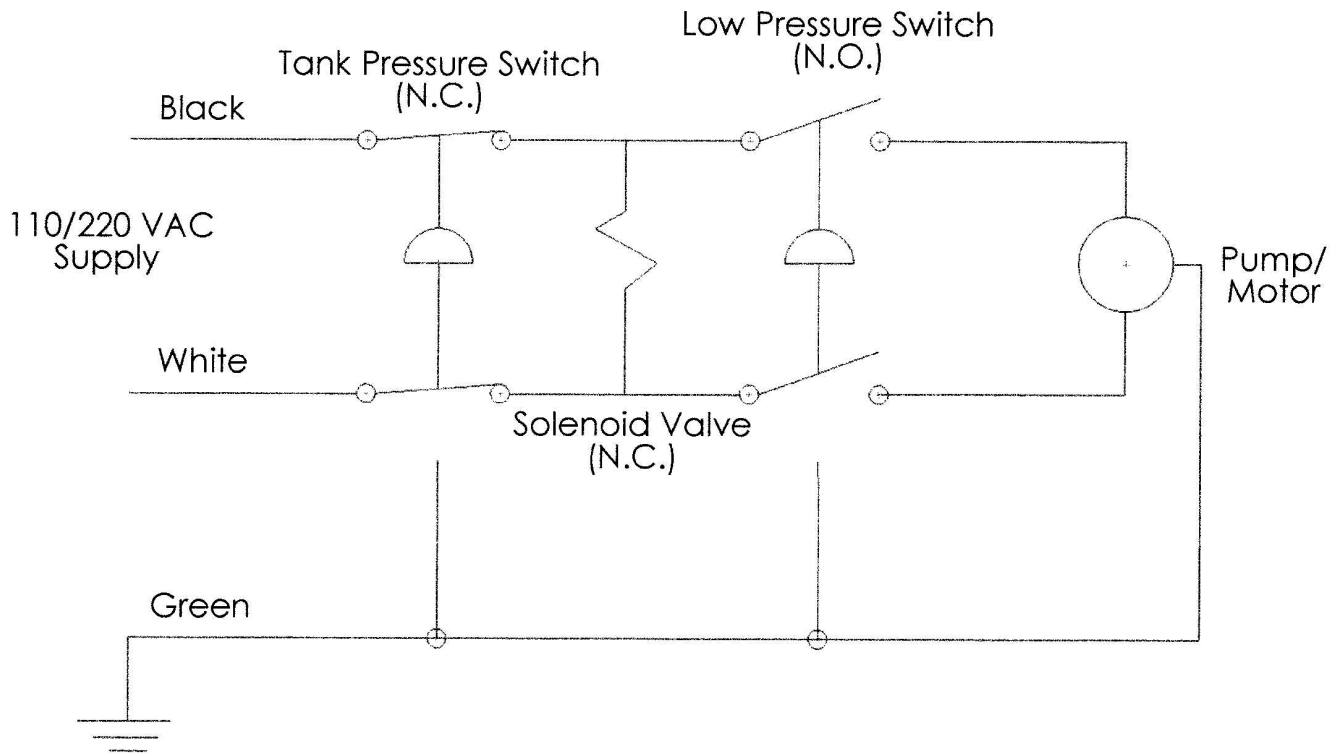
Although EE-1000 systems are fully tested at the factory prior to shipping, it is recommended to flush and verify your system's performance on-site.

Flushing

New membranes are shipped with a preservative on them that needs to be flushed out before use. Run the product line to drain while flushing the system.

- Fully open concentrate recirculation valve by turning the knob counterclockwise.
- Turn on water supply to the unit and check for leaks.
- Plug the system into a compatible electrical outlet. **CAUTION! THE SYSTEM WILL START NOW.**
- After the system has run for a few minutes to clear any air, turn the concentrate recirculation valve clockwise until the system pressure gauge reads 150 psi (10.3 bar).

Figure3: Electrical Diagram, EE-1000



- Allow the system to flush for one hour with all water discharged to drain. Periodically check for leaks and check the system pressure gauge. It is likely that the system pressure will drift from 150 psi (10.3 bar) during the flushing. If it does, turn concentrate recirculation valve clockwise to increase pressure and counterclockwise to decrease pressure. **DO NOT LET SYSTEM PRESSURE RISE ABOVE 200 PSI (14 BAR) AS DAMAGE TO THE SYSTEM CAN OCCUR.**

Performance Verification

Factory test data is supplied with the system. To ensure optimal performance, on-site data should be taken and compared to the factory test data. This data should be taken after the system has been flushed for one hour. Some deviations may be seen due to differences in feed water TDS and temperature between the site and factory. If you have already connected the product line to the tank, you will need to disconnect it ahead of the post carbon filter (if one is installed) to take product samples.

Flow Tests

Determine the flow rates for both product and concentrate. Put the product line into a container and measure the volume of water that flows into it in one minute. Repeat the process with the concentrate (drain) line. These values should be in either gallons per minute or milliliters per minute. Product flow rates (at 77°F, 25°C) should be within 15% of the production rates given in the system specifications.

Concentrate to Product Ratio

Compute the concentrate to product ratio (C:P) by dividing the concentrate flow rate by the product flow rate. This ratio should be between 2:1 and 5:1.

Total Dissolved Solids (TDS) rejection

Using a conductivity meter (TDS meter) measure the TDS in both the feed water and the product water. Calculate percent rejection using the formula below:

$$(\text{Feed TDS} - \text{Product TDS}) \div (\text{Feed TDS}) \times 100 = \% \text{ Rejection}$$

Rejection should be 85% or better. For example, where the feed TDS is 600 and the product TDS is 24, the percent rejection is:

$$(600 - 24) \div 600 \times 100 = 96\%.$$

Low Pressure Switch Test

While the system is running, shut off the water supply to the system. The system should shut off. If the system does not shut off after ten seconds, either unplug the system or restore the water supply to the system. **DO NOT LET THE SYSTEM RUN WITHOUT THE WATER SUPPLY TURNED ON. PUMP DAMAGE WILL OCCUR.**

Note: The switch on the side of the electrical box is a manual override. Do not operate unit when the pump is dry or the pump will be damaged.

Make the tank connection as outlined above.

Tank Pressure Switch Test (for Pressurized Tanks Only)

With the product line connected to the tank and with the system running, close the inlet valve to the tank. The tank pressure gauge should start to rise and the system should shut off when the gauge reads about 60 psi (4.1 bar). Now, by opening the tank inlet valve, the tank pressure should begin to drop and the system should turn on when the pressure drops below about 40 psi (2.8 bar). If the system fails to shut off at 60 psi (4.1 bar), watch the gauge and be sure that it does not rise above 100 psi (6.9 bar). If it reaches 100 psi (6.9 bar), unplug the system.

Float Switch Test (for non-pressurized tanks)

The system should run when the float is hanging down by the power cord. Tilt float up so the power cord is at the bottom of the float. The unit should shut off. If unit does not shut off, re-check installation procedure.

Operation and Maintenance

Nimbus EE-1000 systems are designed for simple operation with little user intervention. We recommend keeping accurate performance records and following a regular preventative maintenance schedule to maximize the life of your system.

Daily System Checks

Your water supply pressure can vary from time to time. This can also affect your system operating pressure. Check and adjust your system pressure daily to ensure maximum water production rates and quality. Check both the water supply pressure gauge and the filter pressure gauge. Under normal conditions, there should be a 3-5 psi difference between the two gauges. When the difference reaches 10 psi, a pre-filter change is recommended.

Monthly System Checks

In addition to the daily checks, it is recommended to repeat the procedure in the section on Performance Verification and record all data on your performance record sheet.

Semi-Annual Service

It is recommended to change both sediment and carbon filter cartridges at least every six months. Carbon cartridges should be changed more often if bad taste and/or odor becomes evident. Sediment cartridge should be changed more often if water supply pressure and filter pressure gauges differ by 10 psi or more.

Peripheral Equipment

Peripheral equipment such as pre-filters, post-filters and tanks also have periodic maintenance requirements. It is essential to maintain these as they can have a dramatic effect on the performance of your system. Refer to their specific manuals for proper maintenance procedures.