

# SYSTEMS



## INTRODUCTION

### Mix and Match...With Barnstead You Have a Choice

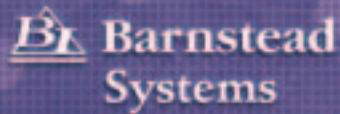
It is often necessary to use more than one form of water purification to produce the most desirable quality of ultrapure water at a reasonable cost.

Barnstead prides itself on providing the most complete line of water purification equipment. This section is intended to acquaint you with various system combinations which have proven successful through years of use in many laboratories.

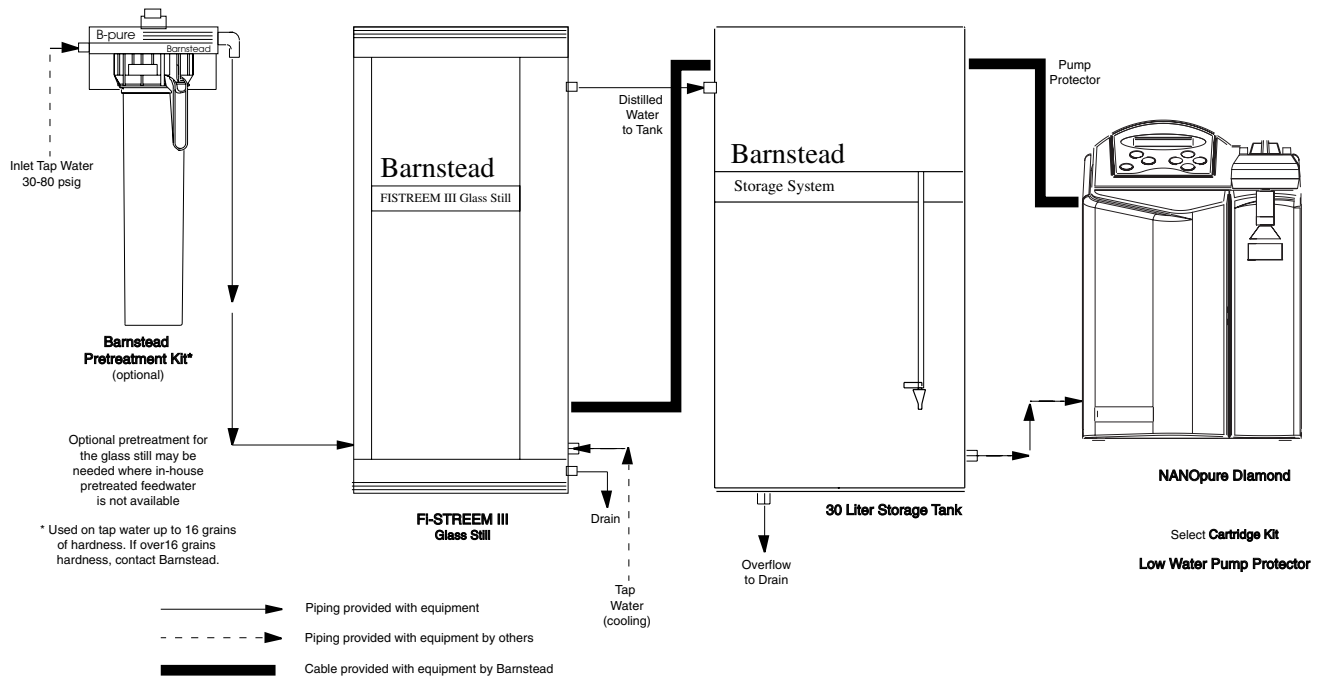
The flow schematics shown throughout this section indicate equipment orientation and possible accessories or pretreatment which may be desired to achieve optimum performance. It is strongly recommended that a free W.A.T.E.R. analysis be done prior to purchasing your equipment to ensure its proper selection. Call Customer Service at 1-800-553-0039 or 563-556-2241 to request a free W.A.T.E.R. kit.

Barnstead supplies the equipment only. However, in many areas of the U.S. and Canada, we can arrange equipment installation through both direct and factory-trained field service representatives. Installation of distribution and other piping should be performed by a qualified plumbing contractor. On-site electrical installation work should be done by a qualified electrician.





## Distillation/Deionization



### Type I Ultrapure Water

(Recommended for ultrapure water requirements greater than 15 liters/day.)

- Fully automatic system
- Space saving design
- Still pretreatment eliminates the need for cleaning and improves purity.

This system illustrates the use of FI-Stream III glass still as pretreatment for a NANOpure® DIAMOND™ ultrapure water system. The optional pretreatment kit for the FI-Stream III glass still may be recommended for use when in-house pretreated feed water is not available.

The FI-Stream III glass still provides you with fully automatic operation and when used in conjunction with the NANOpure DIAMOND and provides the ultimate Type I Reagent grade water system. Not only is the still a useful source of water for your less demanding applications, it extends the life of the cartridges in the NANOpure DIAMOND by a factor of 20 versus tap water. The combination of the FI-Stream III and the NANOpure DIAMOND provides the purest water available at a very reasonable cost.

Listed to the right are the product water qualities that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra-low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra-low dissolved organics, less than 1 ppb TOC with UV
- See NANOpure DIAMOND test results for more information

### Applications

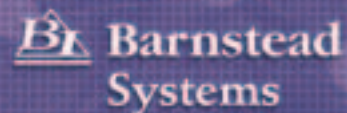
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Distillation System

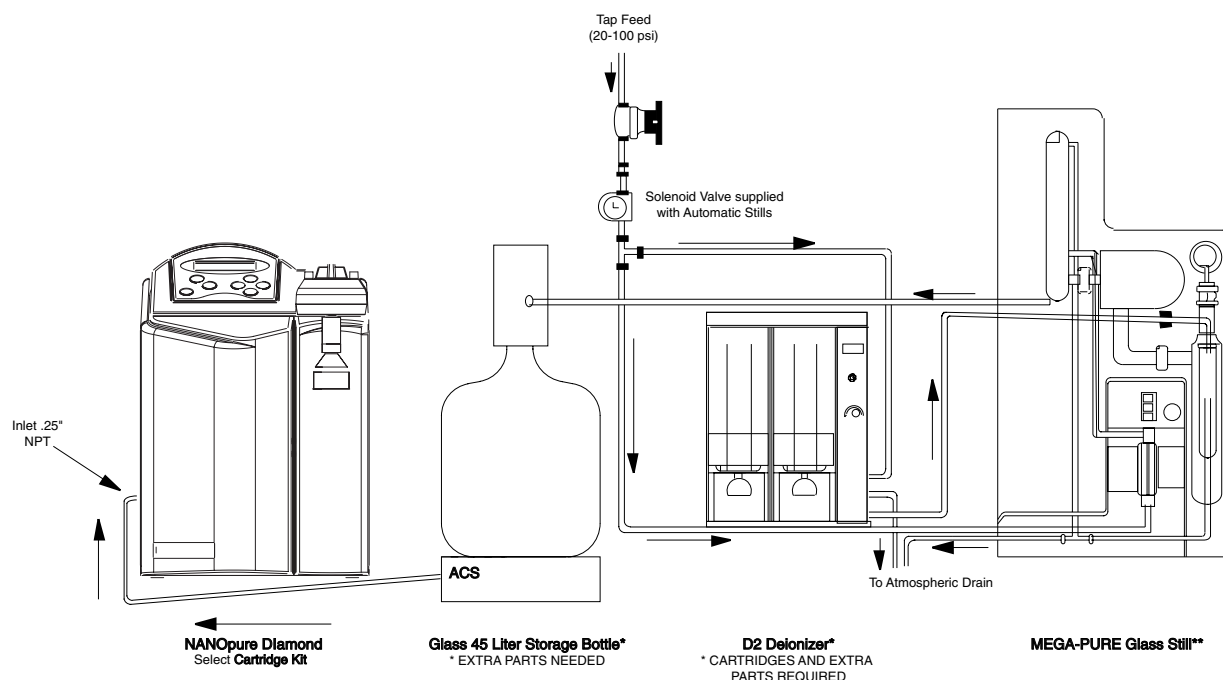
- Sterile
- Free from pyrogens (endotoxins) and bacteria
- Free from particles
- Very low dissolved ionized solids
- Low dissolved organics

### Applications

- General laboratory use
- Qualitative analyses
- Washing and rinsing of glassware and plasticware
- Biological and endotoxin free use
- Media preparation



## Distillation/Deionization



### Type I Ultrapure Water

(Recommended for ultrapure water requirements greater than 15 liters/day.)

- Economically priced
- Five production volume choices
- All glass distilled water and pretreatment system includes glass storage bottle

The use of MEGA-PURE glass distillation as pretreatment to a NANOpure® DIAMOND™ ultrapure water system provides you with the best of both worlds. The MEGA-PURE provides you with a reliable source of water for your less demanding needs while the NANOpure DIAMOND provides you with the ultimate in purity for your most stringent requirements.

The MEGA-PURE produces between 1.4 and 13 liters of water per hour and when coupled with the 45 liter storage bottle, provides a sufficient quantity of water to be used alone or as a feed source to the NANOpure DIAMOND system. The MEGA-PURE used as a feed source to the NANOpure DIAMOND will ensure the ultimate in purity as well as provide for increased cartridge capacity.

Listed to the right are the product water qualities that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra-low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra-low dissolved organics, less than 1 ppb TOC with UV
- See NANOpure DIAMOND test results for more information

### Applications

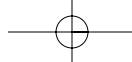
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Distillation System

- Sterile
- Free from pyrogens (endotoxins) and bacteria
- Free from particles
- Very low dissolved ionized solids
- Low dissolved organics

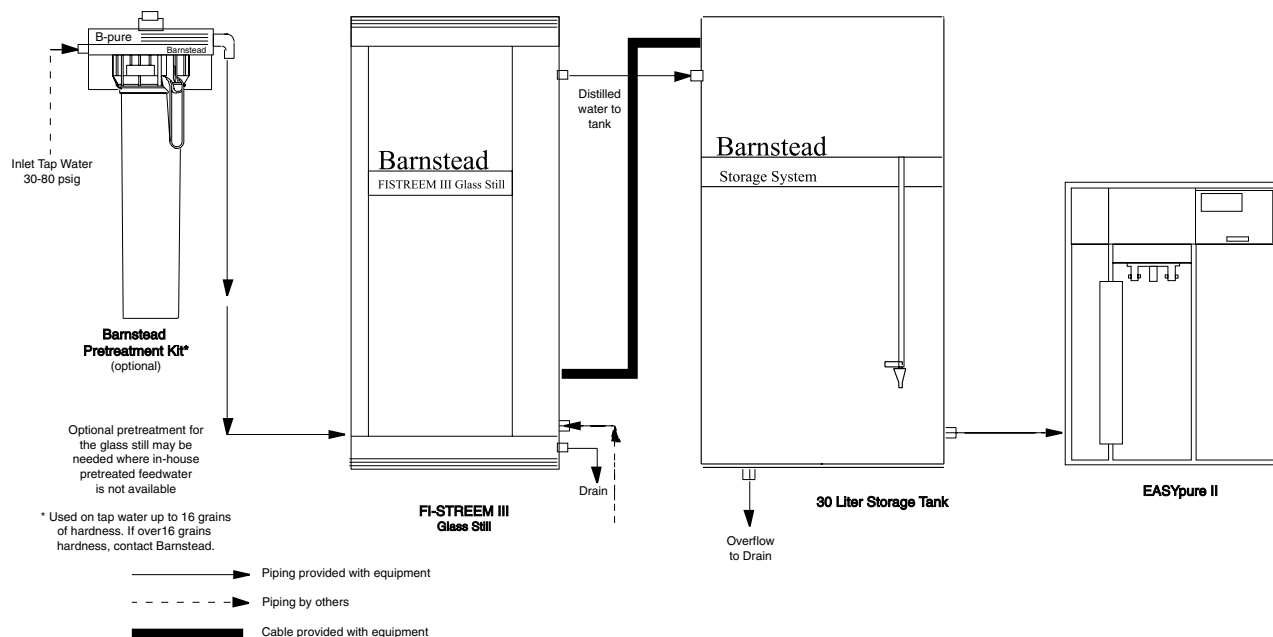
### Applications

- General laboratory use
- Qualitative analyses
- Washing and rinsing of glassware and plasticware
- Biological and endotoxin-free use
- Media preparation



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## Distillation/Deionization



### Type I Ultrapure Water

(Recommended for ultrapure water requirements less than 15 liters/day.)

- Fully automatic system
- Space saving design
- Pretreatment eliminates the need for cleaning the still and improves purity

This system illustrates the use of FI-Streem III glass still as pretreatment for an EASYpure® II ultrapure water system. The optional pretreatment kit for the FI-Streem III glass still may be recommended for use when in-house pretreated feed water is not available.

The FI-Streem III glass still provides you with fully automatic operation and when used in conjunction with the EASYpure II, providing the ultimate Type I Reagent grade water system. Not only is the still a useful source of water for your less demanding applications, it extends the life of the cartridges in the EASYpure II by a factor of 20 versus tap water. The combination of the FI-Streem III and the EASYpure II provides the purest water available at a very reasonable cost.

Listed to the right are the product water qualities that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, 1 - 5 ppb TOC with UV
- See EASYpure test results for more information

### Applications

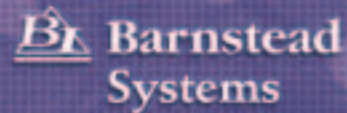
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Distillation System

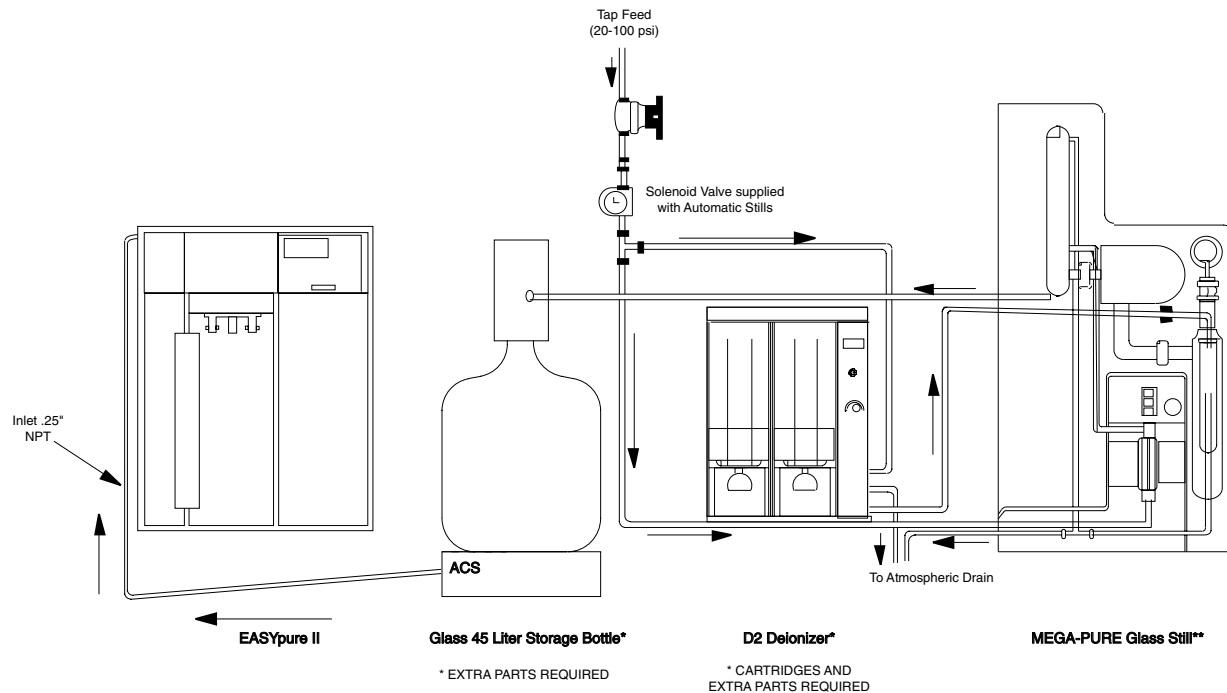
- Sterile
- Free from pyrogens (endotoxins) and bacteria
- Free from particles
- Very low dissolved ionized solids
- Low dissolved organics

### Applications

- General laboratory use
- Qualitative analyses
- Washing and rinsing of glassware and plasticware
- Biological and endotoxin-free use
- Media preparation



## Distillation/Deionization



### Type I Ultrapure Water

(Recommended for ultrapure water requirements less than 15 liters/day.)

- Economically priced
- Five production volume choices
- All glass pretreatment includes glass storage bottle

The use of MEGA-PURE glass still as pretreatment to an EASypure® II ultrapure water system provides you with the best of both worlds. The MEGA-PURE provides you with a reliable source of water for your less demanding needs while the EASypure II provides you with the ultimate in purity for your most stringent requirements.

The MEGA-PURE produces between 1.4 and 13 liters of water per hour and when coupled with the 45 liter storage bottle provides a sufficient quantity of water to be used alone or as a feed source to the EASypure II system. The MEGA-PURE used as a feed source to the EASypure II will ensure the ultimate in purity as well as provide for increased cartridge capacity.

Listed to the right are the product water qualities that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, 1 - 5 ppb TOC with UV
- See EASypure II test results for more information

### Applications

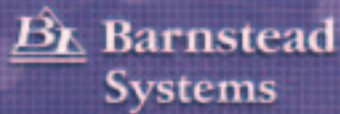
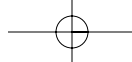
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Distillation System

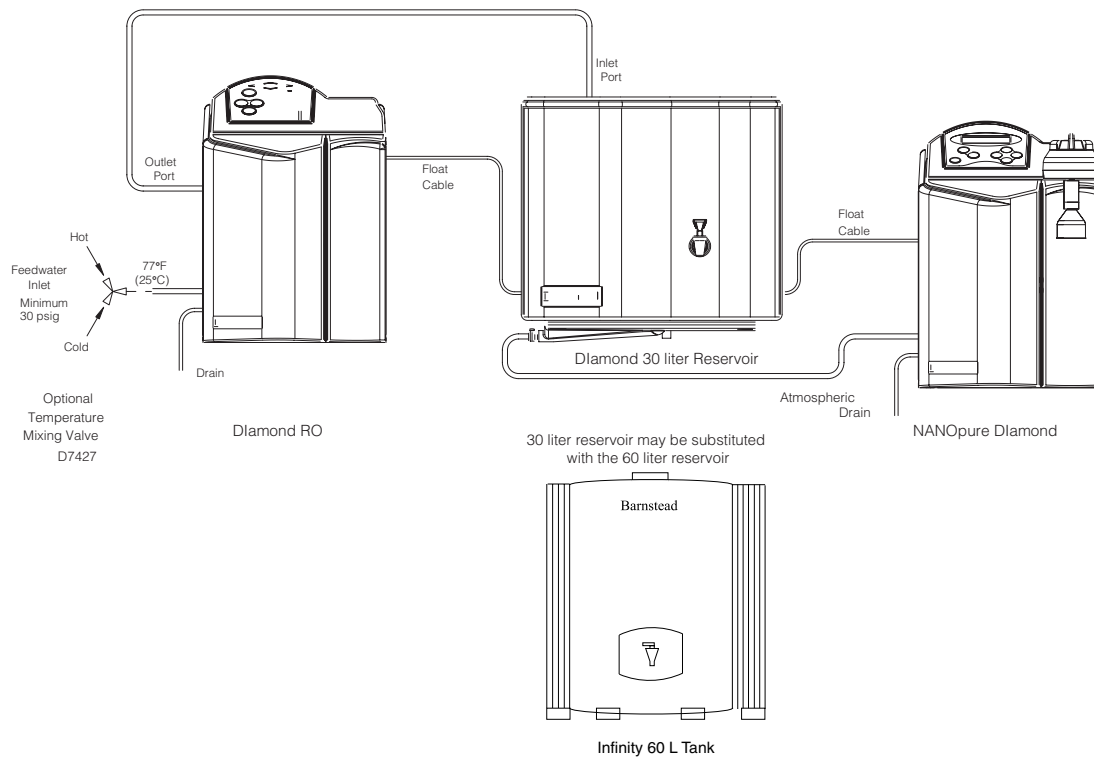
- Sterile.
- Free from pyrogens (endotoxins) and bacteria.
- Free from particles.
- Very low dissolved ionized solids.
- Low dissolved organics.

### Applications

- General laboratory use
- Qualitative analyses
- Washing and rinsing of glassware and plasticware
- Biological and endotoxin-free use
- Media preparation



## Reverse Osmosis/Deionization



### Type I Ultrapure Water

(For RO water requirements up to 450 liters/day and ultrapure water requirements greater than 15 liters/day.)

- Fully automatic system

This system illustrates the use of the Diamond™ RO reverse osmosis system with 30/60 Liter reservoir as pretreatment for a NANOpure® Diamond deionization unit. This combination provides you with a cost effective method of producing water meeting your most demanding requirements.

The use of a Diamond RO reverse osmosis system provides for fully automatic operation providing you with up to 450 liters per day of reverse osmosis quality water and > 15 liters per day of Type I water when used with NANOpure Diamond. The Diamond RO will automatically turn on when the tank water level is reduced and will turn off when the tank is full.

Listed to the right are product water specifications that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, 1 - 5 ppb TOC with UV

### Applications

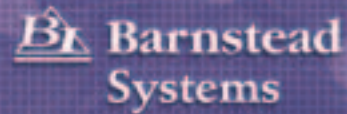
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Reverse Osmosis System

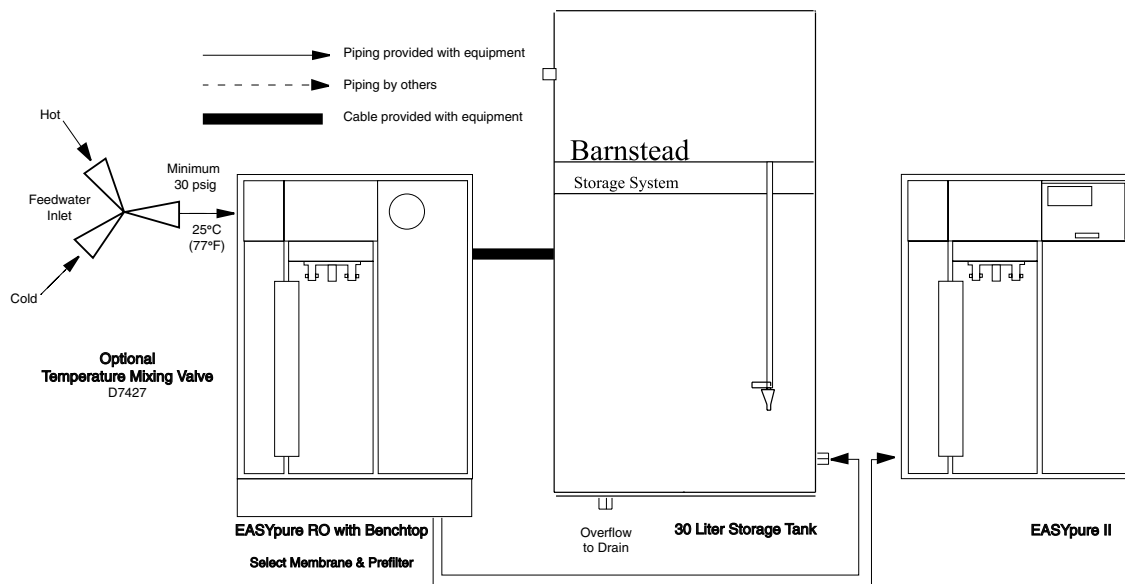
- 85-95% reduction of inorganic solids
- 99% reduction of 300 molecular weight or larger organic solids
- > 99% reduction of particles, bacteria and pyrogens

### Applications

- Pretreated water for feeding deionization systems, extending deionization cartridge life
- Purified water for general laboratory uses including glassware and plasticware washing



## Reverse Osmosis/Deionization



### Type I Ultrapure Water

(For RO water requirements less than 100 liters/day.)

- Fully automatic system
- Space saving design
- Low operating cost

This system illustrates the use of the EASYpure® RO reverse osmosis system as pretreatment for an EASYpure II ultrapure water system. When you require small quantities of very pure water, this system is perfect for your critical needs.

The use of an EASYpure reverse osmosis system provides for fully automatic operation, supplying you with Type I water when you need it when used with an EASYpure II ultrapure water system. The EASYpure RO will automatically turn on when the tank water level is reduced and will turn off when the tank is full. This system with its space saving design is ideal for lower volume pure water requirements.

Listed to the right are product water specifications that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities from Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, less than 10 ppb TOC or 1 - 5 ppb TOC with UV

### Applications

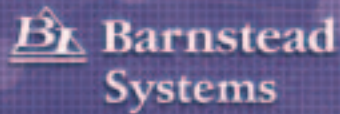
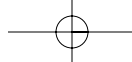
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Reverse Osmosis System

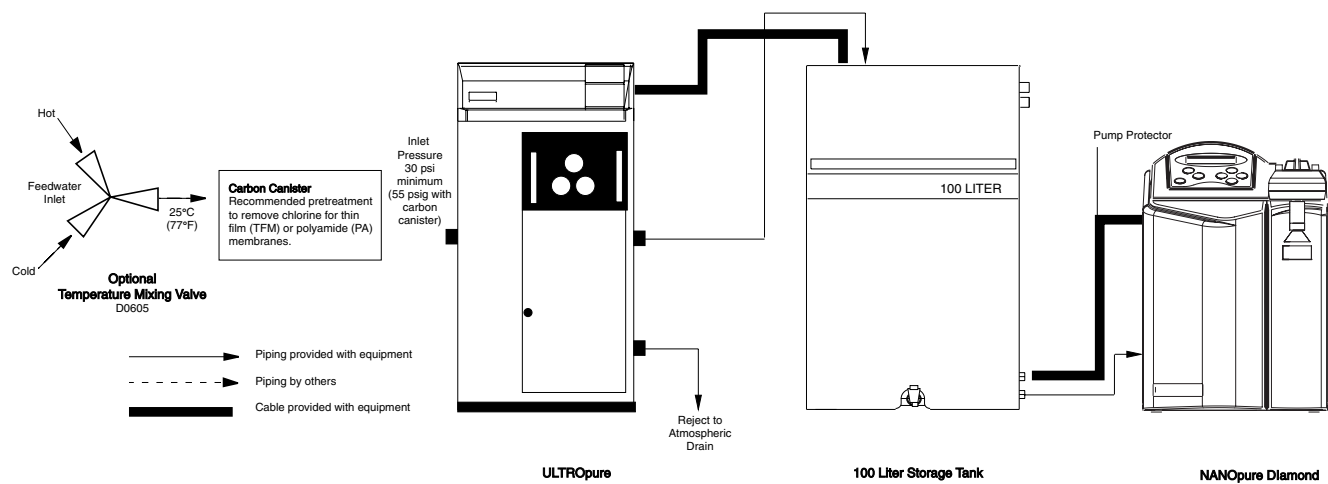
- 85-95% reduction of inorganic solids
- 99% reduction of 300 molecular weight or larger organic solids
- > 99% reduction of particles, bacteria and pyrogens

### Applications

- Pretreated water for feeding deionization systems, extending deionization cartridge life
- Purified water for general laboratory uses including glassware and plasticware washing



## Reverse Osmosis/Deionization



### Type I Ultrapure Water

(For RO water requirements up to 1325 liters/day and ultrapure water requirements greater than 15 liters/day.)

- Fully automatic system

This system illustrates the use of the ULTROpure reverse osmosis system as pretreatment for a NANOpure Diamond ultrapure water system. The ULTROpure in conjunction with the NANOpure Diamond provides water of the exacting quality you require at a rate that meets your high volume needs.

The use of an ULTROpure reverse osmosis system provides fully automatic operation, supplying you with Type I water when used with a NANOpure Diamond. The ULTROpure will automatically turn on when the tank water level is reduced and will turn off when the tank is full.

The NANOpure Diamond will provide up to 1.5 liters/minute, of Type I water for your lab. Listed to the right are product water specifications that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, 1 - 5 ppb TOC with UV

### Applications

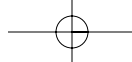
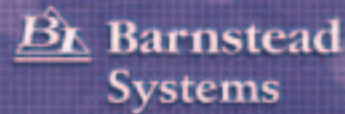
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Reverse Osmosis System

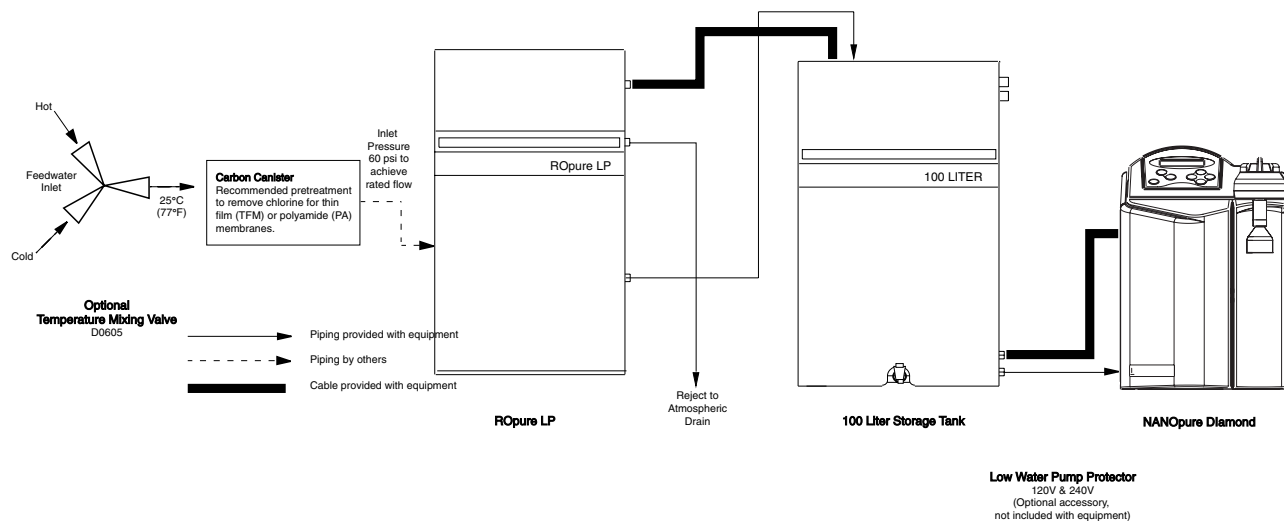
- 95-99% reduction of inorganic solids
- 99% reduction of 300 molecular weight or larger organic solids
- > 99% reduction of particles, bacteria and pyrogens

### Applications

- Pretreated water for feeding deionization systems, extending deionization cartridge life
- Purified water for general laboratory uses including glassware and plasticware washing

## Reverse Osmosis/Deionization



### Type I Ultrapure Water

(For RO water requirements up to 300 liters/day and ultrapure water requirements greater than 15 liters/day.)

- Fully automatic system
- Low operating cost

This system illustrates the use of the ROpure LP reverse osmosis system as pretreatment for a NANOpure DIamond ultrapure water system. Together the systems provide cost effective reagent grade water of unparalleled quality.

The use of a ROpure LP reverse osmosis system provides for fully automatic operation supplying you up to 300 liters per day of Type I water, when used with a NANOpure DIamond. The ROpure LP will automatically turn on when the tank water level is reduced and will turn off when the tank is full.

The NANOpure DIamond will provide up to 1.5 liters/minute of Type I water for your lab. Listed to the right are product water specifications that could be expected from this type of system.

*The Free W.A.T.E.R. Water Analysis To Evaluate and Recommend program assures that you are purchasing the correct system for your application, volume requirements and budget. See the W.A.T.E.R. test kit page for more information.*

### Water Qualities From Deionization System

- Type I Reagent Grade water
- Ultra low dissolved inorganic solids and gases, ASTM Type I up to 18.2 megohm-cm resistivity
- Ultra low dissolved organics, 1 - 5 ppb TOC with UV

### Applications

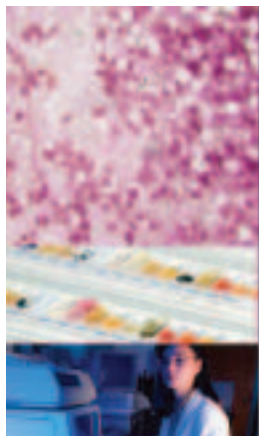
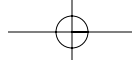
- HPLC
- GC/MS
- Cell & Tissue Culture
- Media Preparation
- ICP/MS
- AA
- IC
- TOC
- GC
- DNA Amplification

### Water Qualities From Reverse Osmosis System

- 85-95% reduction of inorganic solids
- 99% reduction of 300 molecular weight or larger organic solids
- > 99% reduction of particles, bacteria and pyrogens

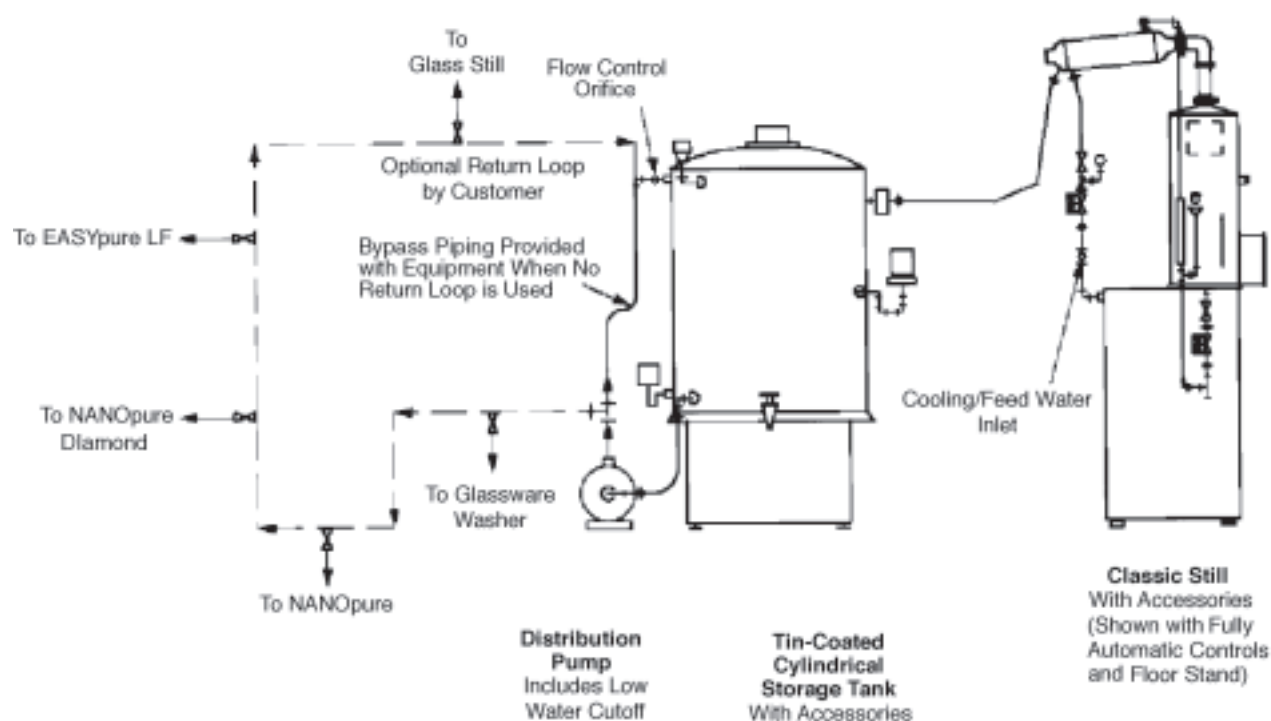
### Applications

- Pretreated water for feeding deionization systems, extending deionization cartridge life
- Purified water for general laboratory uses including glassware and plasticware washing



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## Distillation Central System



### Central Systems

The current role of the central pure water system in the research laboratory is to provide water to multiple outlets which is pure enough to: a) be acceptable for general, higher volume laboratory use, such as glassware washing and b) provide low levels of ions and other impurities so that point-of-use equipment can be operated with optimal maintenance and cost per liter for critical, ultrapure water applications.

Reverse osmosis and distillation both significantly reduce ionized impurities as well as organics, bacteria, pyrogens and particulate matter. Distillation generally provides higher resistivity (with a nominal levels of less than 1 ppm total dissolved solids) than reverse osmosis (about 95% removal of ions). Pretreatment considerations may also be important in selecting the best system.

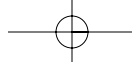
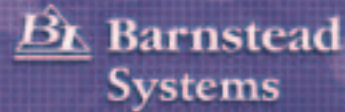
### PRODUCT SPECIFICATIONS

#### Model #

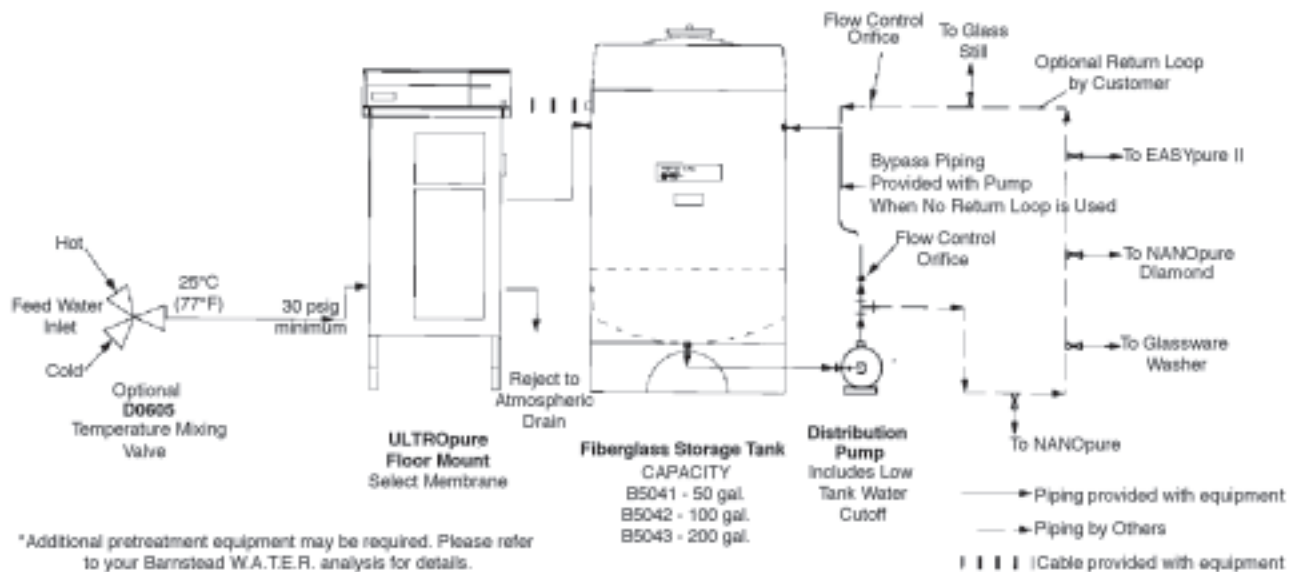
Classic Stills	Flow Control	Type
A1011	(1 gph)	Electric
A1013	(2 gph)	Electric
A1015	(5 gph)	Electric
A1016	(10 gph)	Electric
A1212	(5 gph)	Steam
A1213	(10 gph)	Steam

Cylindrical Tank	Capacity
B3043	(10 gal.)
B3045	(25 gal.)
B3046	(50 gal.)
B3047	(100 gal.)
B3049	(200 gal.)

Rectangular Tank	Capacity
B3027	(25 gal.)
B3028	(50 gal.)

## Reverse Osmosis Central System



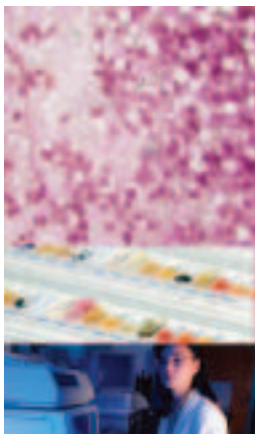
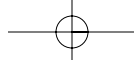
### Central System Considerations

A few considerations in cost/benefit analysis when designing a central pure water system: the distribution pump should be properly sized for elevation change, frictional losses and the maximum instantaneous flow rate required at any one time; velocity through the piping should be about 4-7 feet/second and piping should be designed so that water stagnation areas, or deadlegs, are avoided. A deadleg occurs when water is stagnate in a pipe length equal to six times its diameter (for a 1" diameter pipe, this is 6" pipe length). A return loop to the storage tank should be installed wherever possible. The best commonly available piping materials are 316 ( or 316 L) grade stainless steel or a homopolymer plastic, such as polypropylene or polyvinylidene fluoride (PVDF). PVC, however, may be adequate for some less critical applications.

Water quality degradation will occur to some extent in all central water purification systems. Even the best piping materials will leach out trace organics or metals because of the large amount of contact area within the distribution system, which may provide unacceptable results to most critical work.

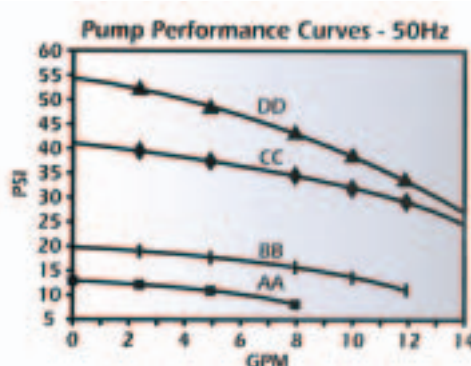
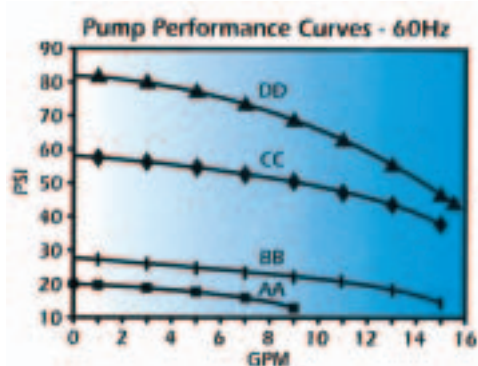
Barnstead's selection of distillation and deionization point-of-use equipment is designed to provide you the best possible water at the point-of-use to meet or exceed the requirements of your most critical applications.

Barnstead supplies the equipment only. However, in many areas of the U.S. and Canada, we can arrange equipment installation through direct or factory-trained field service representatives. Installation of distribution and other piping should be performed by a qualified plumbing contractor. On-site electrical installation work should be done by a qualified electrician.



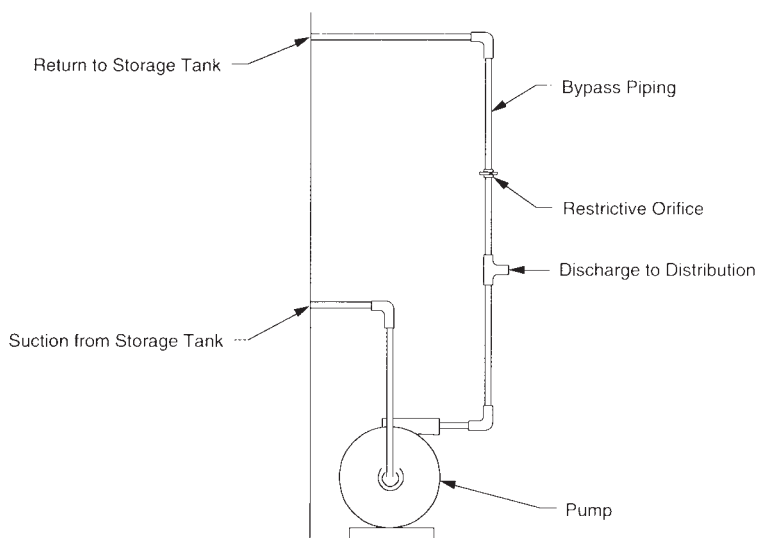
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## Distribution Pumps



### Product Description

- Barnstead's distribution pumps are used with purified water storage tanks when it is necessary to keep the pure water under pressure for delivery to locations above tank level or at greater than gravity flow pressure.
- Choose from four sizes.
- Includes pump bypass with restrictive orifice for tank.
- Includes low-level cutoff switch to shut pump off on storage tank low water conditions.
- Purity is maintained with nonreactive wetted parts.
- Heavy duty, totally enclosed, split-phase induction motor.
- Motor starters not included; all external wiring by customer.
- Bypass piping is precut to fit on tin-lined tanks only.



NOTE: Pump low-level cut-off switch not shown

### ORDERING INFORMATION

Model #	Description	Pump Size	Pump Part #	Pump Suction	Pump Discharge	Distribution Outlet	Bypass Return	Pump Motor HP	Speed (rpm)	VAC	Frequency (Hz)	Phase
H1110	Tin Bypass	AA	01398	1/2"	1/4"	3/4"	1/4"	1/3 HP	3450	115/230	50/60	1
H1112	Plastic Bypass	AA	01398	1/2"	1/4"	3/4"	1/4"	1/3 HP	3450	115/230	50/60	1
H1120	Tin Bypass	BB	01429	3/4"	1/2"	3/4"	1/4"	1/2 HP	3450	115/230	50/60	1
H1122	Plastic Bypass	BB	01429	3/4"	1/2"	3/4"	1/4"	1/2 HP	3450	115/230	50/60	1
H1130	Tin Bypass	CC	01430	3/4"	1/2"	3/4"	1/4"	1 HP	3450	115/230	50/60	1
H1132	Plastic Bypass	CC	01430	3/4"	1/2"	3/4"	1/4"	1 HP	3450	115/230	50/60	1
H1140	Tin Bypass	DD	01431	3/4"	1/2"	3/4"	1/4"	1 1/2 HP	3450	230/460	50/60	3
H1142	Plastic Bypass	DD	01431	3/4"	1/2"	3/4"	1/4"	1 1/2 HP	3450	230/460	50/60	3