

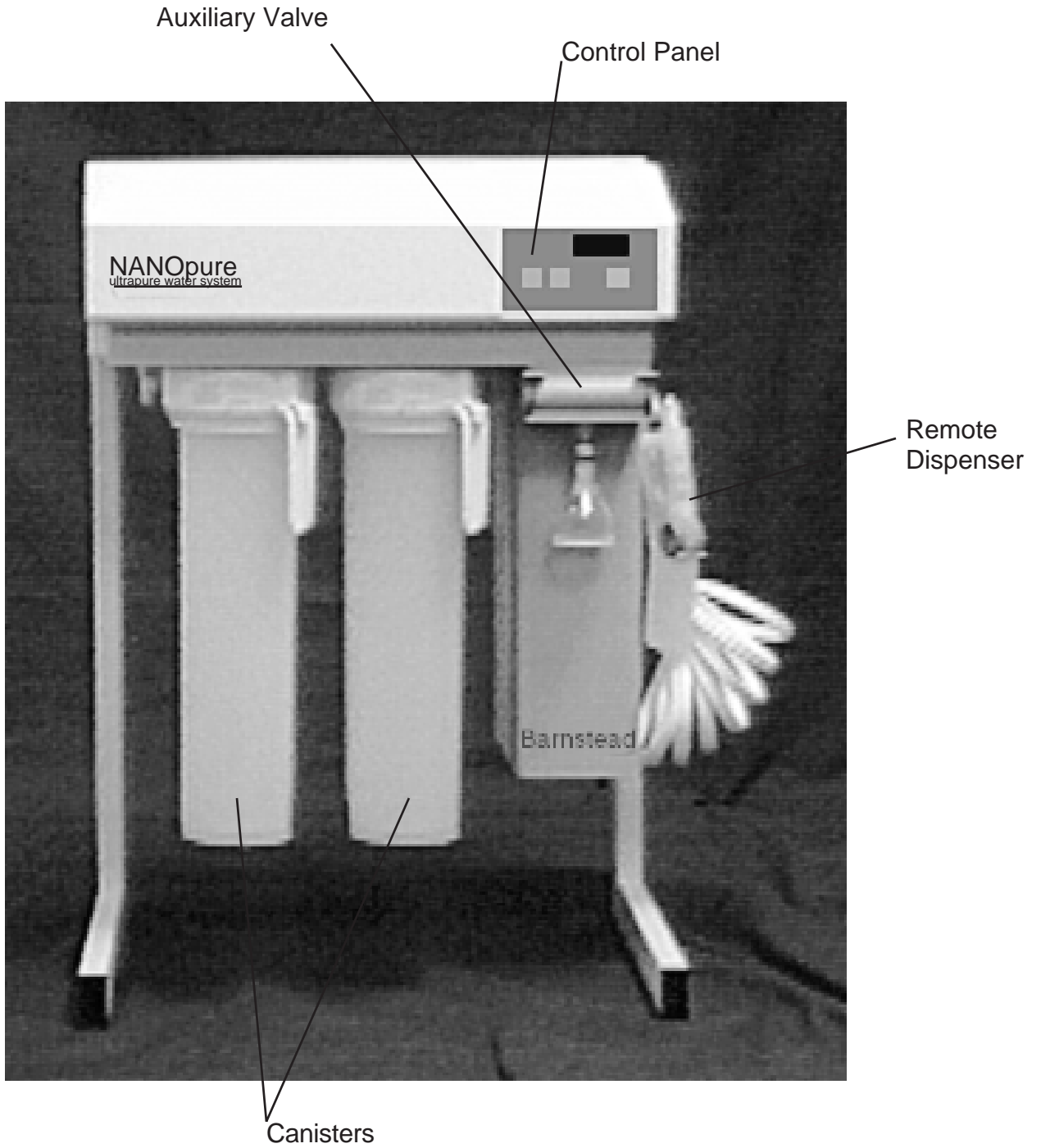
# NANOpure Analytical Deionization System

## OPERATION MANUAL AND PARTS LIST SERIES 851

### ANALYTICAL GRADE SYSTEMS

<b>Model #</b>	<b>Voltage</b>	<b>Mount</b>
D4741	120	Wall
D4742	240	Wall
D4743	100	Wall
D4744	120	Bench
D4745	240	Bench
D4746	100	Bench

This manual contains important operating and safety information. You must carefully read and understand the contents of this manual prior to the use of this equipment.



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# Safety Information

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## 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 NANOpure has been designed with function, reliability and safety in mind. It is your responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert signals throughout the manual.

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## Warnings

To avoid electrical shock, always:

1. Use with a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Do not mount the NANOpure 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 water feeds only. Sanitizing/cleaning agents must be used in compliance with instructions in this manual. Failure to comply with the above could result in explosion and personal injury.

3. Do not mount the NANOpure directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.
4. Replace fuses only with the same type and rating for continued protection against possible fire hazard.
5. Wall composition 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 275 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.
6. Avoid splashing disinfecting solutions on clothing or skin. Ensure all piping connections are tight to avoid chemical leakage. Always depressurize chemical lines before disassembly. Ensure adequate ventilation. Carefully follow manufacturer's safety instructions on labels of chemical containers and material safety data sheets.
7. Depressurize system prior to attempting to remove canisters.
8. Refer servicing to qualified personnel.

# Technical Specifications

## Analytical Grade

### Feed Water Requirements

Types <sup>1</sup>	Tap (Potable), RO, DI, Distilled.
Pressure Range	Gravity feed to 100 psig (7 kg/cm <sup>2</sup> ) maximum.
Temperature Range	4-49°C (40-120°F)

### Product Water

Water Quality <sup>1</sup>	Type I Reagent Grade Water (RGW) per ASTM-D1193, NCCLS ASC-3, and CAP.
Remote Dispenser - Auxiliary Valve -	Type I Reagent Grade Water (RGW) per ASTM-D1193, NCCLS ASC-3, and CAP.
Flow rate (Maximum) <sup>2</sup>	

		Type 1 RGW <sup>3</sup> From Dispenser	Type 1 RGW <sup>3</sup> From Auxiliary Valve
Pressured Feed (40 psig (3 kg/cm <sup>2</sup> ) Inlet Min.)	50 HZ	1.5 LPM	1.3 LPM
	60 Hz	1.6 LPM	1.5 LPM
Gravity Feed (12" (305 mm) Minimum)	50 Hz	1.0 LPM	0.8 LPM
	60 Hz	1.1 LPM	1.0 LPM

### Dimensions

#### Wall mounted models

Width	22"	(559 mm)
Depth	14 1/4"	(362 mm)
Height	29 1/2"	(749 mm)

#### Bench mounted models

Width	22"	(559 mm)
Depth	16 1/4"	(413 mm)
Height	32 1/2"	(826 mm)

### Plumbing Connections

Feed water Inlet	3/8" OD tubing or 1/4" NPTF
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### Electrical Requirements (depending on model supplied)

#### Voltage and Frequency (Nominal)

100 VAC, 50/60 Hz	85-110 VAC, 47-63 Hz, 1 phase
115 VAC, 50/60 Hz	98-127 VAC, 47-63 Hz, 1 phase
230 VAC, 50/60 Hz	196-253 VAC, 47-63 Hz, 1 phase

#### Protection

100 VAC service	3 ampere slow blow fuse
115 VAC service	3 ampere slow blow fuse
230 VAC service	2 ampere slow blow fuse

#### Resistivity Measurement

Range	0.1-18.3 megohm-cm [temperature compensated to 25°C (77°F)]
Accuracy	± 3 % FS
Cell	0.1 constant
Display	Digital

### Notes

- <sup>1</sup> NANOpure will produce Type I water using pretreated water (RO, DI, Distilled) or high quality tap water, provided feedwater suitability is qualified by laboratory analysis and recommended feed flowrate is maintained.
- <sup>2</sup> Flowrates are dependent on operating conditions and filter usage. Flowrates will also depend on filter compaction.
- <sup>3</sup> Typical flowrate with 40 psig inlet and 30 psig outlet pressure at faucet block.

# Installation



## Warning

To avoid personal injury, this device is to be used with water feeds only. Sanitizing/cleaning agents must be used in compliance with instructions in this manual. Failure to comply with the above could result in explosion and personal injury.

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.

It is your responsibility to read and understand the contents of this manual prior to installation and use of this equipment.

This manual contains the information you will need to install, operate, and maintain the NANOpure, Series 851, ultrapure water system manufactured by Barnstead|Thermolyne Corporation.

The NANOpure is designed to produce Type I Reagent Grade Water equal to or exceeding standards established by ASTM, CAP, and NCCLS.

Careful attention to the following instructions will assure that the NANOpure runs properly and produces water to specification.

Illustrated parts lists are found on pages 42-43. Take a few minutes to familiarize yourself with the hardware before installation.

The NANOpure deionization system can be used on pretreated or high quality tap water. Some municipal tap water supplies contain a very high concentration of suspended particulates, colloids, dissolved organic and inorganic materials that should be removed by pretreatment before the water is processed by the NANOpure. If you plan to use tap water feed for your NANOpure, Barnstead encourages the use of our water analysis service to

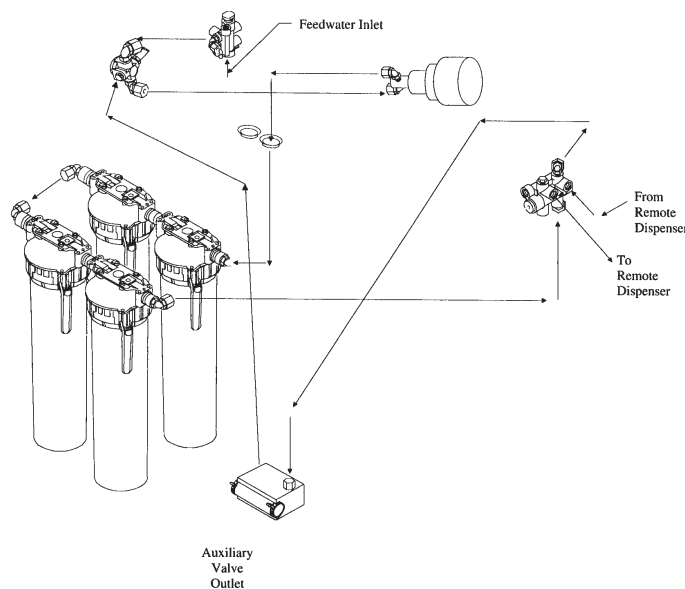


Figure 2 NANOpure water pathway diagram

## INSTALLATION



### Warning

To avoid electrical shock, use with a properly grounded electrical outlet of correct voltage and current handling capacity.

verify feedwater suitability. A sample collection kit may be obtained by contacting our offices or your preferred laboratory supply dealer.

The NANOpure requires expendable pretreatment and deionization cartridges and Final Filters which are not supplied with the unit (except for one Auxiliary Valve 0.2 micron Final Filter) and must be purchased separately. These expendables are available as individual components or in expendables kits (see Table 1 below).

Your NANOpure is supplied with a pre-wired jumper in the "pump interlock" connector. Installation of options D0603 or D0606 (Float Switch) or D2706 (Pressure Switch) require removal of this jumper plug. DO NOT discard this plug; it will be needed for certain maintenance operations.

Your NANOpure Analytical is also supplied with one FL703X2 Auxiliary Valve Final Filter. These filters are not included with the cartridge lists described below. They must be ordered separately.

All models are provided with a power cord and plug to be connected to a standard grounded electrical outlet. Refer to TECHNICAL SPECIFICATIONS and Figure 14, 15 & 16 in this instruction manual for the electrical requirements.

#### D4801 NANOpure 4-Cartridge Expendables Kit

1 each	D0835	Pretreatment Cartridge
1 each	D0803	High Capacity Cartridge
2 each	D5027	Ultrapure SG Cartridge
2 each	D3751	Remote Dispenser Filter

#### D4802 NANOpure 4-Cartridge Expendables Kit with ORGANICfree

1 each	D0836	Pretreatment MACROpure Cartridge
1 each	D0803	High Capacity Cartridge
1 each	D5027	Ultrapure SG Cartridge
1 each	D5021	ORGANICfree Cartridge
2 each	D3751	Remote Dispenser Filter

#### D5025 NANOpure Pretreat Feed 4-Cartridge Expendables Kit

1 each	D0835	Pretreatment Cartridge
1 each	D0809	Ultrapure SG Upflow Cartridge
2 each	D5027	Ultrapure SG Cartridge
2 each	D3751	Remote Dispenser Filter

#### D5026 NANOpure Pretreat Feed 4-Cartridge Expendables Kit with ORGANICfree

1 each	D0836	Pretreatment MACROpure Cartridge
1 each	D0809	Ultrapure SG Upflow Cartridge
1 each	D5027	Ultrapure SG Cartridge
1 each	D5021	ORGANICfree Cartridge
2 each	D3751	Remote Dispenser Filter

Table 1 Expendable Kits





**Caution**

Lifting the NANOpure by cartridge canisters or allowing the NANOpure to sit on the canisters may cause damage.



**Warning**

To avoid electrical shock and personal injury, do not mount the NANOpure directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located.

**Unpacking**

Unpack the NANOpure carefully. Remove all contents carefully. Inspect the packaging for additional materials before discarding. Lift the NANOpure carefully from the box, holding onto either the mounting bracket or bench stand. Lay the unit down on its back. Remove the contents of the accessory box. Locate the canisters and handle rings and set them aside. The remaining contents of the accessory box are the power cord, the Remote Dispenser, tubing with fitting, o-rings, filler panel with bracket, 10 ft. interconnect cable and an Auxiliary Valve 0.2 micron Final Filter. **Do not install any of these components until told to do so.**

**Choosing a Site**

The NANOpure system features remote controls and a remote dispenser, allowing system to be mounted almost anywhere within the laboratory. Use the mounting bracket for wall mounted systems

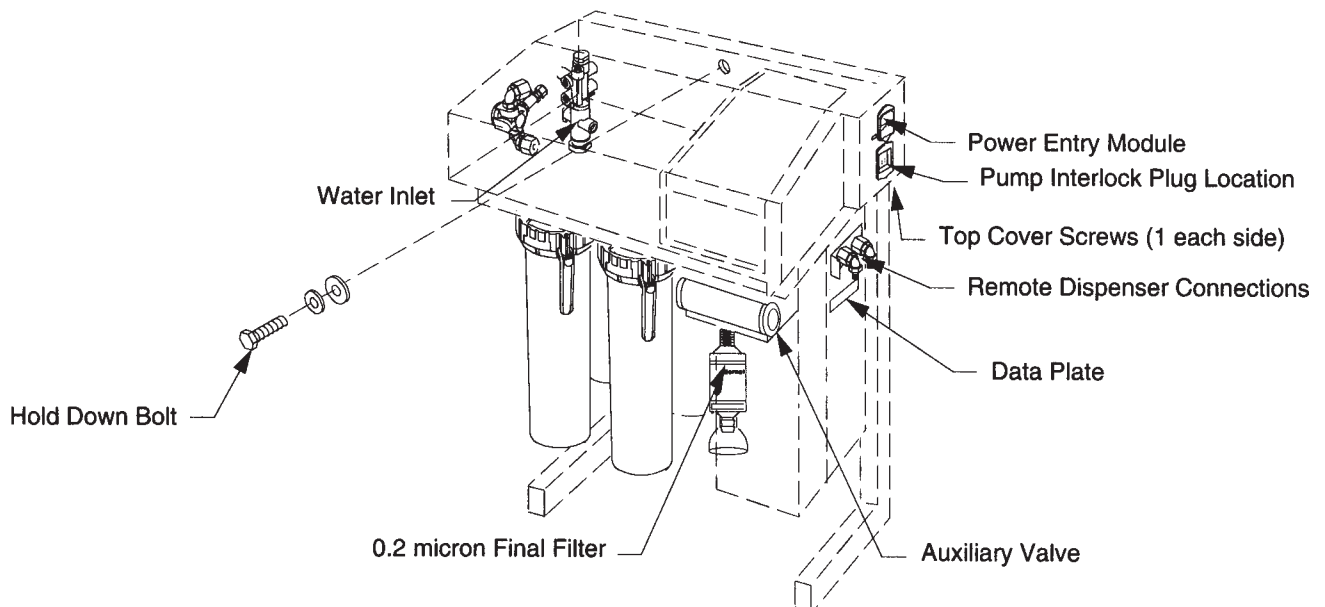


Figure 3 NANOpure Inlet and Outlets



### Caution

Do not connect to electrical service until instructed to do so.



### Note

For bench mounted models, steps 2 through 6 are not required – begin with step 7.



### Warning

To avoid personal injury, 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 275 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.

as a template to drill mounting holes. (The NANOpure does not include screws and fasteners for mounting.) Allow a minimum of 6 inches (150 mm) clearance on all sides of the unit for servicing and 16 inches (410 mm) in front for top cover removal.

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## Mounting and Utility Connections

1. Remove the two screws securing the top cover to the NANOpure. Remove the pump interlock plug (see Figure 3 for location). Slide the top cover off away from the NANOpure. Familiarize yourself with various components and install any optional equipment, i.e. inlet cell, pressure or float switch. See appropriate section for instructions.
2. Remove the hold down bolt securing the NANOpure to the wall bracket. It is located on the center of the back wall inside the NANOpure cabinet. (Figure 3)
3. Disengage the NANOpure from the wall bracket and lay the NANOpure on its back.
4. Remove the packing material from the wall bracket.
5. Use the wall bracket as a template and locate and drill the mounting holes in the mounting surface. A minimum of four fasteners will be required — two on the top and two on the bottom.

**Note**

The Tubing Connector Installation section (on next page) will aid you in completing steps 9-12.

**Note**

To disrupt the flow of water to the NANOpure, press the stainless steel thumb pad. The insert with the valve is easily removed. To resupply the NANOpure water, push the insert into the coupling body and listen for the click that indicates full closure. See Figure 13 for identification.

6. Hang the NANOpure unit on the bracket by sliding the mounting pins into the bracket grooves. Reinstall the hold down bolt.
7. Install the front cover by sliding it forward. Ensure the pins on the cover align with the holes on the forward cabinet section. Install the cover screws and the pump interlock plug removed in step 1. (Figure 3).
8. Remove the Remote Dispenser from packaging.
9. Remove the tubing connector from the ends of the Remote Dispenser tubing. Retain for use as replacement parts. See Figure 4 for identification of the connector components.
10. Remove the tubing nut, grab ring, backup ring and O-ring from the Remote Dispenser connection on the NANOpure. Save as replacement parts.
11. Connect the Remote Dispenser tubing to NANOpure at elbow connections on the NANOpure (Figure 3). It is not important which nut on the dispenser is attached to which connector on the NANOpure.
12. Connect 3/8" OD tubing (supplied with unit) to water service.
13. Locate the quick disconnect valve fitting on the inlet to the NANOpure.
14. Remove the inlet quick disconnect valve insert by pressing the stainless steel thumb pad and removing the valve insert.

## INSTALLATION



### Caution

Do not tighten tube fitting hex nut with a wrench. Tight connections can be easily made by hand.

- 15 Remove the tube nut from the valve insert and slide the nut over the tubing.
16. Wet the tubing with water and slip it over the hose barb. Tighten the nut. **Do not attach to the NANOpure until told to do so.**

## Tubing Connector Installation

1. Completely disassemble the fitting. Refer to Figure 4 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 back-up ring in the hex nut in the order and orientation shown in Figure 4. Thread the nut onto the connector. Do not use the O-ring at this time.
4. Push the tubing through the nut until it bottoms out in the connector.

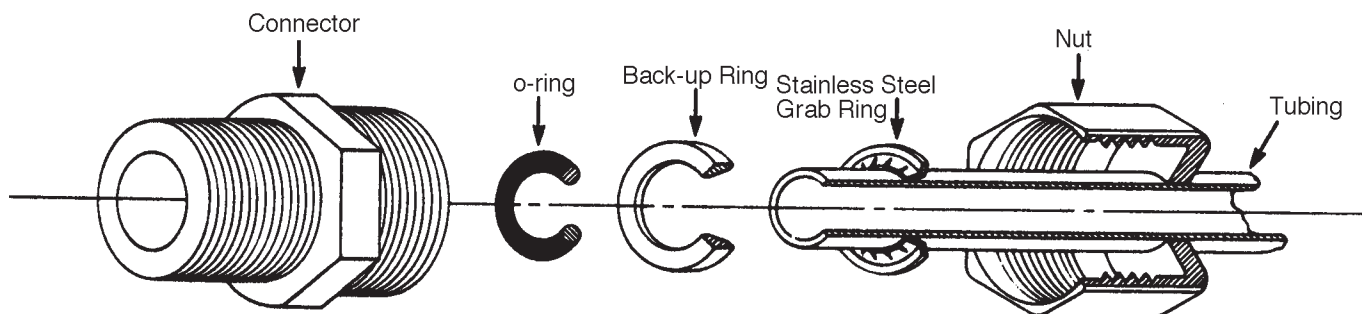


Figure 4 Typical Polypropylene Tubing Connector Installation



**Caution**

Secure locking pin before operating. Pin must be fully engaged before operating.



**Caution**

Ensure O-ring is in place in the groove and wet O-ring prior to securing on the head.



**Note**

An extra set of head-to-canister O-rings are supplied. These can be used to replace any O-rings that may have been damaged or deformed in shipment. Be sure O-ring is in place before replacing canister beyond point where locking pin and pin hole line up.

5. Remove the hex nut and tubing. Place the O-ring over the tubing. Be careful not to push the back-up ring or grab ring further back on the tubing when installing the O-ring.
6. Install the hex nut on the connector and hand tighten.

## Initial Operation

Install and rinse cartridges and filters as follows:

1. Clean the sealing surfaces of the heads and the top of the canisters with a clean, wet cloth. Install the O-rings in the O-ring grooves of the 4 canisters. Wet the O-rings with water and install a D0835 or D0836 Pretreatment Cartridge, with the small opening up, into a canister and install this canister at position 1 (Figure 6). This is done by depressing the thumb lever and rotating the canister handle ring 1/4 turn to the right. Install the remaining canisters empty.

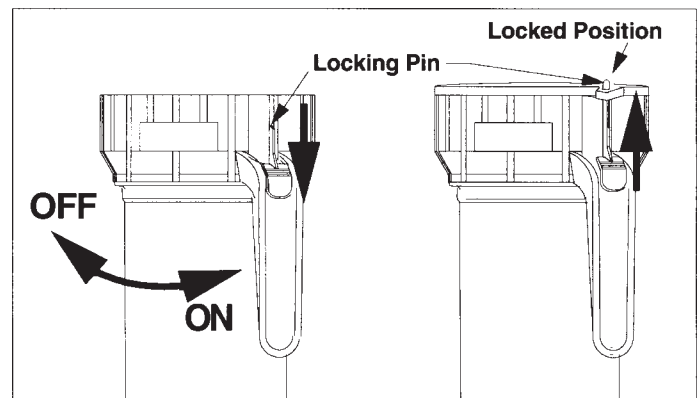


Figure 5 Canister Locking Pin Positioning

## INSTALLATION



### Caution

Do not operate the pump dry – dry running will damage the pump.



### Note

Leave system flush housing in Remote Dispenser until instructed to do otherwise.



### Warning

To avoid personal injury depressurize system prior to attempting to remove canisters.

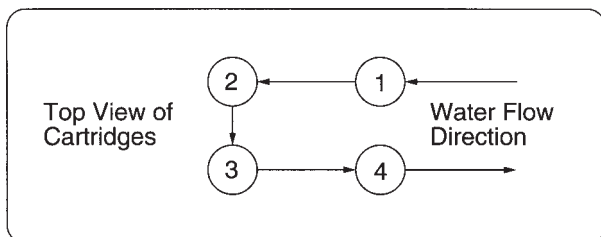


Figure 6 Cartridge Sequence

The locking pin on the canister handle ring must be fully engaged into hole in the head before system is operated (Figure 5 for proper positioning).

2. Install the electrical cord to the power entry module on the right hand portion of the NANOpure (Figure 13 #31). Plug the power cord into a properly grounded outlet of correct voltage and current handling capacity.

3. Ensure that the system flush housing is in the Remote Dispenser. Open customr supplied inlet valve. Push the insert of the inlet quick disconnect including the inlet tubing into the coupling body to supply water to the NANOpure. Turn on power to unit and open the Remote Dispenser valve. Allow water to run to drain for 10 to 15 minutes through the Remote Dispenser.

4. Turn of the system power and disconnect the inlet tubing by depressing the stainless steel thumb pad on the inlet quick disconnect valve and pulling gently.

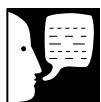
5. With the Remote Dispenser open, also open the Auxiliary Valve to depressurize system prior to attempting to remove canisters.

6. Remove the canisters in positions two, three, and four and pour out the water. Clean as required.

7. Install the remaining cartridges as shown in Figure 6 and Table 2.

**Standard Cartridge Kit  
Catalog Number D4801**

Position	Type	Catalog no.
1.	Pretreatment	D0835
2.	High capacity	D0803
3.	Ultrapure SG	D5027
4.	Ultrapure SG	D5027



**Note**

The correct sequence of cartridges is important in producing the desired quality of water.

**Pretreated Feed Standard Cartridge Kit  
Catalog Number D5025**

Position	Type	Catalog no.
1.	Pretreatment	D0835
2.	Ultrapure SG Upflow	D0809
3.	Ultrapure SG	D5027
4.	Ultrapure SG	D5027

**Cartridge Kit with ORGANICfree  
Catalog Number D4802**

Position	Type	Catalog no.
1.	MACROpure	D0836
2.	High capacity	D0803
3.	Ultrapure SG	D5027
4.	ORGANICfree	D5021

**Pretreated Feed Cartridge Kit with  
ORGANICfree**

**Catalog Number D5026**

Position	Type	Catalog no.
1.	MACROpure	D0836
2.	Ultrapure SG Upflow	D0809
3.	Ultrapure SG	D5027
4.	ORGANICfree	D5021

Table 2 Correct Cartridge Sequence

## INSTALLATION

8. Reconnect the inlet tubing valve insert. Turn on power to unit and run the system to drain through the Remote Dispenser for 10 to 15 minutes.
9. Turn off the system power and disconnect the inlet tubing. Allow the system to depressurize through the Remote Dispenser and by opening the Auxiliary Valve.
10. Remove the system flush housing from the Remote Dispenser by gently pushing the housing in the direction of the grooves in the Remote Dispenser (Figure 7). Ensure that the O-rings remain in place.
11. Install a D3751, 0.2 Micron Final Filter into the Remote Dispenser by sliding the filter into the grooves on side of the Remote Dispenser (Figure 7).
12. Install a new 0.2 Micron Final Filter (FL703X2) by removing the filter from the package and placing it onto the



### Note

Always wet O-rings before 0.2 Micron Final Filter installation.

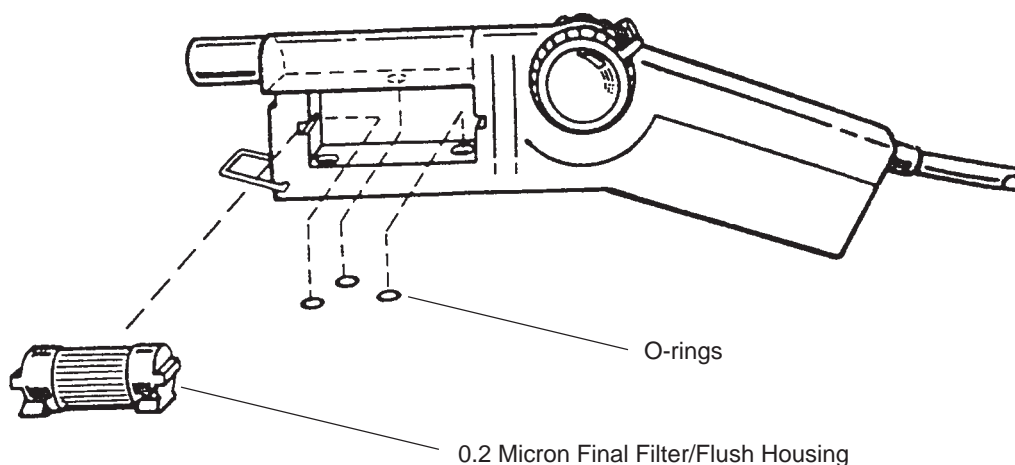


Figure 7 Remote Dispenser Final Filter Installation



Luer connection on the Auxiliary Valve. Gently turn the 0.2 Micron Final Filter clockwise until it is fully seated on the Luer fitting.

13. Resupply the NANOpure with water and turn the power on. Allow approximately 8 liters of water to run to drain through both the Remote Dispenser and the Auxiliary Valve to rinse the D3751 0.2 Micron Final Filter and the FL703X2 Final Filter.
14. Close the Remote Dispenser and the Auxiliary Valve and allow the system to recirculate until the desired purity is achieved. The NANOpure system is now ready for use.

---

# Normal Operation

**For best results and optimum of cartridge life, leave the NANOpure in the standby mode during periods of non-use and over night.** The standby mode is designed to automatically recirculate water through the entire NANOpure system (even the Remote Dispenser) for 10 minutes of each hour of inactivity. When you will not be using the NANOpure for an interval during the day, and at the end of the day, put your NANOpure into Standby mode by pushing "On/Standby/Off" membrane switch on controls until display reads "SbY." Ensure that adequate water supply is available to the NANOpure when the unit is in standby.

When you are ready to use your NANOpure again, press the "On/Standby/Off" membrane switch twice. The display will show the current resistivity of the water. Allow the system to recirculate until the desired purity is achieved, if necessary.

During normal operation, the NANOpure's electronics are set in the resistivity mode. The meter automatically compensates readings to 25°C. If the resistivity falls below the programmed set point (see **Selecting the Set Point**, page 20), the display will flash numerals.

When the NANOpure display reads "Err," it is an indication that there is air in the system or a problem in the resistivity monitoring system. Please refer to the troubleshooting section at the back of this manual for problem identification and solution. On initial startup, the unit will read "ERR" until water has passed through the system and out the Remote Dispenser.

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# Smart Purity Meter

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## Modes of Operation

The NANOpure has three membrane switches which control its functions.

- **Mode**  
Allows you to choose from resistivity, set point, or temperature.
- **Control**  
Allows you to change set point values, check resistivity meter calibration, or monitor the optional inlet cell.
- **On/Standby/Off**  
Allows you to turn unit on, off or operate unit in the standby mode.

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## Turning Unit On or Off

- To turn unit on, press the “On/Standby/Off” membrane switch once. The display will light.

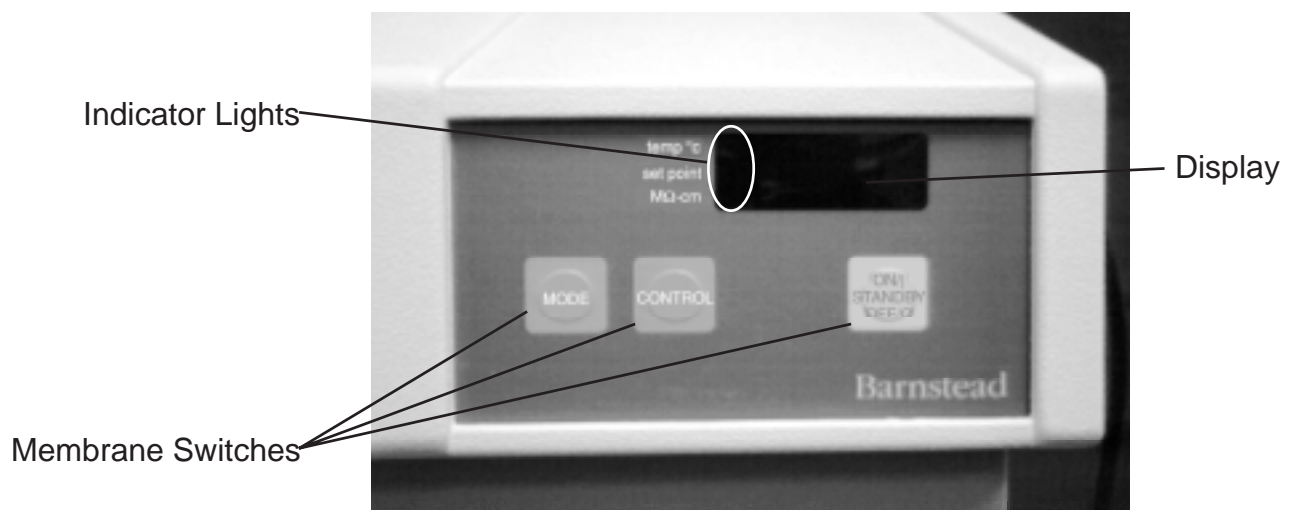


Figure 8 Display Indicators

- To turn unit off, press “On/Standby/Off” membrane switch until the display becomes blank.

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## Selecting the Set Point

The NANOpure electronics include a user programmable set point which alerts you when the water quality falls below the programmed set point. The set point is user selectable from 0.1 megohm-cm to 18.3 megohm-cm. The display will flash numerals when actual resistivity measurement is at or below programmed set point.

1. Push the “Mode” membrane switch until the orange light (Figure 8) is lit alongside the set point indicator. The preset set point in the electronics will appear on the display.
2. To change the set point, press and hold the “Control” membrane switch and then press the “Mode” membrane switch. The set point display will automatically begin to scroll backward. To reverse the scrolling, release the “Control” membrane switch until the desired set point is attained.
3. When the desired set point is reached, release the “Mode” switch. The NANOpure electronics will automatically retain the set point until you re-enter the set point mode and repeat the procedure.

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## Displaying the Temperature

To display the water temperature, simply push the “Mode” switch until the orange light on the left hand side of the display is aligned with the “Temp °C” indicator. The display will now read the water temperature in degrees centigrade.

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## Checking the Calibration

The NANOpure system is equipped with a manual electronics calibration check which allows you to verify meter accuracy.

1. Ensure that the reference/inlet cell toggle switch inside the top housing (Figure 9) is in the reference position.
2. Ensure that the display is in the resistivity mode.
3. Depress and hold the control switch on until a reading is given.

If the electronics are within calibration, the reading will be between 9.0 and 11.0 megohm-cm for resistivity. If the reading is not between these values, call Barnstead|Thermolyne Customer Service for further assistance.

Cell lead	Terminal block position
White	Position 1
Red	Position 2
Black	Position 3

Table 3 Inlet Cell Wire Connections



**Note**

E550X1A includes 1/2" NPS threaded bushing and an o-ring.

## Inlet Cell Installation

The NANOpure system offers as an optional feature the ability to monitor the resistivity and temperature of the NANOpure inlet water. To install the inlet cell:

1. Disconnect the inlet tubing and disconnect electrical service to unit. Open the Remote Dispenser to depressurize the unit.
2. Remove the top cover.
3. Remove the plug from the top of the inlet cell well (Figure 9). Install the cell (part no. E550X1A) into the NANOpure inlet cell well.
4. Thread all lead wires through the NANOpure system as shown in Figure 9.
5. Connect leads to the terminal (Figure 9) according to wiring scheme shown in Table 3.
6. Ensure that the reference/inlet cell toggle switch is in the inlet cell position.
7. Reconnect the inlet tubing and check for leaks.
8. Reinstall the top cover and the power cord.

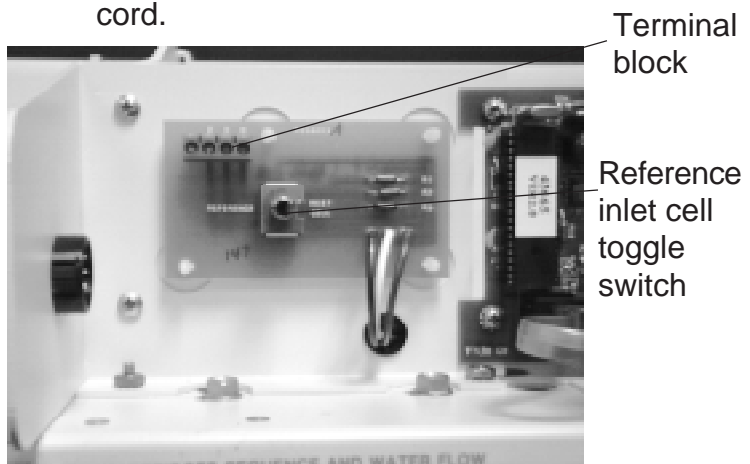
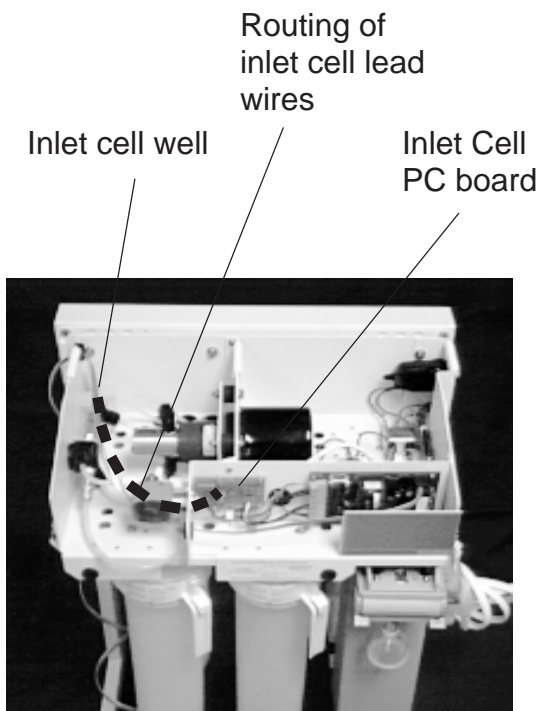


Figure 9 Inlet Cell Installation and Connections

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## Inlet Cell Operation

To monitor inlet cell readings, ensure reference/inlet cell toggle switch is in the inlet cell position, select the mode you desire (resistivity or temperature) and depress and hold the “control” membrane switch. The reading shown on the display will be for the inlet cell and will revert to the primary cell when the switch is released.

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# Remote Display Mounting

The NANOpure includes as a standard feature the ability to remotely mount the electronic control display up to 10 feet away by means of an umbilical cord included with each unit.

1. Disconnect the inlet water line and the electrical service, and remove the power cord from the NANOpure.
2. Remove the top cover of the unit by removing the cover screws and the pump interlock cable or jumper plug and pull the top cover straight out.
3. Locate the 10 ft. display interconnect cable. Remove the 6" cord from its connection points on the main circuit board and the display unit. On the D4742 and D4745 230V NANOpure, suppressor must first be removed from the cable.
4. Remove the display unit from the mounting bracket by pulling the display straight up until the pins in back line up with mounting holes, then pulling straight forward.
5. Attach the 10 foot cord to the connector on the main circuit board and route the interconnect cable through the NANOpure as shown on Figure 10. Attach suppressor removed in Step 3 to 10 foot cable (on 230V systems only).
6. A bracket is supplied to permanently mount the display in a remote location. Attach the bracket at the desired location using user supplied screws. Attach the cable to the display. Attach the display to the bracket by lining up the mounting pins on the display with the bracket grooves.





**Caution**

Do not mount display where water may spill or drip on electronics.

7. A filler panel is supplied to fill the void left when the display is removed. Prior to attaching the filler panel, move the mounting bracket forward by loosening and reattaching the mounting screws.
8. Remove the screws from the filler panel and reassemble through the slots on the mounting bracket.
9. Reinstall the top cover and reattach the cover screws and the pump interlock cable or jumper plug.
10. Reconnect the inlet water line and the power cord, and connect to electrical service.

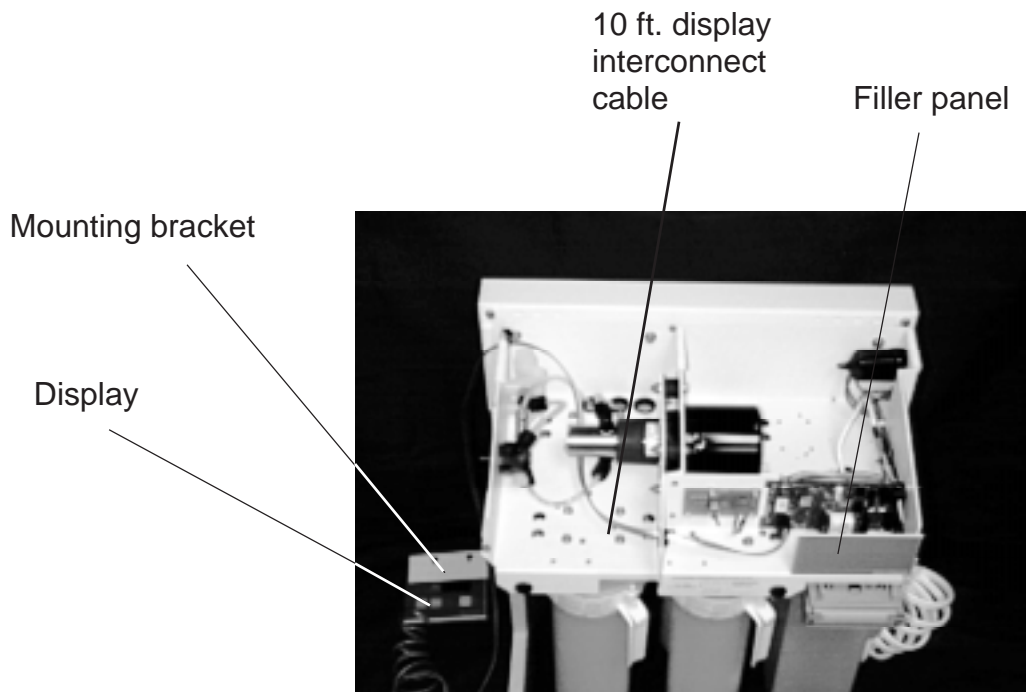


Figure 10 Remote Display Mounting

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# Remote Dispenser



## Note

Do not discard system flush housing after initial cartridge rinsing. Keep for future cartridge changes.

---

## Operation

Each NANOpure system includes a Remote Dispenser unit. The Remote Dispenser unit includes a replaceable 0.2 Micron Final Filter (packaged separately). The Remote Dispenser is shipped with an empty system flush housing installed. This housing is to be used during cartridge rinsing procedures.

The dispenser incorporates an "easy to use" thumb wheel dispensing mechanism which is designed to deliver a steady stream when the thumb wheel is completely forward; drop by drop when it is slightly forward of the center; and spray when it is back. When the thumb wheel is in the center, no water will flow out of the dispenser.

When you are not using the Remote Dispenser, water automatically recirculates through the entire length of the Remote Dispenser's feed tubing and through the 0.2 micron filter, ensuring that you have high purity water immediately available at your fingertips. For applications requiring the highest purity water, allow 500 ml of water to flow to drain from the Remote Dispenser before using the product water.

---

## Installing the 0.2 Micron Final Filter

1. Turn off the system power and disconnect the inlet tubing. Allow the system to depressurize through the Remote Dispenser and by opening the Auxiliary Valve.



**Note**

To prevent leakage at filter connection, do not allow O-rings to become deformed during installation. If O-rings are damaged, replace.

2. Remove the system flush housing from the Remote Dispenser by gently pushing the housing in the direction of the grooves in the Remote Dispenser (Figure 7). Ensure that the O-rings remain in place.
3. Install a D3751, 0.2 Micron Final Filter into the Remote Dispenser by sliding the filter into the grooves on side of the Remote Dispenser (Figure 7).
4. Resupply the NANOpure with water and turn the power on. Allow approximately 8 liters of water to run to drain through the Remote Dispenser to rinse the D3751, 0.2 Micron Final Filter.
5. Close the Remote Dispenser and allow the system to recirculate until the desired purity is achieved. The NANOpure system is now ready for use.
6. Periodically replace the Remote Dispenser filter.

# Float Switch/Pressure Switch Installation

Accessories D0603, D0606 (float switches) and D2706 (pressure switch) are designed to protect the NANOpure pump by alerting the NANOpure of an inadequate feedwater condition so that the pump can be shut down. Use the following instructions for installation.

1. Disconnect electrical service.
2. If using the D0603 or D0606 float switch, follow installation instructions included with unit for installation to tank.
3. If using the D2706 low pressure switch, install the PVC tee (supplied with D2706) into the incoming water line (see Figure 11). Screw the switch into the top of the tee, then connect the inlet tubing to NANOpure with the remaining opening.
4. Route the cable from float or low pressure switch either above or below NANOpure cover as shown in Figure 11.
5. Remove the jumper plug and save for future use.
6. Plug the cable into jumper plug outlet.
7. Reconnect the electrical service.

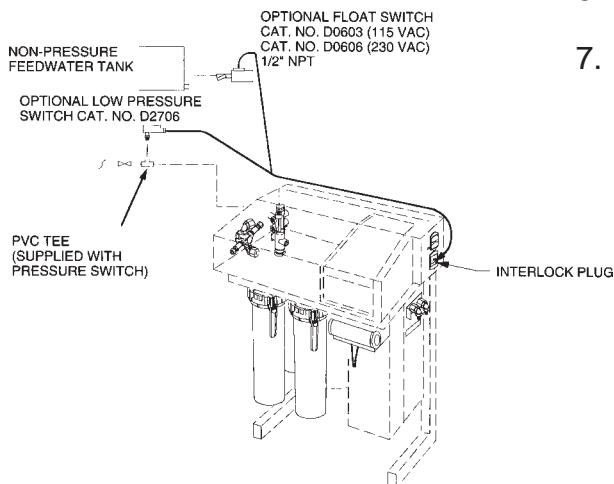


Figure 11 Pump Protector/Pressure Switch Installation

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# Maintenance and Servicing



## Warning

To avoid electrical shock, always disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel.



## Warning

To avoid personal injury, depressurize system prior to attempting to remove canisters.



## Note

Do not tighten canister beyond point where locking pin and pin hole line up.

---

## Replacing Cartridges

When the resistivity of the water drops below the desired level, change all of the cartridges together.

1. Turn off system power and disconnect inlet tubing by depressing the stainless steel thumb pad on the inlet quick disconnect valve and pulling gently.
2. Open the Remote Dispenser and Auxiliary Valve to depressurize system prior to attempting to remove canisters.
3. Place a container under the cartridge canisters to collect any spillage.
4. Carefully remove the canisters from the heads by depressing thumb lever and rotating the canisters from right to left 1/4 turn. Pull the cartridges from heads and discard, drain and clean the canisters.
5. Install the new cartridges as explained in INITIAL OPERATION section of this manual.

---

## Replacing Remote Dispenser Filter

It is recommended that the Remote Dispenser 0.2 micron Final Filter be replaced every 45 days, when there is an unacceptable bacteria passage or when flow decreases to less than one liter per minute.

To replace the filter follow the instructions in the 0.2 MICRON FINAL FILTER INSTALLATION section of this manual.



**Note**

Use care when handling the new Auxiliary Valve 0.2 Micron Final Filter assembly to prevent environmental contamination of filter.



**Caution**

Do not overtighten the Auxiliary Valve 0.2 Micron Final Filter assembly onto the Luer fitting or use excessive force in seating it. The filter and/or Luer fitting can be damaged by overtightening or excessive force.



**Note**

If a newly installed 0.2 Micron Filter clogs rapidly after installation, the NANOpure Analytical may need to be sanitized to remove bacterial contaminants. See **System Sanitization**.

Always run at least 6-10 liters of deionized water through a new 0.2 Micron Final Filter before using water.

---

## Replacing the Auxiliary Valve 0.2 Micron Final Filter

Replace the Auxiliary Valve 0.2 Micron Final Filter whenever any of the following conditions occur: every 30 days, the product water flow is reduced or bacteria and/or pyrogen break through. The Auxiliary Valve 0.2 Micron Final Filter is shipped assembled with a bell. To replace the Auxiliary Valve 0.2 micron filter assembly:

1. Remove the old Auxiliary Valve 0.2 micron filter assembly by turning it counterclockwise until it is free from the Luer fitting.
2. Remove the new Auxiliary Valve 0.2 Micron Final Filter assembly from its bag and insert it into the Luer fitting. Gently turn it clockwise until it is fully seated in the Luer fitting.
3. Rinse at least 5 liters of water through the Auxiliary Valve 0.2 Micron Final Filter to drain prior to using the product water.



Figure 12 Auxiliary Valve 0.2 Micron Filter Installation



**Warning**

Replace fuses only with the same type and rating for continued protection against possible fire hazard and protection of the equipment.

---

## Replacing Fuses

The “main fuse” is located in a fuse holder at the upper right side of the top housing. To access, remove the top cover, squeeze the clip on the fuse holder and remove. Replace with a slow blow 2 ampere fuse for 230 VAC units and a slow blow 3 ampere fuse for 100 or 115 VAC units. To reassemble, simply insert the fuse in the fuse holder and push the fuse holder until it snaps into place.

---

## System Sanitization

Whenever cartridges are replaced, the system should be sanitized. The system should also be sanitized if the 0.2 micron filters clog rapidly after installation. Sanitize the system by using the new, easy-to-use sanitization cartridge (#D50223).

Sanitize your NANOpure Analytical as follows:

1. Turn the system off and disconnect the power.
2. Remove inlet tubing. Open the Remote Dispenser and Auxiliary Valve to depressurize the system prior to attempting to remove canisters.
3. Remove the canisters by depressing the thumb lever and rotating 1/4 turn to the left. Discard used cartridges. With the cartridges removed from the canisters, wash the inside of the canisters and the inside heads with soap or detergent, using a sponge or clean cloth. Rinse out the canisters and the heads with clean water several times to remove the detergent residues.



**Warning**

Depressurize system prior to attempting to remove canisters.



**Warning**

- Avoid splashing disinfecting solutions on clothing or skin.
  - Ensure all piping connections are tight to avoid chemical leakage.
  - Always depressurize chemical lines before disassembly.
  - Ensure adequate ventilation.
  - Carefully follow manufacturer's safety instructions on labels of chemical containers and material safety data sheets.
4. Remove the 0.2 Micron Final Filter from the Remote Dispenser and replace with the system flush housing. Remove the Auxiliary Valve 0.2 Final Filter. Do not attempt to sanitize the 0.2 Micron Final Filters with chemical solutions.
  5. Place the sanitizing cartridge containing the chlorine pellet onto the head of position number one.
  6. Install the four canisters onto the heads by depressing the thumb lever and rotating the handle ring  $\frac{1}{4}$  turn to the right.
  7. Place a suitable container under the Auxiliary Valve to catch the sanitizing solution. Reconnect the inlet tubing and open the Auxiliary Valve and Remote Dispenser. Turn on the water supply and power to the unit.
  8. When the sanitizing solution begins to exit the Remote Dispenser and Auxiliary Valve, close the Auxiliary Valve.
  9. Let the solution exit the Remote Dispenser for thirty seconds in the stream pattern. After thirty seconds, change to the spray pattern and allow the unit to spray the solution for an additional thirty seconds. This allows for the proper sanitization of the inside and outside tip and nozzle of the Remote Dispenser.
  10. Close the Remote Dispenser.
  11. Allow the unit to remain in recirculation for 30-45 minutes.





**Note**

The pellet in the sanitization cartridge may not be completely dissolved. This does not constitute an incomplete sanitization. Do not reuse a spent sanitization cartridge.



**Warning**

Depressurize system prior to attempting to remove canisters.



**Caution**

Secure locking pin before operating. Pin must be fully engaged before operating.

12. After 30-45 minutes, open the Auxiliary Valve and the Remote Dispenser. Allow the sanitizing solution to exit the unit. Leave these valves open for approximately 5 minutes.
13. Turn the system off and disconnect the power. Remove the inlet tubing. Open the Remote Dispenser and Auxiliary Valve to depressurize the system prior to attempting to remove canisters.
14. Carefully remove all canisters from the system and discard the remaining solution. **DO NOT RINSE THE CANISTERS.**
15. Install fresh cartridges in the system as indicated in the REPLACING CARTRIDGES section of this manual. Do not reinstall used cartridges (they may contain large amounts of bacteria).
16. Reconnect the feedwater line to the feedwater source, and reconnect the pump protector or pressure switch to the receptacle in the top housing. Save the jumper plug for future use.
17. Connect the power to the unit, and press the control panel "on/off" button to start the pump and fill the system. Run water through the system to drain any remaining disinfecting solution. A flush of 10 liters is sufficient.
18. Close the Remote Dispenser valve, and allow the resistivity of the water to rise above the "set point" setting on the resistivity meter. Install and a new Remote Dispenser 0.2 Micron Final Filter as indicated under REPLACING THE REMOTE DISPENSER FILTER" section of this manual.

19. Install a new Auxiliary Valve 0.2 micron Final Filter as indicated in the REPLACING THE AUXILIARY VALVE 0.2 MICRON FINAL FILTER section of this manual.



**Caution**

The cell electrodes are etched to improve wetting characteristics. Do not mechanically abrade or damage this surface.



**Caution**

Do not immerse the entire cell assembly in cleaning solution, only the electrode portion.

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## Cleaning the Resistivity Cell

1. Disconnect power to the unit. Disconnect the inlet tubing and depressurize the system.
2. Remove the top cover screws and slide top cover toward you to remove it.
3. Remove the front housing by pushing up on the clip located at the bottom of the housing and pulling the housing straight forward.
4. For Models D4741, D4743, D4744 and D4746, carefully remove the Resistivity Monitor circuit board. The D4742 and D4745 do not require the Monitor to be removed.
5. Disconnect three cell leads at the printed circuit board connector and gently pull the cable down through the grommet toward the cell.
6. Unscrew and remove the cell. Carefully remove O-ring to clean the cell.
7. Wash the cell in a mild detergent solution or a 10% inorganic acid solution (follow acid manufacturers recommended handling procedure). This may be done in an ultrasonic cleaner or with a soft brush.

8. Thoroughly rinse the cell in deionized or distilled water following the detergent or acid cleaning.
9. After cleaning, check the o-ring; replace if necessary.
10. Reinstall the cell into the cell well and hand tighten.
11. Reroute the cable up through the housing and reconnect the leads. Refer to the wiring diagram for proper lead terminal position.
12. Replace the Resistivity Monitor circuit board and front housing. Replace the top cover.

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## Shutdown

If NANOpure is to be shut down for an extended period of time, the system should be completely drained and the cartridges removed to prevent the growth of bacteria.

If the system has remained inactive and full of water, then the system should be drained, sanitized and new cartridges and final filters installed prior to use.

# Problem Solving Guide

Problem	Possible Cause	Solutions
<p>NANOpure completely inactive (pump not operating, control panel not lit, etc.)</p>	<p>No electrical power to NANOpure.</p> <p>Main fuse blown.</p> <p>Printed circuit fuse blown.</p>	<p>Ensure that the NANOpure power cord is connected to a live power source and completely plugged into electrical outlet.</p> <p>Replace the main fuse as indicated in the REPLACING FUSES section.</p> <p>Replace the printed circuit fuse as indicated in the REPLACING FUSES section.</p>
<p>Pump runs, but no display (no digital display).</p>	<p>Printed circuit board inter-connect cable disconnected.</p>	<p>Reconnect cable.</p>
<p>Reduced or no product flow from the Remote Dispenser.</p>	<p>0.2 micron final filter clogged.</p>	<p>Replace the Final Filter as indicated in the REPLACING THE REMOTE DISPENSER 0.2 MICRON FINAL FILTER section.</p>
<p>Leaking canisters.</p>	<p>Large o-ring in canister is missing, damaged or not sealed properly.</p> <p>Loose Head/Canister fit.</p>	<p>Replace or position correctly.</p> <p>Tighten handle ring.</p>
<p>Pump does not run. Display light.</p>	<p>Pump protector (in reservoir), feedwater line pressure switch or jumper plug not connected to pump interlock.</p>	<p>Connect the pump protector or pressure switch cord to the receptacle located inside top cover. If a Barnstead pressure switch is installed in the feedwater line, the pump will not start until the line pressure rises to 0.35 kg/cm<sup>2</sup> (5 psi).</p> <p>Open the feedwater line shut off valve or fill the feedwater reservoir.</p> <p>Make sure the jumper plug is installed.</p>

<b>Problem</b>	<b>Possible Cause</b>	<b>Solutions</b>
Recirculated water will not rinse up to desired purity level.	<p>Exhausted cartridge.</p> <p>Cartridges out of order.</p> <p>Cartridges upside down.</p> <p>Feed water bypassing cartridge(s).</p> <p>Check valve malfunctioning.</p>	<p>Replace all the cartridges as indicated in the REPLACING CARTRIDGES section (page 21).</p> <p>Install the cartridges in the proper order as indicated in the INITIAL OPERATION section.</p> <p>Install the cartridges right side up as indicated in the INITIAL OPERATION section.</p> <p>Be sure that small O-ring inside head is not damaged and is properly installed.</p> <p>Remove tubing from check valve; turn unit on. If water leaks from end of check valve, wash to remove any particulates.</p>
Display reads "Err" when checking resistivity.	<p>Resistivity cell disconnected or wired improperly.</p> <p>Air in system.</p> <p>System electronics or cell out of calibration.</p>	<p>Check resistivity cell wiring.</p> <p>Purge air from system by opening Remote Dispenser and/or Ultrafiltered Water Drawoff.</p> <p>Check resistivity of reference cell. If resistivity displayed is not between 9.7 and 10.3 electronics need recalibration. If resistivity reading is proper, clean cell and reinstall. If problem persists, replace cell.</p>
Display reads E_A.	System electronics failure.	Replace main PC board.
Display locks up in Standby mode.	Inlet power of poor quality.	Disconnect power and then reconnect.

**PROBLEM SOLVING GUIDE**

<b>Problem</b>	<b>Possible Cause</b>	<b>Solutions</b>
<p>Short cartridge life.</p>	<p>Cartridges being used are beyond expiration date.</p> <p>Change in feedwater characteristics.</p>	<p>Check the expiration date. Cartridges begin to lose capacity after being stored two years from the date of manufacture. Replace the cartridges with unexpired ones.</p> <p>If a Barnstead ROpure is the feedwater source, check that the membrane is functioning properly.</p> <p>If a Barnstead Still is the feedwater source, ensure that the distillate temperature to the NANOpure does not exceed 49°C (120°F).</p> <p>If tap water is the feedwater source, check the quality of the water. In some cases the quality of the water will change with the seasons. Changing the source (city water to well water or well water to city water) will result in a water quality change.</p> <p>If feedwater is from a central water purification system, verify water quality and proper functioning of the system.</p>

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# Replacement Parts Listing

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## Recommended Spares

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### Consumables

Consumable parts are those required to support the day-to-day operation of this equipment.

Barnstead |Thermolyne 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 |Thermolyne 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 of this manual to assist you in accomplishing your own service.

Consumables may be ordered separately and in some cases, as an expendables kit. Check with your Barnstead/Thermolyne representative for additional information on the expendables kit.

<b>Description</b>	<b>Catalog No.</b>	<b>Recommended Quantity</b>
Remote Dispenser Final Filter	D3751 (package of 2)	2
Auxiliary Valve 0.2 micron Final Filter	FL703X2 (1/package)	2
Pretreatment Cartridge	D0835 or D0836	1
High Capacity DI Cartridge	D0803	1
Ultrapure SG Cartridge	D5027	2
Ultrapure SG Upflow Cartridge	D0809	1
OrganicFree Cartridge	D5021	1
3.0 Ampere SlowBlow Fuse, 120 Volt Models	04455	1
2.0 Ampere Slow Blow Fuse, 230 Volt Models	04420	1
Teflon® Tape, Roll	06078	1
Main Printed Circuit Board Fuse, 100 & 120 Volt Models	FZX43	1
Main Printed Circuit Board Fuse, 240 Volt Models	FZX48	1
O-ring (between heads)	06440	2
O-ring (head-to-canister)	GSX28	4
O-ring (head-to-canister)	GSX27	4
Sanitization Cartridge	D50223	1

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## REPLACEMENT PARTS LISTING

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### 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 |Thermolyne recommends that you stock the general maintenance parts as an aid to ensuring the continued operation of this equipment.

Description	Catalog No.	Recommended Quantity
Fastener Pin	FP550X1	2
Connector (head to head)	BR550X4	1
Adapter (head end)	BR550X2	1
Quick Disconnect Body 1/4 NPT	CUX8	1
Quick Disconnect Insert 3/8 Tube	CUX9	1
Check Valve	02214	1
1/4" O.D. x 1/4" NPT Connector	05931	1

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### Safety Stock

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

Description	Catalog No.	Recommended Quantity
Resistivity Display	SW550X1A	1
Main PC Board 100 & 120 VAC Models	PC550X1A	1
Main PC Board 240 VAC Models	PC747X2A	1
Recirculation Pump & Motor 100 & 120 VAC Models	PU687X1A	1
Recirculation Pump & Motor 240 VAC Models	PU733X2A	1
Cartridge Canister Head	BK550X2	1
Cartridge Canister Handle Ring	HN550X1A	1
Cartridge Canister	CS550X1	1
Pressure Regulator	02280	1
Resistivity Cell	E550X1A	1



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# 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|Thermolyne 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 319-556-2241 or 800-553-0039.

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

# Exploded View 100 & 120 Volt Models

Key	Part #	Description
1	DL687X1A	Top cover
2	05766	1/4" OD x 1/4 NPT Elbow
3	PU687X1A	Pump assembly, 100/120V Models
4	CRX72	Cord set 100/120V Models
5	04247	Pump interlock plug
6	CUX8	Quick Disconnect
7	CUX9	Quick Disconnect Insert
8	PC550X3A	PC board, reference call
9	SW550X1A	Display
10	WH550X2	Interconnect cable 10' (WH550X1 6")
11	PC550X1A	Main PC board, 100/120V Models
12	02280	Pressure reducing valve
13	02214	Stainless steel check valve
14	BR550X2	Head end fitting
15	06440	O-ring between heads
16	FP550X1	Head connector pins
17	BR550X4	Head connector
18	BK550X2	Head
19	GSX27	Head o-ring
20	GSX28	Head to canister o-ring
21	HN550X1A	Canister handle ring
22	CS550X1	Canister
23	CV851X1A	Auxiliary Valve
24	DL630X18	Front Housing
25	E550X1A	Resistivity Cell
26	CS895X1	Remote Dispenser
28	FL563X2	System Flush Housing
29	GSX29	O-Ring
30	D4740	Floor Stand
31	CEX172	Power Entry Module
32	CAX44	Line Filter
33	PM703X3	Luer Connector
34	FS550X1	1/4" NPT Plug

Not Shown  
TN687X1A Transformer 100 Volt  
FL703X2 Filter

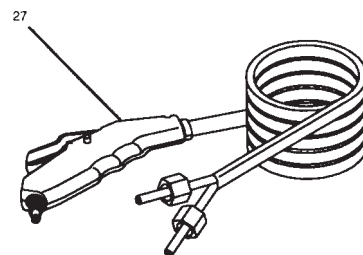
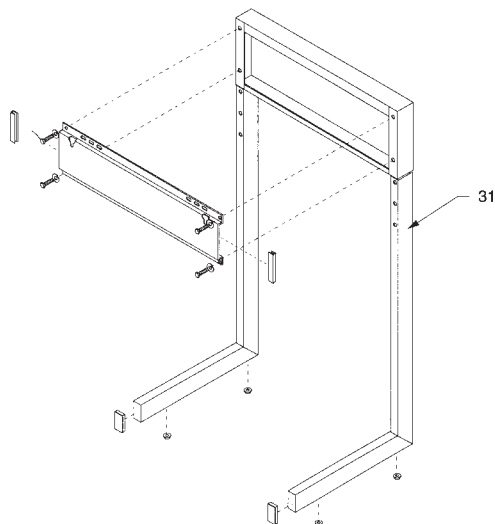
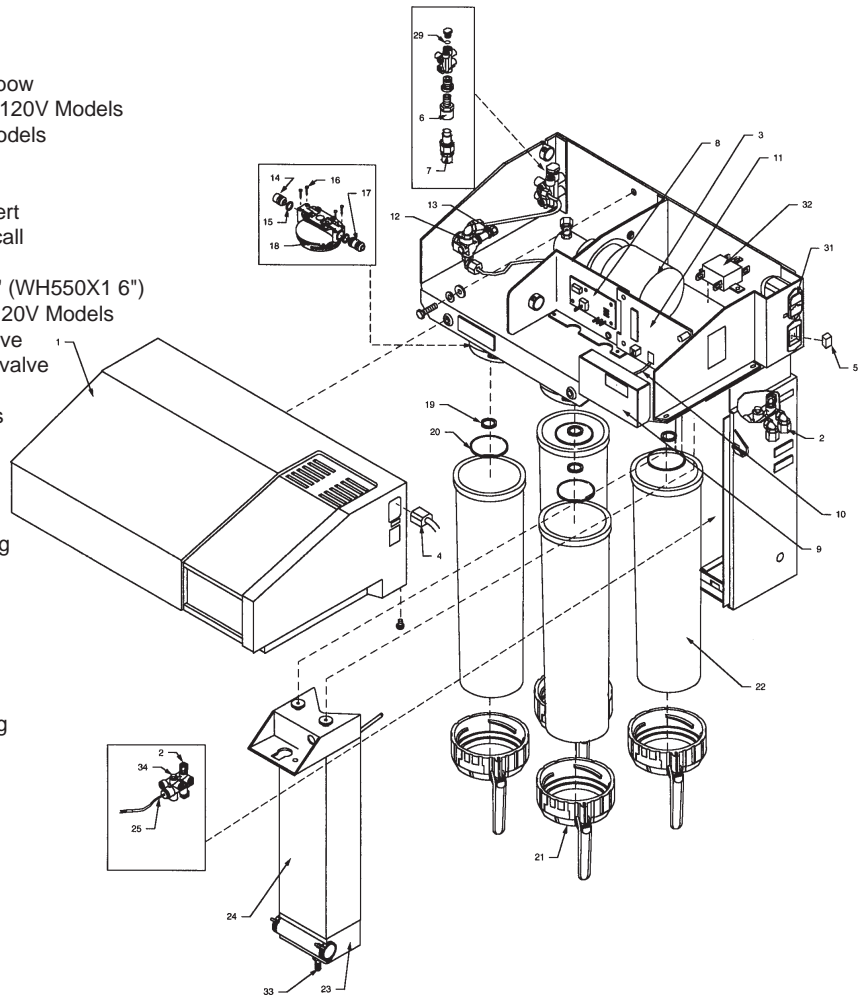


Figure 13 Exploded View

# Exploded View 240 Volt Models

Key	Part #	Description
1	DL687X1A	Top cover
2	05766	1/4" OD x 1/4 NPT Elbow
3	PU733X2A	Pump assembly, 240V Models
4	CRX70	Cord set 240V Models
5	04247	Pump interlock plug
6	CUX8	Quick Disconnect
7	CUX9	Quick Disconnect Insert
8	PC550X3A	PC board, reference call
9	SW550X1A	Display
10	WH550X2	Interconnect cable 10' (WH550X1 6")
11	PC747X2A	Main PC board, 240V Models
12	02280	Pressure reducing valve
13	02214	Stainless steel check valve
14	BR550X2	Head end fitting
15	06440	O-ring between heads
16	FP550X1	Head connector pins
17	BR550X4	Head connector
18	BK550X2	Head
19	GSX27	Head o-ring
20	GSX28	Head to canister o-ring
21	HN550X1A	Canister handle ring
22	CS550X1	Canister
23	CV851X1A	Auxiliary Valve
24	DL630X18	Front housing
25	E550X1A	Resistivity cell
26	CS895X3	Remote Dispenser
28	FL563X2	System flush housing
29	GSX29	O-ring
30	D4740	Floor stand
31	CEX172	Power Entry Module
32	CAX44	Line Filter
33	PM703X3	Luer Connector
34	FS550X1	1/4" NPT Plug

Not Shown  
FL703X2 Filter

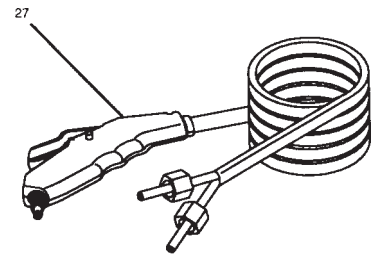
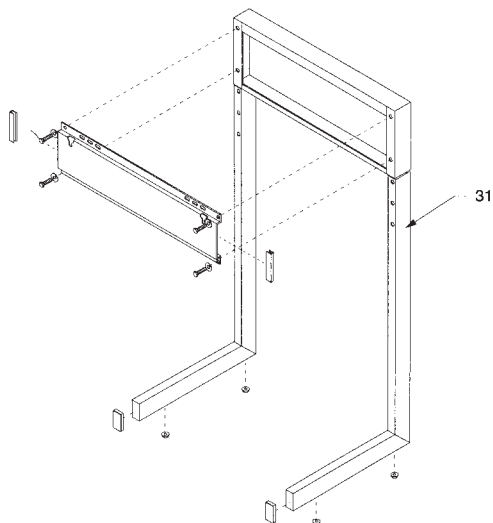
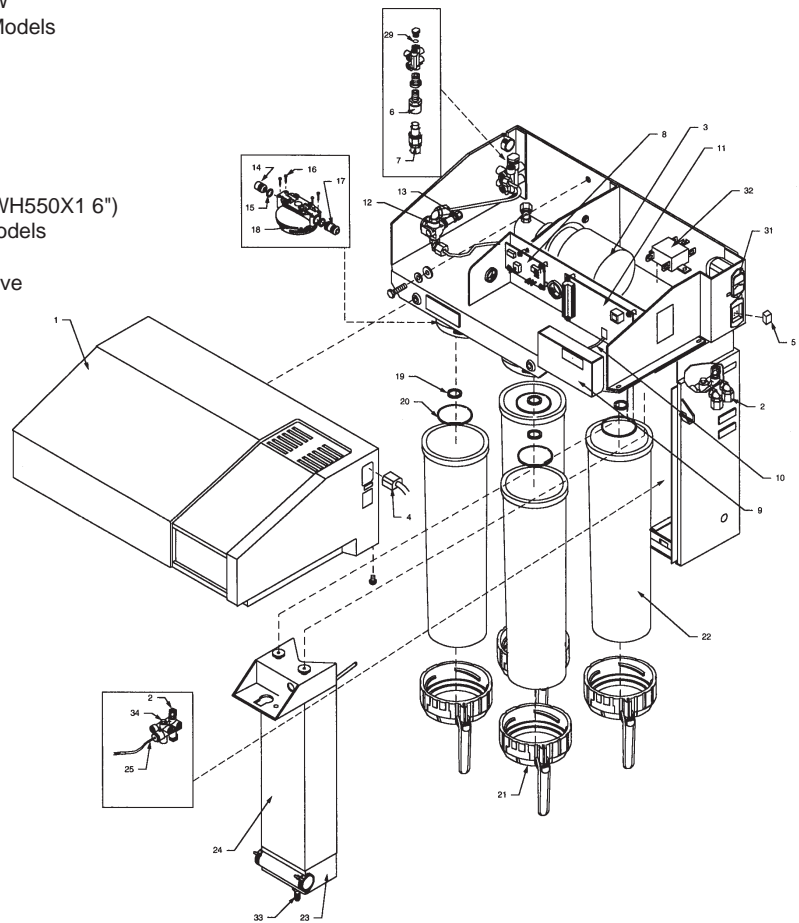


Figure 13 Exploded View (continued)

# Wiring Diagrams

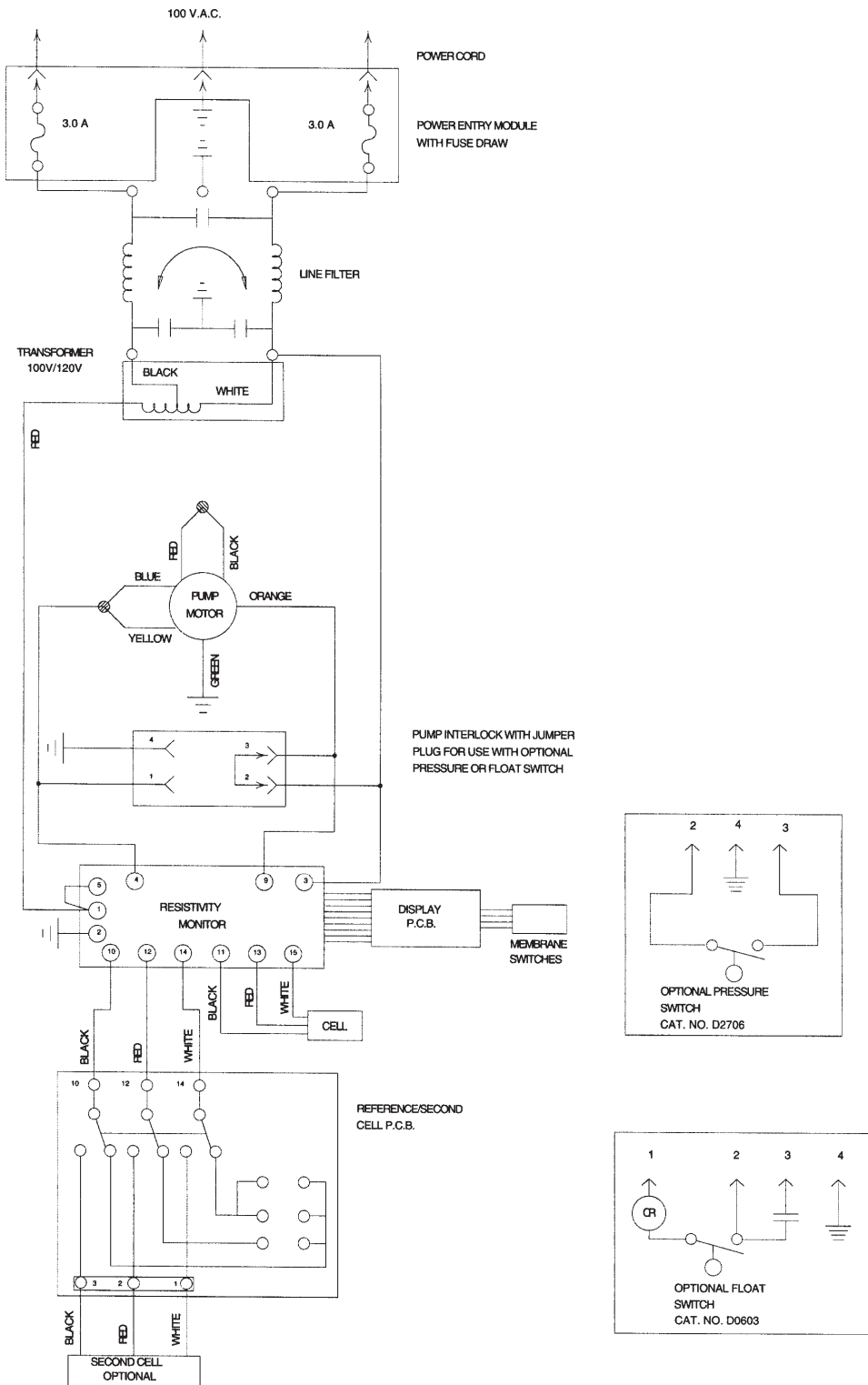


Figure 14 Wiring Diagram for 100V Model

# WIRING DIAGRAMS

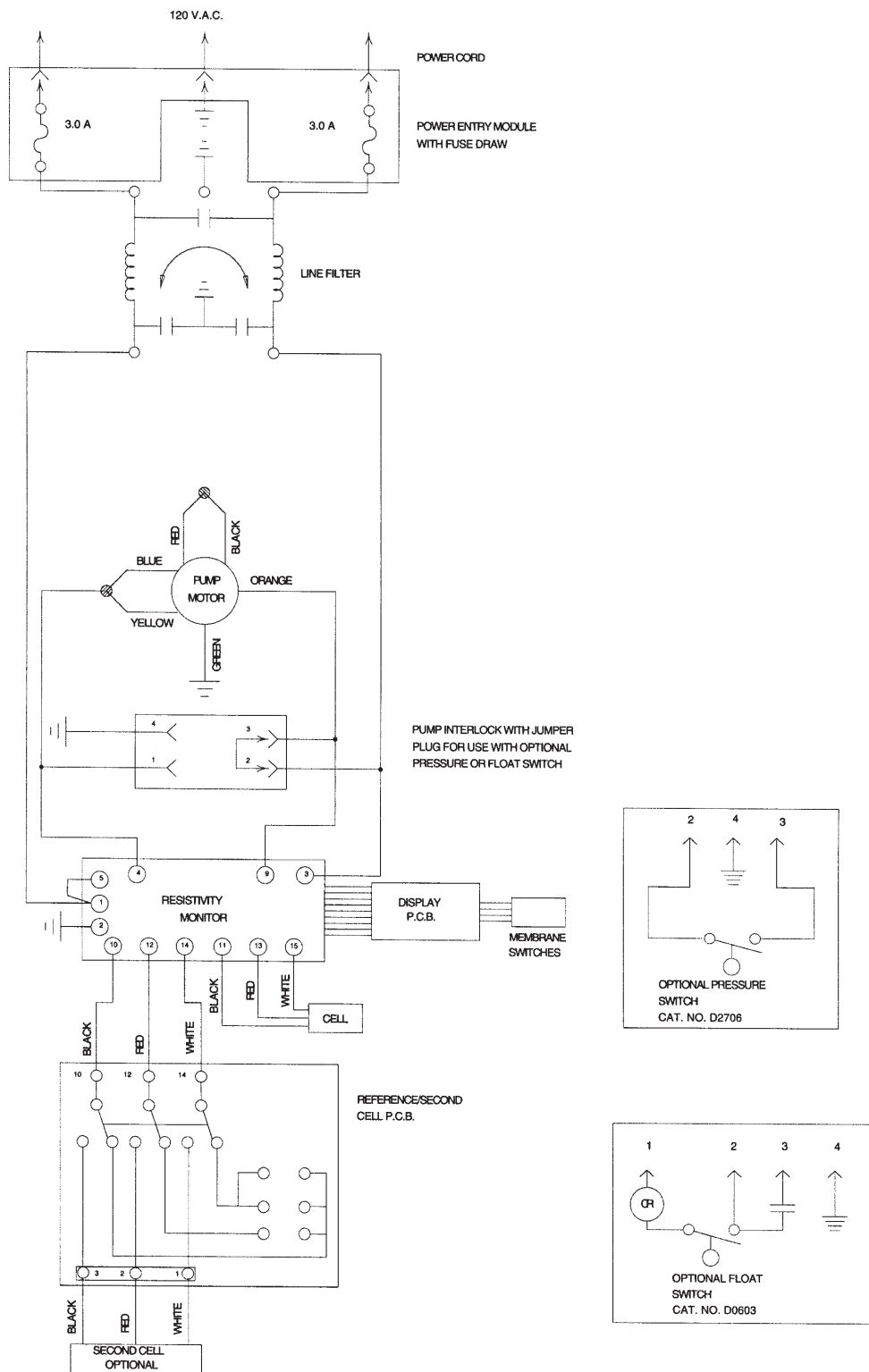


Figure 15 Wiring Diagram for 120V Model

# WIRING DIAGRAMS

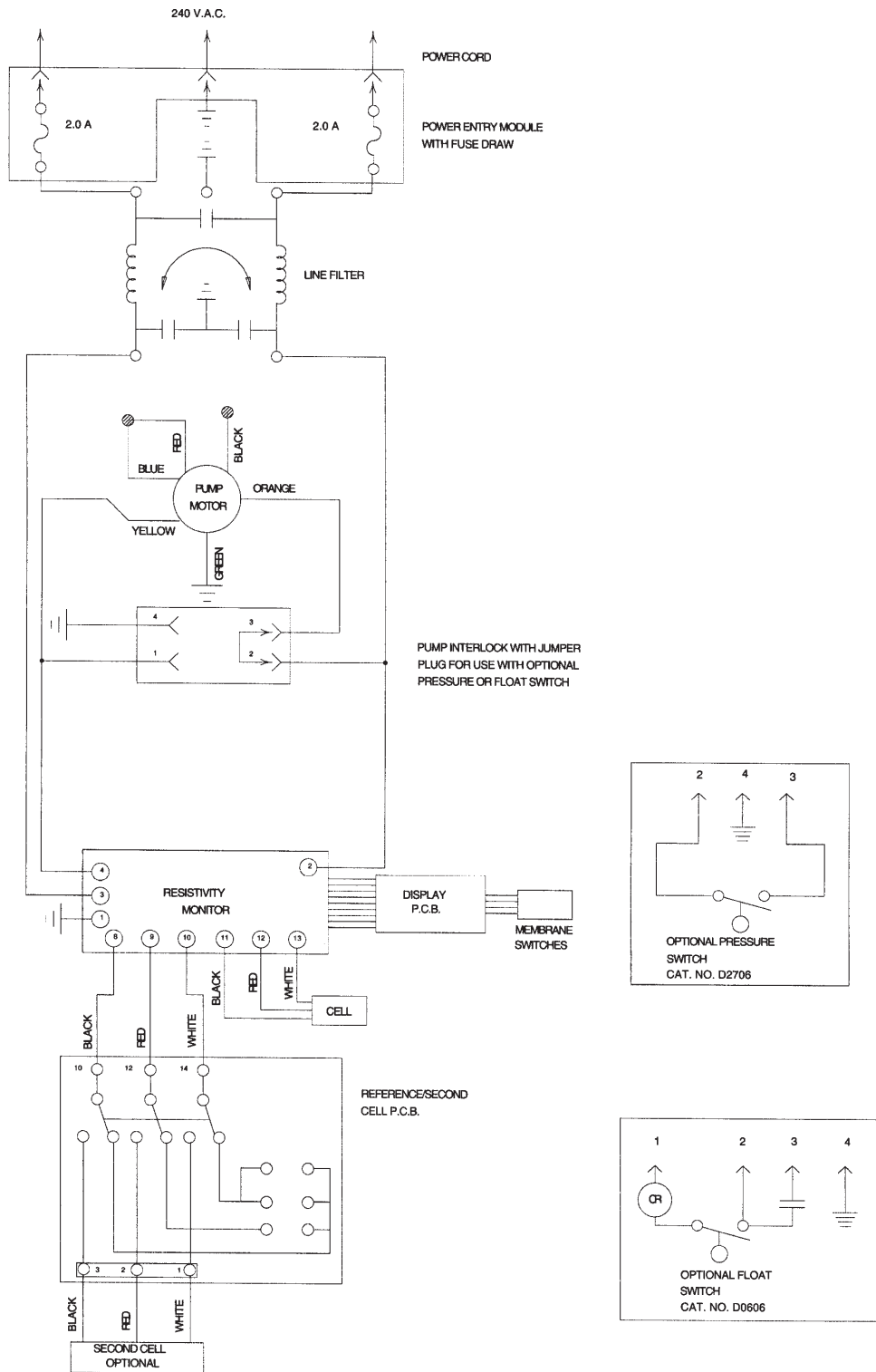


Figure 16 Wiring Diagram for 230V Model

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# One Year Limited Warranty

**Barnstead|Thermolyne Corporation** warrants that if a product manufactured by **Barnstead|Thermolyne** and sold by it within the continental United States or Canada proves to be defective in material or construction, it will provide you, without charge, for a period of ninety (90) days, the labor, and a period of one (1) year, the parts, necessary to remedy any such defect. Outside the continental United States and Canada, the warranty provides, for one (1) year, the parts necessary to remedy any such defect. The warranty period shall commence either six (6) months following the date the product is sold by **Barnstead|Thermolyne** or on the date it is purchased by the original retail consumer, whichever date occurs first.

All warranty inspections and repairs must be performed by and parts obtained from an authorized **Barnstead|Thermolyne** dealer or **Barnstead|Thermolyne** (at its own discretion). Heating elements, however, because of their susceptibility to overheating and contamination, must be returned to our factory, and if, upon inspection, it is concluded that failure is not due to excessive high temperature or contamination, warranty replacement will be provided by **Barnstead|Thermolyne**. The name of the authorized **Barnstead|Thermolyne** dealer nearest you may be obtained by calling 1-800-446-6060 or writing to:

**Barnstead|Thermolyne**  
P.O. Box 797  
2555 Kerper Boulevard  
Dubuque, IA 52004-0797  
USA  
FAX: (319) 589-0516

E-MAIL ADDRESS: [mkt@barnsteadthermolyne.com](mailto:mkt@barnsteadthermolyne.com)

**Barnstead|Thermolyne's** sole obligation with respect to its product shall be to repair or (at its own discretion) replace the product. Under no circumstances shall it be liable for incidental or consequential damage.

THE WARRANTY STATED HEREIN IS THE SOLE WARRANTY APPLICABLE TO **Barnstead|Thermolyne** PRODUCTS. **Barnstead|Thermolyne** EXPRESSLY DISCLAIMS ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR USE.

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