



Diamond™ RO Reverse Osmosis System

OPERATING MANUAL

AND PARTS LIST

Series 1265-1266

| Model | Liters/Hour | Voltage |
|--------------|--------------------|----------------|
| D12651 | 12 l/hr | 100-240 |
| D12661 | 24 l/hr | 100-240 |

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Safety Information

Alert Signals



Warning

Warnings alert you to a possibility of personal injury.



Caution

Cautions alert you to a possibility of damage to the equipment.



Note

Notes alert you to pertinent facts and conditions.

Your Barnstead Diamond RO has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. This manual contains important safety information. You must carefully read and understand the contents of this manual prior to the use of this equipment. For safe operation, please pay attention to the alert indicators throughout the manual.

Water purification technology employs one or more of the following: chemicals, electrical devices, mercury vapor lamps, steam and heated vessels. Care should be taken when installing, operating or servicing Barnstead products. The specific safety notes pertinent to this Barnstead product are listed below.

Warnings

To avoid electrical shock, always:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Do not locate the Diamond RO directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.
3. Replace fuses with those of the same type and rating.
4. Disconnect from the power supply prior to maintenance and servicing.

To avoid personal injury:

1. Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.
2. This device is to be used with potable water feeds only.

SAFETY INFORMATION

3. Refer servicing to qualified personnel.
4. Discard the RO membrane(s) product water for at least two hours during the initial operation. The membrane(s) contains a preservative solution to prevent microbiological growth.

Introduction

Congratulations on your purchase of a Barnstead Diamond RO. This unit is designed to provide reverse osmosis water for your lab or ultrapure water system. It uses a thin film composite membrane combined with three stages of pre-treatment to produce reverse osmosis water.

Careful attention to the following instructions will assure that the system operates properly and produces water to specifications. Also, be sure to fill out and return the enclosed warranty registration card. We would like to receive the information requested, and it will help us assure you of proper warranty coverage.

Each unit requires a separate storage reservoir for automatic operation. Please make sure you have an adequate storage reservoir before installing your Diamond RO.



Figure 1 Diamond RO Front

General Usage

Do not use this product for anything other than its intended usage.

Specifications

Dimensions and Clearance Requirements

Dimensions

Wall and Bench mounted models

| | |
|--------|-----------------|
| Width | 34.3 cm (13.5") |
| Depth | 42.8 cm (16.9") |
| Height | 49.5 cm (19.5") |

Clearances

Sides - 22.9 cm (9") minimum for servicing.

Above - 7.6 cm (3") minimum for removal of the top cover.

Front - 12.1 cm (4.75") minimum for opening the front door.

Cartridge and membrane replacement is easily accomplished upon opening the front and side doors.

Feed Water Requirements¹

| | |
|---------------------------|---|
| Types ¹ | Tap (Potable) |
| Turbidity | 1.0 N.T.U. maximum |
| Pressure Range | 2 bar (30 psig) to 6.8 bar (100 psig) maximum |
| Temperature Range | 1-35°C (34-95°F) |
| Inlet Flow Requirements | 100 lph (26.4 gph) |
| pH | 3-10 |
| TDS | 800 (Max. ppm as CaCO ₃) |
| Silt Density Index | <5% |
| Free Chlorine | <3 ppm |
| Langlier Saturation Index | <1 |
| Iron (Total as Fe) | <0.5 ppm |
| Silica | <30 ppm |

Product Water

Product Water

| <u>Model</u> | <u>Flow Rate²</u> | <u>Recovery²</u> |
|--------------|------------------------------|-----------------------------|
| D12651 | 12 lph ±15% (3.2 gph) | 20-30% |
| D12661 | 24 lph ±15% (6.3 gph) | 10-20% |

Membrane Performance ² ¹Feed water suitability must be determined by a water analysis.

| | <u>Rejection</u> | |
|---------------------|------------------|--|
| Inorganic (minimum) | >90% | ² 500 ppm NaCl feedwater solution @ 25°C (77°F), @ 4.5 bar (65 psig), 10% recovery. Flow rate and recovery will decrease with lower water temperature. Barnstead recommends the use of a hot water mixing valve before the RO system for water cooler than 15°C (59°F). |
| Inorganic (typical) | >95% | |

| | |
|------------------------------|------|
| Particles | >99% |
| Bacteria | >99% |
| Dissolved Organics (>100 MW) | >99% |

Electrical Requirements

The Diamond RO is equipped with a power cord to be plugged into an electrical outlet of the appropriate voltage. Voltage and Frequency (Nominal)

| | |
|--------------|--------------------------------|
| Model D12651 | 100-240 VAC, 47-63 Hz, 1 phase |
| Model D12661 | 100-240 VAC, 47-63 Hz, 1 phase |

Environmental Conditions

| | |
|-------------------|---|
| Operating: | 4°C - 49°C; 20% to 80% relative humidity, non-condensing. Installation Category II (over-voltage) in accordance with IEC 664. Pollution Degree 2 in accordance with IEC 664. Altitude limit: 3,500 meters. |
| Storage: | -25°C to 65°C; 10% to 85% relative humidity. |

Declaration of Conformity

Barnstead International hereby declares under its sole responsibility that this product conforms with the technical requirements of the following standards:

| | | |
|----------------|--------------|--|
| EMC: | EN 61000-3-2 | Limits for Harmonic Current Emissions |
| | EN 61000-3-3 | Limits for Voltage Fluctuations and Flicker |
| | EN 61326-1 | Electrical Equipment for Measurement, Control and Laboratory Use ; Part 1: General Requirements |
| Safety: | EN61010-1 | Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory use; Part I: General Requirements |

per the provisions of the Low Voltage Directive 73/23/EEC, as amended by 93/68/EEC.

The authorized representative located within the European Community is:

Electrothermal Engineering, Ltd.
419 Sutton Road
Southend On Sea
Essex SS2 5PH
United Kingdom

Copies of the Declaration of Conformity are available upon request.

Unpackaging and Installation



Caution

Wall composition, condition and construction, as well as fastener type, must be considered when mounting this unit. The mounting surface and fasteners selected must be capable of supporting a minimum of 68 kg (150 lbs.) Inadequate support and/or fasteners may result in damage to mounting surface and/or equipment. If you are unsure of mounting surface composition, condition and construction or correct fasteners, consult your building maintenance group or contractor.



Warning

Do not locate the Dlamond RO directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.

Do not use in the presence of flammable or combustible materials; fire or explosion may result. The device contains components which may ignite such materials.



Note

It is important that the storage reservoir outlet to any Ultrapure system such as the NANOpure® Dlamond™, be at the same level or higher than the inlet of the Ultrapure system.

Unpackaging

1. Remove the unit from its shipping container. Remove all contents carefully. **Ensure the following parts are removed from the packaging materials before discarding.**
 - 1) **Membrane(s) (FL1265X1)**
 - 2) **Prefilter (D502113)**
 - 3) **Carbon Filter (D502115)**
 - 4) **MPS cartridge (D502114)**
 - 5) **Wall bracket (BC1190X12)**
 - 6) **Parts bag with feed, product, and reject water tubes included with fittings.**
 - a. **Feed water assembly - TU1119X7**
 - b. **Product tube - TU550X5**
 - c. **Reject tube - TU1190X12**
 - d. **Elbow fittings - 03033 (3/8" tube x 1/4" NTPM)**
- PMX80 (3/8" tube x 3/8" NPTM)
 - 7) **2 Power cords w/fuses**
CRX70 - European with 0.63 A fuses
CRX72 - North American with 1.6 A fuses
2. Put the Dlamond RO on a bench.

Choosing a Site

The Dlamond RO system features an optional remotable control panel display which allows the system to be mounted almost anywhere within the laboratory using accessory kit AY1265X1. Your Dlamond RO must be located within six feet of an electrical outlet appropriate for your unit, within ten feet of your feed water supply and within six feet of an atmospherically vented drain. If you are using the accessory 30 Liter Storage Reservoir (part number D12681), the reservoir must not be mounted farther than ten feet away from the Dlamond RO.

Use the wall bracket for wall mounted systems as a template to drill mounting holes. (The Dlamond RO does not include screws and fasteners for mounting.) Allow a minimum of 22.9 cm (9") clearance on all sides of the unit for servicing, 7.6 cm (3") on top for top cover removal and 12.1 cm (4.75") in front for opening the door.

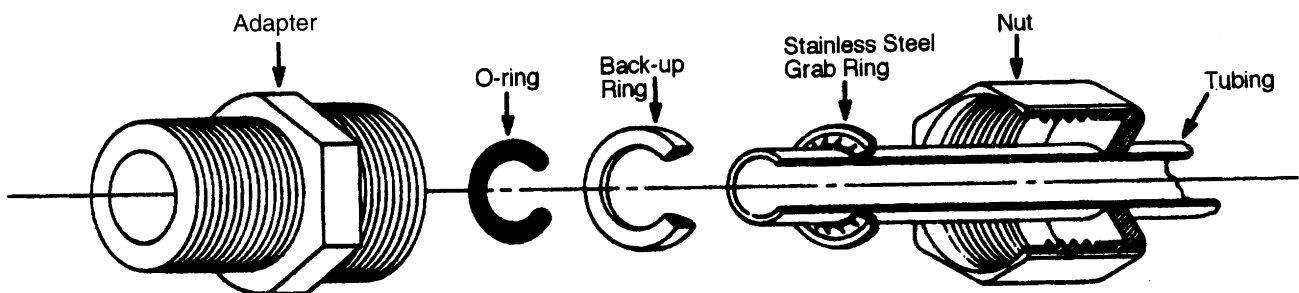
The Diamond RO utilizes two different types of fittings. Please refer to the installation sections when necessary.

Tubing Adapter Installation

These instructions will be needed when making connections at the inlet water supply, atmospheric drain and at a storage reservoir.

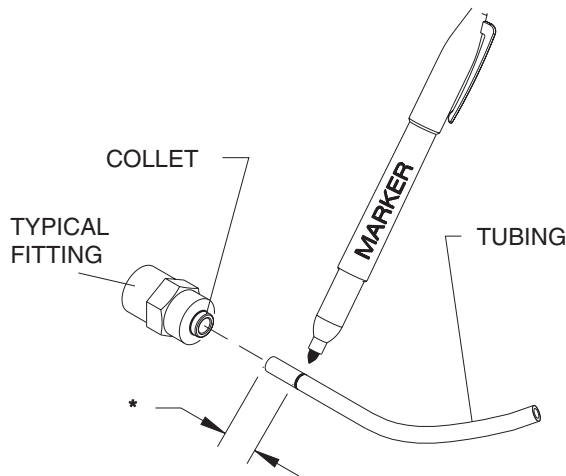
1. Completely disassemble the fitting. Refer to Figure 2 to familiarize yourself with the names of the component parts.
2. Make sure the tubing is cut off reasonably square and that no plastic burrs or ridges are present.
3. Place the grab ring and backup ring in the hex nut in the order and orientation shown in Figure 2. Thread the nut into the adapter. DO NOT use the o-ring at this time.
4. Push the tubing through the nut until it bottoms out on the adapter.
5. Remove the adapter nut and tubing. Place the o-ring over the tubing. Be careful not to push the backup ring or grab ring further back on the tubing when installing the o-ring.
6. Install the hex nut on the adapter and hand tighten.

Figure 2 Tubing Adapter Installation



INSTALLATION

Figure 3 Tubing Installation



Note

For easier insertion, wet the end of the tubing with water.



Note

Figure 3 & 4 will be used at the membrane, as well as connections at product water outlet (to storage) and reject water (atmospheric drain).

PUSH DOWN ON RETAINER TO RELEASE CONNECTOR.

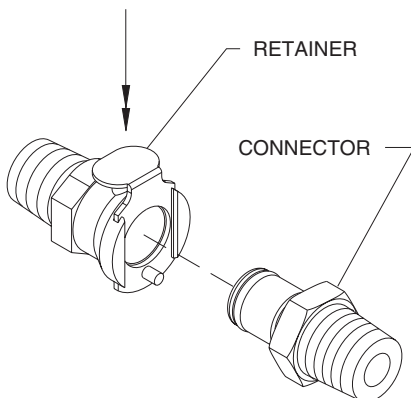


Figure 5 Quick Disconnect

Tubing Installation

The following instructions will apply when you need to install the membranes and to attach a piece of tubing to your Diamond RO during installation, unless otherwise noted in the installation instructions. To make tubing connections:

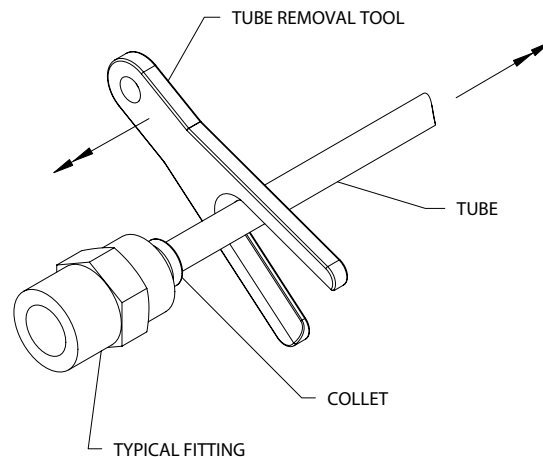
1. Make sure the tubing is cut off reasonably square and that no plastic burrs or ridges are present.
2. Mark from end of tube the length of insertion.

| Tube size | Insertion length |
|-----------|------------------|
| 1/4 O.D. | 1.75 cm (11/16") |
| 3/8 O.D. | 1.9 cm (3/4") |
3. Wet the tube end with water and insert tube straight into fitting until it bottoms out on interior shoulder and insertion mark is no longer visible.

Tubing Removal

1. Using the tool provided, push the collet toward the body and pull on the tubing to release the tube.

Figure 4 Tubing Removal



Quick Disconnect Fittings

These fittings are found on the prefilter, carbon and MPS cartridge, as well as the water inlet. (See Figure 5)

To insert the cartridges or inlet tubing :

1. Press on the metal thumbpad on the unit to ensure the fitting is open.
2. Insert male adapter into fitting until you hear a click. Gently pull on the cartridge or tubing to ensure it is secure.
3. To remove cartridges or tubing, press the metal thumbpad to release fitting and pull adapter out.



Warning

Do not locate the Diamond RO directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.

Do not use in the presence of flammable or combustible materials; fire or explosion may result. The device contains components which may ignite such materials.



Caution

Wall composition, condition and construction, as well as fastener type, must be considered when mounting this unit. The mounting surface and fasteners selected must be capable of supporting a minimum of 68 kg (150 lbs.). Inadequate support and/or fasteners may result in damage to mounting surface and/or equipment. If you are unsure of mounting surface composition, condition and construction or correct fasteners, consult your building maintenance group or contractor.



Note

Prior to installing the Diamond RO on the wall or bench, it is recommended that all cartridges and membranes are installed. See the appropriate section of this manual for installation of cartridges and membranes.

Bench Mounting

1. Place Diamond RO on a bench top that is accessible to water, atmospheric drain and electricity, and that is convenient to your work area, noting clearance requirements.

Wall Mounting

Install the Diamond RO on a wall in a convenient location that is accessible to water, atmospheric drain and electricity.

1. Locate the wall bracket packed separately from the unit.
2. Using the wall bracket as a template, locate and drill the mounting holes in the wall. A minimum of four (customer-supplied) fasteners will be required — two on the top and two on the bottom.
3. Attach the wall bracket to the wall using the customer-supplied fasteners.
4. Remove the locking screws on each side of the wall bracket.
5. Pull the two locking slides on each side of the wall bracket out as far as they will go.
6. Hang the Diamond RO unit on the wall bracket by sliding the mounting pins into the wall bracket slots.
7. Push the locking slides on each side of the wall bracket in as far as they will go.
8. Replace the locking screws.

INSTALLATION

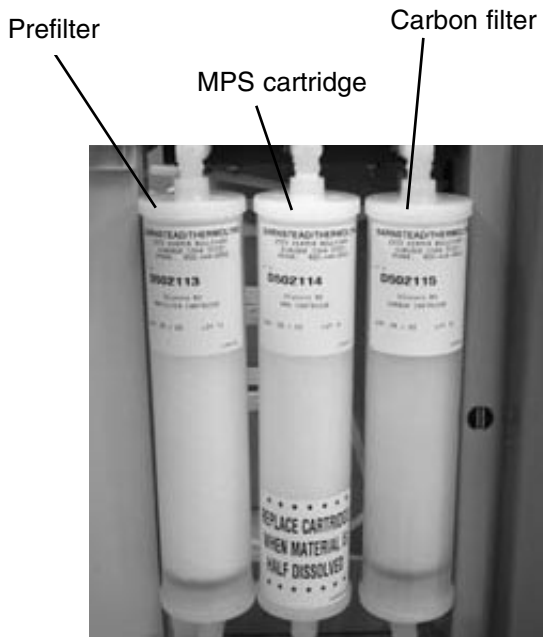


Figure 6 Cartridge Installation



Note

Figure 6 shows the correct sequence of prefilter, MPS and carbon filters. Cartridges must be installed in the correct order to operate properly.



Note

It will be important to replace the MPS cartridge once the material is half dissolved.

Cartridge and Membrane Installation

Your Diamond RO has been shipped with a prefilter, carbon filter, MPS cartridge and one membrane (for 12 lph unit) or two membranes (for 24 lph unit), that you will install. To prepare your Diamond RO for operation, disconnect the unit from the power supply if connected.

Prefilter Installation

Particulates can damage your membranes, resulting in premature membrane failure. Therefore, your Diamond RO uses a prefilter to remove particulates from your feed water. Install the prefilter as follows:

1. Open the front left door.
2. Remove the prefilter (Part Number D502113) from its packaging and wet the o-rings with water.
3. Insert the prefilter straight into the left position upper and lower quick disconnects and push until firmly connected. For easier installation, connect bottom first.

MPS Cartridge Installation

The MPS cartridge contains a slow dissolving anti-scalant material. The anti-scalant material combines with water to prevent scale buildup on the membrane surface.

Install the MPS cartridge as follows:

1. Remove the MPS cartridge (Part Number D502114) from its packaging and wet the o-ring with water.
2. Insert the prefilter straight into the middle position upper and lower quick disconnects and push until firmly connected. For easier installation, connect bottom first.

Figure 7 Single Membrane Installation



Figure 8 Single Membrane Installation

Carbon Filter Installation

Chlorine can also damage your membranes, resulting in premature membrane failure. Therefore, your Diamond RO uses an extruded carbon filter to remove chlorine from your feed water.

Install the carbon filter as follows:

1. Remove the carbon filter (Part Number D502115) from its packaging and wet the o-rings with water.
2. Insert the carbon filter straight into the right position upper and lower quick disconnect and push until firmly connected. For easier installation, connect bottom first.

Membrane Installation

12 LITER PER HOUR UNITS (1 MEMBRANE)

1. Remove the RO membrane from its packaging. Note the location of the FEED, PRODUCT, and REJECT connections on the housing. The correct orientation for the installed membrane will be vertical with the FEED connection down.
2. Open the left side door on the Diamond RO.
3. Locate the three unconnected tubes labeled FEED, PRODUCT, and REJECT. Refer to tubing installation and mark tubing 1.75 cm (11/16") from end.
4. Note the orientation of the membrane housing and install the unconnected tubes into the corresponding connectors on the membrane housing. To do so, first wet the tube end with water and push the tube end firmly into the connector. Start with the FEED followed by the PRODUCT and finally the REJECT.
5. Note the orientation of the membrane housing and press the housing into the two holding clips.
6. The door can remain open until the unit has been operating and you checked for possible water leaks at the membrane connections.



Figure 9 Membrane Housing Label

INSTALLATION

Figure 10 Double Membrane Installation



24 LITER PER HOUR UNITS (2 MEMBRANES)

1. Remove the RO membranes from their packaging. Note the location of the FEED, PRODUCT, and REJECT connections on the housing. The correct orientation for the installed membrane will be vertical with the FEED connection down.
2. Open the left side door on the Diamond RO.
3. Locate the six unconnected tubes labeled FEED1, FEED2, PRODUCT, PRODUCT, REJECT1 and REJECT2. Refer to tubing installation and mark the tubing 1.75 cm (11/16") from end.
4. Note the orientation of the membrane housing and install the unconnected tubes into the corresponding connectors on the membrane housing. To do so first wet the tube end with water and push the tube end firmly into the connector. Start with the FEED2 followed by one of the PRODUCT and finally the REJECT2. Note the orientation of the membrane housing and press the housing into the left set of holding clips. Repeat the procedure for the second membrane with FEED1 followed by the remaining PRODUCT and REJECT1. Note the orientation of the membrane housing and press the housing into the right set of holding clips.
5. The door can remain open until the unit has been operating and you checked for possible water leaks at the membrane connections.

Figure 12 Double Membrane Installation

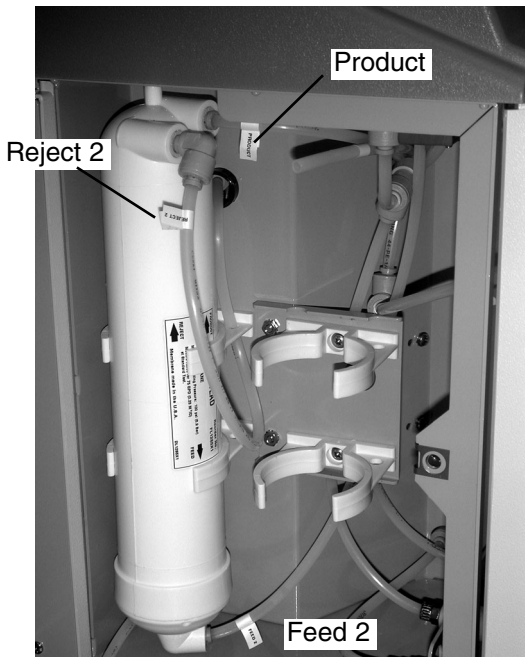


Figure 11 Double Membrane Installation

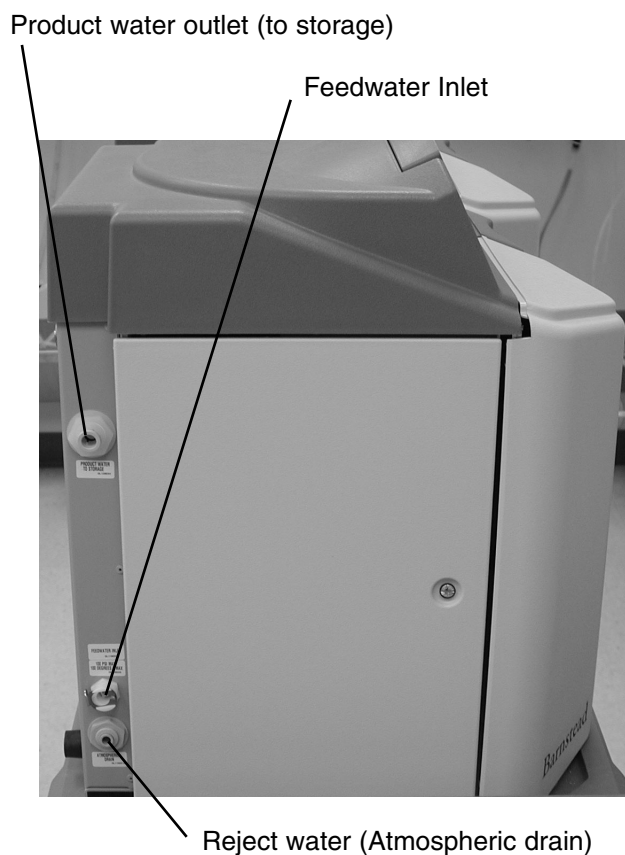


Figure 13 Water Connections



Note

Do not connect the product water tubing to a storage reservoir until the start-up membrane flush procedure has been performed on the Diamond RO.

Water Connections

Feed Water Connection

1. Locate the length of .95 cm (3/8") O.D. tubing provided with a quick disconnect insert on one end and a .95 cm (3/8") O.D. X .64 cm (1/4") NPT tubing adapter on the other.
2. Install the tubing adapter onto your incoming water line. Refer to tubing installation. We recommend a customer supplied shut off valve be installed in your feed water line. The quick disconnect insert will be inserted into the feed water inlet on the lower left side of the Diamond RO during the Initial Operation.

Reject Water Connection

1. Locate the reject water tubing. This is the piece of .64 cm (1/4") O.D. tubing that has a .64 cm (1/4") O.D. x .64 cm (1/4") NPT tubing adapter attached to one end.
2. Install the tubing adapter into your atmospheric drain and route the other end to the Diamond RO atmospheric drain connector. Mark the tubing per tube installation. Wet the tube end with water and firmly push to install into connector.

Product Water Connection

1. Locate the .95 cm (3/8") O.D. tubing without connectors attached, mark the tubing per tube installation, wet the tube end with water and install into the product water to storage connector firmly. Then route the other end of the tubing to drain. Temporary until membrane flush is completed.

Controls



Note

When using reservoirs other than Model D12681, the “low” reservoir LED will never illuminate.

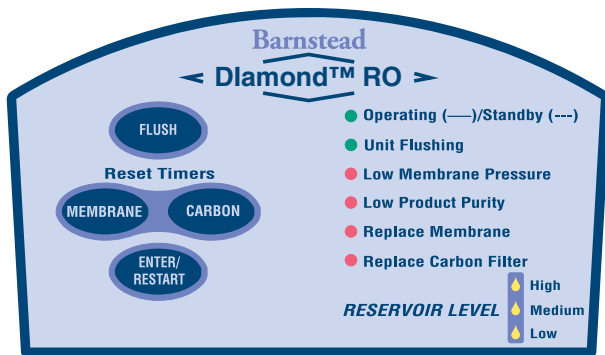


Figure 14 Control Panel

Main Power Switch

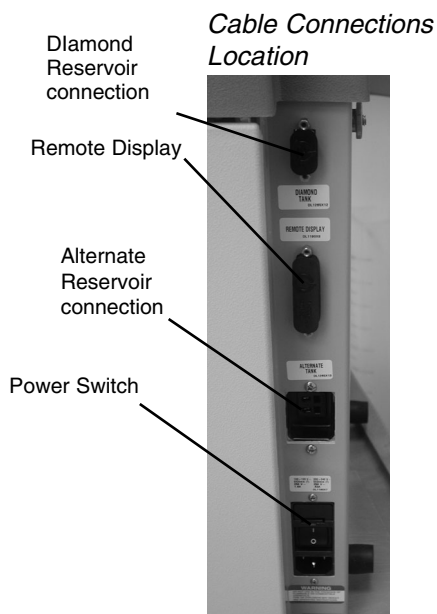
The main power switch on the Diamond RO is located on the lower right side of the unit (as you face the front of the unit). This switch should be turned off when any maintenance is to be done on the unit.

Control Panel

The Diamond RO is controlled through a re-locatable panel that incorporates four switches to control various functions: ENTER/RESTART, FLUSH, MEMBRANE timer reset and CARBON timer reset.

9 LEDs illuminate to provide system operational status as follows:

- Operating/Standby: Solid on if the system is running. Slow blink if the system is in Standby.
- Unit Flushing: Solid on indicates the system is currently flushing.
- Low Membrane Pressure: Solid on indicates the pressure against the RO membrane(s) is lower than expected. Slow blink if low pressure has exceeded 15 minutes of continuous operation.
- Low Product Purity: Solid on indicates the % rejection between incoming water and product water is lower than expected. Factory set at 75% rejection.
- Replace Membrane: Solid on when the operational time of the membrane(s) have been in use for over 12 months.
- Replace Carbon Filter: Solid on when the operational time for the filter has exceeded its useful life.
- 3 Reservoir LEDs: Provides an indication of the level of product water in the storage reservoir.



Note

The black protective cover on the remote display connector should remain in place when the display is not remotely located.



Power Switch: | = ON
O = OFF

Switches

When the main power switch (on the lower right side of the unit) is on, the 4 switches on the control panel function as follows.

FLUSH (followed by ENTER/RESTART) places the unit into a 4-minute flush.

MEMBRANE (followed by ENTER/RESTART) resets the membrane operational timer to zero.

CARBON (followed by ENTER/RESTART) resets the carbon operational timer to zero.

ENTER/RESTART is used to select an operation, or restart the unit if it is in standby mode and reservoir high LED is not illuminated. This key is also used to restart the unit if it has shut down due to an extended low membrane pressure condition.

Electrical/Reservoir Connections

DIAMOND RESERVOIR CONNECTION

Utilized with 30 liter reservoir - D12681

REMOTE DISPLAY

Utilized when control panel is installed in a remote location.

ALTERNATE RESERVOIR CONNECTION

Black jumper plug must remain in place unless either a 60 liter, 100 liter or other Barnstead reservoir is being installed.

CONTROLS



Note

The removable control panel was not designed to be repeatedly removed from the unit, therefore, you may experience difficulty when attempting to remove it. It is recommended that the control panel be permanently mounted in a remote location or remain intact with the unit.



Caution

Repeated removal and replacement of the control panel from the top cover may eventually cause it to become damaged.



Note

The black protective cover on the remote display connector should remain in place when the display is not remotely located.

Figure 15

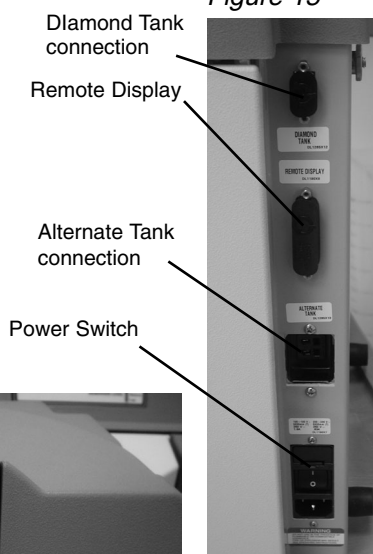


Figure 16 Blank Panel



Figure 17



Wall Mount Bracket

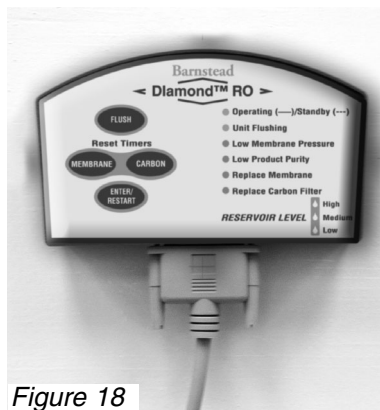


Figure 18

Installing the Control Panel in a Remote Location (with accessory kit AY1265X1)

For your convenience, the control panel can be removed from the unit and mounted at a location within 3.1 m (10 ft.) of the unit. To remove the control panel from the unit:

1. Turn the unit OFF and disconnect it from the power supply.
2. Slide the control panel upward about .64 cm (1/4") to .95 cm (3/8") - just enough to clear connector on top cover, pull forward, and remove. (The control panel fits tightly in the unit so it may be difficult to remove. It may be necessary to use a flat head screwdriver and gently pry up.)
3. Replace the control panel with the blank panel provided with the accessory kit to protect the electrical connector.
4. After selecting a convenient location, use the wall bracket as a template, locate and drill the mounting holes in the wall. A minimum of two (customer-supplied) fasteners will be required. Attach the wall bracket to the wall using the customer-supplied fasteners.
5. Locate the 25-pin connector on the right side of the unit. Remove the protective black plastic cover and store it for future use if the control panel is returned to the top cover.
6. Locate the 3.1 m (10 ft.) 25 pin M-F cable provided with the accessory kit; attach the female end to the 25 pin connector on the back top right of the unit, and the other end to the connector on the bottom of the control panel.
7. Tighten the cable screws on each end to secure the cable to the unit and control panel.
8. The control panel may now be mounted on the wall bracket installed in step 4.

Initial Operation

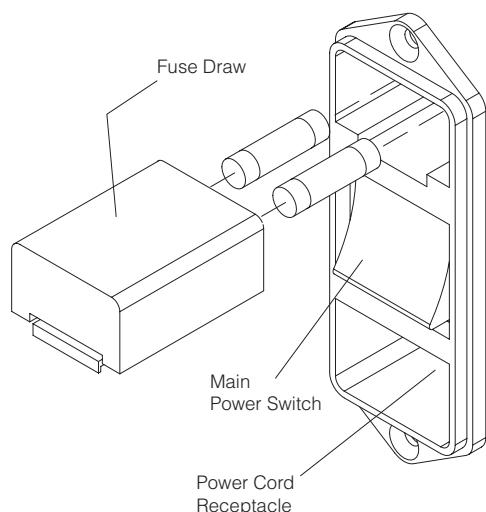


Figure 19 Electrical Connection

Electrical Connection

The Diamond RO comes with two power cords. Each power cord is supplied with a set (2) of fuses (attached to each cord). Choose the cord that applies to you.

The Diamond RO is not shipped with fuses installed in the fuse draw of the power entry module. Before connecting the power cord to the power entry module, select the appropriate cord with fuses and install the proper fuses in the fuse draw. Refer to the Figure 19 on the left. Check to be sure main power switch is in the off position and install the power cord into the power entry module and into a properly grounded electrical outlet.

Initial Operation

1. During initial operation, be sure Product Water Storage tubing is temporarily routed to drain for proper rinsing of RO membrane.
2. Connect water supply to unit by inserting the quick disconnect into the feed water inlet on the lower left side of the Diamond RO (see Figure 13.) Turn on main water supply. Turn the system power on by depressing the Main Power Switch to the “I” position. The 9 LEDs will sequentially flash, testing the LEDs to make sure they are not burned out.
3. The Operating/Standby, replace membrane and replace carbon filter LEDs will turn solid on. The first 30 seconds the inlet and flush solenoid valves open and water moves through the system. The next 30 seconds the pump also operates. After the first minute the flush valve will close and the unit will operate normally and produce product water.
4. Reset the membrane and carbon timers. (See page 23.)
5. Membrane Rinse- Allow the unit to operate and send water to drain for a minimum of two hours. This will rinse the membrane(s) of its preservatives. It is possible that during this time the “Low Product Purity” LED may illuminate.
6. It is recommended that prior to connecting product water tubing to storage reservoir, the flowrate be measured and recorded in the operating log (see page 33) along with the other operation data.
7. After the membrane rinse the unit can be shut down and the product water tubing can be connected to the storage reservoir. Two elbow adapters are provided to allow the Diamond RO to be connected to various reservoirs. Refer to the storage reservoir manual.
8. Connect float cable, check for leaks, etc.



Warning

This device is to be used with potable water feeds only.

Use a properly grounded electrical outlet of correct voltage and current handling capacity.

Discard the RO membrane(s) product water for at least two hours during the initial operation. The membrane(s) contains a preservative solution to prevent microbiological growth.

Normal Operation

Normal Unit Operation

Below is a brief description of the normal automatic operation of the Diamond RO. If the unit does not operate as described below, refer to the troubleshooting guide.

When you activate the main power switch, the following events will occur:

1. All LEDs will sequentially flash, to indicate that they work.
2. After approximately 5 seconds, the solenoid valves are energized. The inlet valve opens, supplying the Diamond RO with water. The flush valve also opens, diverting the water to drain.
3. After approximately 30 seconds, the pump energizes. The majority of the water produced goes to drain.
4. After 30 seconds, the flush solenoid valve closes and the Diamond RO begins making product water and sending it to the storage reservoir.
5. The microprocessor tracks operating time and at a pre-selected interval illuminates the “replace carbon filter” light, signifying that the carbon filter should be replaced.
6. When the reservoir is full and the Diamond RO is in standby mode, a clock is activated, which energizes the Diamond RO for 4 minutes every 3 hours and 56 minutes. This ensures that water will not stagnate on the membrane surface. The majority of the water produced during this 4 minute cycle will divert to the drain.



Note

The Diamond RO flushes automatically in standby for 4 minutes, after 3 hours and 56 minutes in standby (reservoir full). This prevents stagnant water from damaging the membrane. A flush can also be initiated manually.

Flushing the Membrane *Manual 4 Minute Flush*

1. Press the “FLUSH” button on the control panel.
2. The “Unit Flushing” LED light will begin blinking.
3. Press the “ENTER/RESTART” button while the “Unit Flushing” LED light is blinking.

4. While the unit is flushing, the “UNIT FLUSHING” and “OPERATING/STBY” LED lights will remain lit and membrane pressure will drop.
5. The flush can be terminated at any time by pressing the flush button.



Note

Sustained exposure to high chlorine levels can damage the RO membrane(s). It is highly recommended to replace the carbon filter when indicated by the “Replace Carbon Filter” LED.

Resetting the Carbon Timer

The red “Replace Carbon Filter” light on your control panel illuminates when it is time to replace the carbon filter. This light illuminates after the operation time reaches the chlorine level set point.

1. Press the “CARBON” button on the control panel.
2. Press the “ENTER/RESTART” button while the “Replace Carbon Filter” LED light is blinking to reset the carbon timer.

Resetting the Membrane Timer

The red “Replace Membrane” light on your control panel illuminates when it is time to replace the membrane. The membrane light illuminates after approximately 12 months of use.

1. Press the “MEMBRANE” button on the control panel.
2. The “Replace Membrane” LED light will begin blinking.
3. Press the “ENTER/RESTART” button while the “Replace Membrane” LED light is blinking to reset the membrane timer.

Pressure Gauges

There are 4 pressure gauges on the Diamond RO. The functions of the gauges are to provide you the necessary information, to monitor system performance as well as when certain maintenance procedures should be accomplished. The pressure gauges are located in the inside of the right front door. The 4 gauge functions are as follows:

1. **Prefilter Inlet**—Provides you with incoming water pressure and is used in conjunction with the prefilter outlet gauge to determine when it is time to change the prefilter.

NORMAL OPERATION

2. **Prefilter Outlet**—Provides the pressure reading of the water exiting the prefilter. If there is a 5 psig pressure differential between this reading and the prefilter inlet reading, or if there are visible particulates in the second position, MPS filter, the prefilter should be replaced.
3. **Carbon Outlet**—Provides the pressure reading of the water exiting the carbon cartridge. If there is a 10 psig pressure differential between this reading and the prefilter outlet reading, the carbon filter should be replaced. The carbon filter should also be replaced when the “Replace Carbon Filter” LED illuminates.
4. **Membrane Pressure**—Provides a reading of the membrane pressure. The gauge should read 55 psig, +/- 5 psig, during normal operation.



Note

The Diamond RO is designed to be energized at all times. Do not turn off the Diamond RO during non-work hours. Doing so will allow bacterial growth and may damage the RO membrane(s).

Standby Mode

When the water level reaches the top float of the Diamond Storage Reservoir or other reservoirs with properly configured float switches, the Diamond RO unit goes into standby. The display's green “Operating/Standby” LED light will blink when the storage reservoir is full, indicating the unit is in standby. If the unit is idle for 3 hours 56 minutes during the “Standby Mode,” the unit automatically performs a 4-minute membrane flush. The display's green “Unit Flushing” LED light will be lit during this time. When the water level falls below the middle float in the 30 liter storage reservoir or lower float in the 100 liter reservoir or other auxiliary reservoir, the Diamond RO resumes normal automatic operation. Pressing the ENTER/RESTART button when the unit is in Standby and the Reservoir High LED is not lit will cause the unit to enter operating mode.

Low Pressure

The display's red “Low Membrane Pressure” LED lights when the system pressure against the membrane(s) is low. After 15 minutes, if the pressure is still low the inlet solenoid and pump will turn off and the red “Low Membrane Pressure” LED will blink. You then need to check your inlet water line. See troubleshooting section of this manual. Pressing “Enter/Start” will reset the timer and restart the unit for an additional 15 minutes - providing time to check pressure gauges, etc.

Maintenance



Warning

Disconnect from the power supply prior to maintenance and servicing.

Refer servicing to qualified personnel.



Warning

To avoid electrical shock, always:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Do not locate the Diamond RO over equipment that requires electrical service. Routing maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.
3. Replace fuses with those of the same type and rating.
4. Disconnect from power supply prior to maintenance and servicing.



Warning

Discard the RO membrane(s) product water for at least two hours during the initial operation. The membrane(s) contains a preservative solution to prevent microbiological growth.

General Cleaning Instructions

Wipe exterior surfaces with lightly dampened cloth containing mild soap solution.

Main Fuse Replacement

1. Turn off the Diamond RO and disconnect it from the power supply by removing the power cord directly below the I/O switch. Locate the fuse drawer above the power cord receptacle.
2. Pull out the fuse drawer located in the power entry module.
3. Remove old fuses and replace with fuses of the same type and rating. (See Parts Listing.)
4. Replace fuse drawer.
5. Reattach the power cord and reconnect the unit to the power supply.
6. Operate normally.

Membrane Replacement

A variety of factors will determine the service life of the Diamond RO membrane(s). With proper maintenance and monitoring the membrane should last a minimum of 1 year. To replace the membrane, ensure that the power and water are disconnected from the unit. Have a container ready as the membrane will have water inside.

1. It may be helpful to completely replace the membranes one at a time.
Ensure that you note which tubing is used for the front membrane and rear membrane if you are replacing two membranes. Remove the old membrane(s) by disconnecting the reject and product tubing from the top of the membrane and the feed water connection from the bottom. See page 12 for tubing removal instructions.
2. Install the new membrane(s) by following the “Membrane Installation” section of this manual.

3. Disconnect the product to storage tubing at the reservoir and route to drain.
4. Membrane Rinse-
Restart unit and allow it to operate and send water to drain for a minimum of two hours. This will rinse the membrane(s) of its preservatives. It is possible that during this time the “Low Product Purity” LED may illuminate.
5. It is recommended that prior to connecting product water tubing to the storage reservoir, the flowrate be measured and recorded in the operating log.
6. After the membrane rinse the unit can be shut down and the product water tubing can be connected to the storage reservoir, connect float cable, check for leaks, etc.
7. Reset the membrane timer by following the “Resetting the Membrane Timer” section of this manual.

Prefilter Replacement

The prefilter incorporated in your Dlamond RO is designed to remove particles from your incoming water source. It is impossible to predict expected life. It is recommended that the prefilter be replaced when the pressure differential across the prefilter reaches 5 psig or if there are visible particles in the second position MPS cartridge. The pressure is displayed on the pressure gauges located on the inside of the Dlamond RO right front door. The differential represents the difference between the prefilter inlet and the prefilter outlet. To replace the prefilter, ensure that all power and water are disconnected from the unit.

1. Remove the prefilter by first pressing the upper and lower thumb buttons on the quick disconnects.
2. Remove the prefilter by pulling the cartridge straight out.
3. Replace the prefilter by following the instructions located in the “Prefilter Installation” section of this manual.

MPS Replacement

The MPS cartridge incorporated in your Diamond RO is designed to prevent scale buildup on the membrane(s). This cartridge must be replaced when the anti-scalant level is approximately half dissolved. At this point, the quantity of anti-scalant entering the water is insufficient to effectively prevent scale accumulation on the membrane(s). To replace the MPS cartridge, ensure that all power and water are disconnected from the unit.

1. Remove the MPS cartridge by pressing the upper and lower thumb buttons on the quick disconnect fittings.
2. Remove the MPS cartridge by pulling the cartridge straight out.
3. Replace the MPS cartridge by following the instructions located in the “MPS Cartridge Installation” section of this manual.

Carbon Replacement

The carbon filter incorporated in your Diamond RO provides a combination of filtration and chlorine removal. There is a timer built into the Diamond RO which will alert you when the carbon requires replacement. When the “Replace Carbon Filter” light illuminates the carbon filter must be replaced. To replace the carbon filter, ensure that all power and water are disconnected from the unit.

1. Remove the carbon filter by first pressing the upper and lower thumb buttons on the quick disconnect.
2. Remove the carbon filter by pulling the cartridge straight out.
3. Replace the carbon filter by following the instructions located in the “Carbon Filter Installation” section of this manual.
4. Reset the carbon timer by following the “Resetting the Carbon Timer” section of this manual.

Shutdown

If the Diamond RO is to be shut down for an extended period of time, the unit should be completely drained and the cartridges and membrane(s) removed to prevent the growth of bacteria.

Troubleshooting Guide

| Problem/Symptom | Possible Causes | Solutions |
|--|--|--|
| Diamond RO completely inactive (controls not operating and no LEDs illuminated). | <ul style="list-style-type: none"> • No electrical power to Diamond RO • Blown Power Entry Fuses • Display not connected or remote display cable is loose. • Power Supply fuse blown | <ul style="list-style-type: none"> • Ensure Diamond RO powercord is installed and connected to live power • Check/replace fuses. (Refer to fuse replacement for procedure.) • Check display connection • Replace fuse AZ9027 |
| <p>No quantity of water flowing and “Low Membrane Pressure” red LED illuminated solid or blinking.</p> <p>(Note: If LED blinking, pressing “ENTER/RESTART” will restart system long enough to troubleshoot and check cartridges and gauges.)</p> | <ul style="list-style-type: none"> • Feedwater supply valve closed • Quick disconnect for feedwater not inserted fully • Prefilter or carbon filter plugged • Inlet solenoid valve not open • Feed pressure below specification | <ul style="list-style-type: none"> • Open feedwater supply valve • Reinsert quick disconnect on feed water into unit. • Replace prefilter or carbon filter • Replace inlet solenoid (RY1265X2) • Increase feedwater pressure |
| Low quantity of water flowing and “Low Membrane Pressure” red LED illuminated solid. | <ul style="list-style-type: none"> • Prefilter plugged • Carbon filter plugged • Feed pressure below specification | <ul style="list-style-type: none"> • Replace Prefilter • Replace Carbon Filter • Increase feed water pressure |
| Product water is being produced, but no water is exiting out the atmospheric drain connection. | <ul style="list-style-type: none"> • Flush solenoid plugged | <ul style="list-style-type: none"> • Perform system flush (refer to “Flushing the Membrane or Membranes” section) |
| “Membrane Pressure” guage displaying good pressures, but other gauges are showing 0 or less than zero. | <ul style="list-style-type: none"> • Prefilter plugged • Carbon filter plugged | <ul style="list-style-type: none"> • Replace prefilter • Replace carbon filter |
| Decrease in system productivity. | <ul style="list-style-type: none"> • Decrease in feedwater temperature • Membrane(s) fouled • Low feedwater pressure • Low membrane operating pressure (will be accompanied by “Low Membrane Pressure” LED) | <ul style="list-style-type: none"> • If flowrate is unacceptable, install hot/cold water mixing valve (D7427) to elevate temperature. • Replace membrane(s) • Ensure prefilter is not blocked • Increase feedwater pressure • Refer to troubleshooting of “Low or no quantity water flowing” items. |

TROUBLESHOOTING GUIDE

| | | |
|---|--|---|
| <p>A pressure gauge is not displaying or never changes pressure readings. (Other gauges do change and properly display system pressures.)</p> | <ul style="list-style-type: none"> • Gauge is bad | <ul style="list-style-type: none"> • Verify by shutting down system and temporarily exchanging pressure gauge feed tube with an adjacent tube. Restart system: If problem moved with gauge - replace gauge (MEX196). Be sure to change tubing back to original configuration. |
| <p>“Low Product Purity” red LED illuminated solid ON</p> | <ul style="list-style-type: none"> • Improperly installed membrane • Fouled membrane • Faulty PCB (ME1265X1) • Air bubbles on conductivity probe | <ul style="list-style-type: none"> • Ensure membrane(s) is installed properly. • Compare feedwater and product water T.I.S. (total ionized solids) If % rejection is less than 75%, replace membrane(s). • Replace PCB ME1265X1 • Perform system flush |
| <p>“Low Product Purity” red LED illuminating blinking ON.</p> | <ul style="list-style-type: none"> • Faulty PCB (ME1265X1) Circuit Board | <ul style="list-style-type: none"> • Cycle system power • Replace PCB ME1265X1 |
| <p>Unit is not operating and the Control Panel Reservoir LEDs are blinking.</p> | <ul style="list-style-type: none"> • Reservoir tank floats are feeding back conflicting level indications. | <ul style="list-style-type: none"> • Check to ensure reservoir floats are not stuck. • Verify float orientation (not required with Diamond tank float stick assembly.) |
| <p>Leaks at membrane fittings, reject or product water fittings.</p> | <ul style="list-style-type: none"> • Burrs on tubing • Tubing not installed in fitting completely | <ul style="list-style-type: none"> • Remove tubing as shown in tubing removal. Check tubing for burrs. Mark tubing and install per Tubing Installation section. |

Replacement Parts

Consumables

Consumable parts are those required to support the day-to-day operation of this equipment. **Barnstead International** establishes two types of consumables; those items that must periodically be replaced to maintain performance (filters, resin cartridges, etc.) and other items of limited life (indicator lights, fuses, etc.) that you can expect to replace on a more or less random basis. Where practical, **Barnstead International** recommends the frequency of replacement, or provides information on life expectancy from which you may calculate a replacement interval compatible with your usage pattern.

The replacement of consumable parts is discussed in the Maintenance and Servicing section to assist you in accomplishing your own service.

| <u>Description</u> | <u>Catalog No.</u> | <u>Recommended Quantity</u> |
|--|--------------------|-----------------------------|
| Prefilter | D502113 | 6 |
| Carbon Filter | D502115 | 6 |
| MPS Cartridge | D502114 | 3 |
| Mains Fuse, 120V/100V - Slow Blow, 1.6 Amp, 250 Volt | FZX47 | 2 |
| Main Fuse, 230V - Type T Time-Lag, 0.63 Amp, 250 Volt | FZX54 | 2 |

General Maintenance Parts

General maintenance parts are defined as laboratory level repair parts which do not require great expertise or special tools for installation. **Barnstead International** recommends that you stock the general maintenance parts as an aid to ensuring the continued operation of this equipment.

| <u>Description</u> | <u>Catalog No.</u> | <u>Recommended Quantity</u> |
|-----------------------------------|--------------------|-----------------------------|
| Membrane, 12 l/hr | FL1265X1 | 1 |
| Quick Disconnect Inlet | CUX11 | 1 |
| Quick Disconnect Insert 3/8" tube | CUX9 | 1 |

Safety Stock

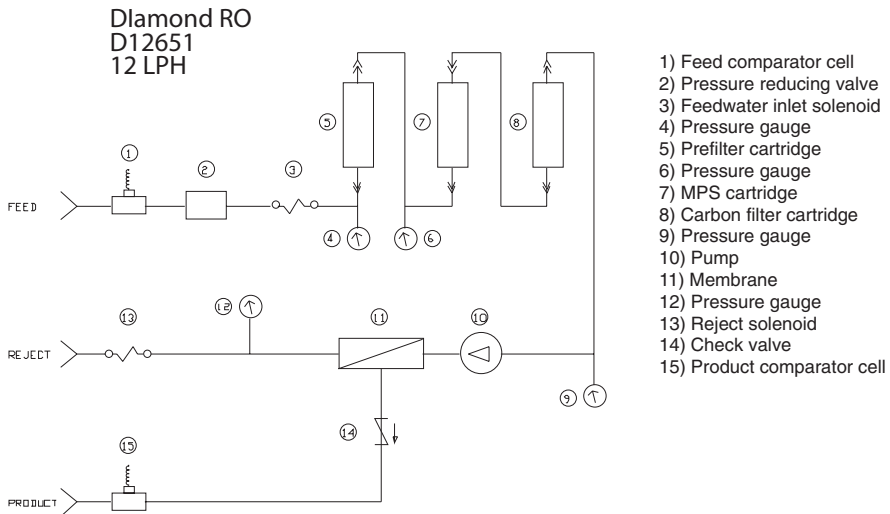
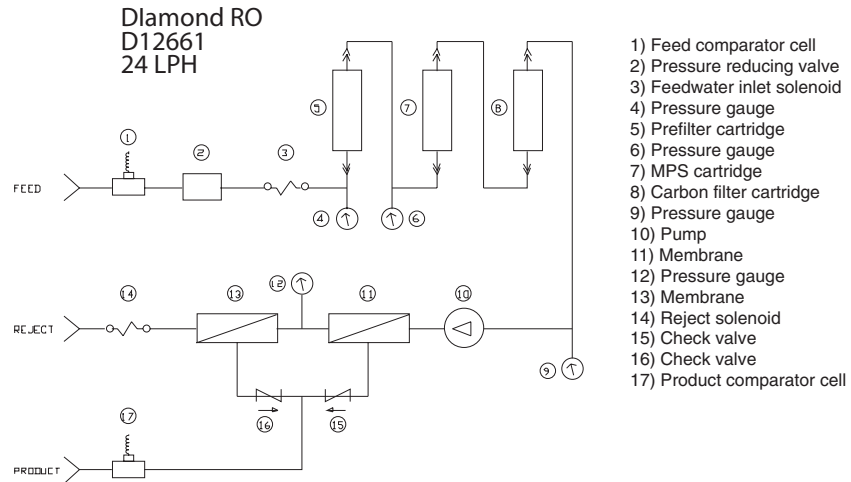
For critical applications where performance with minimum downtime is required, **Barnstead International** recommends that you maintain a local stock of those parts listed in the General Maintenance Parts and Safety Stock sections.

| <u>Description</u> | <u>Catalog No.</u> | <u>Recommended Quantity</u> |
|---|--------------------|-----------------------------|
| Pump | PU1265X1 | 1 |
| Main PC Board | PC1265X1 | 1 |
| Inlet Solenoid Valve | RY1265X2 | 1 |
| Reject Solenoid Valve | RY1265X1 | 1 |
| Pressure Regulating Valve | PM1265X1 | 1 |
| Pressure Gauge | MEX196 | 4 |
| Meter PC Board w/probes | ME1265X1 | 1 |
| Power Supply Fuse, 3.15 Amp, 250V, Type F | AZ9027 | 1 |
| Jumper Plug, Alternate Tank | CE1265X2 | 1 |

Optional Accessory Ordering Information

| <u>Description</u> | <u>Catalog No.</u> |
|---------------------------------------|--------------------|
| 30L Diamond Storage Tank (wall mount) | D12681 |
| Bench Mount Kit for Diamond Tank | AY1268X2 |
| Display Remote Mounting Kit | AY1265X1 |
| Hot/Cold Mixing Valve | D7427 |

Flow Diagrams



Operating Log

To ensure the Diamond RO is working properly, the following operating parameters should be recorded monthly

| | Initial Start-Up | | | | | | | |
|---------------------------|------------------|--|--|--|--|--|--|--|
| Date and Time | | | | | | | | |
| Feed Water Temperature | | | | | | | | |
| Product Water Flowrate | | | | | | | | |
| Reject Water Flowrate | | | | | | | | |
| Pressure Prefilter Inlet | | | | | | | | |
| Pressure Prefilter Outlet | | | | | | | | |
| Pressure Carbon Outlet | | | | | | | | |
| Membrane Pressure | | | | | | | | |

Wiring Diagram

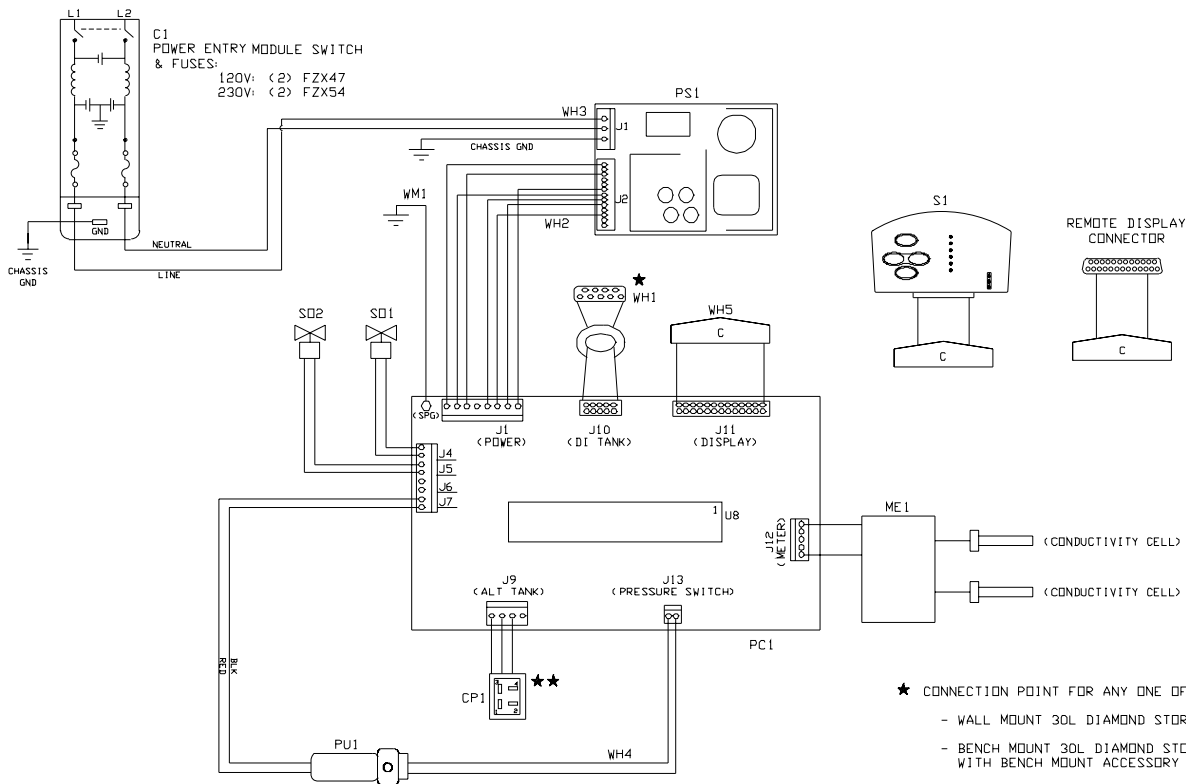


DIAGRAM COMPONENT LIST

| REF. NO. | DESCRIPTION | MODEL NO. AND OUR PART NO. (S) | | |
|----------|------------------------|--------------------------------|----------|----------|
| | | D12651 | D12661 | D12671 |
| C1 | POWER ENTRY MODULE | CEX183 | CEX183 | CEX183 |
| CP1 | ALTERNATE TANK HARNESS | CE1265X1 | CE1265X1 | CE1265X1 |
| ME1 | METER WITH PROBES | ME1265X1 | ME1265X1 | ME1265X1 |
| PC1 | MAIN CONTROL BOARD | PC1265X1 | PC1265X1 | PC1265X1 |
| PU1 | PUMP | PU1190X1 | PU1190X1 | ----- |
| PS1 | POWER SUPPLY | TNX116 | TNX116 | TNX116 |
| S1 | MEMBRANE SWITCH | SWX198 | SWX198 | SWX198 |
| SD1 | FLUSH SOLENOID | RY1265X1 | RY1265X1 | RY1265X1 |
| SD2 | INLET SOLENOID | RY1265X2 | RY1265X2 | RY1265X2 |
| WH1 | DIAMOND TANK HARNESS | WH1190X1 | WH1190X1 | WH1190X1 |
| WH2 | DC POWER HARNESS | WH1190X2 | WH1190X2 | WH1190X2 |
| WH3 | AC POWER HARNESS | WH1190X3 | WH1190X3 | WH1190X3 |
| WH4 | PRESSURE SW. HARNESS | WH1190X5 | WH1190X5 | ----- |
| WH5 | DISPLAY HARNESS | WHX19 | WHX19 | WHX19 |
| WM1 | GROUND WIRE | WM1190X2 | WM1190X2 | WM1190X2 |

Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the **Barnstead International** dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed we ask that you check first with your dealer. If the dealer cannot handle your request, then contact our Customer Service Department at 563-556-2241 or 800-553-0039.

Prior to returning any materials to **Barnstead International**, please contact our Customer Service Department for a "Return Goods Authorization" number (RGA). Material returned without a RGA number will be refused.

One Year Limited Warranty

Barnstead International (“BARNSTEAD”) warrants that if a product manufactured by Barnstead shall be free of defects in materials and workmanship for one (1) year from the first to occur of (i) the date the product is sold by BARNSTEAD or (ii) the date the product is purchased by the original retail customer (the “Commencement Date”). Except as expressly stated above, BARNSTEAD MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS AND EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF DESIGN, MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



An authorized representative of BARNSTEAD must perform all warranty inspections. In the event of a defect covered by BARNSTEAD’s warranty, BARNSTEAD shall, as its sole obligation and exclusive remedy, provide free replacement parts to remedy the defective product. In addition, for products sold by BARNSTEAD within the continental United States or Canada, BARNSTEAD shall provide provide free labor to repair the products with the replacement parts, but only for a period of ninety (90) days from the Commencement Date.

BARNSTEAD’s warranty provided hereunder shall be null and void and without further force or effect if there is any (i) repair made to the product by a party other than BARNSTEAD or its duly authorized service representative, (ii) misuse (including use inconsistent with written operating instructions for the product), mishandling, contamination, overheating, modification or alteration of the product by any customer or third party or (iii) use of replacement parts that are obtained from a party who is not an authorized dealer of BARNSTEAD.

Heating elements, because of their susceptibility to overheating and contamination, must be returned to the BARNSTEAD factory and if, upon inspection, it is concluded that failure is due to factors other than excessive high temperature or contamination, BARNSTEAD will provide warranty replacement. As a condition to the return of any product, or any constituent part thereof, to BARNSTEAD’s factory, it shall be sent prepaid and a prior written authorization from BARNSTEAD assigning a Return Goods Number to the product or part shall be obtained.

IN NO EVENT SHALL BARNSTEAD BE LIABLE TO ANY PARTY FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, OR FOR ANY DAMAGES RESULTING FROM LOSS OF USE OR PROFITS, ANTICIPATED OR OTHERWISE, ARISING OUT OF OR IN CONNECTION WITH THE SALE, USE OR PERFORMANCE OF ANY PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), ANY THEORY OF STRICT LIABILITY OR REGULATORY ACTION.

The name of the authorized Barnstead International dealer nearest you may be obtained by calling 1-800-446-6060 (563-556-2241) or writing to:

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