




# Pure H<sub>2</sub>O for your science

Thermo Scientific workbook

## Pure H<sub>2</sub>O for your science

Pure water is elemental to the success of your experiments. But finding the right water system for your research goes deeper than water quality alone. You need a smart choice that supports both your science and your budget—not only on day 1, but with every cartridge and filter change—one that reflects 130 years of innovations, like feed water monitoring, hands-free dispensing, and effortless cartridge change-outs. With a Thermo Scientific™ Barnstead™ Lab Water System, the only thing you'll have in your water is confidence.

The background of the page is an abstract, artistic representation of water. It features soft, flowing ripples in shades of light blue and white, creating a sense of movement and purity. The ripples are more pronounced in the lower half of the image, where they appear as concentric, overlapping waves, and become more subtle and ethereal towards the top.

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# Lab water experts

For more than 130 years, Thermo Scientific™ lab water systems have been a trusted resource for science and industry. Our complete line of water purification technologies includes solutions for your most critical and everyday application needs, from deionization to reverse osmosis (RO) and distillation.

## Thermo Scientific™ Barnstead™ water purification systems deliver:

### Innovation

Our water purification portfolio features advanced ergonomics and technology, including remote dispensing and UV intensity monitoring that offer users full control with confidence.

### Flexibility

Laboratory environments often have limited bench space. Our portfolio offers numerous mounting options, small footprints, and flexible dispensing choices to provide you the luxury of designing a configuration that best suits your lab.

### Convenience

Our Thermo Scientific™ H<sub>2</sub>O Select Analysis Program with a complete kit to collect sample of feed water for testing to have the confidence to select the right water purification solution. Some systems allow for easy ordering. Order one part number and receive complete water system with consumables.

### Innovations that deliver accuracy

With innovative water monitoring technology, Thermo Scientific™ water purification systems minimize expense and lost time, which may occur with contaminated lab water.

### Advanced feed water monitoring

Alerts the user to fluctuations in the feed water quality— poor feed water can reduce cartridge life.

### Total organic carbon (TOC) measurements with UV intensity monitoring

Continuously monitor and record TOC measurements in real-time and ensure ultrapure water that meets or exceeds even

the most stringent requirements for sensitive applications. A photo sensor continually checks the intensity of the UV lamp. A drop in measured UV radiation can result in an incorrect TOC measurement.

### Electrodeionization (EDI) systems feature tank recirculation to maintain high-purity water even during long periods of inactivity

With our recirculation within the tank across a special polishing cartridge, we can help to ensure protection against bacteria growth even during periods of inactivity.

### Flexibility system design

#### Mounting flexibility

Installation options include under the cabinet, on the wall, on the bench, or free-standing units with wheels for added mobility.

### Full system control at the Thermo Scientific™ Barnstead™ GenPure™ xCAD Plus Remote Dispensers

Eliminate the hassle of going back to the primary system to adjust parameters.

### Adjustable storage tank

Growing the lab or planning for changing needs? Type 2 and RO systems enable changing water level settings in the storage tank to adapt to your lab's needs.

### Dual water quality

Need more than one type of water? Many of the systems produce two types of water.

### Convenience with customized system selection

Based on the results of a H<sub>2</sub>O Select analysis, we will recommend the best water system for your application based on your feed water quality, laboratory applications, daily volume requirements, and budget. We do all the thinking for you.

#### How it works:

1. Request a complimentary H<sub>2</sub>O Select water analysis kit at [www.thermofisher.com/h2oselect](http://www.thermofisher.com/h2oselect)
2. Fill the sample bottle with your anticipated feed water.
3. Answer the short questionnaire pertaining to your water requirements, applications and budget found at [www.thermofisher.com/h2oselect](http://www.thermofisher.com/h2oselect)
4. Place the completed decontamination form and water sample bottle in the return box. Add postage and mail to Barnstead water lab (return label included in box).

#### Easy self maintenance

The Aquastop quick connections make changing your cartridges quick and simple.



# Lab water 101

## Barnstead water purification technologies

### Don't let impurities contaminate your sensitive experiments.

Barnstead water purification systems are engineered to remove impurities that threaten your research so you can focus on what's important—your next discovery.



#### Suspended particles

Sand, silt, clay, and other suspended particles cause water to be turbid. These suspended particles can interfere with instrument operation, plug valves and other narrow flow paths, and foul RO membranes. They typically range from 1 to 10  $\mu\text{m}$  in size.



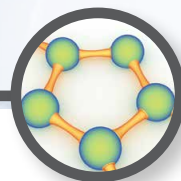
#### Colloids

Colloidal particles typically have a slightly net negative charge, range in size from 0.01 to 1.0  $\mu\text{m}$ , and can be either organic or inorganic. Unlike suspended particles, colloids do not settle out by gravity, but remain suspended in the liquid that carries them. Colloids clog filters, interfere with instrument operation, foul RO membranes, and can bypass ion exchange resins, resulting in lower resistivity in deionized water systems.



#### Inorganic ions

Impurities such as silicates, chlorides, fluorides, bicarbonates, sulfates, phosphates, nitrates, and ferrous compounds are present as cations (positively charged ions) and anions (negatively charged ions). Water with a high concentration of ions will conduct electricity readily and have high conductivity and low resistivity, as conductivity and resistivity are inversely related. Ions will adversely affect the results of inorganic analyses such as IC, AA, ICP-MS and may inhibit cell and tissue growth in biological research. They can also affect cartridge life in deionized water systems.

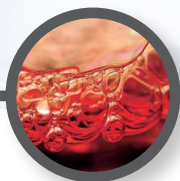


#### Dissolved organics

Organic solids are present from plant and animal decay and from human activity. They may include proteins, alcohols, chloramines, residues of pesticides, herbicides and detergents. They foul ion exchange resins; interfering with organic analyses including HPLC, gas chromatography, and fluoroscopy. They will also hinder electrophoresis, tissue, and cell culture.

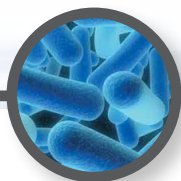
Contaminants to avoid in your lab water

Application and interest areas	Particulates	Colloids	Ions	Dissolved gases	Organics	Nucleases	Pyrogens
<b>General lab purpose</b>							
Autoclave	•	•	•				
Humidification	•	•	•				
Glassware washing/rinsing	•	•	•				
Media preparation	•	•	•				
<b>Analytical</b>							
Ion chromatography (IC)	•	•	•	•			
Atomic absorption (AA)	•	•	•	•			
High-performance liquid chromatography (HPLC)	•	•	•	•	•		
Inductively coupled plasma spectroscopy (ICP)	•	•	•	•	•		
Mass spectroscopy (MS)	•	•	•	•	•		
Gas chromatography (GC)	•	•	•	•	•		
Total organic carbon (TOC)	•	•	•	•	•		
<b>Life sciences</b>							
Genomics (e.g., PCR, mutagenesis)	•	•	•	•	•	•	•
Proteomics (e.g., crystallography, electrophoresis)	•	•	•	•	•	•	•
Immunology (e.g., monoclonal antibody production, blots)	•	•	•	•	•	•	•
Pharmacology	•	•	•	•	•	•	•
Cell and tissue culture	•	•	•	•	•	•	•
Drug discovery	•	•	•	•	•	•	•



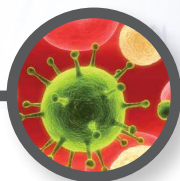
### Dissolved gases

Water naturally contains dissolved gases such as carbon dioxide, nitrogen, and oxygen. Carbon dioxide dissolves in water to form weakly acidic carbonic acid (H<sub>2</sub>CO<sub>3</sub>), which can alter the pH of water. Additionally, oxygen, the most common non-ionized gas, may cause corrosion of metal surfaces.



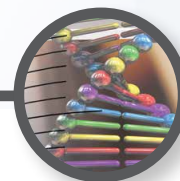
### Microorganisms

Bacteria, fungi, and algae are found in all natural water sources. Chlorination eliminates harmful bacteria, but tap water still contains live microorganisms that interfere with sterile applications, such as cell and tissue culture.



### Pyrogens and viruses

Pyrogens or bacterial endotoxins are lipopolysaccharide molecules incorporated in the cell membrane of gram negative bacteria. Viruses are considered to be non-living nucleic acids. Both can adversely affect laboratory experiments often hindering cell and tissue growth in culture.



### Nucleases

RNase and DNase are naturally occurring enzymes that are instrumental in regulating bodily functions. As important as these enzymes are to life's processes, they can be devastating to nucleic acid experiments. If these contaminants are present in the lab water used, the ability to amplify DNA molecules will be severely limited. Likewise, experiments utilizing RNA can be ruined.

# Barnstead water purification technologies

To make pure and ultrapure water, the impurities discussed on the previous page must be efficiently and effectively removed. Barnstead water purification systems employ multiple technologies, to remove impurities and give you consistently pure water.

Water purification is a step-by-step process, often requiring a combination of technologies, each of which varies in the ability to remove specific contaminants.

The table below illustrates which impurities are removed by each technology.

	Distillation	Reverse osmosis (RO)	Deionization	Electro-deionization (EDI)	Filtration	Ultrafiltration (UF)	Adsorption	Ultraviolet (UV) oxidation	Combination UV/UF
Inorganic ions	Excellent	Good	Excellent	Excellent	Poor	Poor	Poor	Poor	Poor
Dissolved gasses	Good	Poor	Excellent	Excellent	Poor	Poor	Good	Poor	Poor
Organics	Good	Good	Poor	Poor	Poor	Poor	Excellent	Excellent	Excellent
Particles	Excellent	Excellent	Poor	Poor	Excellent	Excellent	Poor	Poor	Excellent
Bacteria	Excellent	Excellent	Poor	Poor	Excellent	Excellent	Poor	Excellent	Excellent
Pyrogens	Excellent	Excellent	Poor	Poor	Poor	Excellent	Good	Poor	Excellent
Nucleases	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Excellent





## Speaking the language of lab water

### Distillation

#### Distillation

Distillation has the broadest ability to remove impurities from water in a single purification step.

Water is boiled and undergoes phase changes during the distillation process, changing from liquid to vapor and back to liquid. It is the change from liquid to vapor that separates the water (in various degrees) from many dissolved impurities, such as ions, organic contaminants with low boiling points <100°C, bacteria, pyrogens, and particulates. Distillation cannot be used on its own to remove inorganic ions, ionized gases, organics with boiling points higher than 100°C, or dissolved non-ionized gases.

#### Benefits

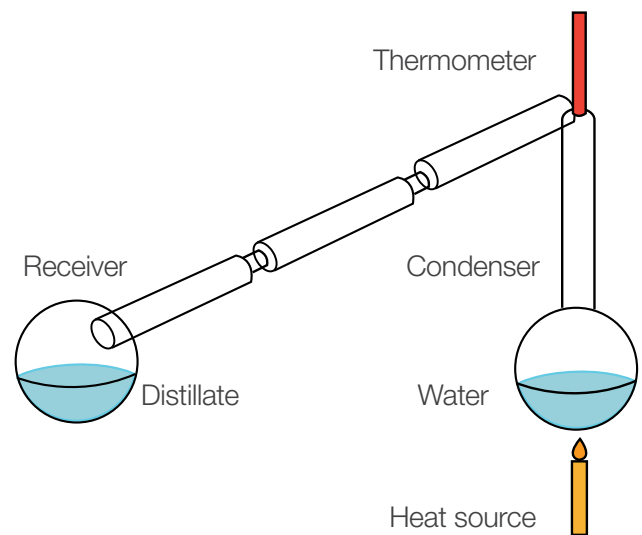
- Offers the broadest capabilities to remove impurities in a single purification step
- Requires no consumables

#### Limitations

- Requires periodic maintenance and manual cleaning of system to maintain water purity
- Requires water for cooling

#### Systems that utilize this technology

Thermo Scientific™ Barnstead™ Classic Stills and Mega-Pure Stills



A basic distillation diagram



Barnstead Classic Stills

## Speaking the language of lab water

### Filtration and ultrafiltration

#### Filtration

Barnstead water purification products offer both depth and membrane filters.

Depth filters are most commonly used as a pretreatment and are manufactured by winding fibers around hollow and slotted tubes. As water passes through the wound fiber matrix toward the center tube, particles are retained on the fibers. Traditionally this type of filter removes most of the impurities above the rated pore size of the filter. Most often these filters are rated to remove larger particles (>1  $\mu\text{m}$ ) protecting the technologies that follow.

Membrane filters use a membrane, (in the form of a flat sheet or hollow fiber), and are most often used at the end of a system to remove bacteria or other particles that are not removed by the preceding technologies. Traditionally membrane filters in laboratory water systems have a rated pore size below 0.45  $\mu\text{m}$ , most often 0.2  $\mu\text{m}$ .

#### Benefits

- Efficient operation
- Easy to replace filters

#### Limitations

- Clogging
- Will not remove organics, nucleases, pyrogens, dissolved gases or dissolved inorganics

#### Systems that utilize this technology

- Thermo Scientific™ Barnstead™ GenPure™, MicroPure™, E-Pure™, LabTower™ EDI, Smart2Pure™, Pacific TII, and LabTower™ TII Water Purification Systems b-pure B-Pure™



Sterile filter

Ultrafilter

#### Ultrafiltration (UF)

In water purification, ultrafiltration is used to remove pyrogens (bacterial endotoxins) and nucleases, which is critical for tissue culture, cell culture, and media preparation.

Ultrafilters use size exclusion to remove particles and macromolecules. By design, ultrafilters operate similarly to reverse osmosis membranes—particles are captured on the surface of the membranes and are flushed from the membrane via a reject stream. Ultrafilters are used near the end of systems ensuring the near total removal of macromolecular impurities like pyrogens, nucleases, and particulates.

#### Benefits

- Effectively removes molecules (pyrogens, nucleases, microorganisms, particulates) larger than the size of the pore
- Inline ultrafilters with large surface area and longer life
- Helps to remove pyrogens and nucleases

#### Limitations

- Will not remove dissolved inorganics, dissolved gases, and organics
- Systems that utilize this technology Barnstead GenPure, MicroPure, and Smart2Pure Water Purification Systems

## Speaking the language of lab water

### Reverse osmosis

#### Reverse osmosis (RO)

Reverse osmosis is the most economical method of removing up to 99% of feed water contaminants.

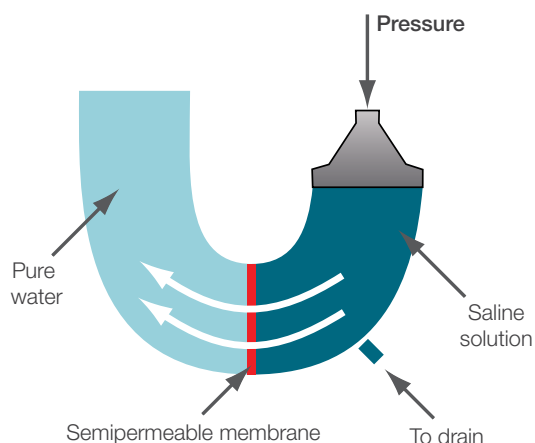
To understand RO, you must first understand osmosis. During natural osmosis, water flows from a less concentrated solution through a semipermeable membrane to a more concentrated solution until concentration and pressure on both sides of the membrane are equal.

In water purification systems, external pressure is applied to the more concentrated (feed water) side of the membrane to reverse the natural osmotic flow. This forces the feed water through the semipermeable membrane. The impurities deposited on the membrane surface are sent to drain and the water that passes through the membrane as product water is, for the most part, free of impurities.

A RO membrane has a thin microporous surface that rejects impurities, but allows water to pass through. The membrane rejects bacteria, pyrogens, and 90–95% of inorganic solids. Polyvalent ions are rejected easier than monovalent ions. Organic solids with a molecular weight greater than 200 Da are rejected by the membrane but dissolved gases are not as effectively removed.

RO is based on percent rejection technology. The purity of the product water depends on the purity of the feed water. The product is typically 95–99% higher in purity than that of the feed water.

Due to the restrictive nature of the membrane, the flow rate is much slower than other purification technologies. This slow flow rate means that all RO systems require a storage reservoir to provide a constant supply of RO water ready when you need it.



#### Benefits

- To varying degrees, removes most types of contaminants, bacteria, pyrogens, and 90–95% of inorganic ions
- Requires minimal maintenance

#### Limitations

- Limited flow rates through the membrane require intermediate storage devices to meet user demand
- Does not remove dissolved gases
- Requires pretreatment to avoid damaging the membrane
  - Oxidation: chlorine
  - Scaling:  $\text{CaCO}_3$
  - Fouling: organics and colloids
  - Piercing: hard particles

#### Systems that utilize this technology

- Barnstead Smart2Pure, LabTower EDI, Pacific TII, LabTower TII, Pacific RO, LabTower RO Water Purification Systems



**Barnstead Pacific RO and Barnstead Lab Tower RO water systems**

## Speaking the language of lab water

### Deionization

#### Deionization

Deionization is also referred to as demineralization or ion exchange.

The process removes ions from feed water with the use of synthetic resins. These resins are chemically altered to have an affinity for dissolved inorganic ions and are divided into two classifications: cation removal resins and anion removal resins.

Cations have a positive charge and include sodium ( $\text{Na}^+$ ), calcium ( $\text{Ca}^{2+}$ ) and magnesium ( $\text{Mg}^{2+}$ ). Anions have a negative charge and include chloride ( $\text{Cl}^-$ ), sulfates ( $\text{SO}_4^{2-}$ ), and bicarbonates ( $\text{HCO}_3^-$ ). The ions are removed from the water through a series of chemical reactions. These reactions take place as the water passes through the ion exchange resin beds. Cation resin contains hydrogen ( $\text{H}^+$ ) ions on the surface, which are exchanged for positively charged ions. Anion resin contains hydroxide ( $\text{OH}^-$ ) ions on its exchange sites which are exchanged for negatively charged ions. The final product of these two exchanges is  $\text{H}^+$  and  $\text{OH}^-$ , which combine to form water ( $\text{H}_2\text{O}$ ).

Deionization is the only technology which produces the resistivity requirement for Type 1 reagent-grade water. In laboratory water systems, cation and anion resins are most often mixed together allowing them to achieve maximum ionic purity.

#### Two-bed deionization

The cation and anion resin are in separate halves of a cartridge. In general, this method is less effective deionizing water as compared to the mixed-bed deionization; however, it is more tolerant of other types of impurities.

#### Mixed-bed deionization

We use semi conductor-grade, mixed-bed deionization resin to achieve maximum resistivity and low TOC. Mixing the cation and anion resin drives the deionization to completion, making it more efficient and more effective at the removal of ions.

#### Benefits

- Removes dissolved inorganic ions very effectively
- Produces product water with a resistivity above 18  $\text{M}\Omega\cdot\text{cm}$

#### Limitations

- Finite capacity—once all ion binding sites are occupied, ions are no longer retained and the cartridge must be replaced
- Does not remove organics, particles, pyrogens, or bacteria

#### Systems that utilize this technology

Barnstead GenPure, MicroPure, E-Pure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII, and the Thermo Scientific™ Bantam™ Water Purification Systems, and Barnstead™ Hose Nipple, and B-Pure™ cartridges

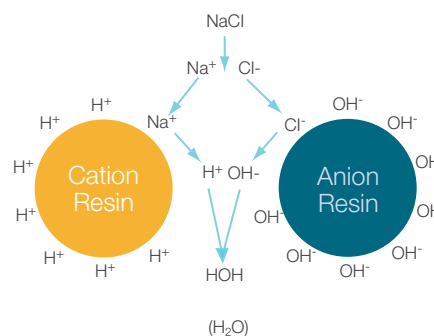
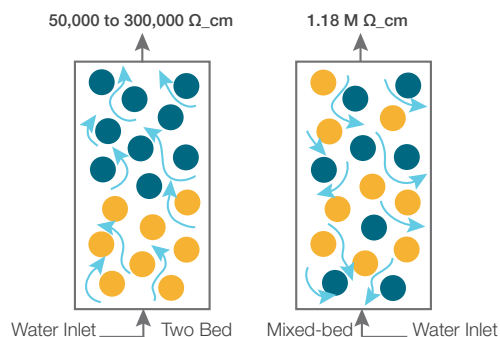


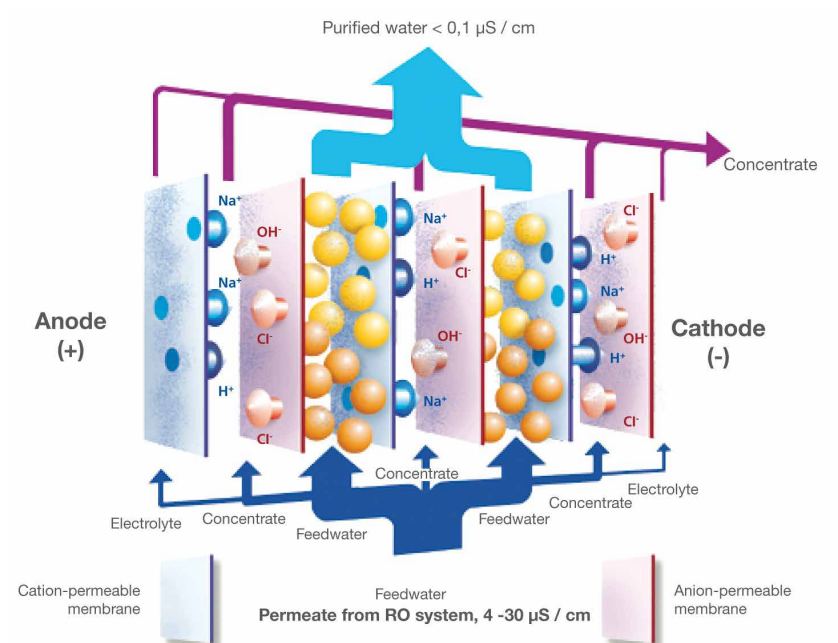
Diagram showing how cations and anions are exchanged on the resin



Two-bed resin is shown on the left and mixed-bed resin in on the right

## Speaking the language of lab water

### Electrodeionization



#### Process of electrodeionization

#### Electrodeionization (EDI)

In contrast to conventional ion exchange in which resins are exhausted and must either be thrown away or chemically regenerated, EDI utilizes an electric current for continual resin regeneration.

#### How EDI works

Several layers of ion selective membranes are positioned between an anode and a cathode. Layered ion exchange resin beds and concentrate chambers are alternately positioned between them.

On applying an electric voltage, water ( $\text{H}_2\text{O}$ ) is split into  $\text{H}^+$  and  $\text{OH}^-$  in the cell. The  $\text{H}^+$  and  $\text{Na}^+$  cations can migrate through the cation permeable membranes and anions through the anion permeable membranes.

The ions migrate in the direction of the applied voltage, anions to the positive pole (anode), cations to the negative pole (cathode). The water ions  $\text{H}^+$  and  $\text{OH}^-$  that migrate through an ion exchange

chamber displace salt ions retained by the ion exchanger resins and so continually regenerate the resins. The salt ions migrate through the appropriate ion-selective membranes into the concentrate chambers and are flushed out by water. As all concentration chambers are flushed through one after the other, excess  $\text{H}^+$  and  $\text{OH}^-$  ions can again combine to form  $\text{H}_2\text{O}$ .

#### Benefits

- Effectively removes ions
- Continuously regenerates automatically

#### Limitations

- Limited capacity—feed water must be of high quality
- Does not remove organics, particles, pyrogens or bacteria

#### Systems that utilize this technology

- Barnstead LabTower EDI Water Purification System

## Speaking the language of lab water

### Adsorption

#### Adsorption

Adsorption uses high surface area of activated carbon to remove organics and chlorine from feed water.

It is used as a first or second step in most water purification systems and may be used as a final step, in combination with ion exchange resins, to achieve ultralow TOC. Organics and chlorine adhere to the surface of the activated carbon and remain attached to the carbon.

#### Mixed-bed deionization and adsorption

A combination semiconductor-grade mixed-bed deionization resin and synthetic carbon in a single cartridge are used to achieve maximum resistivity and low TOC.

#### Benefits

- Removes dissolved organics and chlorine
- Long life

#### Limitations

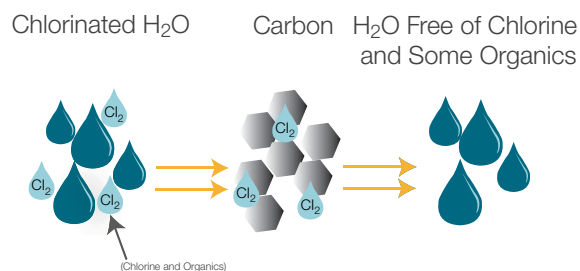
- Will not remove ions and particulates

#### Systems that utilize this technology

- Barnstead GenPure, MicroPure, E-Pure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII, and the Bantam Water Purification Systems, and Hose Nipple, and Barnstead B-Pure cartridges



Selection of high-quality resins used in our cartridges



Feed water with organic and chlorine contaminants come into contact with the activated carbon in the cartridge. The impurities adhere to the surface of the carbon, allowing purified water to be produced.



# Speaking the language of lab water

## Ultraviolet oxidation

### Ultraviolet (UV) oxidation

Photochemical oxidation with ultraviolet light eliminates trace organics and inactivates microorganisms in feed water.

The UV lamps in our lab water systems generate light at two wavelengths, 185 and 254 nm. The light generated at 254 nm has the most optimal anti-bacterial action, reacting with their DNA, resulting in inactivation.\* The combination of 2-wavelength (185 and 254 nm) light oxidizes organic compounds, allowing for total oxidizable carbon levels of less than 5 ppb. (Based on the water supply meets feed water TOC specifications.)

### Benefits

- Effective method to prevent bacterial contamination
- Oxidizes organics to produce pure water with low TOC levels

### Limitations

- Will not remove ions and particulates

### Systems that utilize this technology

- Barnstead GenPure, MicroPure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII Water Purification Systems

PMCID: PMC3292282

NIHMSID: NIHMS357126

PMID: 22339192

Ultraviolet C irradiation: an alternative antimicrobial approach to localized infections?

Tianhong Dai,<sup>1,2</sup> Mark S Vrahas,<sup>3</sup> Clinton K Murray,<sup>4</sup> and Michael R Hamblin<sup>1,2,5,\*</sup>

### Combination ultraviolet oxidation and ultrafiltration (UV/UF)

The use of ultraviolet oxidation and ultrafiltration technologies in conjunction with adsorption and deionization in the same system produces water virtually free of all impurities.

These technologies have demonstrated the ability to remove nucleases such as RNase and DNase as well as pyrogens when challenged with known concentrations of the material.

The Type 1 systems with UV/UF options produce reagent grade water with resistivity up to 18.2 MΩ.cm, TOC of 1-5 ppb, pyrogens <0.001 EU/mL and no detectable RNase, DNase or DNA. :

### Benefits

- Removes nucleases and DNA
- Produces water with low TOC and pyrogen levels

### Limitations

Must be used in the same system

### Systems that utilize this technology

- Barnstead GenPure, MicroPure, and Smart2Pure Water Purification Systems



# International water standards

## What does Type 1 water mean?

### Reagent water has quantitative specifications that describe the level of purity for the water.

These specifications have been described by American Society for Testing and Materials (ASTM) D1193, International Organization for Standardization (ISO) 3696 and Clinical and

Laboratory Standards Institute-Clinical Laboratory Reagent Water (CLSI™-CLRW).

The most commonly used standards, ASTM D1193-6, are summarized in the tables below.

ASTM standards for reagent water			
Measurement (unit)	Type I	Type II	Type III
Resistivity (MΩ.cm) at 25°C	>18	>1	>4
Total organic carbon (ppb)	<50	<50	<200
Sodium (ppb)	<1	<5	<10
Chloride (ppb)	<1	<5	<10
Total silica (ppb)	<3	<3	<500

The ASTM standards are further subdivided into A, B, and C. These standards can be used in conjunction with the Type of water.

ASTM Standards for Reagent Water			
Measurement (unit)	A	B	C
Heterotrophic bacteria count (CFU/mL)	10/1,000	10/100	1,000/10
Endotoxin (units per mL)	0.03	0.25	N/A

Here are some additional definitions of the parameters they use to indicate the water's purity.

### Resistivity

#### The tendency of water without ions to resist conducting electricity.

The unit of measure is megohm centimeter (MΩ.cm), often shortened to MΩ or "meg". It is generally used for high-purity water. The theoretical maximum is 18.2 MΩ.cm at 25°C. The higher the ionic content, the lower the resistivity. Conversely, the lower the ionic content, the higher the resistivity (high resistivity is good). In ultrapure water systems this value is determined using an in-line meter. Conductivity and resistivity measurements are inversely related to each other.

### Conductivity

#### The tendency of water that contains ions to conduct electricity.

The unit of measure is microsiemens/centimeter (μS/cm) or microhm/cm. The measurement is used to measure feed water or lower quality treated water. The more ions present in the water, the higher the conductivity. This is measured by a conductivity meter.

### TOC

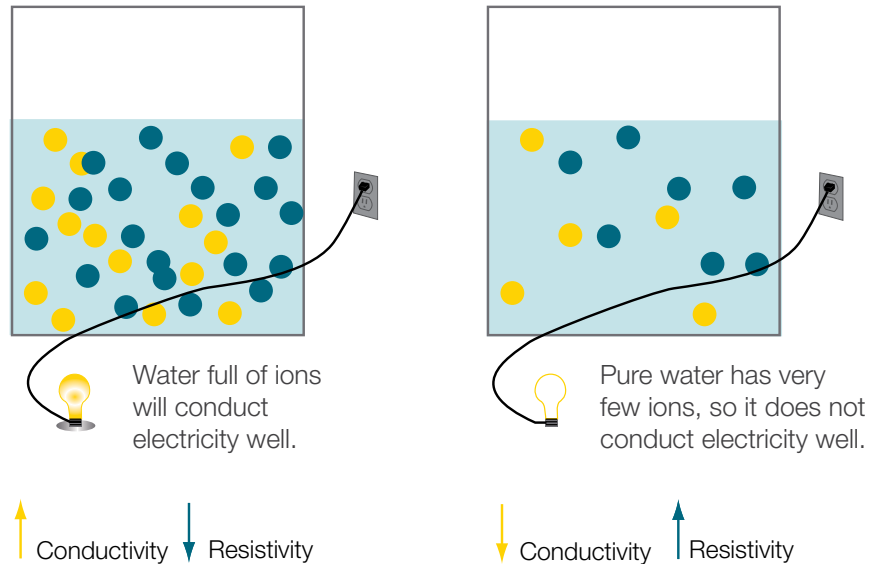
#### A measure of the organic contaminants found in water.

The unit of measure is parts per million (ppm) or parts per billion (ppb). Feed water can be in the 2–5 ppm range and the best high-purity water should be in the 1–5 ppb range. Measurement of TOC is done using an in-line system.



# Advanced technologies used to monitor purity

## Conductivity and resistivity



### Conductivity and resistivity

Electrical conductance or resistance is measured by two in-line electrodes. Electrical current moves through water using ionic molecules as stepping stones. The fewer stepping stones, the more difficult the passage of electricity. This causes less electrical conductance and more electrical resistance. The temperature of the water also affects the conductivity and resistivity so readings are usually normalized to 25°C via temperature compensation.

We use resistivity to measure ion concentration in pure water. We understand water and realize that in order to achieve Type 1 water, meeting the most stringent requirements of our customers, multiple technologies must be used.

# Building your own water system



## What type of water system do you need?

When designing your water system, we suggest you take time to evaluate the applications and interest areas of the lab now and in the future. Take a look at the table below to determine what type(s) of water you need.

Application and interest areas	Type of water			
	Ultrapure Type 1	Pure Type 2	RO	Cartridge and filter systems
<b>General lab purpose</b>				
Autoclave		•	•	•
Humidification		•	•	•
Glassware washing/rinsing		•	•	•
General lab equipment (water baths, incubators, etc.)		•	•	•
Feed water to Type 1 systems		•		
Media prep		•		
Buffer prep		•		
Chemical and biochemical reagent prep		•		
<b>Analytical</b>				
High-performance liquid chromatography (HPLC)	•			
Gas chromatography (GC)	•			
Ion chromatography (IC)	•			
Inductively coupled plasma spectroscopy (ICP)	•			
Mass spectroscopy (MS)	•			
Atomic absorption (AA)	•			
Total organic carbon (TOC)	•			
<b>Life sciences</b>				
Genomics (e.g., PCR, mutagenesis)	•			
Proteomics (e.g., crystallography, electrophoresis)	•			
Immunology (e.g., monoclonal antibody production, blots)	•			
Pharmacology	•			
Cell and tissue culture	•			
Drug discovery	•			
Molecular biology	•			
Microbiology	•			

# Building your own water system

## Ultrapure (Type 1) water and pure (Type 2) water

### What Barnstead water systems provide

Our water systems are engineered to be used independently or in conjunction with our other water systems for more flexibility. Below is a summary of our product lines for each water type.



**Barnstead GenPure  
Water Purification System**



**Barnstead Smart2Pure  
Water Purification System**

### Ultrapure (Type 1) water

This grade of water is required for your most sensitive and critical laboratory applications. Type 1 water can be made free of pyrogens nucleases, bacteria, and particulates. It has the highest purity, but is also the most expensive to generate.

If your applications require different types of water, let our experts assist with designing a water purification system specific to your needs.

The below systems provide you with the Type 1 water you need for your applications.

- Barnstead LabTower EDI Water Purification System
- Barnstead Smart2Pure Water Purification System
- Barnstead GenPure Water Purification System
- Barnstead MicroPure Water Purification System
- Barnstead E-Pure Water Purification System

The ultrapure systems differ in their features and daily volume output, so please see the Type 1 section for complete information.

### Pure (Type 2) water

Type 2 water is most widely used in general laboratory applications, such as reagent preparation and glassware rinsing. It is also commonly used to feed our Type 1 systems to create a comprehensive water system.

The below systems provide you with the Type 2 water you need for your applications.

- Barnstead Pacific TII Water Purification System
- Barnstead LabTower TII Water Purification System
- Barnstead Mega-Pure Glass Stills Water Purification System
- Barnstead Classic Stills Water Purification System

## Speaking the language of lab water

### Reverse osmosis (RO water), Cartridge and filter systems



Barnstead GenPure xCAD Plus water purification system, shown with two additional remote dispensers

#### Reverse osmosis (RO) water

RO is a percent removal technology, thus the purity of the product water is directly dependent on the quality of the feed water. Accordingly, it can not be generally classified as a specific “type” of water.

RO water is recommended for use in general laboratory equipment such as the sterilizer, dishwasher, and water baths.

The systems mentioned below provide you with the RO water you need for your applications.

- Barnstead Pacific RO water systems
- Barnstead LabTower RO water systems



Barnstead Hose Nipple Cartridge and Holder



Barnstead B-Pure Cartridge System



Barnstead Bantam Deionizer

#### Cartridge and filter Systems

Cartridges are a great option for laboratories either needing point of use polishing of pretreated water or single state treatment of tap water.

The below cartridge and filter systems are available for your specific application needs.

- Barnstead B-Pure Single and Double Cartridge Systems
- Barnstead Hose Nipple cartridges
- Bantam deionizer
- Barnstead 1/2 Size B-Pure filters

# Building your own water system

## Lab case studies

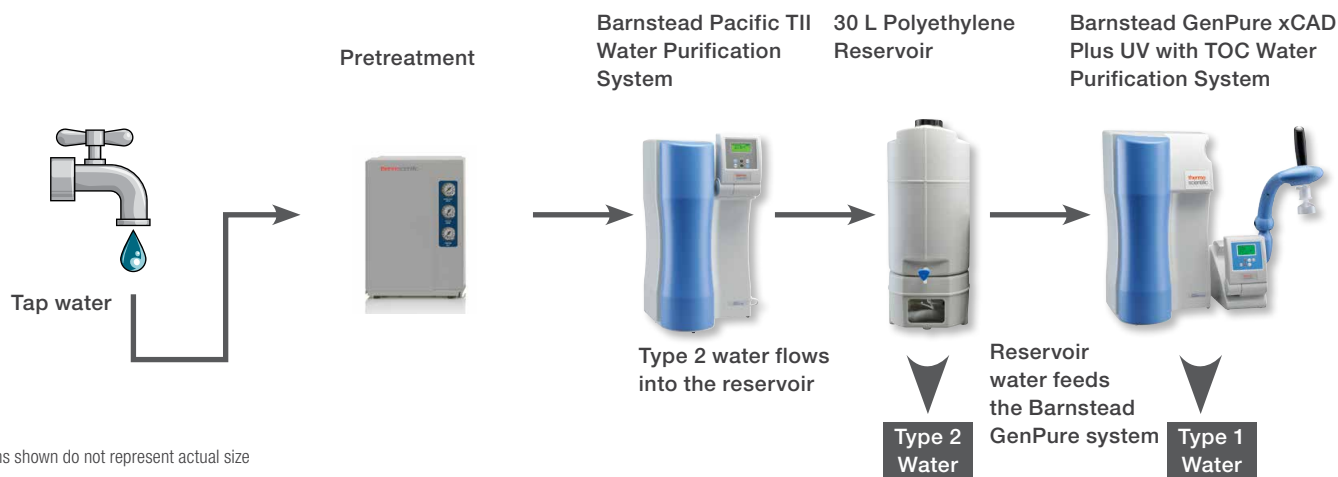


Smart2Pure Pro Water System

Watson lab	
Applications in the lab	Cell and tissue culture, PCR, media prep, and HPLC
Water type(s) needed	Type 1 (low organics, pyrogens, and nucleases) and Type 2 water
Solution	Smart2Pure Pro system with external storage tank with pump

The Watson lab is a traditional cell and molecular biology lab with a tap water source, so they needed a system that is capable of producing Type 1 water free of nucleases, pyrogens, and bacteria. Our Barnstead Smart2Pure Pro UV/UF is perfect for their ultrapure water needs.

Our Barnstead Smart2Pure Pro will also produce Type 2 water for all general lab uses.



Le lab	
Applications in the lab	ICP-MS, GC-MS, HPLC, chemical and buffer prep
Water type(s) needed	Type 1 (with low organics) and Type 2 water
Solution	Barnstead Pacific TII and the Barnstead GenPure Pro with TOC Water Systems

The Le lab performs analytical experiments on a daily basis. They would like to make their own buffers and reagents, so we suggested a configuration that would give the lab both Type 1 and Type 2 water.

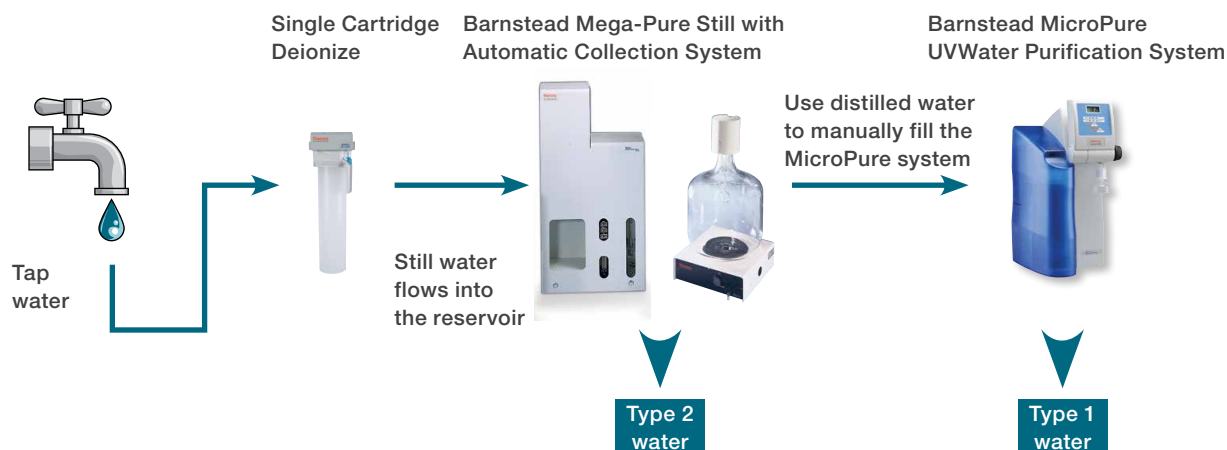
Our Barnstead Pacific TII converts tap water into Type 2 water, which is stored in the 30 L integrated reservoir. Water can be drawn from the reservoir or from our Barnstead GenPure xCAD UV with TOC (which has a 0.2 µm on it to ensure bacteria-free water). The reservoir feeds our Barnstead GenPure xCAD system, which will deliver ultrapure (Type 1) water.

If the customer already has a building for purified water source (e.g., service DI, reverse osmosis, or distillation) then the Pacific TII would not be necessary to pretreat the GenPure system.

# Speaking the language of lab water

## Mix and match for greater flexibility

Our water systems are designed to mix and match, as many laboratories have the need for multiple types of water. Here are some examples of our systems built for use in labs with diverse interest areas.



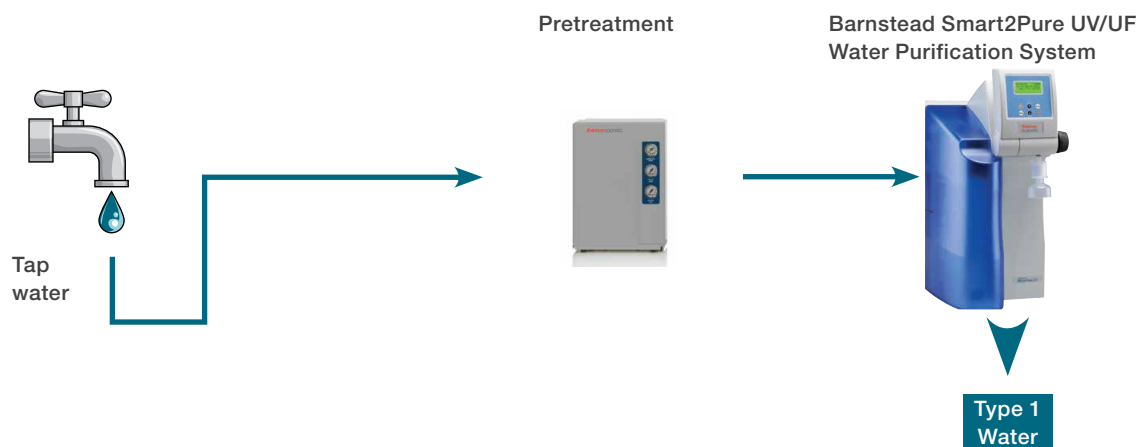
### Bauer lab

**Applications in the lab**      General lab use, rinsing of glass and plastic ware, media prep, HPLC

**Water type(s) needed**      Type 1 and Type 2 (distilled)

**Solution**      Barnstead Mega-Pure Still with Automatic Collection System and a Barnstead MicroPure UV system with storage tank

The Bauer lab needed Type 1 water for their HPLC and analytical experiments (estimated to be less than 15 L a day) and distilled water for general reagent preparation and glassware rinsing, thus our Barnstead MicroPure UV system and a Barnstead Mega-Pure Still with Automatic Collection System were recommended. A dual-cartridge deionizer was also suggested as pretreatment to the still as the lab's tap water was especially hard.



### Simpson lab

**Applications in the lab**      Protein purification and PCR

**Water type(s) needed**      Type 1

**Solution**      Barnstead Smart2Pure UV/UF slide

Biochemical techniques such as protein purification and PCR are important for the Simpson lab, but they have serious space constraints. Our Barnstead Smart2Pure UV/UF system is the all-in-one solution for tap to Type 1 water. It converts tap water to ultrapure water and has a small foot print. The UV/UF option will provide the lab with nuclease free water, perfect for their sensitive applications.

# Ultrapure water purification systems

## Type 1

What sets Barnstead water purification systems apart?

Our Barnstead water purification portfolio includes a complete line of Type 1 systems to meet all your ultrapure water needs.

Why are there so many options?

For you to have a tailored system specifically for your needs; no need to pay for technologies that you won't use.





## Innovation

UV and feed water monitoring for maximum efficiency.

EDI systems with reservoir recirculation maintains purity even between use.



## Convenience

Quick-change cartridge design simplifies self maintenance.

All required parts and accessories ship under one part number.



## Flexibility

Full system control at the Barnstead GenPure xCAD Plus remote dispenser.



# Feedwater—Type 1

## Barnstead ultrapure water purification system selector guide

Select the water system that best fits your requirements

Benefits

	Select the water system that best fits your requirements	Benefits
Applications	Ultralow organic levels, <5 ppb HPLC, TOC, GC-MS, ICP, ICP-MS	UV oxidation is necessary for the removal of organics in the feed water, reduces organic levels to >5 ppb, and protects against microorganisms.
	Cell culture, monoclonal antibody production, electrophoresis	Ultrafiltration removes pyrogens from the feed water.
	Nuclease and pyrogen-free applications such as PCR, 2D electrophoresis, cell culture, blotting	UV/UF is the most common combination of technologies—used to reduce organics and remove pyrogens and nucleases
Technology	UV monitoring	Photosensor continually checks the intensity of the UV lamp. A decrease could result in an incorrect TOC measurement result.
	Feed water monitoring	Feed water monitoring alerts you to fluctuations in feed water quality.
	TOC monitor	Real-time monitor of the amount of organic materials in the product water shown on the display.
Features	Volumetric Dispensing	Dispense at the push of a button. Control from 0.01 L to 65 L with an accuracy of <2%.
	GenPure xCAD Plus remote dispenser	Allows for full control of the system at the GenPure xCAD Plus remote dispenser.
	Under-the-bench mounting	Ideal when bench space is tight. System sits under the bench and out of sight.
	RS-232 data printing at pre-programmed intervals	Satisfies GLP guidelines, data available in print.
Capacity	Optimal amount of water to use daily to sustain reasonable cartridge life	Expands with your laboratory and application needs.

Tap water feed required

Pretreated water feed required



	GenPure xCAD Plus system	GenPure Pro system	GenPure system	MicroPure system	E-Pure system	LabTower EDI system	Smart2Pure system
	Full control at the GenPure xCAD Plus remote dispenser	Flexible dispensing	Economical Type 1 water	Smaller capacity for optimal value	Simple design, great value	Produces Type 1 and 2 with EDI technology	Compact unit producing Types 1 and 2
	•	•	•	•	—	•	•
	•	•	•	•	—	—	•
	•	•	•	•	—	—	•
	•	•	—	—	—	—	—
	•	•	•	•	—	—	—
	•	•	—	—	—	—	—
	•	•	—	—	—	—	—
	•	—	—	—	—	—	—
	•	—	—	—	—	—	—
	•	•	•	—	—	•	•
	200 L/day	200 L/day	200 L/day	15 L/day	100 L/day*	200 L/day	70 L/day

\* Applicable when using pre-treated feed water only.

# Barnstead GenPure xCAD Plus Water Purification System

The Barnstead GenPure xCAD Plus system delivers ultrapure 18.2 M $\Omega$ .cm water with consistent quality for the most demanding and sensitive applications. The xCAD remote dispenser provides flexibility and control.

All Barnstead GenPure systems exceed international standards ASTM Barnstead Type I, ISO 3696 Grade 1, ASTM D1193 and CLSI-CLRW.



## Simultaneously dispense from up to three dispensers

- Each system ships with a single GenePure xCAD Plus remote dispenser
- For increased flexibility, optional accessory to add one or two more additional Barnstead GenPure xCAD Plus dispensers for up to 3 dispensers from one unit  
Dispense from all three simultaneously

## Integrated feed water monitoring

- Feed water monitoring alerts user if poor quality feed water is entering system impacting cartridge life

## Online TOC measurement with UV intensity monitoring\*

- Real-time TOC monitoring for continual measurement of organic substances present in the water
- Continuous monitoring of UV intensity with exclusive photosensor which ensures proper UV light operation for most accurate TOC measurements
- Fault message alerts user when the UV lamp intensity is no longer sufficient for accurate TOC measurements

## UV photo-oxidation at 185/254 nm

- High performance UV assembly reliably reduces the amount of microorganisms and their metabolites
- UV oxidation reduces organic compounds in the water to ultralow levels

## Leak detection

- Internal leak detector with red display and message alert

## Ready-to-use

- Wall bracket, UV lamp, ultrapure cartridge, ultrafilter (select models), sterile filter, all included in one part number

## Measurement of conductivity/resistivity

Conductivity cells are carefully calibrated prior to each measurement via built-in reference resistance with cell constants at 0.01 cm<sup>-1</sup>

Temperature measurements are made by a platinum chip sensor with  $\pm 0.1^{\circ}\text{C}$  accuracy

## Quick-connect cartridge replacement

- Aquastop quick-connect capability enables cartridge replacement within seconds

## Superior filters

- Ultrafilter is flushed automatically to assure the highest retention of endotoxins and nucleases, which produces a service life up to two years

## Exact dosing

- Electronic dosing for fully automatic volume control of 0.01–65 L with <2% accuracy

### Applications include Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC measurements, IC

Optionally Available Online TOC measurement with UV intensity monitoring

# Full control, extreme flexibility

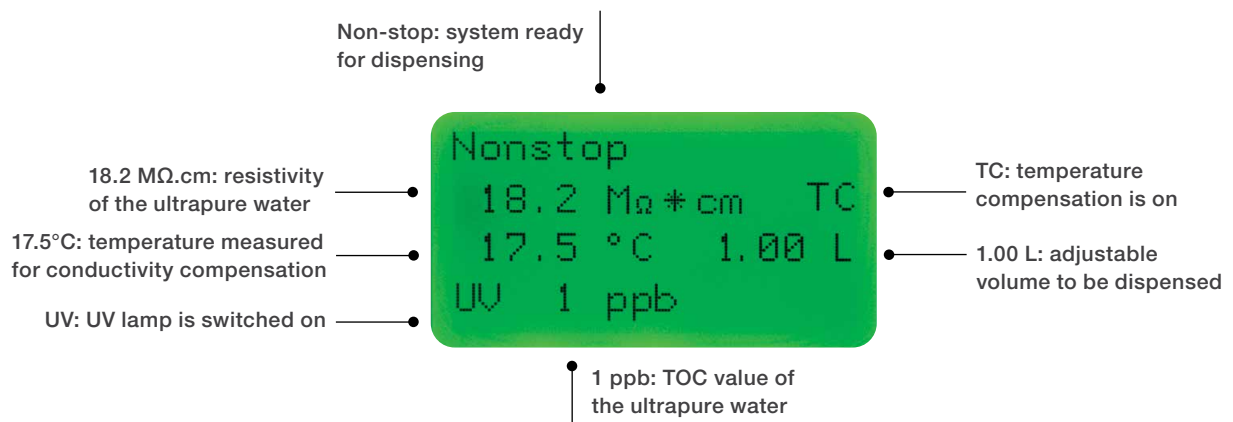
## GLP-compliant documentation

- Real-time clock and code-protected operating system prevents unauthorized changes to system settings
- Digital microprocessor control automatically monitors and stores faults from the last four weeks
- RS-232 interface with adjustable send-interval for safe data transfer of all measured data, faults, date, and time to a PC computer or log printer
- USP-compliant conductivity measurement with temperature compensation can be switched on or off

Quick look comparison				
	GenPure xCAD Plus UV system	GenPure xCAD Plus UV/UF system	GenPure xCAD Plus UV–TOC system	GenPure xCAD Plus UV/UF–TOC system
Applications	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Molecular biology, PCR, DNA, monoclonal antibodies, cell culture media	Chemical analysis (trace analysis, HPLC, IC, ICP-MS, TOC measurements)	Biosciences (cell and tissue culture media, PCR, DNA, monoclonal antibodies)
Resistance at 25°C, MΩ.cm	18.2	18.2	18.2	18.2
Conductivity, μS/cm	0.055	0.055	0.055	0.055
TOC, ppb	1–5	1–5	1–5	1–5
RNase, ng/mL	N/A	<0.003	N/A	<0.003
DNase, pg/μL	N/A	<0.4	N/A	<0.4
Bacteria, CFU/mL	<0.01	<0.01	<0.01	<0.01
Particles, 0.22 μm/mL	<1	<1	<1	<1
Endotoxins, EU/mL	N/A	<0.001	N/A	<0.001
TOC monitor	N/A	N/A	Standard	Standard
Flow rate, L/min	Up to 2	Up to 2	Up to 2	Up to 2

## Visible ultrapure water quality

Important conductivity/resistivity and TOC measurements are easy to read during dispensing.



# Barnstead GenPure xCAD Plus Water Purification System

## Barnstead GenPure xCAD Plus remote dispenser—full system control in a compact design

- xCAD is short for “Extended control and dispense.” The system provides more flexibility for ultrapure water dispensing with an action radius of 32 in. (80 cm).
- Ergonomic dispensing arm provides precise volume dosing at the press of a button.
- With ability to turn, adjust height, or extend it towards your vessel, you’ll appreciate the flexibility of this dispenser.
- One-of-a-kind design provides access to all system controls at your fingertips.
- Specify bench-top or wall-mount Barnstead GenPure xCAD Plus dispenser for the installation option of your choice. The small footprint of the bench-top xCAD Plus allows for more bench space while the wall-mount version completely frees up horizontal workspace.
- Adjustable controller makes usage more practical and provides a clear view of critical settings.
- In addition to flexible Barnstead GenPure xCAD Plus installation options, Barnstead GenPure systems can also be installed under the bench or wall-mounted with included mounting brackets up to 2.5 m (8 ft) away from Barnstead GenPure xCAD Plus dispenser.



Our Barnstead GenPure with xCAD Plus wall version dispensers, shown above. The Barnstead GenPure system is under the bench (not pictured), freeing up valuable bench space.



For increased flexibility, add up to two more GenPure with xCAD Plus bench version dispensers.



Complete water purification system control via the GenPure with xCAD Plus bench version dispensers.

## Barnstead GenPure xCAD dimensions

Dimensions W x D x H in. (mm)	
Benchtop xCAD system	10.2 x 21 x 28.5 (260 x 530 x 725)
Wall mount xCAD system	10.2 x 21 x 25.8 (260 x 530 x 655)

## Feed water Requirements\*

Source	water purified by reverse osmosis, ion exchange or distillation
Feed water conductivity, $\mu\text{S/cm}$	<2
TOC, ppb	max 50
Bacteria count, CFU/mL	<100
Turbidity, NTU	<1.0
Temperature, °C	2–35
Pressure, psi (bar)	1.4–87 (0.1–6)

\* Please see user manual for complete list of feed water requirements.

## Product specifications

Flow rate	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in. (mm)
Up to 2 L/min	90-240 V, 50/60 Hz	0.1 kW	3/4" NPT	14.6 x 13 x 24 (372 x 330 x 615)

## Ordering information

Barnstead system options		GenPure xCAD Plus UV	GenPure xCAD Plus UV/UF	GenPure xCAD Plus UV–TOC	GenPure xCAD Plus UV/UF–TOC
<b>Barnstead GenPure System*</b> All systems include a wall bracket, ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, pressure regulator, UV lamp and/or ultrafilter where applicable	With xCAD Plus bench version	50136152	50136151	50136153	50136146
	With xCAD Plus wall version	50136170	50136169	50136171	50136172
<b>Optional accessories</b>					
<b>xCAD Plus Remote Dispenser</b> Additional remote dispenser for increased flexibility. Up to 2 additional dispensers can be added to a single system	Bench version	50136494	50136494	50136494	50136494
	Wall version	50136505	50136505	50136505	50136505
<b>Disinfection cartridge</b> Reusable cartridge required to clean the water purification system; use with CMX25 cleaning solution		09.2201	09.2201	09.2201	09.2201
<b>Pressure regulator</b> Recommended where incoming feed pressure is above the specified range		50155462	50155462	50155462	50155462
<b>Printer</b> Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines		STARA-106	STARA-106	STARA-106	STARA-106
<b>Replacement consumables</b>					
Ultrapure polisher cartridge		09.2005	09.2005	09.2005	09.2005
Sterile filter, 0.2 $\mu\text{m}$		09.1003	09.1003	09.1003	09.1003
Ultrafilter		N/A	50133980	N/A	50133980
UV lamp		09.2002	09.2002	09.2002	09.2002
Cleaning solution		CMX25	CMX25	CMX25	CMX25

\*

# Barnstead GenPure Pro Water Purification System

The Barnstead GenPure Pro system delivers ultrapure 18.2 M $\Omega$ .cm water with consistent quality. Suitable for the most demanding laboratory applications, this ultrapure water system will deliver water from a small footprint. The Barnstead GenPure Pro system can be used on a laboratory bench or on a wall. The new flexible dispenser offers maximum freedom while dispensing ultrapure water up to 24 in. (60 cm) away from the unit.

All Barnstead GenPure systems exceed international standards—ASTM Barnstead Type I, ISO 3696 Grade 1, ASTM D1193, and CLSI-CLRW.

## Dispensing for a variety of tasks

- Flexible dispenser offers a radius of 24 in. (60 cm) from the system for filling larger vessels or glassware washing

## Leak detection

- Internal leaks can be detected and an error can be displayed

## Integrated feed water monitoring

- Feed water monitoring alerts user if poor quality feed water is entering system impacting cartridge life

## Online TOC measurement with UV intensity monitoring\*

- Real-time TOC monitoring for continual measurement of organic substances present in the water
- Continuous monitoring of UV intensity removes the risk of false TOC values due to diminished UV intensity
- Fault message alerts user when the UV lamp intensity is no longer sufficient for accurate TOC measurements

## UV photo-oxidation at 185/254 nm

- High-performance UV assembly reliably reduces the content of microorganisms and their metabolites
- UV oxidation also reduces organic compounds in the water to ultralow levels

Optionally Available Online TOC measurement with UV intensity monitoring



## Ready-to-use

- Wall bracket, UV lamp, ultrapure cartridge, ultrafilter (select models), sterile filter, all included in one part number
- Standard internal leak detector with red display and message alert

## Measurement of conductivity/resistivity

- Conductivity cells are carefully calibrated prior to each measurement via built-in reference resistance with cell constants at 0.01 cm<sup>-1</sup>
- Temperature measurements are made by a platinum chip sensor with  $\pm 0.1^{\circ}\text{C}$  accuracy

## Quick-connect cartridge replacement

- Aquastop quick-connect capability enables cartridge replacement within seconds

## Superior filters

- Ultrafilter is flushed automatically to assure the highest retention of endotoxins and nucleases, which produces a service life up to two years

## Exact dosing

- Electronic dosing for fully automatic volume control of 0.01–65 L with <2% accuracy

### Applications include Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC Measurements, IC



# Flexible dispensing and precise purity monitoring

## GLP-compliant documentation

- Real-time clock and pass code protected operating system prevents unauthorized changes to system settings
- RS-232 interface with adjustable send-interval for safe data transfer of all measured data, faults, date, and time to a PC computer or log printer
- Digital microprocessor control automatically monitors and stores faults from the last four weeks

- USP-compliant conductivity measurement with temperature compensation can be switched on or off

## Tilting control panels for easy viewing

- Ergonomically designed controller tilts for ease-of-use and better visibility
- Illuminated four-line alpha-numeric display

### Quick look—technical comparison across Barnstead systems

	GenPure Pro UV system	GenPure Pro UV/UF system	GenPure Pro UV-TOC system	GenPure Pro UV/UF-TOC system
<b>Applications</b>	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Molecular biology, PCR, DNA, monoclonal antibodies, cell culture media	Chemical analysis (trace analysis, HPLC, IC, ICP-MS, TOC measurements)	Biosciences (cell and tissue culture media, PCR, DNA, monoclonal antibodies)
<b>Resistance at 25°C, MΩ.cm</b>	18.2	18.2	18.2	18.2
<b>Conductivity, μS/cm</b>	0.055	0.055	0.055	0.055
<b>TOC, ppb</b>	1–5	1–5	1–5	1–5
<b>RNase, ng/mL</b>	N/A	<0.003	N/A	<0.003
<b>DNase, pg/μL</b>	N/A	<0.4	N/A	<0.4
<b>Bacteria, CFU/mL</b>	<0.01	<0.01	<0.01	<0.01
<b>Particles, 0.22 μm/mL</b>	<1	<1	<1	<1
<b>Endotoxins, EU/mL</b>	N/A	<0.001	N/A	<0.001
<b>TOC monitor</b>	N/A	N/A	Standard	Standard
<b>Flow rate, L/min</b>	Up to 2	Up to 2	Up to 2	Up to 2



Convenient dispensing for a variety of applications possible with flexible dispenser radius



Quick-connect cartridge replacement



Intuitive display shows important system parameters



Exact dosing from Barnstead GenPure Pro Water Purification System with one-touch dispensing

Feed water requirements*	
Source	water purified by reverse osmosis, ion exchange or distillation
Feed water conductivity, $\mu\text{S}/\text{cm}$	<2
TOC, ppb	Max 50
Bacteria count, CFU/mL	<100
Turbidity, NTU	<1.0
Temperature, $^{\circ}\text{C}$	2–35
Pressure, psi (bar)	1.4–87 (0.1 <sup>-6</sup> )

\* Please see user manual for complete list of feed water requirements.

## Product specifications

Flow rate	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
Up to 2 L/min	90-240 V, 50/60 Hz	0.1 kW	3/4 in. NPT	18.6 x 13 x 24.2 (472 x 330 x 615)

## Ordering information

Barnstead system options	GenPure Pro UV	GenPure Pro UV/UF	GenPure Pro UV–TOC	GenPure Pro UV/UF–TOC
Barnstead GenPure Pro System* All systems include a wall bracket, ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, pressure regulator, and UV lamp and/or ultrafilter where applicable	50131952	50131950	50131948	50131922
<b>Optional accessories</b>				
Disinfection cartridge Reusable cartridge needed to clean the water purification system; use with CMX25 cleaning solution	09.2201	09.2201	09.2201	09.2201
Pressure regulator Recommended where incoming feed pressure is above the specified range	50155462	50155462	50155462	50155462
Printer Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines	STARA-106	STARA-106	STARA-106	STARA-106
<b>Replacement consumables</b>				
Ultrapure polisher cartridge	09.2005	09.2005	09.2005	09.2005
Sterile filter, 0.2 $\mu\text{m}$	09.1003	09.1003	09.1003	09.1003
Ultrafilter	N/A	50133980	N/A	50133980
UV lamp	09.2002	09.2002	09.2002	09.2002
Cleaning solution	CMX25	CMX25	CMX25	CMX25



# Barnstead GenPure Water Purification System

The Barnstead GenPure system delivers ultrapure 18.2 MΩ.cm water with consistent quality for the most demanding and sensitive applications.

All Barnstead GenPure systems exceed international standards—ASTM Barnstead Type I, ISO 3696 Grade 1, ASTM D1193, and CLSI-CLRW.

## Integrated feed water monitoring

- Feed water monitoring alerts user if poor quality feed water is entering system impacting cartridge life

## UV photo-oxidation at 185/254 nm

- High-performance UV assembly reliably reduces the content of microorganisms and their metabolites
- UV oxidation also reduces organic compounds in the water to ultralow levels

## Ready-to-use

- Wall bracket, UV lamp, ultrapure cartridge, ultrafilter, sterile filter, all included in one part number

## Quick-connect cartridge replacement

- Aquastop quick-connect capability enables cartridge replacement within seconds

## GLP-compliant documentation

- Real-time clock and code-protected operating system prevents unauthorized changes to system settings
- RS-232 interface with adjustable send-interval for safe data transfer of all measured data, faults, date, and time to a PC computer or log printer
- Digital microprocessor control automatically monitors and stores faults from the last four weeks
- USP-compliant conductivity measurement with temperature compensation can be switched on or off



## Superior filters

Ultrafilter is flushed automatically to assure the highest retention of endotoxins and nucleases, which produces a service life up to two years

## Tilting control panels for easy viewing

- Ergonomically designed controller tilts for optimal key pressing and easy readability
- Illuminated four-line alpha-numeric display

## Applications include

### Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC Measurements, IC

# Basic configuration with options to meet your needs

## Quick look comparison

	GenPure UV/UF system
Applications	Molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
Resistance at 25 °C, MΩ.cm	18.2
Conductivity, μS/cm	0.055
TOC, ppb	1–5
RNase, ng/mL	<0.003
DNase, pg/μL	<0.4
Bacteria, CFU/mL	<0.01
Particles, 0.22 μm/mL	<1
Endotoxins, EU/mL	<0.001
TOC monitor	N/A
Flow rate, L/min	Up to 2





Barnstead GenPure systems feature tilting control panels for optimal viewing



Easy cartridge replacement

Feed water requirements*	
Source	water purified by pretreated by reverse osmosis, ion exchange, or distillation
Feed water conductivity, $\mu\text{S}/\text{cm}$	<2
TOC, ppb	Max 50
Bacteria count, CFU/mL	<100
Turbidity, NTU	<1.0
Temperature, $^{\circ}\text{C}$	2–35
Pressure, psi (bar)	1.4–87 (0.1–6)

\* Please see user manual for complete list of feed water requirements.

### Product specifications

Flow rate	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in. (mm)
up to 2 L/min	90–240 V, 50/60 Hz	0.1 kW	$\frac{3}{4}$ in. NPT	14.6 x 13 x 24.2 (372 x 330 x 615)

### Ordering information

Barnstead system options	GenPure UV/UF
GenPure system*	
All systems include a wall bracket, ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, pressure regulator, and UV lamp and ultrafilter	50131217
<b>Optional accessories</b>	
Disinfection cartridge Reusable cartridge needed to clean the water purification system; use with CMX25 cleaning solution.	09.2201
Pressure regulator Recommended where incoming feed pressure is above the specified range	50155462
Printer Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP-guidelines.	STARA-106
<b>Replacement consumables</b>	
Ultrapure polisher cartridge	09.2005
Sterile filter, 0.2 $\mu\text{m}$	09.1003
Ultrafilter	N/A
UV lamp	09.2002
Cleaning solution	CMX25

\*  

# Barnstead MicroPure system

## Compact system for small ultrapure water demands

The Barnstead MicroPure system was designed for laboratories that require up to 15 L/day of ultrapure water for HPLC or other instrumental analyses, sample preparation, glassware rinsing, or molecular biology work in which endotoxins and/or nucleases would interfere.

### Smart features

- Backlit display tilts for easy viewing
- Variable speed dispensing
- Integrated 6 L feed water reservoir so you can operate the system without direct access to a water supply (Barnstead MicroPure ST series only)

### Monitor feed water quality

- Feed water monitoring alerts user if poor quality feed water is entering system impacting cartridge life

### Smart design

- Recirculation pump prevents bacterial growth during standstill and allows for constant monitoring of all system functions, allowing for the immediate display of fault messages if a problem is detected
- Systems ship fully equipped with pressure reducer, ultrapure cartridge, UV, and 0.2 µm sterile filter

### Superior filters

- Ultrafilter is flushed automatically to assure the highest retention of endotoxins and nucleases, which produces a long two year lifetime
- 0.2 µm final filter with pleated membrane can be sterilized up to 5 times



### UV photo-oxidation at 185/254 nm

- High-performance UV assembly reliably reduces the content of microorganisms and their metabolites
- UV oxidation also reduces organic compounds in the water to ultralow levels

### Applications include

#### Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

#### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC measurements, IC





**Quick look comparison**

	<b>MicroPure UV system</b>	<b>MicroPure UV/UF system</b>
<b>Applications</b>	High-sensitivity instrumental analytical methods, such as HPLC, ICP-MS, TOC analyses	Microbiology, molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
<b>Resistance at 25°C, MΩ.cm</b>	18.2	18.2
<b>Conductivity, μS/cm</b>	0.055	0.055
<b>TOC, ppb</b>	1–5	1–5
<b>RNase, ng/mL</b>	N/A	<0.003
<b>DNase, pg/μL</b>	N/A	<0.4
<b>Bacteria, CFU/mL</b>	<0.01	<0.01
<b>Particles, 0.22 μm/mL</b>	<1	<1
<b>Endotoxines, EU/mL</b>	N/A	<0.001
<b>Flow rate, L/min</b>	1.5	1



18.2 MΩ.cm water in a compact system



Adjustable water dispense rate that allows for drop- by-drop or quick dispensing



Rapid cartridge change with Aquastop quick-connect design



The Barnstead MicroPure-ST series includes a 6 L feed water reservoir for manually feeding the system and allowing it to be portable

Feed Water Requirements*	
Source	water purified by reverse osmosis, ion exchange, or distillation
Feed water conductivity, $\mu\text{S/cm}$	<5
TOC, ppb	Max 50
Turbidity, NTU	<1.0
Temperature, $^{\circ}\text{C}$	2–35
Pressure, psi (bar)	1.4–87 (0.1–6)

\* Please see user manual for complete list of feed water requirements.

## Product specifications

Flow rate	Electrical requirements	Power consumption	Feed water connector	Dimensions of MicroPure system (no reservoir) W x D x H in (mm)	Dimensions of MicroPure-ST system W x D x H in (mm)
Up to 1.5 L/min	90-240 V, 50/60 Hz	0.06 kW	3/4 in. NPT	12 x 11.8 x 21.5 (305 x 300 x 545)	12 x 15.7 x 21.5 (305 x 400 x 545)

## Ordering information

System options	MicroPure UV	MicroPure UV/UF
MicroPure system* All systems include an ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, UV lamp and/or ultrafilter where applicable	50132373	50132370
<b>Accessories</b>		
Optional Wall-mounting bracket	09.2212	09.2212
Required Disinfection cartridge		
Reusable cartridge needed to clean the water purification system; only for line-fed units; use with CMX25 cleaning solution.	09.1102	09.1102

## Ordering information

System options	MicroPure ST UV with storage tank	MicroPure ST UV/UF with storage tank
MicroPure with storage tank system* All systems include a 6 L internal reservoir, ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, UV lamp, and/or ultrafilter where applicable	50132374	50132372
<b>Replacement consumables for Barnstead MicroPure systems and with Storage Tank System</b>		
Ultrapure polisher cartridge	09.1006	09.1006
Sterile filter, 0.2 $\mu\text{m}$	09.1003	09.1003
Ultrafilter	N/A	50133981
UV lamp	09.1002	09.1002
Cleaning solution	CMX25	CMX25

\*  

# Barnstead E-Pure Water Purification System

## Compact system for small ultrapure water demands

The Barnstead E-Pure Water Purification System economically produces Type 1 water with low operating costs. Large cartridges provide longer cartridge life and an impressive system flow rate.



### Product features

- Resistivities up to 18.2 MΩ.cm and TOC levels below 10 ppb
- Virgin polypropylene water pathways prevent recontamination
- Recirculation pump continuously recirculates water throughout the entire system to maintain water purity and reduce the quantity of waste water required for rinse-up
- Wall-mountable and completely assembled for easy installation
- Quarter turn quick release canisters allow for easy cartridge replacement
- Final filter (0.2 μm) removes bacteria and particulates protecting the integrity of your results
- Digital resistivity meter is automatically temperature compensated to 25°C, preventing fluctuating readings due to temperature changes
- High-capacity cartridges provide low operating costs

### Product accessories

#### Remote dispenser

- Recirculates water through to tip of dispenser and includes a 0.2 μm final filter
- Remote dispenser delivers water up to 8 ft (2.4 m) from the system
- Ships with a mounting bracket for increased flexibility in choosing a mounting location

#### Low pressure pump protector

- Low pressure pump-protection ensures that the pump is fully protected if there is a drop in the pressurized feedline used to supply water to the Barnstead E-Pure.
- Interrupts power if pressure on feed water line falls below 5 psig (0.35 kg/cm<sup>2</sup>)
- Includes 6 ft (1.8 m) cord which plugs directly into the Barnstead E-Pure system
- Complete with 1/4 in. NPT "T" to install in your feed line

### Applications include

#### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC Measurements, IC

#### Microbiology

- Buffer preparation
- Electrophoresis

### Quick look comparison

Resistivity at 25°C, MΩ.cm	18.2
TOC, ppb	<10
Bacteria, CFU/mL	<1
Flow rate, L/min	2

# Simple to use, easy to maintain

Feed water requirements*	
Source	Depending on the system and the cartridge pack chosen—potable tap water, or water treated by reverse osmosis, ion exchange or distillation
Temperature, °C (°F)	4–49 (40–120)
Pressure, psig max	Gravity to 100

\* Please see user manual for complete list of feed water requirements.

## Product specifications

	Overall dimensions W x H x D	Feed water connector	Inlet water temperature
Barnstead E-Pure 3-holder	31.5 x 28 x 7.5 in. (800 x 711.2 x 191 cm)	1/4 in NPTF	40–120 °F /4–49 °C
Barnstead E-Pure 4-holder	37.5 x 28 x 7.5 in. (952.5 x 711.2 x 191 cm)	1/4 in NPTF	40–120 °F/4–49 °C

## Ordering information

Barnstead system options	Electrical requirements	Max flow rates	3-holder	4-holder
E-Pure systems	120 V	2 L/min	D4631	D4641
Ships with wall bracket and cartridge o-rings	240 V	2 L/min	D4632-33	D4642-33

## Required accessories

	Tap feed	NA	<b>D5028 kit</b> D0835 Pretreatment (1) D0803 High-capacity (1) D5027 Ultrapure (2)
<b>Cartridge kits</b> Choose the cartridge pack according to your feed water and need for organic free water (Kits include large canister o-rings)	Tap feed, Organic free	NA	<b>D5023 kit</b> D0836 Macropure (1) D0803 High-capacity (1) D5027 Ultrapure (1) D5021 Organic-free (1)
Included cartridges are listed under the cartridge kit number.	Pretreated feed	<b>D5029 kit</b> D0835 Pretreatment (1) D5027 Ultrapure (2)	<b>D50227 kit</b> D0835 Pretreatment (1) D0809 Ultrapure (1) D5027 Ultrapure (2)
	Pretreated feed, Organic free	<b>D5022 kit</b> D0836 Macropure (1) D5027 Ultrapure (1) D5021 Organic Free (1)	<b>D50228 kit</b> D0836 Macropure (1) D0809 Ultrapure (1) D5027 Ultrapure (1) D5021 Organic-free (1)
0.2 µm final filter		D3750	D3750

## Optional accessories

Remote dispenser Recirculates water through to tip of dispenser and includes a 0.2 µm final filter; delivers water up to 8 ft (2.4 m) from the system; ships with a mounting bracket.	D8952	D8952
Low pressure pump protector Alerts the Barnstead E-Pure system of an inadequate feed water condition in a pressurized feed line	D2706	D2706

## Replacement consumables

Cleaning cartridges set of three	D50223	D50223
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# Barnstead LabTower EDI Water Purification System



The Barnstead LabTower EDI is an integrated system combining purification with EDI technology and storage in one, as well as producing both Type 1 and Type 2 water. Stock high purity water safely and conveniently.

Ultrapure water which exceeds ASTM Type I standards, with a resistivity of 18.2 MΩ.cm and TOC 1–5 ppb with standard UV lamp. High purity water ASTM Type II water, with resistivity of 1-10<sup>-1</sup> MΩ.cm, is ideal for daily needs of 100 to 200 L.

## Two systems in one

- Unique systems with pretreatment plus polisher to produce both Type 1 and Type 2 water
- Type 2 water is stored in the integrated 100 L high-purity water reservoir
- Water system sits on top of the reservoir saving critical bench space

## Ready-to-use

- RO membranes, filters and cartridges, sterile filter, all in one package

## Two ways to draw water

- Dispense ultrapure water directly from the system via the dispenser with sterile filter. The water quality is measured immediately prior to the dispensing point.
- Type 2 water is accessible from the reservoir, which is an ideal supply for lab equipment such as autoclaves

## Performance for your application feeds

- High-performance RO module is paired with an EDI module and polisher cartridge
- Two systems to choose from with capacities of 15 and 30 L per hour

## Quick look—comparison between Barnstead LabTower systems

	LabTower EDI 15 system	LabTower EDI 30 system
<b>Type 1 water</b>		
Resistivity at 25°C, MΩ.cm	18.2	18.2
Conductivity, μS/cm	0.055	0.055
TOC, ppb	1–5	1–5
Bacterial content in CFU/mL	<0.01	<0.01
Particles, 0.22 μm/mL	<1	<1
Flow rate at dispenser, L/min	1.5	1.5
<b>Type 2 water</b>		
Pure water production at 15°C L/hr	15	30
Resistivity at 25°C	10-1	10-1
Conductivity	01-1.0	01-1.0

\* Specification only applicable if system has optional ultrafilter attached.

## Applications include

### Type 1 water applications

- Electrophoresis,
- TOC measurements, IC
- HPLP, GC-MS, ICP-MS, AA

### Type 2 water applications

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, reagents, and media

# Dual quality system with EDI technology

## Compact and easy to use

- Free-standing unit takes up no bench space
- Easily relocated with bottom-mounted casters

## Safe operation

- Microprocessor control for automatic operation
- Continuous monitoring of all critical parameters
- Recirculation pump protects purified water from bacterial growth during periods of inactivity

## GLP-compliant documentation

- Real-time clock and code-protected operating system prevents unauthorized changes to system settings
- RS-232 interface with adjustable send-interval for safe data transfer of all measured data, faults, date and time to a PC computer or log printer
- Digital microprocessor control automatically monitors and stores faults from the last four weeks
- USP-compliant conductivity measurement with temperature compensation that can be switched on or off

## Integrated polyethylene reservoir safely stores

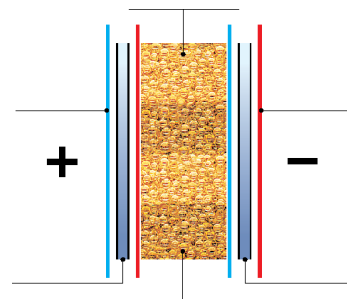
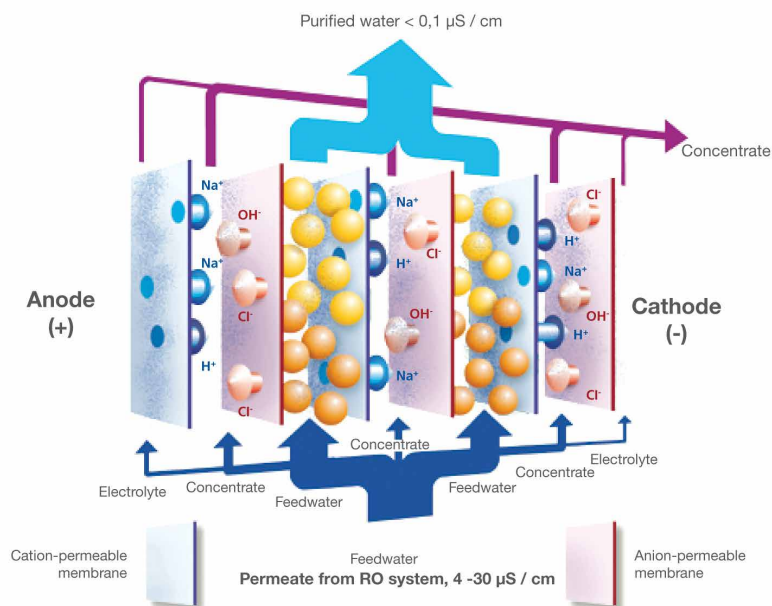
### Type 2 water

- Automatic water recirculation in the reservoir moves water across a special polisher module ensuring fresh Type 2 water on demand
- High-purity water reservoir outlet for convenient drainage
- Efficient cleaning and disinfection enhanced by conical bottom design for completely emptying reservoir
- Integrated reservoir provides 85 L of purified water storage
- Sterile vent filter and reservoir overflow prevents internal contamination by microorganisms from the surrounding air
- Optional CO<sub>2</sub> adsorber prevents CO<sub>2</sub> adsorption into the water, which would reduce cartridge life
- Highly visible reservoir volume display on the Barnstead LabTower controller
- Volume stored in the reservoir customizable via the controller



Quickly view reservoir level (volume in %) with highly-visible continuous monitor

# Barnstead LabTower EDI Water Purification System



Electrodeionization or EDI unites two proven technologies for producing ultrapure water: electrodialysis and ion exchange. In contrast to conventional ion exchange in which resins must be either chemically regenerated or the cartridge discarded, EDI utilizes an electric current for continual resin regeneration.

## Technologies that keep you one step ahead

- Constant high efficiency of the ion exchange layer bed produces consistent, high-quality water
- No regeneration of chemicals required and no disposal of cartridges, making this technology eco-friendly
- No exchange of spent resins or cartridges saves cost
- High-purity water when you need it with no wait time

## How EDI works

Several layers of ion selective membranes are situated between an anode and a cathode. Layered ion exchange resin beds and concentrate chambers are alternately positioned between them.

On applying an electric voltage, water ( $\text{H}_2\text{O}$ ) is split into  $\text{H}^+$  and  $\text{OH}^-$  in the cell.  $\text{H}^+$  and  $\text{Na}^+$  cations present in the feedwater can migrate through the cation-permeable membranes, anions through the anion-permeable membranes.

The ions migrate in the direction of the applied voltage, i.e., anions to the positive pole (anode), cations to the negative pole (cathode). The water ions that migrate through an ion exchange chamber displace salt ions retained by the ion exchange resins and so continually regenerate the resins. The salt ions migrate through the appropriate ion selective membranes into the concentrate chambers and are flushed out by water. As all concentration chambers are flushed, excess  $\text{H}^+$  and  $\text{OH}^-$  ions can again combine to form  $\text{H}_2\text{O}$ .



Optional hand dispenser



Feed water requirements*	
Source	Potable tap water softened
Conductivity, $\mu\text{S}/\text{cm}$	<1000
Colloid index	<3
pH-range	4–11
Temperature, $^{\circ}\text{C}$	2–35
Pressure, psi (bar)	29–87 (2-6)

\* Please see user manual for complete list of feed water requirements.

## Product specifications

Flow rate	Operating pressure min/max	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
Up to 1.5 L/min	29–87 psi (2–6 bar)	90–240 V, 50/60 Hz	0.25 kW	3/4 in. NPT	17.7 x 22.8 x 59.1 (450 x 580 x 1,500)

## Ordering information

Barnstead system options	LabTower EDI 15	LabTower EDI 30
LabTower EDI system* All systems include an ultrapure polisher cartridge, RO membrane, RO pretreatment filters (5 $\mu\text{m}$ filter and hardness stabilizer), EDI module, UV lamp, sterile 0.2 $\mu\text{m}$ filter, 10 in. 1 $\mu\text{m}$ filter (reservoir outlet) and pressure regulator	50132395	50132396
<b>Required accessories</b>		
Sterile overflow for reservoir Prevents the penetration of bacteria and other microorganisms	50132714	50132714
CO <sub>2</sub> adsorber + sterile filter, 0.2 $\mu\text{m}$ Combination sterile filter with CO <sub>2</sub> adsorber will prevent CO <sub>2</sub> from entering the tank, saving cartridge life	06.5002	06.5002
Mix Multi Mini water softener, 240 V (Europe) Required if feed-water SDI is greater than 3; also required for purchase with a softener is the softener salt, hardness detection kit, and the 5 $\mu\text{m}$ filter with carbon	50130297	50130297
Softener salt for Mix Multi Mini (Europe) Required for use with the water softener	50155490	50155490
5 $\mu\text{m}$ filter with carbon cartridge	06.5201	06.5201
Hardness detection kit—required with purchase of softener Alerts user when water is no longer softened	Europe	06.1000
	North America/Latin America Asia Pacific	50134335
1 $\mu\text{m}$ filter with a 10 in. filter housing	09.4003	09.4003
<b>Optional accessories</b>		
Sterile 0.2 $\mu\text{m}$ filter for reservoir outlet	06.5555	06.5555
Disinfection cartridge Reusable cartridge needed to clean the water purification system Use with CMX25 cleaning solution	09.2201	09.2201
Printer Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines	STARA-106	STARA-106
Hand dispenser kit Hand dispenser with 2.4 m (8ft) tubing that connects to tank (to dispense Type 2 water); ships with a 0.2 micron final filter.	50138221	50138221
Qualification documents (IQ and OQ)	IOQDOCE50133916	IOQDOCE50133916
<b>Replacement consumables</b>		
Ultrapure polisher cartridge	09.2005	09.2005
5 $\mu\text{m}$ filter and hardness stabilizer	06.5204	06.5204
Sterile 0.2 $\mu\text{m}$ filter for system	09.1003	09.1003
UV lamp for system	09.2002	09.2002
Reverse osmosis membrane	22.0046 (requires 2)	22.0087 (requires 2)



# Barnstead Smart2Pure Water Purification System



All in one! The Barnstead Smart2Pure system is a compact system which converts tap water to into ASTM Type I water. The Smart2Pure 3 and 6 feature a built-in 6 L reservoir. The Smart2Pure 12 offers the choice of a 30 or 60 L reservoir for customizable storage capacity and ability to dispense both ASTM Type I and Type II water.

## Powerful performance

- Based on your requirements, choose from capacities of 3, 6, or 12 L/hr

## Economical

- Water purification progresses through independent cartridges with Aquastop quick-connect for fast replacement

**Module 1**—reverse osmosis membrane

**Module 2**—polishing cartridge contains high-quality ultrapure resin for consistent purity and long cartridge life

## Easy-to-operate

- Dispensing is easy and features variable speed to control flow
- The display can be tilted for optimal reading
- UV bulb and ultrafilter to customize ultrapurewater quality

## Placement options

- Flexible mounting on wall or bench

## Barnstead Smart2Pure 3 and 6 features smart, integrated 6 L reservoir

- Constructed with pigment-free materials
- Conical bottom outlet allows for complete draining and efficient cleaning and disinfection

## Barnstead Smart2Pure 12 offers reservoir options, either 30 or 60 L

- Large opening for easy cleaning
- Sterile venting filter/reservoir overflow protects against contamination by microorganisms
- CO<sub>2</sub> adsorber prevents TOC value increases from drawn-in CO<sub>2</sub>
- Polyethylene reservoir is opaque to light
- Recirculation pump maintains water purity in system. Recirculation UV light prevents bacteria growth and TOC build up in system.
- Wall-mount optional for simple space savings
- Conical bottom outlet allows for complete draining and efficient cleaning and disinfection

## Applications include

### Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC measurements, IC

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, and reagents

# Compact dual-quality system

## Quick look comparison

	Smart2Pure UV system	Smart2Pure UV/UF system
<b>Type 1 water</b>		
Applications	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
Resistivity at 25°C, MΩ.cm	18.2	18.2
Conductivity, μS/cm	0.055	0.055
TOC value, ppb	1–5	1–5
RNase, ng/mL	N/A	<0.003
DNase, pg/μL	N/A	<0.4
Bacterial content, CFU/mL	<0.01	<0.01
Particles, μm/mL	<1	<1
Endotoxines, EU/mL	N/A	<0.001
Flow rate, L/min	Up to 1	Up to 1
<b>Type 2 water</b>		
Pure water production at 15 °C, L/hr	12	12
Resistivity at 25°C, MΩ.cm	15–10	15–10
Conductivity, μS/cm	0.067–0.1	0.067–0.1

## Feed water requirements\*

Source	Tap water
pH range	4–11
Temperature, C°	2–35
Conductivity (μS/cm), maximum	1200
Pressure, psi (bar)	1.4–87 (1–6)

\* Please see user manual for complete list of feed water requirements.

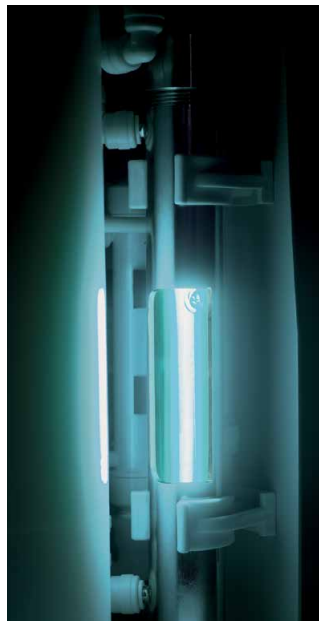


Space-saving design. Simply stand the Barnstead Smart2Pure system on the benchtop or mount it directly to the wall, as shown by the Barnstead MicroPure system, for more bench space.

# Barnstead Smart2Pure Water Purification System



Economical design. The RO membrane cartridge is separate from the DI cartridge, ensuring you only replace each cartridge as needed.



UV-Oxidation at 185/254 nm. UV-oxidation for reducing the content of microorganisms and their metabolites.



Flexible dispensing. Gain increased flexibility by adding a hand dispenser for dispensing Type 1 water up to 2.4 m (8 ft) from Smart2Pure.



Flexible storage. Store high purity water safely and conveniently in either a 30 or 60 L reservoir (only for Barnstead Smart2Pure 12 L system).

## Storage reservoirs—product specifications

Volume	Material	Dimensions H x D in (mm)
30 L	Polyethylene, ultrapure, water resistant, opaque to light	23.5 x 15 (598 x 380)
60 L		35.9 x 15 (912 x 380)

## Ordering information

Storage reservoir options for Smart2Pure 12 system only	30 L	60 L
Tank		
Choose a tank to meet your capacity needs	50155497	50155501
<b>Required accessories</b>		
Sterile overflow for reservoir	06.5001	06.5001
CO <sub>2</sub> adsorber + sterile filter, 0.2 µm	06.5002	06.5002
<b>Optional accessories</b>		
Wall reservoir mounting bracket	06.5015	06.5016

## Product specifications—Barnstead Smart2Pure system (3, 6, and 12 L/hr)

Flow rate	Operating pressure min/max	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
up to 1 L/min	29-87 psi 2-6 bar	90-240 V, 50/60 Hz	0.06 kW	3/4" NPT	12 x 15.7 x 21.5 (305 x 400 x 545)

### Ordering information

System options for Barnstead Smart2Pure system	Permeate flow at 15°C	Smart2Pure UV system	Smart2Pure UV/UF system
Smart2Pure System 3 and 6 L/hr* All systems include an RO cartridge, ultrapure polisher cartridge, sterile 0.2 µm filter, UV lamp, and/or UF filter where applicable. The 3 and 6 L/hr models also include an internal 6 L tank with vent filter.	3 L/hr	50129872	50129688
	6 L/hr	50129885	50129887
<b>Required accessories</b>			
<b>Barnstead Pretreatment</b>			
Comes with pressure reducing valve, 1 micron pre-filter, hardness stabilizing cartridge and carbon		50157886	50157886
<b>Optional accessories</b>			
Wall mounting bracket		09.2212	09.2212
Qualification documents (IQOQ)		IQQDOCE50133911	IQQDOCE50133911
<b>Hand Dispenser Kit</b>			
Hand dispenser with 2.4 m (8ft) tubing that connects to tank; ships with a 0.2 micron final filter.		50138221	50138221

### Ordering information

System options for Barnstead Smart2Pure 12 system	Smart2Pure 12 UV system	Smart2Pure 12 UV/UF system
Smart2Pure system 12 L/hr Systems include an RO cartridge, an ultrapure polisher cartridge, sterile 0.2 µm filter, UV lamp and/or UF filter where applicable	50129890	50129845
<b>Required accessories</b>		
Smart2Pure Reservoir Choose a reservoir that fits your needs	See "Storage Reservoir Options"	
<b>Barnstead Pretreatment</b>		
Comes with pressure-reducing valve, 1 micron pre-filter, hardness stabilizing cartridge and carbon. 11 x 7 x 15.6 in (28 x 17.8 x 39.6 cm)	50157886	50157886
<b>Optional accessories</b>		
Wall mounting bracket for the system	09.2212	09.2212
Qualification documents (IQOQ)	IQQDOCE50133912	IQQDOCE50133912
Pressure regulator Recommended where incoming feed pressure is above the specified range	50155462	50155462
<b>Hand Dispenser Kit</b>		
Hand dispenser with 2.4 m (8 ft) tubing that connects to tank. Ships with a 0.2 micron final filter.	50138221	50138221

### Ordering information

Replacement consumables—Barnstead Smart2Pure system 3, 6, 12 L/hr			
RO membrane	3 L/hr	09.2003	09.2003
	6 L/hr	09.2006	09.2006
	12 L/hr	09.2012	09.2012
Ultrapure polisher cartridge		09.1020	09.1020
Sterile 0.2 µm filter for system		09.1003	09.1003
Ultrafilter		N/A	50133981
System UV-lamp		09.1002	09.1002
Cleaning solution		CMX25	CMX25
1 micron pre-filter		D502113	D502113
Hardness stabilizer		D502114	D502114
Carbon cartridge		D502115	D502115
Sterile vent filter for tank	3 L and 6 L/hr	22.0091	22.0091



# Barnstead Smart2Pure Pro Water Purification System



The Barnstead Smart2Pure Pro system is a compact system that converts water into ASTM Type 1 and Type 2 water at a rate of 16 L/hr in RO, with built-in warning and shut-off features to prevent lab accidents.

## Powerful performance

- Suitable for even the most demanding and sensitive applications, the Barnstead Smart2Pure Pro Water Purification System exceeds current international standards—ASTM D11931 Type 1, ISO 3696 Grade 1, and CLSI-CLRW, delivering ultrapure 18.2 MΩ.cm water with consistent quality.
- Offers up to 16L/hr production of RO water.

## Simplified user interface

- Easy system operation
- Enhanced system monitoring through integrated sensors and timers for:
  - RO product purity
  - automatic feed-water shut off to prevent accidents
  - Monitoring and dispensing of purified water is easy and features variable speed to control flow
- The display can be tilted for easy reading
- Includes UV bulb and ultrafilter to deliver ultrapure water quality

## Flexible placement options

- Position on laboratory bench
- Mount it on the wall

## Lasting economy

- Water purification progresses through independent cartridges with Aquastop quick-connect for fast replacement  
**Module 1**—the reverse osmosis membrane  
**Module 2**—polishing cartridge contains high-quality ultrapure resin for consistent purity and long cartridge life
- Independent cartridges to maximize life

## Easy ordering! One part number includes complete system

- Pretreatment to protect reverse osmosis membrane
- Smart2Pure Pro system to produce Type 1 and Type 2 water complete with all consumables and wall bracket
- Optional remote dispenser for flexible dispensing of Type 1 and Type 2 water up to 3 m from system

## Applications include

### Molecular biology and microbiology

- Cell and tissue culture
- PCR, DNA sequencing
- Electrophoresis

### Analytical chemistry

- HPLC
- GC, GC-MS, ICP-MS, AA
- TOC measurements, IC

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, and reagents

# Compact dual quality system

## 30 or 60 L Storage tank to store and deliver

### Type 2 water

#### Features

- Standby mode offers flexibility for use; the system continually recirculates water to maintain purity
- Built-in alert system helps ensure optimal performance with prompts for leak detection and to replace consumables
- Inlet solenoid valve closes if a leak is detected
- Inline ultrafilter with large surface area to remove endotoxins and nucleases. Ultrafilter is flushed at regular intervals, extending service life over point of use filters.
- System parameters are code-protected preventing unauthorized changes to settings

## Barnstead Smart2Pure Pro system offers reservoir options, either 30 or 60 L

- Sterile venting filter/reservoir overflow protects against contamination by microorganisms
- CO<sub>2</sub> adsorber prevents TOC value increases from drawn-in CO<sub>2</sub>
- Recirculation pump cycles water through the UV lamp protecting the high-purity water from bacterial growth during periods of inactivity and maintaining low-conductivity value
- Large opening for easy cleaning
- Conical bottom outlet allows for complete draining and efficient cleaning and disinfection
- Polyethylene reservoir is opaque to light
- Wall-mount optional for simple space-savings

Feed water requirements*	
Source	Potable tap water pretreated with Barnstead Pretreatment System—Cat. No. 50157886
SDI	<3
Turbidity	<1 NTU
Conductivity (reference temperature +25°C)	1,500 µS/cm (670 Ω·cm)
Hardness	Hardness stabilized
Chlorine	Max. 0.1 ppm
pH range	4–11
Temperature	+2°C to +35°C
Pressure	2–6 bar/29–87 psi (at a pressure >6 bar/87 psi a pressure reducer must be installed upstream of the system)

\* Please see user manual for complete list of feed water requirements.

Quick look comparison	
Type 1 water	Barnstead Smart2Pure Pro UV/UF system
Applications	Inorganic and organic trace analysis, HPCL, ICP-MS, IC, TOC analysis, molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
Resistivity at 25°C, MΩ·cm	18.2
Conductivity, µS/cm	0.055
TOC value, ppb	1–5
RNase, ng/mL	<0.003
DNase, pg/µL	<0.4
Bacterial content, CFU/mL	<0.01
Particles, µm/mL	<1
Endotoxines, EU/mL	<0.001
Flow rate, L/min	Up to 1
Type 2 water	
Pure water production at 15 °C, L/hr	16
Resistivity at 25°C, MΩ·cm	10–1
Conductivity, µS/cm	0.1–1.0

# Barnstead Smart2Pure Pro Water Purification System



Economical design. The RO membrane cartridge is separate from the DI cartridge, ensuring you only replace each cartridge as needed.



UV-Oxidation at 185/254 nm. Optional UV-oxidation for reducing the content of microorganisms and their metabolites.



Flexible dispensing. Gain increased flexibility by adding a hand dispenser



Smart2Pure Pro Water System

## Product Specifications – Storage Reservoirs

Volume	Material	Dimensions H x D in (mm)
30 L	Polyethylene, ultrapure water resistant, opaque to light	23.5 x 15 (598 x 380)
60 L		35.9 x 15 (912 x 380)



## Product specifications—Barnstead Smart2Pure Pro system

Flow rate	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
up to 1 L/min	90-240 V, 50/60 Hz	0.06 kW	3/4" NPT	12 x 15.7 x 21.5 (305 x 400 x 545)

## Ordering information

System options for Barnstead Smart2Pure Pro system	Cat. No.
<b>Smart2Pure Pro UV/UF 16 LPH with 30 L Re-circulation Tank, Pre-Treatment and Wall Mount</b> Complete system includes Barnstead Pretreatment system with cartridges, RO cartridge, an ultrapure polisher cartridge, sterile 0.1 µm filter, UV lamp, UF filter, 30 L tank, CO <sub>2</sub> vent filter, sterile overflow and system wall bracket. Tank wall mount sold separately.	50157873
<b>Smart2Pure Pro UV/UF 16 LPH with 60 L Re-circulation Tank, Pre-Treatment and Wall Mount</b> Complete system includes Barnstead Pretreatment system with cartridges, RO cartridge, an ultrapure polisher cartridge, sterile 0.1 µm filter, UV lamp, UF filter, 60 L tank, CO <sub>2</sub> vent filter, sterile overflow and system wall bracket. Tank wall mount sold separately.	50157872
<b>Smart2Pure Pro UV/UF 16 LPH with 30 L Re-circulation Tank</b> Complete system includes RO cartridge, an ultrapure polisher cartridge, sterile 0.1 µm filter, UV lamp, UF filter, 30 L tank, CO <sub>2</sub> vent filter and sterile overflow.	50157882
<b>Smart2Pure Pro UV/UF 16 LPH with 60 L Re-circulation Tank</b> Complete system includes RO cartridge, an ultrapure polisher cartridge, sterile 0.1 µm filter, UV lamp, UF filter, 60 L tank, CO <sub>2</sub> vent filter and sterile overflow.	50157877
<b>Required accessories</b>	
<b>Barnstead Pretreatment</b> Comes with pressure reducing valve, 1 micron prefilter, hardness stabilizing cartridge and carbon cartridge 11 x 7 x 15.6 in (28 x 17.8 x 39.6 cm)	50157886
<b>Optional accessories</b>	
Wall mounting bracket for Point of Use Systems	50157885
Hand dispenser for Type 1 or Type 2 water dispensing	50138221
Wall Mount for 30 L Tank	06.5015
Wall Mount for 60 L Tank	06.5016

## Ordering information

Replacement accessories and consumables—Barnstead Smart2Pure Pro system		
Barnstead Pretreatment System	1 micron prefilter	D502113
	Hardness stabilizer	D502114
	Carbon cartridge	D502115
Smart2Pure System consumables	Smart2Pure Pro RO membrane	*50157608
	Smart2Pure Ultrapure Cartridge	*09.1020
	Sterile 0.1 µm filter for system	*50157375
	0.2 micron Final Filter for remote hand dispenser	09.1003
	Ultrafilter	*50133980
Sterile vent filter for tank	UV Lamp for Type 1 System	*09.1002
	CO <sub>2</sub> Vent filter	06.5002

\* Standard consumables in Smart2Pure Pro



# Pure water purification systems

## Type 2

Pure water for a wide range of applications

Type 2 pure water is an essential part of creating consistently pure chemical reagents, microbiological buffers, and media.

Type 2 water is also recommended as a pretreatment for Type 1 ultrapure systems.





## Innovation

Advanced feed water monitoring alerts user to fluctuations in feed water quality to optimize cartridge help optimize cartridge life performance.



## Convenience

Aquastop connections allow users to quickly change the cartridge and minimize downtime.






## Flexibility

Gain more space with numerous installation options—on the bench or wall or stand-alone.

# Type 2

## Barnstead pure water purification system selector guide

Select the system 

	Technology/feature 	Benefits 	
Capacity	Use of optimal amount of water daily to sustain reasonable cartridge life	Take into account any new techniques you will introduce in the coming years or new volume demands you may have	
Technology	UV oxidation	Protects against microorganism	
Features	Automatic operation	Total operation of the system is automatic	
	Multiple choices of dispense	Flexible options for dispensing	



## Reverse osmosis (RO) and deionization

## Distillation



Barnstead Pacific TII water purification system	Barnstead LabTower TII water purification system	Barnstead Mega-Pure Stills	Barnstead Classic Stills
Multiple capacities available	Flexible dispensing	All glass design	Tin-lined
7–20 L/hr	40 L/hr	1.4–6 L/hr	1.9–19 L/hr
Optional	Optional	—	Optional for reservoir
Standard	Standard	Optional	Optional
Optional	Standard	—	—

# Barnstead Pacific TII Water Purification System

The Barnstead Pacific™ TII Water Purification System converts tap water into high-purity water. The Barnstead Pacific TII system is ultimate system for the automatic and economical production of Type 2 water, which supports daily requirements from 20 to 200 L.

## Multiple options for Type 2 water

- Three system options with permeate flows of 7, 12, or 20 L/hr
- Space-saving design permits benchtop installation or wall mounting with integrated mounting bracket

## Operational reliability

- Microprocessor controlled for automatic operation with continuous monitoring of all critical parameters
- Automatic return to “operating” mode ensures recirculation during periods of inactivity
- Optional UV lamp prevents biological contamination

## Easy-to-operate

- Resistivity/conductivity clearly displayed on large back-lit control panel that tilts for optimum viewing
- Status of current operating mode clearly indicating production, stand-by, or rinsing modes
- System parameters are code-protected to prevent unauthorized changes to settings
- Water is dispensed directly from storage tank or accessory dispenser

## GLP-compliant documentation

- Optional printer connects to RS-232 port for data recording and traceability
- Cell constant of 0.01 cm<sup>-1</sup> ensures precise conductivity measurements
- Temperature compensation for the conductivity measurement has an accuracy of ±0.1°C (in conformity with USP 645)



## Volume display

- Water level % in reservoir is shown automatically on the Barnstead Pacific TII system display

## Clear information

Large, illuminated four-line display is easy to read and provides information on:

- Operating mode status, such as production or stand-by
- Reservoir volume shown as %
- Temperature in °C

## Applications include

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, and reagents

# Type 2 water system with ultimate flexibility

## Quick look comparison of Barnstead Pacific TII systems

	Pacific TII 7 L/hr system	Pacific TII 12 L/hr system	Pacific TII 20 L/hr system
Pure water production at 15°C, L/hr	7	12	20
Resistivity at 25°C, MΩ.cm	1.0 - 10	1.0 - 10	1.0 - 10
Conductivity, μS/cm	0.1-1.0	0.1-1.0	0.1-1.0
TOC, ppb	<30	<30	<30
Removal, bacteria and particles, %	98-99	98-99	98-99
Silicate removal, %	>99.9	>99.9	>99.9

## Technologies that produce high-purity water using RO membrane

The high-performance RO membrane removes approximately 98% of inorganic ions and 99% of all dissolved organic substances as well as microorganisms and particles.

## High-purity water cartridge

This cartridge further purifies the RO permeate to produce high-purity water as required by international standards (ASTM Type II, CAP, ISO 3696, BS 3997, and CLSI).

## UV lamp (UV version only)

The 254 nm UV transmission ensures optimal UV irradiation. Light at 254 nm wavelength acts as germicide.

## Recirculation

Recirculation of the water between the storage reservoir and Barnstead Pacific TII system is important for maintenance of the water quality. Water from the reservoir is cycled through the high-purity water cartridge and the UV chamber, then back to the reservoir. (Available only for systems that include a tank with recirculation/pressure pump.)



# Barnstead Pacific TII Water Purification System

The Barnstead Pacific TII system converts tap water to 1-10 MΩ.cm high purity water.



## Barnstead Pacific TII reservoirs

- Store high-purity water safely and conveniently

## Large opening

- For easy cleaning

## Optional safety filters:

- A CO<sub>2</sub> adsorber prevents conductivity increases from drawn-in CO<sub>2</sub>
- Sterile overflow prevents microorganisms from entering and contaminating reservoir water

## Recirculation pump

- Recirculation pump protects high-purity water from bacterial growth during standstill while maintaining a low conductivity value

## Polyethylene reservoir

Constructed with inert materials opaque to light

## Wall mount

- Simple and space-efficient wall mounting

## Conical bottom outlet

- Allows complete draining and efficient cleaning and disinfection

Feed water specifications*	
Source and pre-treatment	Tap water, softened or hardness stabilized
Conductivity, μS/cm	<1,500
Free chlorine concentration, mg/L	<0.1
pH-Range	4–11
Temperature, °C	2–35°C
Pressure, psi (bar)	29–87 (2–6)

\* Complete list of feed water specifications can be found in the operational manual.

## Barnstead Pacific TII system specifications

Operating pressure	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H	Ambient temperature
29-87 psi (2-6 bar)	90-240 V, 50/60 Hz	0.08 kW	3/4 in. NPT	14.6 x 13 x 23.7 in. (372 x 330 x 603 mm)	2–35 °C

## Storage reservoir

Volume	Material	Dimensions
30 L	Polyethylene, ultrapure water resistant, opaque to light	23.5 x 14.9 in (598 x 380 mm)
60 L		35.9 x 14.9 in (912 x 380 mm)
100 L		49.2 x 14.9 in (1249 x 380 mm)



## Ordering information

Barnstead system options	UV option	Pacific TII 7	Pacific TII 12	Pacific TII 20
<b>Pacific TII systems</b> All systems have a built-in wall bracket and include an RO membrane, a high purity water cartridge and UV lamp where applicable	System with UV	50132131	50132132	50131982
	System without UV	50132123	50132124	50132125
<b>Required pretreatment</b>				
<b>Barnstead Pretreatment System</b> Comes with pressure reducing valve, 1 micron prefilter, hardness stabilizing cartridge and carbon cartridge, 11 x 7 x 15.6 in (28 x 17.8 x 39.6 cm)		50157886	50157886	50157886
<b>Pacific TII reservoir</b> Choose a reservoir that fits your needs		See "Storage Reservoir Options" below		
<b>Optional accessories</b>				
Qualification documents (IQOQ)		IOQDOCE50133915	IOQDOCE50133915	IOQDOCE50133915
<b>Water watcher</b> Alerts the user to leaks—available as 230 V, 50 Hz only		16.0129	16.0129	16.0129
<b>Printer</b> Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines	120/240 VAC	STARA-106	STARA-106	STARA-106
<b>Hand Dispenser Kit</b> Hand dispenser with 2.4 m (8ft) tubing that connects to tank; use only with a tank equipped with a pressure pump (50155494, 50155499, 50155502); ships with a 0.2 micron final filter		50138221	50138221	50138221
<b>Replacement consumables</b>				
High purity water cartridge		09.4011	09.4011	09.4011
<b>Reverse Osmosis membrane</b> Pacific TII 3, 7, 12 only require a single RO membrane Pacific TII 20 require two membranes as indicated		22.0046	22.0046	22.0046 (order 2)
System UV lamp		50139226	50139226	50139226
<b>Consumables for accessories</b>		<b>Description</b>	<b>Cat. No.*</b>	
<b>Barnstead Pretreatment System</b>		1 micron prefilter	D502113	
		Hardness stabilizer	D502114	
		Carbon cartridge	D502115	

\* included with new unit.

## Ordering information

Storage reservoir options for Barnstead Pacific TII system		30 L	60 L	100 L
<b>Reservoir</b> Choose a tank to meet your capacity and pump	With level display	50155495	50155500	50155503
	With level display and recirculation/pressure pump	50155494	50155499	50155502
<b>Required accessories</b>				
Sterile overflow for reservoir		06.5001	06.5001	06.5001
<b>Vent filter</b> Choose the vent filter for your application needs	Sterile filter, 0.2 µm (ideal choice for tanks without a recirculation pump)	50135142	50135142	50135142
	Sterile filter, 0.2 µm + CO <sub>2</sub> adsorber (ideal choice for tanks with a recirculation pump)	06.5002	06.5002	06.5002
<b>Optional accessories</b>				
Wall mounting bracket		06.5015	06.5016	N/A
Pure water distribution manifold, 2 outlets (Optional for use with tanks with recirculation pump)		50155463	50155463	50155463
Pure water distribution manifold, 3 outlets (Optional for use with tanks with recirculation pump)		50155458	50155458	50155458
<b>Replacement consumables</b>				
Sterile 0.2 µm filter for hand dispenser		09.1003	09.1003	09.1003



# Barnstead Pacific TII Water Purification System

The Barnstead LabTower TII system converts tap water into high-purity water and provides water storage for a complete Type 2 water solution.

## Consistent water quality

- Type 2 laboratory water meets ASTM Type II, CCLS-CLRW and ISO 3696 international standards
- Designed to recirculate purified reservoir water to preserve water quality even during periods of inactivity

## Compact mobile design

- Stand-alone design with integrated 100 L reservoir takes up zero bench space
- Castors allow easy relocation

## Two ways to dispense water

- Dispense directly from the system via the dispensing valve for calibration solutions, reagent preparation, filling of containers, general rinsing purposes, etc.
- Dispense from the reservoir to supply autoclaves, dishwashers, ultrapure water systems, etc.

## Integrated 100 L reservoir

- Up to 85 liters of stored of high-purity water ready for dispensing when needed
- High-purity polypropylene reservoir is opaque to light
- Conical bottom allows complete emptying for efficient cleaning and disinfection
- Adjustable reservoir volume can be programmed for times when demand is low, allowing you to only store water that you can use

## Clear information on system display

- The large four-line display is code-protected to prevent accidental changes in system settings



- Illuminated and easily readable, the display provides information on resistivity or conductivity, operating mode status, such as “production”, “stand-by” or disinfection, and volume of the reservoir in %

## GLP-compliant documentation

- Developed to meet or exceed GLP requirements
- Recorded and traceable data can be obtained by print-out via the RS-232 interface and accessory printer
- Highly qualified and precise measurement of the conductivity is ensured by the cell constant of 0.01 cm<sup>-1</sup> to an accuracy of ±0.1°C

## Applications include

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, reagents, and media

# Pure water system with integrated 100 L tank

## Pretreatment

- 5 µm prefilter and activated carbon in the combi-filter cartridge protects the RO membrane from chlorine and particles
- Hardness stabilizing cartridge protects the reverse osmosis membrane

## RO and reservoir

- Pretreated water is forced through the permeable RO module removing 98% of all inorganic ions, 99% of dissolved organic substances as well as microorganisms and particles
- The built-in 100 L reservoir has a conical bottom outlet to optimize cleaning and sanitization

## Ion exchange and UV

- RO membrane removes up to 98-99% of impurities. All remaining ions are removed by the low TOC, high-purity resins in the ion exchange cartridge.
- Irradiation with UV light (TII units with UV option only) eliminates any bacteria or germs that are present.

## Quick look comparison of Barnstead LabTower systems

	LabTower TII system	LabTower TII + UV system
Pure water production at 15°C, L/hr	40	40
Resistivity at 25°C, MΩ.cm	1-10	1-10
Conductivity, µS/cm	0.1-1	0.1-1
Bacteria content, CFU/mL, with sterile filter	<0.01	<0.01
TOC, ppb	<50	<50
Particle content µm per mL with sterile filter	<1	<1

Barnstead LabTower TII with optional hand dispenser



# Barnstead LabTower TII Water Purification System



Feed water specifications*	
Source	Potable tap water softened or hardness stabilized
Blocking index (SDI)	<3, with higher values, an upstream pretreatment (Cat. No. 50157886) is to be installed
Conductivity, $\mu\text{S}/\text{cm}$	<1,500
Free chlorine, mg/L	<0.1
Colloid index	<3
pH range	4–11
Temperature, °C	2–35
Pressure, psi (bar)	29–87 (2–6)

\* Complete list of feed water specifications can be found in the operational manual.

## LabTower TII specifications

Operating pressure	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)	Ambient temperature
29-87 psi (2-6 bar)	90-240 V, 50/60 Hz	0.12 kW	3/4 in. NPT	17.7 x 22.8 x 59 (450 x 580 x 1500)	2–35°C

## Ordering information

Barnstead system options	UV option	LabTower TII 40
<b>LabTower TII Systems*</b>		
All systems include an RO membrane, a high purity water cartridge, 10 in. 5 $\mu\text{m}$ prefilter with hardness stabilizer cartridge, pressure regulator, 06.5555 optional 0.2 10 in. filter, 0.2 $\mu\text{m}$ filter, integrated 100 L reservoir and UV lamp where applicable	System with UV	50132141
<b>Required accessories</b>		
<b>LabTower TII pretreatment</b>	5 $\mu\text{m}$ filter with activated carbon and a 10 in. filter housing	50134022
Both cartridges are required for complete pretreatment	1 $\mu\text{m}$ filter with a 10 in. filter housing	09.4003
Sterile vent filter for reservoir		50135142
Sterile overflow for reservoir		50132714
<b>Optional accessories</b>		
<b>Water watcher</b>		16.0129
Alerts the user to leaks. Available as 230 V, 50 Hz only		
<b>Printer</b>	120/240 VAC	STARA-106
Utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines		
Qualification documents (IQ/OQ)		IOQDOCE50134156
<b>Hand dispenser Kit</b>		50138221
Hand dispenser with 2.4 m (8 ft) that connects to tank. Ships with a 0.2 micron final filter.		
<b>Replacement consumables</b>		
High purity water cartridge		02.2850-LAB
Reverse Osmosis membrane		22.0087
LabTower TII 40 requires two membranes		(must order 2)
System UV-lamp		50139226
Sterile 0.2 $\mu\text{m}$ filter for hand dispenser		09.1003
Activated carbon cartridge with 5 $\mu\text{m}$ prefilter		06.5201
Hardness stabilizing cartridge		06.5452
Sterile 0.2 $\mu\text{m}$ filter for reservoir outlet		06.5555
5 $\mu\text{m}$ prefilter and hardness stabilizer		06.5204

\*  

# Barnstead Mega-Pure Glass Stills

Barnstead Mega-Pure Glass Stills effectively remove inorganic solids, organics with boiling points higher than water, bacteria, and pyrogens. The stills are constructed of non-leaching components to ensure high purity water.

## Product features

- Contact with only glass, quartz and Teflon™ components ensures ultimate purity and eliminates cross-contamination
- Choice of three production capacities
- Units are easily wall-mounted or bench-mounted
- Vertical condenser design provides maximum purity
- High temperature cutoff shuts down the still if the temperature is too high, preventing heating element burnout
- Quick release cover provides easy cleaning access
- Connection to Automatic Collection System (ACS) allows 24-hour automatic system operation
- Push-button system start with feed water solenoid valve

## Barnstead MegaPure-1 Glass Stills

- Compact, easy-to-use 1 L/hr glass still available with or without a storage bottle

## Barnstead MegaPure-3A and 6A Glass Stills

- Ideal for larger volume demands with storage and options



## Quick look comparison

	MegaPure-1	MegaPure-3A	MegaPure-6A
<b>System features</b>	Compact, easy-to-use	Stills for larger volume demands	
<b>Product water capacity, L/hr</b>	1	3	6
<b>Cooling water capacity, L/hr</b>	11.3	30.3	53
<b>Number of heaters</b>	1	1	2
<b>Resistivity at 25°C, MΩ.cm</b>	1-10	1-10	1-10

## Applications include

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, reagents, and media

# Glass stills ideal for biological applications

## Product accessories

### Automatic Collection System (ACS)

- All glass system designed to collect water from the Barnstead Mega-Pure Glass Stills and control their operation
- Generous 45 L capacity
- Easy wall- or bench-mount
- Preset to shut off the power to the heaters and the water supply to the still after the bottle has collected approximately 45 L
- The system will automatically restart the still and refill the collection system when the purified water supply has been depleted to approximately 38 L

### Pretreatment for hard water

- Allows for pretreating feed water to Barnstead Mega-Pure Glass Stills
- B-Pure single- or dual-cartridge deionizer reduces scale build up and increases distillate purity
- Greater flexibility in meeting varying feed water qualities
- Purity light measures water quality and indicates when cartridges are exhausted
- Large cartridge capacity for extended cartridge use
- Unit must be wall mounted



Plastic bottle (413964)



13 L bottle (413934)



Automatic Collection System



Barnstead B-Pure  
Cartridge Holder

# Barnstead Mega-Pure Glass Stills

## Product specifications

Inlet water temperature °C (°F)	Vent temperature °C (°F)	Auto drain	Inlet pressure (psig)	Auto start/stop controls
4-37 (39.2-98.6)	85-96.7 (185-206)	No	20-100	Yes

## System options ordering information

	Volume output (L/hr)*	Overall dimensions W x H x D in (cm)	Electrical (50/60 Hz)			Cat. No.	
			Volts	Amps	Phase	Unit	6 L bottle included
MegaPure-1**	1.4	18 x 34 x 9.75 (45.7 x 86.4 x 24.8)	120	9	1	A440266	A440267
MegaPure-3A**	3.4	23 x 45 x 12 (58.4 x 114.3 x 30.5)	240	11	1	A440367	-
			208	13	1	A440696	-
MegaPure-6A**	6	23 x 45 x 12 (58.4 x 114.3 x 30.5)	240	21	1	A440518	-
			208	25	1	A440697	-

\* Volume Output for 208 V units can be reduced up to 25 % less than specified. \*\*

## Required accessories ordering information

Description	Cat. No.
Storage solutions See Storage Options	
MP-1 Flow Meter (Required for MP-1 units only)	440092

## Optional accessories ordering information

Description	Cat. No.
<p><b>Single-cartridge deionizer</b> Single-cartridge deionizer removes inorganic contaminants. Use with adapter kit to connect to Megapure still. Wall mount only. 7 x 24 x 7 in (17.8 x 61 x 17.8 cm)</p>	<ul style="list-style-type: none"> <li>D4511 Single B-Pure system;</li> <li>331040 Adapter Kit;</li> <li>D0803 High Capacity Cartridge (Recommended)</li> </ul>
<p><b>Double-cartridge deionizer</b> Provides increased capacity to remove inorganic contaminants. Suggested combination— (2) High Capacity cartridges. Use with adapter kit to connect to MegaPure Glass-Still. Wall mount only. 15 x 27 x 7 in (38.1 x 68.65 x 17.8 cm)</p>	<ul style="list-style-type: none"> <li>D4524 Double B-Pure system with 50 Kohm light;</li> <li>331041 Adapter kit;</li> <li>D0803 High-capacity cartridge (Qty 2 recommended)</li> </ul>
<p><b>Deionization cartridges</b></p> <p>High capacity cartridge Used in B-Pure system; removes ionized solids for extended capacity</p>	D0803
<p>Organic removal cartridge Used in B-Pure for organic and chlorine removal</p>	D0813
<p><b>Dual solenoid</b> Required if using service DI or RO as boiler feed water and untreated (tap) cooling water</p>	MP-1 (240 V), MP-3, MP-6A 440236
	MP-1 (120 V) RY798X2A





## Ordering information

Storage options		Cat. No.
Storage bottles For manual operation	Plastic bottle, 6 L capacity For use with MegaPure-1 and MegaPure-3A Glass Stills	413964
	Glass bottle, 13 L capacity For use with any Mega-Pure Glass Still	413934
Automatic Collection System (ACS) For use with any Mega-Pure Glass Still	Automatic Collection System (ACS) unit	B440704
Collects up to 45 L of water and controls the still Dimensions: W x H x D 16.25 x 38 x 16.25 in. (41.3 x 96.5 x 41.3 cm)	Flexible tubing adapter kit Needed when the supplied glass tubing is either too long or too short to reach still; flexible tubing is not included. 0.5 in. Teflon tubing able to handle 80-90°C water is recommended	440138
	ACS wall mounting bracket	400634
	Adapter for ACS washer hook-up for glassware washers	440241



# Barnstead Classic Glass Stills

Thermo Scientific™ Barnstead™ Classic Stills effectively remove inorganic solids, organics, bacteria, and pyrogens. The stills are constructed of copper and bronze with a coating of pure tin. The inert nature of tin prevents any leaching of contaminants into the water.

## Product features

- Double-walled boiler and preheating of feed water conserves electricity
- Vented condenser allows for stripping of gaseous impurities
- Unique de-concentrator removes scale forming impurities from the boiler
- Unique Thermo Scientific™ Q-Baffle ensures high quality pyrogen free water by stripping contaminant laden water droplets from steam
- Space-saving horizontal condenser
- Metal construction withstands years of use
- Units are easily floor and bench mountable, depending on model
- Inert pure tin pathways assure product water quality
- Controller unit can be wall mounted

## Portable stills

- Requires no permanent plumbing or electrical connections, allowing quick setup
- Includes low water cutoff for safety protection
- Bench-mounted

## Floor model electric stills

- Come standard with floor mounting stand
- Over-temperature protection system improves safety
- Plug-and-play hardware allows for easier installation
- Capacities from 2 to 5 gal/hr
- Low water cutoff protects heating elements when water supply is interrupted
- Optional fully automatic controls allow for unattended operation

## Steam still

- Utilize available in-house steam as heat source
- Optional automatic controls allow for unattended operation
  - Stops still when storage reservoir is full, starts still when water level falls below preset level
  - Drains still boiler at selected 4-hour intervals to reduce scale formation



## Quick look comparison

	Portable electric stills	Floor model electric stills	
Product water capacity, gal/hr	1/2	2	5
Mounting	Bench	Floor	

## Applications include

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves and ultrapure water systems
- Preparing and diluting buffers, reagents, and media

# Tin lined for pure water

## Tin-coated specifications and ordering information

	Outputgal/hr (L/hr)	Cooling water gal/hr (L/hr)	KW	Electrical (50/60 Hz)			Dimensions W x H x D in (cm)			Cat. No.	
				Volts	Amps	Phase					
Electric stills* Portable	0.5 (1.9)	4 (15)	1.3	120	12	1	21 (52)	19 (49)	10 (26)	A1007	
Floor stand included (except A1007)	2 gal/hr	2 (7.6)	16 (61)	6	240	26	1	23 (58)	68 (173)	11 (28)	A1013-B-61
		2 (7.6)**	16 (61)	6	208	17	3	23 (58)	68 (173)	11 (28)	A1013-C
	5 gal/hr	5 (19)	40 (151)	13	240	57	1	35 (89)	77 (196)	14 (36)	A1015-B-61
		5 (19)**	40 (151)	13	208	36	3	35 (89)	77 (196)	14 (36)	A1015-C

\*\* Volume output for 208 V units can be reduced up to 25% less than specified.

## Ordering information

Required accessories		Cat. No.
Storage reservoir	Storage of distilled water is required, see pages 70-71 for storage tank and accessories	
Optional accessories		
Fully automatic controls 120 V (50/60 Hz) includes feed water and drain solenoid valves, manual valves, piping, and level monitor	For use with 1 and 2 gal/hr electric stills	G2100
	For use with 5 gal/hr electric stills	G2110



# Barnstead Classic Still Storage Reservoirs and accessories

Select a Barnstead Classic Still Storage Reservoir and mounting option that will best fit your needs. The Thermo Scientific™ Barnstead™ Ventgard Air Filter, Water Seal and UV Light Assembly are accessories that will protect your pure water during storage.

## Storage reservoirs

- Available in 25 G gallon reservoir
- Crafted from copper and it is hand wiped with pure tin to ensure the purity of the distilled water
- All reservoirs include a removable cover, water-level sight glass, and a tin coated draw-off faucet with serrated hose nipple
- Connections provide for optional accessories including pumps and fully automated controls
- Requires a floor stand or wall bracket for proper installation

## Required accessories

### Floor stand

- floor stand is required for proper installation of reservoir
- 25 reservoir stand is fabricated from heavy gauge sheet metal and has adjustable feet

### Ventgard air filter and water seal

- Protects the stored water against airborne particulates, organics and CO<sub>2</sub>
- Water seal works as a one-way valve to allow distilled water into reservoir
- Prevents air from entering the reservoir via the condenser atmospheric vent



Storage reservoir—  
floor stand



Storage reservoir  
—wall bracket



### UV light assembly

- Maintains sterility in the reservoir
- UV lamp is enclosed by a tubular, transparent, inert sheath
- When lamp changes are necessary, only the lamp needs to be removed; the reservoir cover and sheath remain in place eliminating any exposure of water to contamination from the air

## Specifications

Reservoir options	Distribution outlet (NPT)	Drain outlet (NPT)	Overall dimensions in. (cm)			Cat. No.
			W	H	D	
25 gal <sup>1</sup>	1/2 in.	N/A	18 (46)	29 (74)	25 (64)	B3045

## Required accessories ordering information

Mounting options	Distribution outlet (NPT)	Drain outlet (NPT)	Overall dimensions in (cm)			Cat. No
			W	H	D	
Floor mounting stand ensures storage tank is a required height for water collection	Floor stands	For the 25 gal reservoir	19 (48)	27 (69)	19 (48)	H1001
Ventgard air filter and water seal						H3111
<b>Optional accessory</b>						
UV light assembly Maintains water sterility in reservoir. Includes housing, on/off switch, 6 ft. cord, lamp and ballast						H4005
<b>Replacement consumables</b>						
Replacement UV lamp						04141
Ventgard air filter Protects stored water against airborne particulates, organics and CO <sub>2</sub>						H3120
Replacement water seal Prevents air from entering storage reservoirs via condenser atmospheric vent						H3130
Ventgard filter element						25001-DB
Replacement vent filter - replace every 90 days						



# Distillation 101

**Distillation effectively removes most inorganic solids, all organics with a boiling point greater than water (100°C), and all bacteria and pyrogens. Gases and low molecular weight organics are not effectively removed by distillation.**

## **Barnstead products include a broad range of stills**

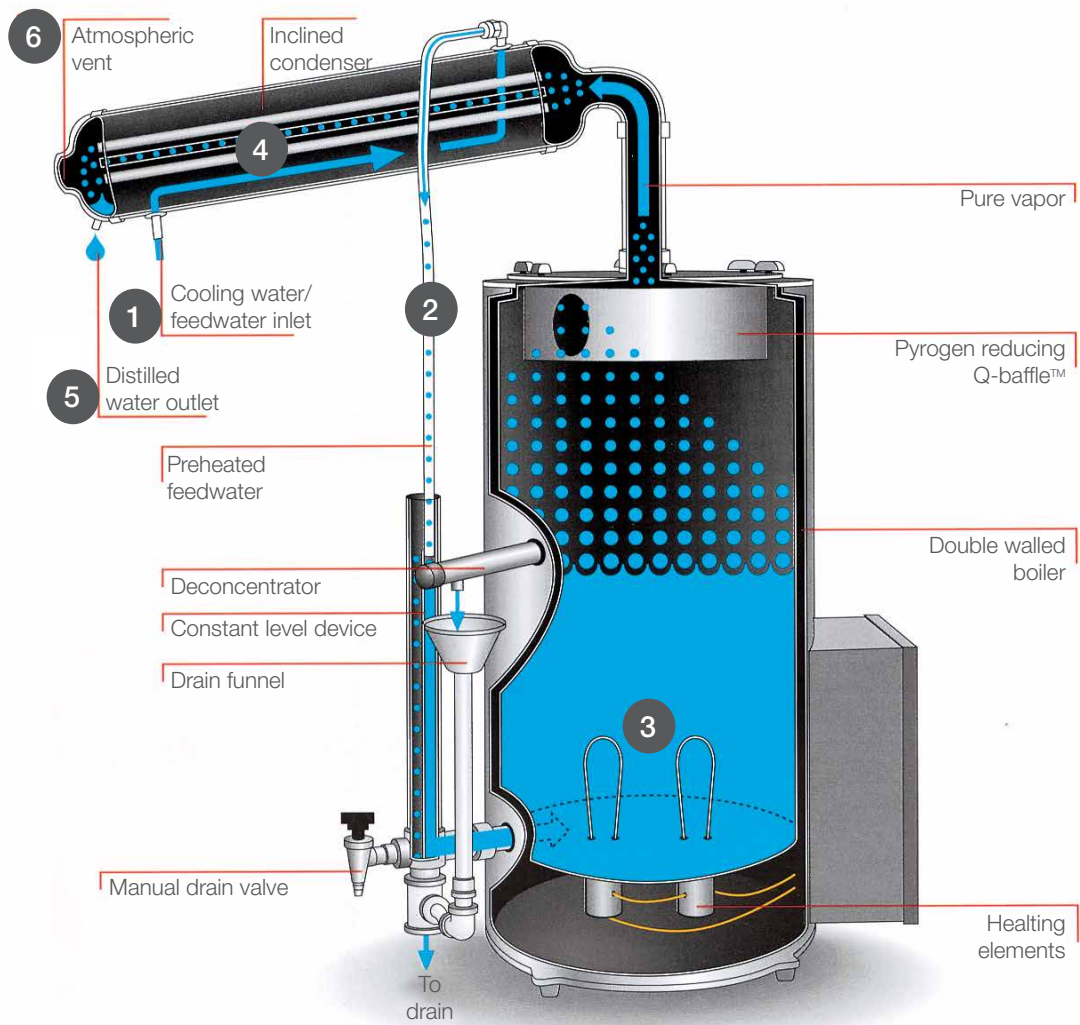
Our stills range in size from 1.4 to 38 L/hr. Select from stills constructed of tin or glass. Many models offer fully automatic options or pretreatment options to minimize scaling.

## **Still components**

A still includes a boiling chamber (boiler), electric or steam immersion heaters, pyrogen-reducing baffle, condenser, constant-level device, and low water cutoff. Options include pretreatment solutions and fully automatic controls that allow stills to work automatically with pretreated feed water and a storage reservoir.

## **Step-by-step technologies used in distillation systems**

1. Feed water enters the still through the cooling water/feed water inlet. As the water passes through the inlet, it becomes warmed as it makes its way to the boiler and in turn cools the vapor entering the condenser.
2. Water flows from the condenser into the constant level device, then into the boiler.
3. The water in the boiler is heated. Impurities with a boiling point higher than water (100°C/212°F) remain in the boiler, while water and impurities with a boiling point equal to or lower than water are converted to water vapor. The pure vapor moves up the boiler through a pyrogens-reducing baffle and into the condenser.
4. In the condenser, the pure vapor is transported through the condenser where it contacts tubes or coils containing cooling water. The pure vapor contacts these tubes and coils and is condensed to produce pure water.
5. The distilled water exits the condenser and is stored in a reservoir through the distilled water outlet.
6. Atmospheric vent allows for volatile contaminants to be vented increasing the purity of the distilled water.



# Reverse osmosis water purification system

Water purified using RO is useful in supplying water to lab equipment such as water baths, dishwashers, and autoclaves.







## Innovation

Thermo Scientific™ Barnstead™ LabTower™ RO system allows the tank level to be set manually.



## Convenience

Dispense easily from the tank.

## Flexibility

Endless mounting choices— on the bench, on the wall, or free-standing.



# Reverse osmosis (RO)

## RO is economical

RO is the most economical method to remove up to 99% of impurities in feed water. The RO membrane is semi-permeable with a thin microporous surface that rejects virtually all dissolved materials including inorganic solids, organics, particles, and microorganisms.

## RO water is versatile

RO water can be used to prepare microbiological buffers and chemical reagents. Additionally, it is a great option for use in general laboratory equipment, such as water baths, humidifiers, and autoclaves.

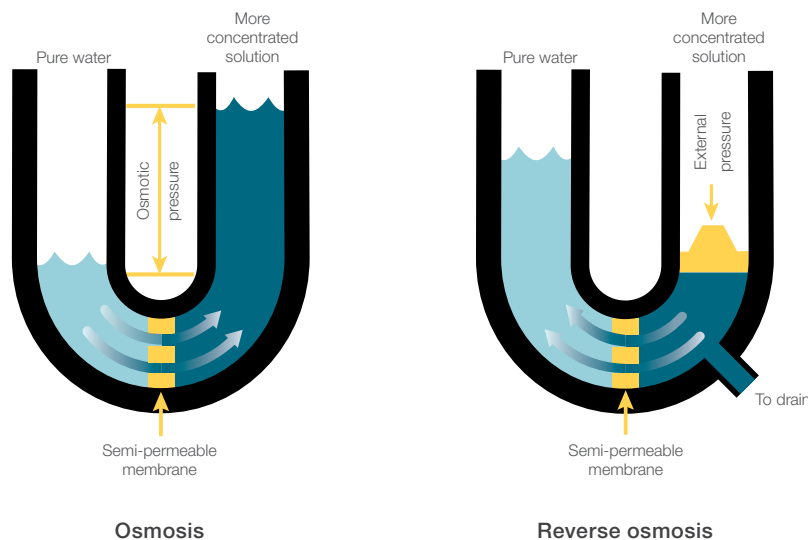
## RO is effective

As the feed water passes through the RO membrane, impurities deposit on the surface of the RO membrane and are flushed away to the drain. The result is purified feed water free of up to 99% of its impurities. The specific rejection rates of all the impurities are shown in each of the product specifications.

## Feed water factors

Certain characteristics of your feed water directly relate not only to membrane performance and lifetime but also directly impact the quality of your product water.

Take advantage of the H<sub>2</sub>O Select Analysis Kit, our free comprehensive testing program that will analyze your feed water to ensure optimum RO performance.



The natural osmotic flow of water through a semi-permeable membrane from less concentrated solutions to more concentrated solutions. RO is achieved when external pressure is applied to reverse this natural flow, as shown on the right.

**Our technical service experts are a great resource for any feed water questions you might have.**

### **Here is an explanation of key characteristics impacting RO performance.**

#### **Temperature**

Volumes listed for the RO product water are based on a feed water temperature of 15°C (59 °F). For every 1°C below 15°C (59°F), the quantity of product water is reduced by 3%. Additionally, if the feed water temperature goes beyond 25°C (77°F), the RO membrane may be damaged. We recommend a hot and cold water mixing valve to regulate the temperature to 15°C (59°F).

#### **Alkalinity and calcium**

Carbonates, bi-carbonates, hydroxides, and calcium impurities in your feed water contribute to RO membrane scaling. Both the Barnstead Pacific RO and Barnstead LabTower RO systems have pretreatment solutions to prevent this. Included in the pretreatment system is a hardness stabilizer cartridge which binds calcium, thereby protecting the RO membrane.

#### **Chlorine**

Chlorine can damage the RO membrane and reduce its performance and useful life. To address this, both Barnstead Pacific RO and LabTower RO systems have solutions to pretreat the water, which includes a 5 µm prefilter + activated carbon cartridge to prevent entry of particles >5 µm and high concentrations of free chlorine.

#### **Turbidity**

The turbidity level indicates the amount of suspended solids present. This suspended material can shorten the life of filters and reverse osmosis membranes if not removed.

Our Pure Water Experts can recommend pretreatment options if turbidity is an issue with your feed water. RO membranes show very little fouling when the feed water has a turbidity of less than 1 NTU.



**Barnstead LabTower RO with optional hand dispenser**

#### **Silt density index (SDI)**

Suspended solids and colloidal materials in feed water are one of the biggest problems in RO systems. In order to have some measure of the degree of this fouling problem, a concept called SDI is used. Here a 0.45 µm filter is exposed to the feed water under pressure and filtration rates are calculated. A SDI of <5 is considered acceptable for the reverse osmosis systems.

# Barnstead RO purification system selector guide

	Technology/feature ▼	Benefits ▼
Capacity	Optimal amount of water to use daily to sustain reasonable cartridge life	Choosing the right system will give you the most value. Take into account any new applications you will introduce in the coming years or new volume demands you may have.
Features	Feed water monitoring	Alerts you to fluctuations in feed water quality
	Integrated 100 L reservoir	Offers a stand-alone configuration for labs with little bench space
	Pretreatment integrated into system	Pretreatment integrated into system to save space



	Pacific RO	LabTower RO
	Flexible mounting options	Integrated 100 L reservoir
	7, 12, 20 L/hr	40 L/hr
	Standard	Standard
	—	Standard
	—	Standard

# Barnstead LabTower RO water purification system



The Barnstead LabTower RO converts tap water into RO Water and stores it in an integrated 100 L

## Advanced technology in a mobile design

- An ultra-modern controller provides easy-to-read system parameters
- Mounted on casters, the compact Barnstead LabTower RO system is an ideal pure-water supply for any laboratory; ideally suited as a feed-water source for dishwashers, autoclaves, and general laboratory use
- A built-in pretreatment unit, including a hardness stabilizer for protection of the reverse osmosis module from hardness formers
- An activated carbon/5 µm combi-cartridge protects the system against free chlorine and particles, ensuring the long service life of downstream purification stages
- Completely drainable integrated 100 L high-purity water reservoir has a low-noise pressure booster as a standard component

## Compact and mobile design

- Stand-alone design with integrated 100 L tank takes up zero bench space
- Casters allow for easy relocation

## Integrated 100 L reservoir

- 85 L of stored RO water in a high-purity polyethylene PE opaque reservoir
- Adjustable reservoir volume can be programmed for times of low demand
- Dispense from the reservoir to supply autoclaves, glassware washers, incubators, etc.

## Easy-to-operate clear display

- Resistivity/conductivity clearly displayed on large back-lit control panel that tilts for optimum viewing
- Status of current operating mode clearly indicating “production”, “stand-by”, or “rinsing” modes
- Reservoir fill-level shown as %
- System parameters are code-protected to prevent accidental changes to set points

## GLP-compliant documentation

- Developed to fulfill GLP requirements
- Recorded and traceable data can be obtained by print out via the RS-232 interface and accessory printer
- Highly qualified and precise measurement of the conductivity is ensured by the cell constant of 0.16 cm<sup>-1</sup>

Quick look comparison	Barnstead LabTower RO 40
Pure water production at 15°C, L/hr	40
Withdrawal performance from reservoir at 1.5 bar, L/hr	180
Retention quota for inorganics, %	>98
Bacteria content, %	>99
Retention quota for particles, %	>99

## Applications include

### Routine lab work

- Rinsing lab glassware
- Supplying autoclaves, water baths, incubators and glassware washers
- Preparing and diluting buffers and reagents
- General biotechnology

# RO water delivered from an integrated system

## Barnstead LabTower RO product specifications

Operating pressure	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H	Temperature
29-87 psi (2-6 bar)	90-240 V, 50/60 Hz	0.25 kW	3/4 in. NPT	17.7 x 22.8 x 59 in. (450 x 580 x 1500 mm)	2-35°C

## Ordering information

Barnstead system options	LabTower RO 40 Cat. No.
LabTower RO Systems*	50132391
All systems include an RO membrane(s), integrated 100 L reservoir, and pressure regulator	
<b>Required accessories</b>	
<b>Pretreatment cartridges</b>	50134022
Both are required for complete pretreatment solution	10 in. filter housing
	1 µm filter with a 10 in. filter housing
Sterile vent filter for reservoir	09.4003
Sterile overflow for reservoir	50135142
	50132714
<b>Optional accessories</b>	
Printer utilizes RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines	120/240 V, 50/60 Hz
	STARA-106
<b>Water watcher</b>	16.0129
Alerts the user to leaks; available as 240 V only	
<b>Hand dispenser Kit</b>	50138221
Hand dispenser with 2.4 m (8 ft) tubing that connects to tank; ships with a 0.2 micron final filter	
<b>Replacement consumables</b>	
<b>Reverse osmosis membrane</b>	22.0087 (must order 2)
LabTower TII 40 requires two membranes	
10 in. 5 µm filter with hardness stabilizer cartridge	06.5204
1 µm filter prefilter for 09.4003	06.5101
5 µm prefilter + activated carbon 10 in. cartridge	06.5201



# Barnstead Pacific RO Water Purification Systems

The Barnstead Pacific RO system is a modularly designed laboratory reverse osmosis system specifically developed for functional and economical production of high-purity water.

## Product features

- Three system options with permeate flows of 7, 12, or 20 L/hr
- Space-saving design allows system to sit on the laboratory bench or be mounted on the wall
- RO membrane removes organic and inorganic contaminants, microorganisms, particles, and colloids

## Reliable operation

- Microprocessor control offers automatic operation with continual monitoring of all important parameters

## Easy-to-operate clear display

- Resistivity/conductivity clearly displayed on large back-lit control panel that tilts for optimum viewing
- Status of current operating mode clearly indicates “production”, “stand-by”, or “rinsing” modes
- Reservoir fill-level shown as %

## Integrated feed water monitoring

- Feed water monitor to determine % rejection performance

## GLP-compliant documentation

- Real-time clock records system errors and faults
- Ongoing data storage collects four weeks information, displayed as text
- Operating system is code-protected to prevent unauthorized changes to system settings



- RS-232 interface with adjustable sender interval allows for customized timing of data transmission of measured values and faults to a PC or data printer
- Cell constant of 0.16 cm<sup>-1</sup> ensures precise conductivity measurements

## Pacific RO pretreatment

- Barnstead Pretreatment contains 3 cartridges to protect RO membrane to extend its life
- Cartridges are designed to remove tap water impurities such as particles, hardness and chlorine.

## Worry-free pure water storage

- Reservoir are constructed of pigment-free polyethylene
- Conical bottom allows for easy cleaning, disinfecting, and complete emptying

## Applications include

- Rinsing lab glassware
- Supplying autoclaves, water baths, and incubators
- Preparing and diluting buffers and reagents
- General biotechnology



# Flexible configurations for your RO water needs

## Quick look comparison

	Pacific RO 7 L/hr systems	Pacific RO 12 L/hr systems	Pacific RO 20 L/hr systems
Pure water production at 15°C, L/hr	7	12	20
Salt retention, %	98	98	98
Retention, bacteria and particles, %	99	99	99

## Feed water requirements\*

Source	Potable tap water that has been softened or hardness stabilized
SDI	<5, with higher values, a pretreatment (Cat. No. 50157886 External pretreatment must be installed upstream of the system)
Conductivity, $\mu\text{S}/\text{cm}$	<1,500
Prefiltration	5 $\mu\text{m}$ + activated carbon
Free chlorine, mg/L	<0.1
pH range	4–11
Temperature, °C	2–35

\* Complete list of feed water specifications can be found in the operational manual.



# Barnstead Pacific RO Water Purification Systems

## Storage reservoir specifications

Volume	Material	Dimensions
30 L	Polyethylene, opaque to light	23.5 x 14.9 in. (598 x 380 mm)
60 L		35.9 x 14.9 in. (912 x 380 mm)
100 L		49.2 x 14.9 in. (1249 x 380 mm)

## Pacific RO product specifications

Operating pressure, psi (bar)	Electrical requirements	Power consumption	Feed water connector	Dimensions (Bench mount, system only) W x D x H	Temperature
29–87 (2–6)	90–240 V, 50/60 Hz	0.1 kW	3/4 in. NPT	14.6 x 13 x 23.7 in (372 x 330 x 603 mm)	2–35°C

## Specifications and ordering information

Barnstead system options	Pacific RO 7	Pacific RO 12	Pacific RO 20
<b>Pacific RO systems*</b> All systems have an integrated wall bracket and include an RO membrane	50132386	50132387	50132388
<b>Required accessories</b>			
<b>Barnstead Pretreatment</b> Comes with pressure reducing valve, 1 micron prefilter, hardness stabilizing cartridge, and carbon cartridge 11 x 7 x 15.6 in (28 x 17.8 x 39.6 cm)	50157886	50157886	50157886
<b>Pacific RO reservoir</b> Choose a reservoir that fits your needs	See “Storage reservoir options” the next page		
<b>Optional accessories</b>			
<b>Water watcher</b> Alerts the user to leaks; available as 230 V, 50 Hz only.	16.0129	16.0129	16.0129
<b>Replacement consumables</b>			
<b>Reverse osmosis membrane</b> Pacific RO 7, 12 only require a single RO membrane Pacific RO 20 requires two membranes as indicated	22.0046	22.0046	22.0046 (order 2)
<b>Replacement consumables</b>	<b>Description</b>	<b>Cat. No.</b>	
Barnstead Pretreatment system	1 micron prefilter	D502113	
	Hardness stabilizer	D502114	
	Carbon cartridge	D502115	

\* Included with new unit.



## Ordering information

Storage reservoir options for Barnstead Pacific RO system		30 L	60 L	100 L
Reservoir	With level display	50155495	50155500	50155503
Required accessories				
Sterile overflow for reservoir		06.5001	06.5001	06.5001
Vent filter	Sterile filter, 0.2 µm	50135142	50135142	50135142
Optional accessories				
Wall mounting bracket		06.5015	06.5016	N/A

# Pretreatment

Not all feed-water sources are equal

Pretreatment is sometimes necessary to maximize the effectiveness of water purification systems. Poor water quality can also shorten the life of water system consumables.



### Thermo Scientific™ Mixed Multi Mini Water Softener

- Ideal system to treat hard feed water
- Not only softens the water, but also protects the RO membrane from blockage
- Removes calcium, magnesium, iron, and manganese, and a great variety of suspended matter and organic material
- Combination of multiple stages, from porous polymeric adsorbers to ion exchangers
- Necessary for feed water with a SDI that is greater than 3 or the total ionized solids (TIS) is greater than 250 ppm

### Single pretreatment cartridge

- Easy-to-use pretreatment cartridge protects the RO membrane in a system against particles
- Ships with 10 in. filter housing and a 1 µm filter
- Ideal when feed water SDI is 2–3

### Double Pretreatment System

- Ships with two 10 in. filter housings, a combi-cartridge which contains a 5 µm filter and activated carbon, and a hardness stabilizer cartridge
- Removes chlorine, organics, and hard ions

### Barnstead Pretreatment

- Compact system with options to wall or bench mount, includes pressure reducing valve and pressure gages
- 5 micron prefilter, hardness stabilizer and carbon filter protect RO membrane from tap water impurities for longer life.
- An effective triple pretreatment system removes chlorine, organics, hard ions, and particles larger than 1 µm



Not sure what you need?

Request a complimentary H<sub>2</sub>O Select analysis kit and let us analyze your feed water. Your report will include a recommendation of any pretreatment system needed for your water purification system.



Mixed Multi Mini Water Softener



Double pretreatment system

# Thermo Scientific™ Barnstead Pretreatment selector guide

Use pretreatment when your feed water quality doesn't match the requirements for your system.

Water type	Solutions	Voltage	Descriptions	Cat. No.
Tap into RO system	<b>Barnstead Pretreatment</b> Contains pressure gauges, ressure reducing valve, 5 micron pre-filter, hardness stabilizing cartridge, and carbon cartridge to protect RO membrane.		Complete pretreatment system >	50157886
Deionized distilled water	Deionized and distilled water will meet the feed water requirements for the Barnstead GenPure and MicroPure families. No pretreatment is typcially required.			
Tap water	<b>Barnstead Pacific TII and reservoir or LabTower TII</b> Utilize a Type 2 system to pretreat the Barnstead GenPure and MicroPure families.			See pages 56–63
	Pretreatment filter, 1 µm filter		10 in. 1 µm filter with housing >	09.4003
	<b>Mix Multi Mini Water softener</b> The softener is required for most customers who have unsoftened tap water, or a Total Ionized Solids of more than 10 ppm. Additionally, you will need to replace the hardness stabilizer cartridge that ships with the unit with a 5 µm filter with activated carbon 230 V, 50 Hz.		Mixed multi softener > 5 µm filter with activated carbon >	50130297 06.5201
Tap water	<b>Pretreatment filter, 1 µm filter</b> Ships with one 10 in. filter housing It is ideal to place largest pore filter before smaller, so put the 5 µm filter with hardness stabilizer (ships with the unit) before the 1 µm filter for optimal performance Designed for customers without chlorine in their tap water—typically Europe and Asia Pacific		10 in. 1 µm filter with housing >	09.4003
	<b>Pretreatment filter with carbon</b> 5 µm filter with activated carbon, 1 µm filter Ships with two 10 in. filter housings Designed for customers with chlorine in their tap water – typically North America, Latin America and UK		5 µm filter with carbon > 10 in. 1 µm filter with housing >	50134022 09.4003
	<b>Single pretreatment system</b> 5 µm filter with hardness stabilizer cartridge Ships with one 10 in. filter housing Great option for customers with little/no chlorine in their tap water—typically Europe and Asia Pacific		5 µm filter with hardness stabilizer >	09.4001
	<b>Double Pretreatment System</b> 5 µm filter with activated carbon cartridge, hardness stabilizer cartridge. Ships with two 10 in. filter housings Designed for customers with chlorine in their tap water—typically North America, Latin America, and UK		5 µm filter with carbon and a hardness stabilizer cartridge >	09.4000
	<b>Triple Pretreatment System</b> 5 µm filter with activated carbon cartridge, hardness stabilizer cartridge, 1 µm filter Ships with two 10 in. filter housings		5 µm filter with carbon and a hardness stabilizer cartridge > 1 um filter >	09.4000 09.4003
Hard tap water	<b>Mix Multi Mini Water softener</b> The softener will remove hardness and protect the RO membrane. Additionally, you will need to add a 5 µm filter with activated carbon and a 1 µm filter; 230 V, 50 Hz Ships with two 10 in. filter housings		Mixed multi softener > 5 µm filter with activated carbon > 1 µm filter >	50130297 50134022 09.4003
	<b>Mix Multi Mini Water softener</b> The softener will remove hardness to protect the RO membrane. Additionally, you will need to replace the hardness stabilizer cartridge that ships with the unit with a 5 µm filter with activated carbon; 230 V, 50 Hz		Mixed multi softener > 5 µm filter with activated carbon >	50130297 06.5201

\* Ships with 5 µm filter with hardness stabilizer.



	GenPure	MicroPure	Smart2Pure	LabTower EDI*	Pacific TII	LabTower TII*	Pacific RO	LabTower RO*
			•		•		•	
	•	•						
			•					
				•				
						•		•
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					•		•	
					•		•	
					•		•	
						•		•
							•	•

# Barnstead Pretreatment

## Features

- External pretreatment protects RO membrane to maximize life and perform Required pretreatment for Smart2Pure, Pacific TII and Pacific RO systems.
- Barnstead Pretreatment system can be wall- or bench-mounted.
- System includes pressure reducing valve, pressure gages to monitor filter life, 5 micron prefilter, hardness stabilizer and carbon cartridges.



## Specifications

Dimension	Measurement
<b>Pretreatment System</b>	
Height	396 mm/15.58 in.
Height with wall bracket	385 mm/15.17 in.
Width	280 mm/11 in.
Depth	178 mm/7 in.
Depth with wall bracket	188 mm/7.38 in.
Dry weight	11.1 kg/24.5 lbs
Wet weight (during operation)	13.2 kg/29 lbs

## Ordering information

Barnstead Pretreatment	Cat. No.	
<b>Barnstead Pretreatment</b> Comes with pressure reducing valve, 1 micron prefilter, hardness stabilizing cartridge and carbon cartridge 11 x 7 x 15.6 in. (28 x 17.8 x 39.6 cm)	50157886	
<b>Replacement consumables</b>		
	<b>Description</b>	<b>Cat. No.*</b>
	1 micron prefilter	D502113
Barnstead Pretreatment system	Hardness stabilizer	D502114
	Carbon cartridge	D502115

\* included with new unit.



## Replacement consumables ordering information

Pretreatment description	Pretreatment Cat. No.	Component description	Component Cat. No.
Single Pretreatment Carbon	50134022	10 in. (25.4 cm) Activated carbon cartridge with 5 µm filter	06.5201
Single Pretreatment System - Hardness Stabilizer	09.4001	10 in. (25.4 cm) 5 µm filter and hardness stabilizer	06.5204
Single Pretreatment System - Prefilter	09.4003	10 in. (25.4 cm) 1 µm filter	06.5101
Double Pretreatment System	09.4000	10 in. (25.4 cm) Activated carbon cartridge with 5 µm filter	06.5201
		10 in. (25.4 cm) Hardness stabilizing cartridge	06.5452
Triple Pretreatment System	09.4000	10 in. (25.4 cm) 5 µm filter with activated carbon cartridge	06.5201
	09.4003	10 in. (25.4 cm) Hardness stabilizing cartridge	06.5452
		10 in. (25.4 cm) 1 µm filter	06.5101
Mix Multi Mini, 230 V, 50 Hz	50130297	Salt, 25 kg	50155490
		Hardness measurement kit	06.1000
		5 µm filter with carbon	06.5201

## Specifications

Mix Multi Mini Water Softener, 230 V, 50 Hz	
Max flow rate, L/hr	500
Filter volume, L	5
Capacity, m <sup>3</sup> at 10 °dH	2
Salt storage, kg	20
Operating pressure, psi (bar)	20–87 (1.4–6)
Water temperature max, °C	40
Controller	time controlled
Dimensions, W x D x H, in (mm)	9 x 17.7 x 22 (230 x 450 x 560)
Cat. No.	50130297

### What is SDI?

**SDI stands for silt density index. When the SDI of feed water is >3, it can quickly ruin your RO membrane.**

- SDI is a measure of the fouling capacity of water in RO systems
- The test measures the rate at which a 0.45 µm filter is plugged when subjected to a constant water pressure of 30 psi
- SDI gives the percent drop per minute in the flow rate of the water through the filter, averaged over a period of time such as 15 minutes

# Cartridges and filter systems

We offer a complete line of cartridge and filter systems for all your single-step purification and pretreatment needs. Use the Bantam Deionizer, Barnstead Hose Nipple Cartridges or B-Pure cartridges for simple, single step purifications.





## Innovation

Joints and seams are ultrasonically welded to prevent contamination from chemical adhesives.



## Convenience




Quick-release designs provide easy cartridge change-outs and simplify maintenance, bypassing the cost of service calls.



## Flexibility

Versatile configurations meet an array of specific applications.

## Barnstead cartridge and filter selector guide

Choose the feature you need 	Technology/feature 	Benefits 	
Purity indicators	Digital purity indicator	Digital purity indicator features real-time readout of resistivity values; useful with more sensitive applications	
	Barnstead Pura-Lite "Go/No Go" system/ analogue resistivity indicator	Quick glance monitoring to notify user when it's time to install a new cartridge; useful if cartridge system feeds a piece of lab equipment, such as an autoclave, where real time resistivity is not required	
	Color change of cartridge	Color change indicates when the cartridge is beyond its useful life and must be replaced; useful for general lab applications	
Added features	Remote dispenser	Hand-dispense water from the cartridge system; ideal for rinsing glassware or filling a waterbath.	
	Wall-mounted	Saves laboratory bench space; ideal configuration for autoclaves and dishwashers where no bench space exists	
	Quick release canisters	Allows for fast and simple cartridge change-outs	
	Maximum flow rate L/min	Enhances productivity	

## Barnstead pressurized systems

## Barnstead non-pressurized water systems



B-Pure Double Holder	B-Pure Single Holder	B-Pure Half Size Holder	Harvey DI+	Economical filter holder	Hose Nipple	Bantam Deionizer
Expanded purification with full features	Single-step purification	Smaller capacity for optimal value	Complete system with dispenser and cartridge	Economical choice for particle filtration	Simple system for nonpressurized applications	Complete nonpressurized system
•						
•	•	•	•			•
					•	
			•			
•	•	•	•	Requires hard piping to support unit	•	•
•	•	•	•			
4	4	2	4	2	0.75	0.63

# Barnstead B-Pure water system

The Barnstead B-Pure system is an economical, laboratory-grade water system with flow rates up to 4 L/min that can be customized to meet your specific applications. Choose from single or double holders depending on your application needs.

- Customize your water system to meet your application needs; modular design provides the ability to add additional holders when the need arises
- Produces up to 4 L/min
- Quarter-turn, quick-release canisters make changing cartridges simple
- Accepts Thermo Scientific™ Barnstead™ Pura-Lite™ purity indicator or digital purity meter to monitor water quality
- Available in full- or half-size cartridge configurations supporting space constraints

## Single holder

- Produces up to 4 L/min
- Simple system without a draw-off valve or purity indicator

## Double holder

- Produces up to 4 L/min
- Complete with draw-off valve
- Choose from models with digital purity meter or Pura-Lite “Go/No Go” resistivity indicator

## Half-size holder

- Produces up to 2 L/min
- Easily attaches to full size Barnstead B-Pure systems
- Small size allows for flexibility in mounting location



## Quick look comparison

Resistivity reading	Flow rate
1–10 MΩ.cm (depending on cartridges used)	Up to 4 L/min

## Applications include

### Routine lab work

- Pretreatment
- Deionization
- Organic and chlorine removal
- Feeding laboratory equipment

# Customizeable for your pretreatment or deionization needs

## Thermo Scientific™ Harvey™ DI+ Cartridge System

- Turnkey system ships complete with a remote dispenser, Barnstead Pura-Lite (50 KΩ.cm) indicator, and a high-capacity, two-bed ion exchange cartridge to remove calcium, magnesium, and other ions from water
- The system accepts a broad range of other cartridges to remove impurities and produces pure water at a flow rate of up to 4 L/min



### Product specifications

	Overall dimensions W x H x D	Inlet connection	Feed water temperature	Max feed water pressure	Max flow rate
Single holder	7 x 24 x 7 in. (17.8 x 61 x 17.8 cm)	1/2 in. NPTF	4–49°C (40–120°F)	100 psig	4 L/min
Double holder	15 x 27 x 7 in. (38.1 x 68.65 x 17.8 cm)	1/2 in. NPTF	4–49°C (40–120°F)	100 psig	4 L/min
Half-size holder	7 x 15 x 7 in. (17.8 x 38.1 x 17.8 cm)	1/2 in. NPTF	4–49°C (40–120°F)	100 psig	2 L/min
Barnstead Harvey DI+ system	7 x 26 x 7 in. (17.8 x 63 x 17.8 cm)	1/2 in. NPTF	4–49°C (40–120°F)	100 psig	4 L/min

# Barnstead B-Pure water system



## Cartridges

Size	Dimensions: length x diameter
Full-size cartridge	17.5 x 3.4 in.
Half-size cartridge	10.95 x 3.4 in.

## Ordering information

System options	Electrical	Cat. No.
Single holder	–	D4511
Double holder with digital purity meter	120/240 VAC	D4521
Double holder with Barnstead Pura-Lite indicator (50 kΩ)	120 VAC	D4524
Double holder with Barnstead Pura-Lite indicator (1 MΩ)	120 VAC	D5833
Half-size holder	–	D4505
Barnstead Harvey DI+ system	120 VAC	AY1273X4



## Ordering information

Choose the cartridge(s) according to your needs.	Resin type(s)	Cartridge size	Capacity as CaCO <sub>3</sub>	Cat. No.
<b>Required accessories</b>				
<b>Anion removal</b> Effective removal of weakly ionized impurities, raises the pH of solutions, recovers precious metal complex	Strong anion exchange	Full	1,680 grains	D0760
<b>Cation removal</b> Converts ionized salts to the acid form resulting in a product water that is low in pH, ideal for precious metal or isotope recovery	Strong cation exchange	Full	3,170 grains	D0815
<b>High capacity</b> Removes ionized impurities, produces a larger quantity of water than that of the Ultrapure (D0809), however at a lower resistivity	Two-bed ion exchange	Full	1,760 grains	D0803
<b>Pretreatment macropure</b> Effectively removes colloids and bacteria, increases filter life	Macroreticular, activated carbon	Full	2,000 gal	D0836
<b>Organic removal</b> Removes organics and chlorine	Activated carbon	Full	5,000 gal	D0813
		Half	5,000 gal	D50215
<b>Organic removal</b> Removes organics and chlorine; ideal for pretreating water systems with high organic levels in the feed water	Extruded carbon	Full	5,000 gal	D63112
<b>Oxygen removal</b> Maintains low oxygen content to prevent corrosion in cooling water loops, etc.; the feed water should contain less than 10 ppm of ionized solids	Porous strong anion exchange	Full	30 g	D0811
		Half	18 g	D50214
<b>Oxygen and demineralization</b>	Oxygen removal mixed-bed	Half	275 grains/ 9 g	D50216
<b>Ultrapure</b> Removes ionized impurities to produce high resistivity water with a neutral pH	Mixed-bed	Full	875 grains	D0809
		Half	550 grains	D50213
<b>Ultrapure and organic removal</b> Commonly used as still pretreatment; removes ionized impurities and has a layer of activated carbon to remove chlorine and organics	Mixed-bed, activated carbon	Full	785 grains/ 1,000 gal	D0832
		Half	275 grains/ 2,000 gal	D50217
<b>Ultrapure and oxygen removal</b>	Ultrapure, oxygen removal	Full	455 grains/ 30 g	D8809
<b>Ultrapure, oxygen, and organic removal</b>	Ultrapure, oxygen and organic removal	Full	365 grains/ 2,000 gal/12 g	D8811

## Ordering information

Optional accessories	Voltage	
	120	
<b>Barnstead Pura-Lite system</b>	Indicator light at 50,000 Ω.cm	E3450
	Indicator light at 200,000 Ω.cm	E3451
	Indicator light at 1,000,000 Ω.cm	E3452
<b>Flow meters</b>	0 to 190 L/hr using 1/8 in. NPT inlet	D0788
<b>0.2 μm final filter—for use on double holder units</b>		D3750

# Bantam Deionizer

## Simple deionization system

The Bantam Deionizer is an economical way to deionize your water. You can easily view resistivity readings directly from the unit. The system is customizable to specific applications by selecting the appropriate cartridge listed below.

- Ideal for applications requiring up to 38 L/hr of purified water
- Select the cartridge to best meet your application needs
- Point of use polishing of pretreated water or single stage treatment of tap water
- Direct reading purity monitor
- Designed for non-pressurized applications; output water must be diverted to an atmospherically-vented receptacle, no back pressure can be accepted
- Minimum inlet pressure 5 psi, maximum inlet pressure 70 psi
- Includes 3 ft (0.9 m) of inlet feed tubing



### Quick look comparison

Resistivity reading	Flow rate
25,000–18,000,000 $\Omega$ -cm	Up to 38 L/hr

### Ordering information

System options	Overall dimensions W x H x D	Feed water pressure	Electrical	Cat. No.
<b>Bantam Deionizer*</b>	6 x 28.5 x 8.75 in.	5–70 psi	120 VAC	D0800
	(15.2 x 72.4 x 22.2 cm)		240 VAC	D0805

### Required accessories

Choose the cartridge based on your application needs	Resin Type(s)	Capacity	Cat. No.
<b>High capacity</b> Removes ionized impurities, produces a larger quantity of water than that of the Ultrapure (D0809), however at a lower resistivity	Two-bed ion exchange	1760 grains	D0803
<b>Ultrapure</b> Removes ionized impurities to produce highest resistivity water with a neutral pH	Mixed-bed	875 grains	D0809
<b>Ultrapure and organic removal (pretreatment)</b> Removes ionized impurities and has a layer of activated carbon to remove chlorine and organics	Mixed-bed, activated carbon	785 grain /1,000 gal	D0832

### Applications include

#### Routine lab work

- Pretreatment
- Deionization
- Organic and chlorine removal

# Barnstead Hose Nipple Cartridges

## Easily customizable cartridge holder

The Barnstead Hose Nipple Cartridges are an economical way to purify water volumes up to 45 l/hr (12 gph) for average tap water and flowrates up to 75 l/hr (20 gph) can be achieved using high quality feed water. Applications include softening, deionization, organic and chlorine removal.

- Economical purification option
- Ideal for small volume applications
- Same superior quality resins used in Barnstead B-Pure cartridges
- Constructed of 100% virgin polypropylene cartridge
- Designed for non-pressure applications, these cartridges include 3/8 in. barb hose connections on each end; D8822, D8950, and D8951 cartridges include tapered straight nipple for 3/8 in. ID tubing
- Color-change indicator identifies when resin is exhausted in specific cartridges
- Simple cartridge holder easily wall mounted

### Applications include Routine lab work

- Pretreatment
- Deionization
- Organic and chlorine removal
- Feeding laboratory equipment

### Product specifications

Cartridge size	Dimension (length x diameter)
1/2 size	10.2 x 3.25 in. (25.9 x 8.25 cm)
2/3 size	13.3 x 3.25 in. (33.8 x 8.25 cm)
Full size	18.7 x 3.25 in. (47.5 x 8.25 cm)



### Ordering information

System options	Cat. No.
Barnstead Hose Nipple Cartridges For easy wall mounting	D8900

### Required accessories

Choose the cartridge based on your needs	Resin type(s)	Capacity	Color indicator <sup>1</sup>	Cat. No.
1/2 size mixed-bed	Ultrapure ion exchange	430 grains	No	D50220
1/2 size mixed-bed with oxygen removal	Ultrapure mixed-bed with strong anion exchange	280 grains / 4.4 g	No	D8822
2/3 size high capacity	Two-bed ion exchange with strong cation exchange	1,100 grains	Yes	D8950
2/3 size mixed-bed and organic removal	Mixed-bed ion exchange with activated carbon	470 grains / 2,000 gal	Yes	D8951
Full size cation removal	Cation exchange	3,000 grains	Yes	D8905
Full size high capacity	Two-bed ion exchange	1,650 grains	Yes	D8901
Full size macroreticular, cation removal	Macroreticular cation exchange	N/A	No	D8908
Full size organic removal	Activated carbon	5,000 gal	No	D8904
Full size oxygen removal	Strong anion exchange	30 g	No	D8903
Full size pretreatment and scale eliminator	Mixed-bed and strong cation exchange, activated charcoal	1,250 grains / 1,000 gal	Yes	D8921
Full size ultrapure	Ultrapure ion exchange	915 grains	No	D8911
Full size ultrapure	Ultrapure mixed-bed ion exchange	915 grains	Yes	D8902
Full size ultrapure with organic removal	Mixed-bed ion exchange with activated carbon	730 grains / 2,000 gal	Yes	D8922

# Barnstead 1/2 Size B-Pure Filter

Thermo Scientific™ Barnstead™ 1/2 Size B-Pure™ Filters will meet all your prefiltration needs. The filters can be used to pretreat feed water or act as a final filter to ensure consistently pure water.

## Product features

- Large surface area ensures long life
- Flow rates of up to two L/min Includes 3 ft (0.9 m) of inlet feed tubing

## Choose from two holder options

### Barnstead 1/2 Size B-Pure Filter Holder

- Natural polypropylene material construction maintains purity
- Filters are easily and quickly replaced with quarter turn quick release canisters
- Accepts 10 in. (25.43 cm) pre- and post-filters
- Wall mounting bracket comes standard

### Economy filter holder

- Accepts 10 in. (25.43 cm) double open-ended filters
- Can be piped into any water line

## Optional accessory

### Pressure gauge kit

- Attaches to any Barnstead B-Pure system
- 0–160 psi pressure gauge allows for monitoring inlet and outlet water pressure
- Monitors pressure drop across any of the 10 in. (25.43 cm) filter cartridges used in the Barnstead 1/2 Size B-Pure Filter Holder
- Pressure drop of greater than 10 psi indicates need for filter change



Barnstead 1/2 size B-Pure Filter Holder



Economy filter holder

## Applications include

### Routine lab work

- Particulate and bacterial work

# Flexible filtration system

## System options product specifications and ordering information

	Overall dimensions W x H x D	Inlet connection	Feed water temperature	Max feed water pressure	Max flow rate	Cat. No.
<b>Barnstead 1/2 Size B-Pure holder*</b> Wall mount included	7 x 15 x 7 in. (17.8 x 38.1 x 17.8 cm)	1/2 in. NPTF	4–49°C (40–120 °F)	100 psig	2 L/min	D5839
<b>Economy filter holder*</b>	5.25 x 12 x 5.25 in. (13.3 x 30.5 x 13.3 cm)	3/4 in. NPTF	4–49°C (40–120 °F)	100 psig	2 L/min	15840

## Required accessory ordering information

	Pore size	Length in (cm)	Diameter in (cm)	Barnstead 1/2 size B-Pure Filter Holder	Economy holder
<b>Filters</b> Choose the filter(s) according to your needs	1 µm pre-filter	10 (25.4)	2.5 (6.5)	FL583X4	18024
	5 µm pre-filter	10 (25.4)	2.5 (6.5)	FL583X1	D2729
	10 µm pre-filter	10 (25.4)	2.5 (6.5)	FL583X2	18011
	15 µm pre-filter	10 (25.4)	2.5 (6.5)	FL583X3	18018
	0.2 µm final filter	10 (25.4)	2.5 (6.5)	FL583X6	–
	0.45 µm final filter	10 (25.4)	2.5 (6.5)	FL583X5	–
<b>Optional accessories</b>					
				D2780	–
				D0780	–

\*  

## Already have a Thermo Scientific water purification system?

This is where you can find the replacement consumables for your previously purchased Thermo Scientific water purification system.



Cleaning your purification system allows bacterial contaminants to be flushed away

### Regularly changing filters and cartridges protects your water quality

Water purification systems can only produce pure water when the cartridges and filters are changed according to the operational manuals. Regular maintenance of your water system will ensure the product water is consistently the highest purity.



Changing the UV lamp protects the system against microorganisms and oxidizes organic compounds in the feed water, allowing for TOC levels of less than 5ppb

## Ordering information

### Barnstead NanoPure System consumables



	NanoPure Analytical	NanoPure Analytical UV	NanoPure Biological UF	NanoPure Life Science UV/UF
Standard unit	D11901	D11911	D11921	D11931
+ TOC monitor	D11941	D11951	D11961	D11971

### Replacement consumables

Diamond cartridge pack Choose the cartridge pack according to your feed water and system; ships with 0.2 µm final filter (D3750)	Deionized feed	D50283	D50281	D50283	D50281
	RO or distilled feed	D50282	D50280	D50282	D50280
0.2 µm final filter		D3750	D3750	D3750	D3750
Ultraviolet lamp (system)		N/A	LMX13	N/A	LMX13
Ultrafilter		N/A	N/A	FL1192X1	FL1192X1
Cleaning syringe		CMX25	CMX25	CMX25	CMX25
UV lamp (TOC)		LMX26	LMX26	LMX26	LMX26

## Ordering information

### Thermo Scientific™ Barnstead™ EasyPure™ system consumables



	EasyPure II	EasyPure II UV	EasyPure UF	EasyPure II UV/UF
	D7381	D7401	D7411	D8611

#### Replacement consumables

Cartridge pack	Deionized feed	D502126	D502124	D502126	D502124
Choose the cartridge pack according to your feed water and system	RO or distilled feed	D502127	D502125	D502127	D502125
0.2 µm final filter		D3750	D3750	D3750	D3750
Ultraviolet lamp		N/A	LMX13	N/A	LMX13
Ultrafilter		N/A	N/A	FL1192X1	FL1192X1
Cleaning syringe		CMX25	CMX25	CMX25	CMX25

## Ordering information

### Barnstead EasyPure RF System consumables



	EasyPure RF	EasyPure RF UV
	D7031	D7035

#### Replacement consumables

Cartridge pack	Deionized feed	D502126	D502124
Choose the cartridge pack according to your feed water and system	RO or distilled feed	D502127	D502125
0.2 µm final filter		D3750	D3750
Ultraviolet lamp		N/A	LMX13
Ventgard reservoir cap		CV703X4A	CV703X4A
Set of three empty cartridges for cleaning		D7034	D7034

## Ordering information

### Barnstead TII System consumables



	Barnstead TII
TII 12 L/hr	D14031
TII 24 L/hr	D14041

#### Replacement consumables

TII DI cartridge pack	D502137
Ships with 0.2 µm final filter (D3750)	
1 µm pre-filter	D502113
MPS cartridge	D502114
Extruded carbon cartridge	D502115
0.2 µm final filter	D3750
Reverse osmosis membrane	FL1265X1
Ultraviolet lamp (system)	LMX13
Ultraviolet lamp (reservoir)	LMX31
Ventgard reservoir cap	25001-DB

## Ordering information

### Barnstead EasyPure RoDi System consumables



	EasyPure RoDi
	D13321

#### Replacement consumables

Cartridge kit	D502133
Includes pre-filter, ultrapure mixed bed cartridge, and EasyPure high-purity/low TOC cartridge	
0.2 µm final filter	D3750
Ultraviolet lamp	LMX13
Ventgard reservoir cap	CV742X5A
RO membrane	FL1332X2
Set of three empty cartridges for cleaning	D7034

## Ordering information

### Barnstead RO System consumables



	Barnstead RO
RO 6 L/hr	D12671
RO 12 L/hr	D12651
RO 24 L/hr	D12661

#### Replacement consumables

Reverse osmosis membrane	6 and 12 L/hr 24 L/hr Requires 2 RO membranes	FL1265X1
1 µm pre-filter		FL1265X1
MPS cartridge		D502114
Extruded carbon cartridge		D502115
Ventgard reservoir cap		25001-DB

# Support and maintenance

Have a question or concern?

Contact our Pure Water Experts

## Technical questions

Our technical service team is ready to answer any of your questions on your existing systems.

## Customer service

Let our professional and experienced customer service representatives guide you when choosing your water system. They will evaluate your needs, develop a system recommendation, and coordinate the installation of your water system.

## New lab construction

We offer the most comprehensive line of water purification systems in the world. We can design a water system to meet your new lab's needs.

## Contact the Lab Water Experts

Have a question or concern? Contact our Pure Water Experts.





### Services

Maintaining your water purification system is crucial to the overall productivity of your laboratory, the long-term performance of the system and the total cost of ownership. We offer a variety of services to suit your individual needs. Professional service delivers improved productivity, convenience, peace-of-mind and budget control.

### Preventive maintenance

To ensure your system is working within specifications, regular maintenance is essential. We offer various service options and preventative maintenance, which will extend the working life, protect your system, and prevent costly breakdown.

### Installation

Our factory-trained technicians can install your system to ensure it operates with precision. With our services, you will receive:

- Installation scheduled at your convenience
- Assurance that all technical specifications are met
- Practical hands-on instructions

### Validation

We offer validation services according to cGMP and GLP regulations, certifying that your system is performing according to pre-determined technical specifications. Our validation services provide you with:

- Factory-trained experts—experienced in cGMP and GLP environments and good document practice
- IQ/OQ factory-developed validation protocols



### Go green

Smart, green designs mean a great water system for you and a smaller impact on the environment! Our engineers created water systems with the environment in mind:



### Reduce

Our cartridges use high-quality resin to extend the useful life of the cartridge. Extended life reduces the need to replace your cartridges which, in turn, reduces the waste stream and improves your laboratory's sustainability. You'll use your cartridges longer, reducing the need to reorder, ship, handle, and dispose of your cartridges.

Our units are designed to minimize the amount of water that is used during the analysis.

To provide the customer with pure water and low power consumption, our units go into a low-energy mode after dispensing without sacrificing water quality for your applications.

### Reuse

Our cartridges were engineered with the environment in mind. The plastic cartridge casings and endcaps are constructed using virgin polypropylene to allow for easy recycling after end of life. The cartridge is assembled in a clean environment using environmentally friendly ultrasonic welding that minimizes energy usage compared to other joining as well as avoids the use of any environmentally unfriendly solvents. Our conscious effort to avoid chemical solvents and adhesives makes the plastic and resin suitable to be recovered, reground, and reused for a variety of alternate uses.

Common conversions for pure water	
Volume	1 US gallon (gal) = 231 cubic in (in.3) = 3.785 liters (L)
	1 cubic meter (m3) = 35.3 cubic feet (ft.3)
	1 US ounce (oz) = 29.57 milliliters (mL)
Density	1 US gallon (gal) = 8.33 lb water
	1 cubic foot (ft <sup>3</sup> ) = 62.3 lb water
Temperature	$^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$
	$\text{K} = ^{\circ}\text{C} + 273$
	$^{\circ}\text{F} = (\text{K} - 273.15) * 9/5 + 32$
Mass	1 lb = 453.6 grams (g) = 7,000 grains (gr.)
	1 kg = 2.205 lb
Pressure	1 Atmosphere = 14.7 lb per sq. in. (psi) = 101.325 kilo pascal (KPa)
	psia (absolute) = psig (gauge) + 14.7
	9.92 in Hg = 33.83 ft. H <sub>2</sub> O
	1 kg/cm <sup>2</sup> = 14.233 psi
	1 KPa = 0.145 psi
Total ionized solids concentration	1 grain per gallon (gr/gal) = 17.1 parts per million (ppm)
	1 grain per gallon as NaCl = 0.85 grains per gallon as CaCO <sub>3</sub>
	1 part per million (ppm) = 1 milligram per liter (mg/L)
	1 ppm as NaCl = 0.85 ppm as CaCO <sub>3</sub>
	1 ppm = 1,000 parts per billion (ppb) = 1,000,000 parts per trillion (ppt)
	1 ppb = 1 microgram per liter (μg/L)
	1 ppm = 1.5 μS/cm
Resistivity/conductivity	1 megohm-cm = 1/(μS/cm) = 1/(μmho/cm)

### Calculating ion exchange capacity

Cartridge grain capacity/total dissolved solids (grains/gal) = gallons processed

Cartridge grain capacity x 17.1/total dissolved solids (ppm) = gallons processed

Cartridge grain capacity x 64.7/total dissolved solids (ppm) = liters processed

# Glossary

**Absorption**—Process by which one substance is taken up by another, either chemically or physically, as when a sponge “soaks up” a liquid.

**Activated carbon**—Material used to adsorb organic impurities from water.

**Anion exchange resin**—An ion exchange material that removes anions from solution by exchanging them with hydroxyl ions.

**Bed**—Column of carbon, sand, or ion exchange resins through which the water passes during treatment.

**Cation exchange resin**—Ion exchange resins capable of removing cations by exchanging them for hydrogen ions.

**Conductivity**—The reciprocal of resistivity, it is a measure of the ability to conduct an electric current. Since ionized impurities increase the conductivity of water, it is also an accurate measure of ionic purity. To measure it, current is passed between two electrodes a fixed distance apart. Conductivity is normally expressed as microsiemens/cm, identical to micromhos/cm.

**Deionization**—Removing dissolved ions from solution by passing it through a bed of ion exchange resins, consisting of polymer beads that exchange hydrogen ions for cations and hydroxyl ions for anions in solution. The ionic impurities remain bound to the resins, and the hydrogen and hydroxyl ions combine with each other to form water.

**Dissolved solids**—Also referred to as total dissolved solids (TDS), it is the amount of nonvolatile matter dissolved in a water sample and is usually expressed in parts-per-million by weight.

**Distillation**—The process of separating water from impurities by heating until it changes into vapor and then cooling the vapor to condense it into purified water.

**Electrodeionization (EDI)**—Removes dissolved ions from solution using electricity to ionize water and separate ions.

**Effluent**—The output or discharge from a water treatment process.

**Endotoxin**—A poisonous substance present in bacteria that is released when the cell disintegrates. In water treatment, it most often refers to pyrogens.

**Exhaustion**—When absorbents, such as activated carbon or ion exchange resins, have depleted their capacity by using up all active sites. Ion exchange resins may be regenerated to reverse the process.

**Feed water**—Water entering a treatment process.

**Filtration**—Removal of suspended matter by passing it through a porous matrix that prevents particles from getting through, usually by entrapment on or in the filter matrix.

**Fouling**—When gelatinous coatings, colloidal masses or dense bacterial growth form a compacted crust on membrane or filter surfaces which blocks further flow.

**Grains per gallon**—Concentration of dissolved ions in water, generally as calcium carbonate. 7,000 grains is equal to a pound. One grain per gallon is equivalent to 17.1 ppm of dissolved solids.

**Hardness**—Concentration of calcium and magnesium salts in water and is sometimes also taken to include iron and manganese. High hardness can cause boiler or pipe scale and failure of reverse osmosis membranes.

**Ion exchange**—Also called deionization. A process in which harmless ions attached to the resin beads are exchanged for undesirable ions in solution. Typically, hydrogen ions are exchanged for any cations and hydroxyl ions for any anions. The hydrogen and hydroxyl ions combine to form pure water.

**Macroreticular Resin**—An ion exchange resin with a reticular porous matrix that makes it effective for removing colloids and bacteria, as well as dissolved anions. It is especially useful for preventing colloidal and organic fouling of mixed-bed resins and premature clogging of final filters.

**Megohm-cm**— $\Omega$  A measure of ionic purity in water. Resistivity (the reciprocal of conductivity) is a measure of specific resistance to electrical flow. The fewer dissolved ions in water the higher its resistivity. One megohm-cm is equivalent to one million ohms of

resistance measured between two electrodes one centimeter apart. The theoretical maximum ionic purity for water is 18.2 megohm-cm at 25°C.

**Membrane**—Filtration membranes are thin polymer films that are permeable to water and other fluids. Microporous membrane filters have measurable pore structures which physically remove particles or microorganisms larger than pore size. Ultrafiltration membranes (sometimes called molecular sieves), also remove molecules larger than a specified molecular weight. Reverse osmosis membranes are permeable to water molecules and very little else, rejecting even dissolved ions in water.

**Mho**—Unit of measurement for conductance; the reciprocal of ohm (resistance). See Megohm-cm.

**Mixed-bed ion exchange**—Mixing both anion and cation resins in the same deionizer results in higher efficiency, but lower capacity than separate-bed deionizers.

**NPT**—Abbreviation for National Pipe Thread.

**Ohm**—The practical unit of electrical resistance in a circuit, where a potential difference of one volt produces a current of one ampere.

**Ohm-cm**—Unit of specific resistance of water.

**Osmosis**—The diffusion of a solvent through a semipermeable membrane from a less concentrated solution to a more concentrated solution.

**Percent recovery**—In reverse osmosis or ultrafiltration, the ratio of pure water output to feed water input.

**Percent rejection**—In reverse osmosis or ultrafiltration, the ratio of impurities removed to total impurities in the incoming feed water. For example, RO membranes typically remove (reject) 90 % of the dissolved inorganic contaminants in water.

**Permeate**—In reverse osmosis, the water that diffuses through the membrane, thereby becoming purified water.

**Pretreatment**—Initial water treatment steps performed prior to final processing to prolong the life of cartridges and filters and to protect downstream elements from premature failure.

**Product water**—The purified water produced as a result of treatment.

**Pyrogens**—Lipopolysaccharides found in the outer cell walls of certain bacteria which can trigger an immune response.

**Recirculation**—Continuous recirculation may be necessary to maintain uniformly high purity in larger water systems. Water is continuously recirculated and reprocessed to prevent stagnation and to rinse out residual impurities in the system. Bacteria flourish in stagnant water.

**Reject**—In reverse osmosis and ultrafiltration, those impurities not able to permeate the membrane are said to be rejected (removed). They are flushed away in the reject (waste) stream.

**Resin**—Ion exchange resins are usually bead-like spherical materials with an affinity for particular ions. Cation exchange resins, made of styrene and divinylbenzene containing sulfonic acid groups, will exchange hydrogen ions for any cations they encounter. Similarly, anion exchange resins, made of styrene and divinylbenzene containing quaternary ammonium groups, will exchange a hydroxyl ion for any anions.

# Glossary

**Resistivity**—A measure of specific resistance to the flow of electricity. In water, it is an accurate measure of ionic purity. See “Megohm-cm”.

**Reverse osmosis**—The reversal of osmosis to purify water. In osmosis, water diffuses through a semipermeable membrane from a less concentrated solution to a more concentrated solution. The flow of water can be reversed with an opposing pressure that exceeds osmotic pressure. With reverse osmosis, water is forced out of a concentrated solution, leaving the solute (impurities) behind.

**Salt rejection**—The ratio of salts removed (rejected) to the original salt concentration in reverse osmosis. See Percent Rejection.

**Scale**—The mineral deposits that can coat the insides of boilers or the surfaces of RO membranes. It consists mainly of calcium carbonate, which precipitates out of solution under certain conditions of pH, alkalinity and hardness.

**Semipermeable**—Membranes that do not have measurable pores, but through which smaller molecules can pass.

**Suspended solids**—Undissolved solids that can be removed by filtration.

**TDS**—Abbreviation for total dissolved solids.

**Total ionized solids**—Concentration of dissolved ions in solution, expressed in concentration units of NaCl (sodium chloride).

**Total organic carbon (TOC)** – A measure of the level of organic impurities in water, which determines the operating life of activated carbon beds.

**Total Solids** – Total solids in water include both dissolved and suspended solids.

**Turbidity**—A suspension of fine particles that obscures light rays but requires many days for sedimentation because of small particle size.

**Two-bed**—Separate beds or layers of cation and anion exchange resins. Results in lower purity than mixed-bed deionization, but provides higher capacity in terms of throughput.

**Ultrafiltration**—Molecular sieves; membranes with pores small enough to remove large molecules. Rated in terms of nominal molecular weight cutoff. A 10,000 Da (molecular mass) UF membrane, for example, will remove bacterial pyrogens, which are typically in the range of 20,000 Da.

**Ultrapure water**—Water with a specific resistance higher than 1 megohm-cm. In the laboratory, it usually refers to ASTM D1193 Type 1 reagent grade water. Anything in laboratory water that is not H<sub>2</sub>O is an impurity. Although chemically pure water is not attainable, ultrapure water systems are now capable of reducing impurities down to the limits of detection.

**UV oxidation**—Ultraviolet radiation is employed in water purification for the photochemical oxidation of organic impurities, resulting in HPLC-grade water with organic impurity levels below 5 ppb.





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