



**Thermo Scientific Waterbook**

**exceptional lab water systems**  
without the attitude

**Thermo**  
SCIENTIFIC

exceptional lab water systems  
without the attitude

**H<sub>2</sub>O.** It's such a simple compound.

So why settle for a complicated lab water system?

Thermo Scientific Barnstead water purification systems **deliver pure and ultrapure water – with ease.** With flexible systems designed precisely for your applications, and multiple water types from a single solution. Plus simple, efficient operation without the need for maintenance plans, and innovations like UV intensity monitoring to ensure accurate total organic carbon (TOC) readings. It's no surprise that the smart choice in cost-effective lab water systems is the familiar name you already trust.

**Lab Water 101** ■

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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 electrodeionization to reverse osmosis and distillation.**

**Thermo Scientific Barnstead lab water 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 options to provide you the luxury of designing a configuration that best suits your lab. Many water systems can be easily upgraded to allow for additional capacity.

## **convenience**

Our Thermo Scientific H<sub>2</sub>O Select™ analysis program and complete all-in-one box ordering gives you the confidence to select the right solution. Receive a complete water system using one part number and have the components you need to easily maintain your new water purification system.



## innovation

that deliver accuracy

With innovative water monitoring technology, Thermo Scientific water purification systems eliminate 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 will reduce cartridge life.

### TOC measurements with UV intensity monitoring

Continuously monitoring and recording TOC measurements in real-time, this technology ensures 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.

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

Automatic recirculation of the water in the tank across a special polisher actively protects against bacteria growth even during long 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 xCAD remote dispenser

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

### Upgradeable units

Growing the lab or planning for changing needs? Many of our systems can be upgraded to accommodate greater capacity.

### Dual water quality

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

## convenience

with customized system selection

Based on the results of a Thermo Scientific 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. Contact your local sales representative for a complimentary H<sub>2</sub>O Select analysis kit.
2. Fill the sample bottle with your anticipated feed water.
3. Answer the short questionnaire pertaining to your water requirements, applications and budget.
4. Place the completed application and water sample bottle in the return box. Add postage and mail to the Thermo Scientific Barnstead Water Lab (return label included in box).

### All-in-one-box ordering

Have confidence in knowing that there are no surprises with added post sale costs. Everything you need ships under one part number!

### Easy self maintenance

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

## Common Water Impurities

**Don't let impurities contaminate your sensitive experiments.** Thermo Scientific 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 reverse osmosis membranes. They typically range from 1 – 10  $\mu\text{m}$  in size.



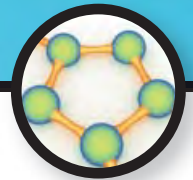
### Colloids

Colloidal particles typically have a slightly net negative charge, range in size from 0.01 – 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 reverse osmosis 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 retard cell and tissue growth in biological research. They can also affect the 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 and residues of pesticides, herbicides and detergents. They foul ion exchange resins, interfere with organic analyses including HPLC, gas chromatography and fluoroscopy. They will also hinder electrophoresis, tissue and cell culture.

# Speaking the Language of Lab Water

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 (ex. PCR, mutagenesis)	•	•	•	•	•	•	•
Proteomics (ex. crystallography, electrophoresis)	•	•	•	•	•	•	•
Immunology (ex. monoclonal antibody production, blots)	•	•	•	•	•	•	•
Pharmacology	•	•	•	•	•	•	•
Cell and tissue culture	•	•	•	•	•	•	•
Drug discovery	•	•	•	•	•	•	•



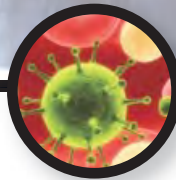
## Dissolved Gases

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 the water. Additionally, oxygen, the most common non-ionized gas, may cause corrosion of metal surfaces.



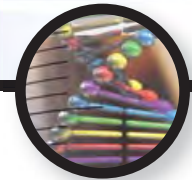
## Microorganisms

Bacteria, fungi and algae are found in all natural water sources. Chlorination eliminates harmful bacteria, but tap water still contains live microorganisms which 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 the life process, 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.

# Thermo Scientific 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, some synergistically, to remove impurities and give you consistently PURE water.

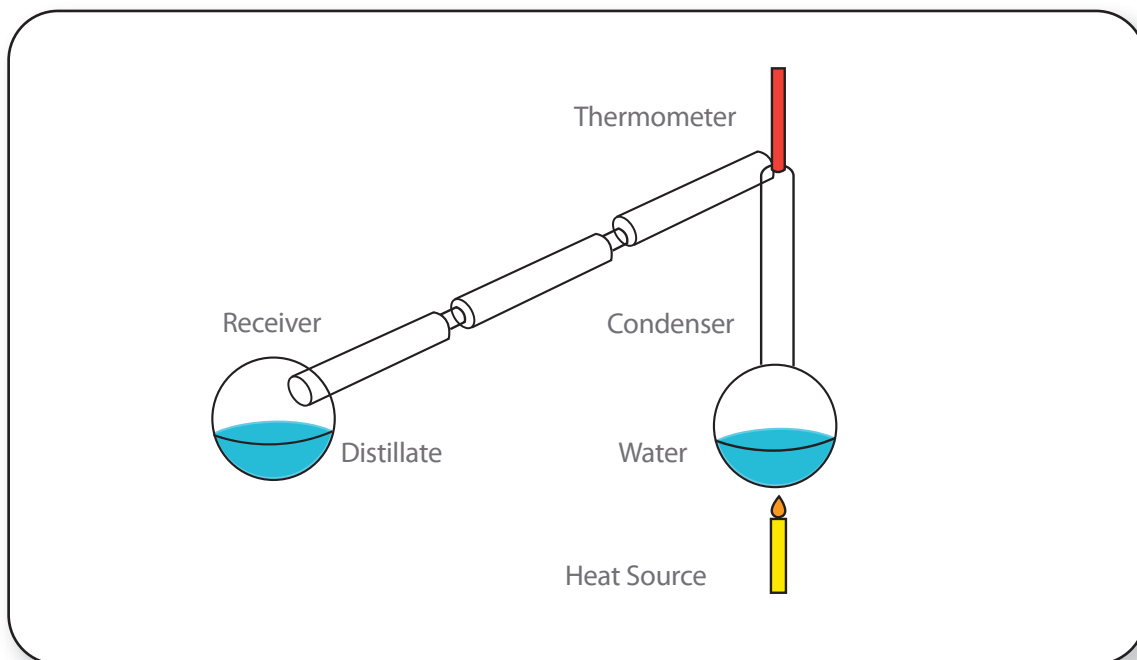
Water purification is a step-by-step process often requiring a combination of technologies, each of which varies in the ability to remove specific contaminants.

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

	Distillation	Reverse Osmosis	Deionization	Electro-deionization	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







A basic distillation diagram.

## Distillation

**Distillation has the broadest removal capabilities of any single form of water purification.**

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 can not 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 removal capabilities of any single form of water purification
- 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



Classic Stills

# Thermo Scientific Barnstead Water Purification Technologies

## Filtration

**Barnstead water purification products offer both depth (nominal) and membrane (absolute) 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 ( $> 1 \mu\text{m}$ ) to protect the technologies that follow.

**Membrane filters** are often termed absolute, meaning that they are designed to remove all particles above the rated pore size of the filter. These filters use a membrane, (in flat sheet or hollow fiber form), 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
- Maintenance is change out only

### 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, LabTower TII water purification systems



## 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 similar 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 at 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) above their rated size
- Long 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

## Reverse Osmosis

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

To understand reverse osmosis 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 are deposited on the membrane surface and sent to drain and the water that passes through the membrane as product water is, for the most part, free of impurities.

A reverse osmosis 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 Daltons are rejected by the membrane but dissolved gases are not as effectively removed.

Reverse osmosis is a 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

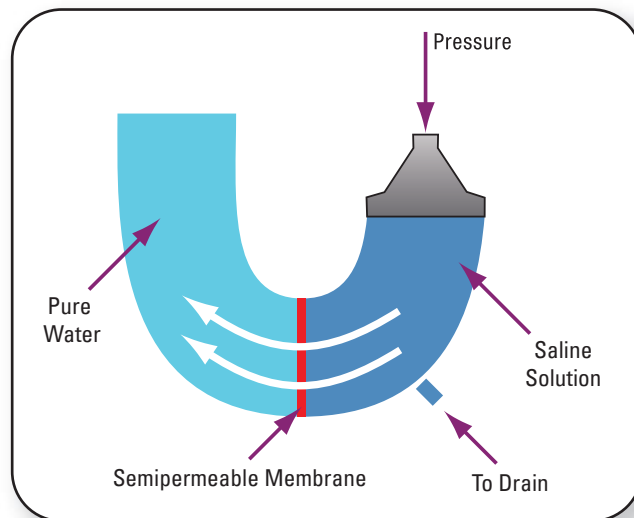
- To varying degrees, removes most types of contaminants, bacteria, pyrogens and 90-95% of inorganic ions
- Requires minimal maintenance

### 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

- Thermo Scientific Barnstead Smart2Pure, LabTower EDI, Pacific TII, LabTower TII, Pacific RO, LabTower RO water purification systems



Process of reverse osmosis



Pacific RO and Lab Tower RO water systems

# Thermo Scientific Barnstead Water Purification Technologies

## 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 inorganics 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

- Thermo Scientific Barnstead GenPure, MicroPure, E-Pure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII, and the Bantam water purification systems, Hose Nipple, and B-Pure cartridges

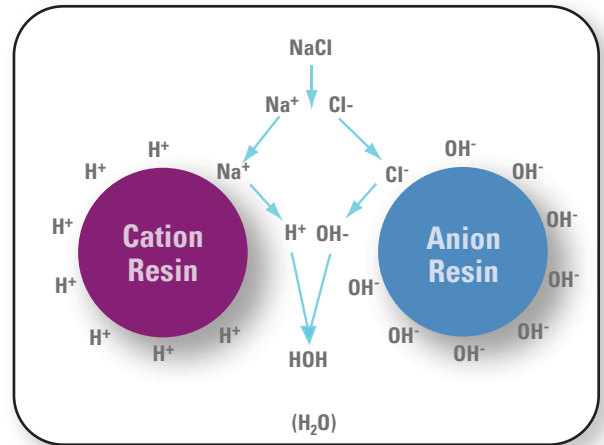
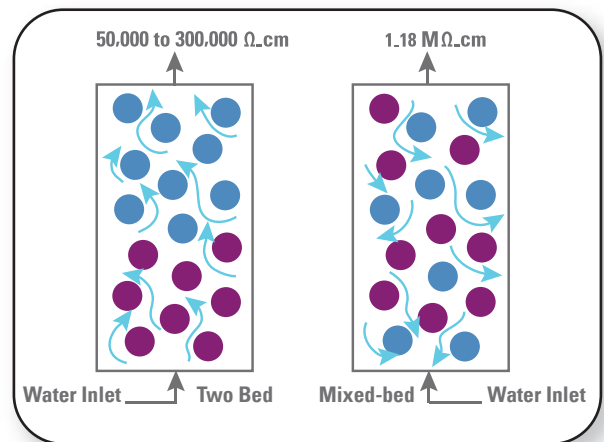
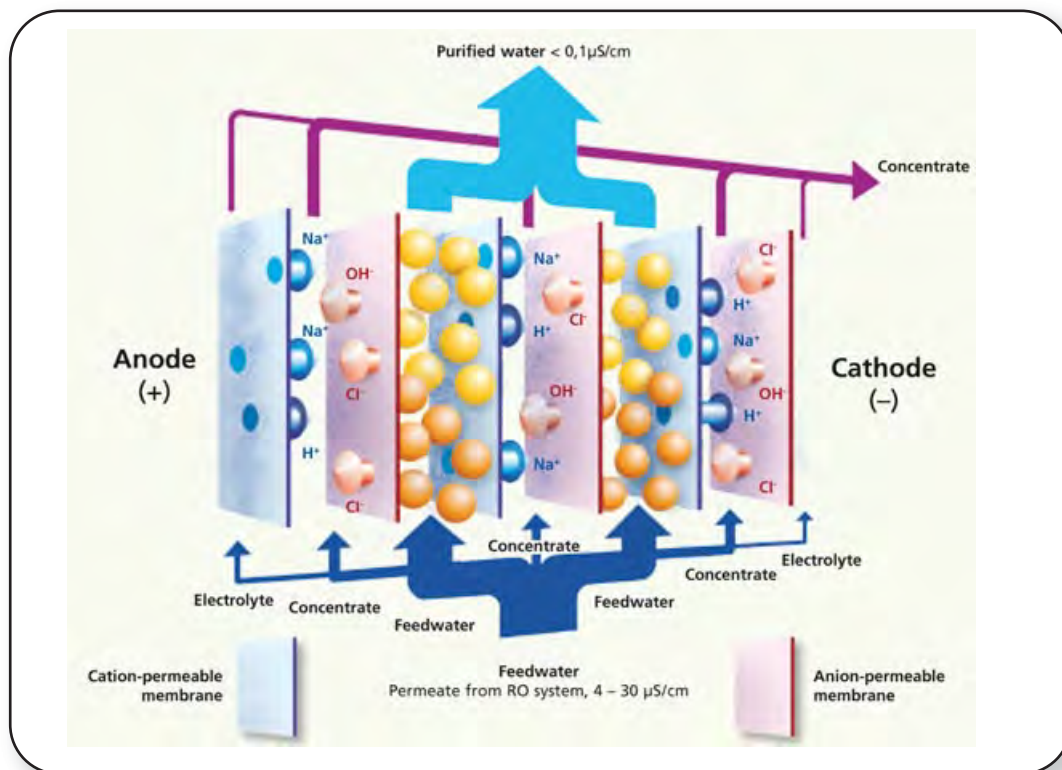


Diagram showing how cations and anions are exchanged on the resin.



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



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, 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  $\text{H}^+$  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 of them 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

# Thermo Scientific Barnstead Water Purification Technologies

## Adsorption

**Adsorption uses high surface area 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 ultra low Total Organic Carbon (TOC). Organics and chlorine adhere to the surface of the activated carbon and remain attached to the carbon.

**Mixed-bed deionization and adsorption** – We use a combination semiconductor grade mixed-bed deionization resins and synthetic carbon in a single cartridge to achieve maximum resistivity and low Total Organic Carbon (TOC).

### Benefits

- Removes dissolved organics and chlorine
- Long life

### Limitations

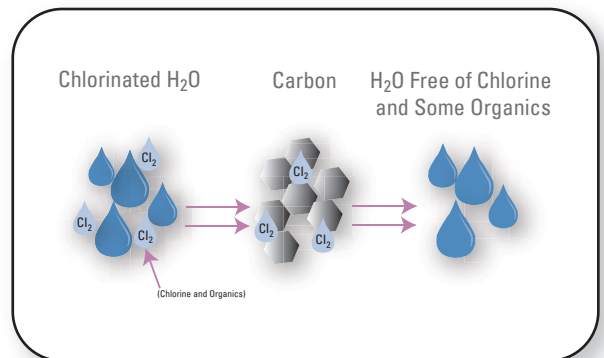
- Will not remove ions and particulates

### Systems that utilize this technology

- Barnstead GenPure, MicroPure, E-Pure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII, and the Bantam water purification systems, Hose Nipple, and 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.





## 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 greatest anti-bacterial action, reacting with their DNA, resulting in inactivation. The combination 185/254 nm light oxidizes organic compounds, allowing for total oxidizable carbon levels of less than 5 ppb.

### Benefits

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

### Limitations

- Will not remove ions, colloids and particulates

### Systems that utilize this technology

- Barnstead GenPure, MicroPure, LabTower EDI, Smart2Pure, Pacific TII, LabTower TII water purification systems

## 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 ASTM (American Society for Testing and Materials) D1193, ISO (International Organization for Standardization) 3696 and CLSI®-CLRW. (Clinical and Laboratory Standards Institute-Clinical Laboratory Reagent Water). 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)	10/1000	10/100	1000/10
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.

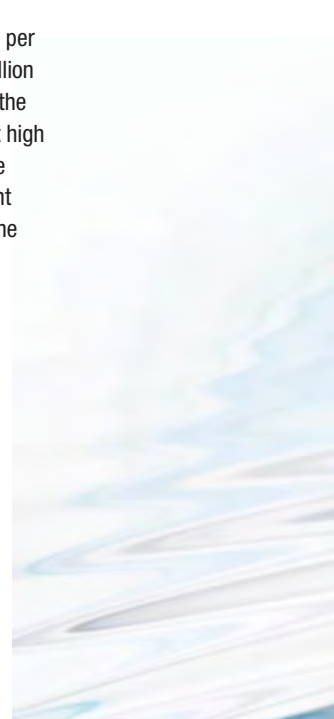
The unit of measure is megohm-centimeter (MΩ.cm), often shortened to MΩ or “meg”. It is generally used for high purity water. The theoretical maximum is 18.2 MΩ.cm at 25°C . The higher the ionic content – the lower the resistivity and the lower the ionic content – the higher the resistivity (high resistivity 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.

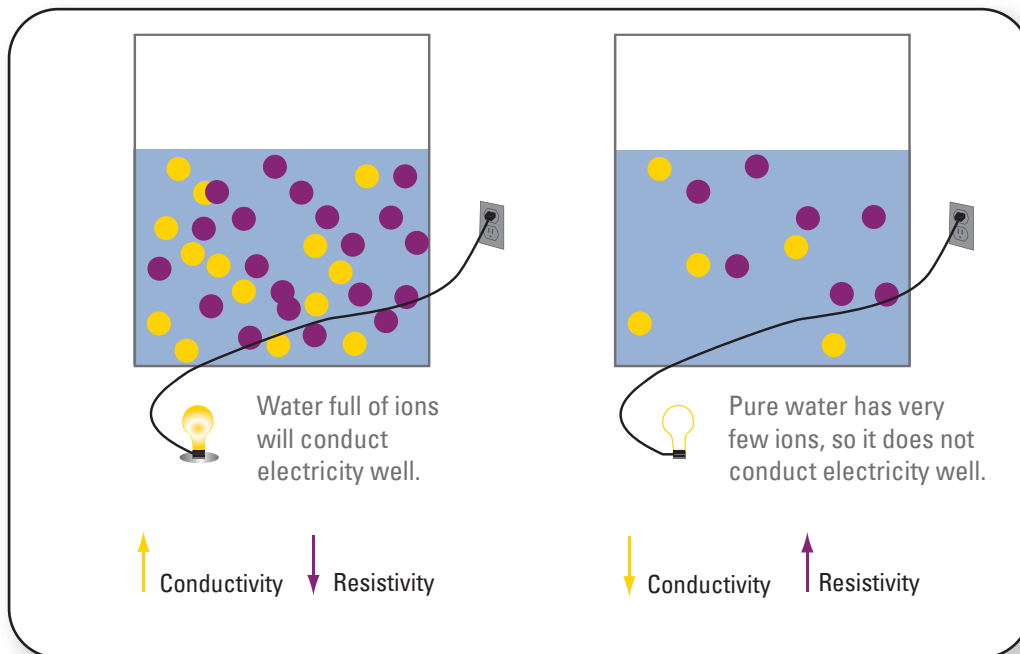
**Total Organic Carbon (TOC)** – a measure of the organic contaminants found in water.

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 Technology Used to Monitor Purity



### 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/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 Water System



## What Type of Water 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 (ex. PCR, mutagenesis)	•			
Proteomics (ex. crystallography, electrophoresis)	•			
Immunology (ex. monoclonal antibody production, blots)	•			
Pharmacology	•			
Cell and tissue culture	•			
Drug discovery	•			
Molecular biology	•			
Microbiology	•			

# Building Your Water System

Barnstead GenPure  
water purification system



Barnstead Smart2Pure  
water purification system

## What Thermo Scientific 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.**

### Ultrapure (Type 1) Water

This grade of water is required for your most sensitive and critical laboratory applications. Type 1 water can be made pyrogen-, nuclease-, bacteria- and particulate-free. 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.**

- Thermo Scientific Barnstead LabTower EDI water purification system
- Thermo Scientific Barnstead Smart2Pure water purification system
- Thermo Scientific Barnstead GenPure water purification system
- Thermo Scientific Barnstead MicroPure water purification system
- Thermo Scientific 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.**

- Thermo Scientific Barnstead Pacific TII water purification system
- Thermo Scientific Barnstead LabTower TII water purification system
- Thermo Scientific Barnstead Mega-Pure Glass Stills water purification system
- Thermo Scientific Barnstead Classic Stills water purification system



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

- Thermo Scientific Barnstead Pacific RO water systems
- Thermo Scientific Barnstead LabTower RO water systems

## Cartridge and Filter Systems

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

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

- Thermo Scientific Barnstead B-Pure water system
- Thermo Scientific Barnstead Hose nipple cartridges
- Thermo Scientific Barnstead Bantam deionizer
- Thermo Scientific Barnstead 1/2 Size B-Pure filters



Barnstead Hose Nipple Cartridge and Holder

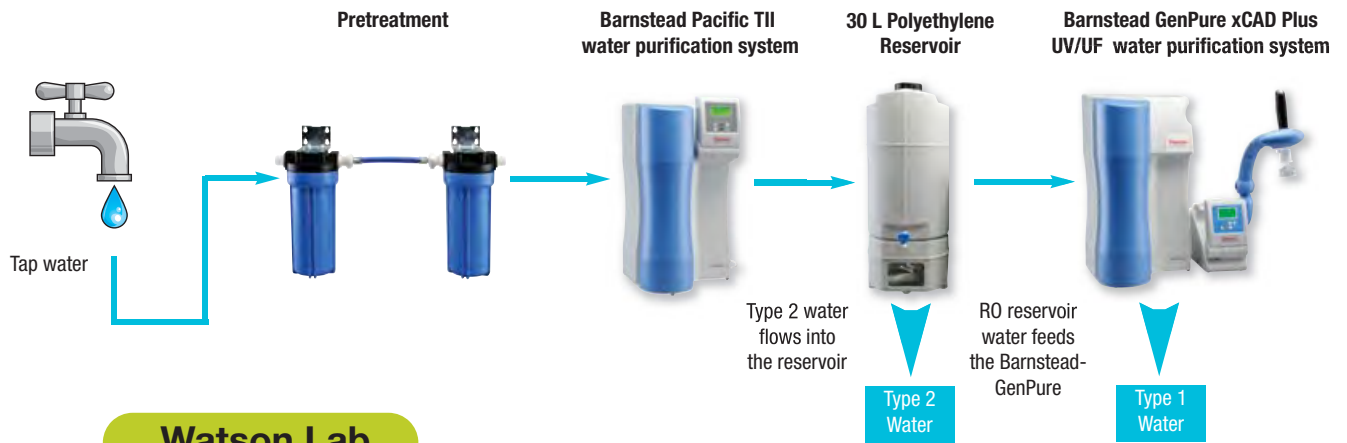


Barnstead B-Pure Cartridge Holder



Barnstead Bantam Deionizer

# Building Your Water System



## Watson Lab

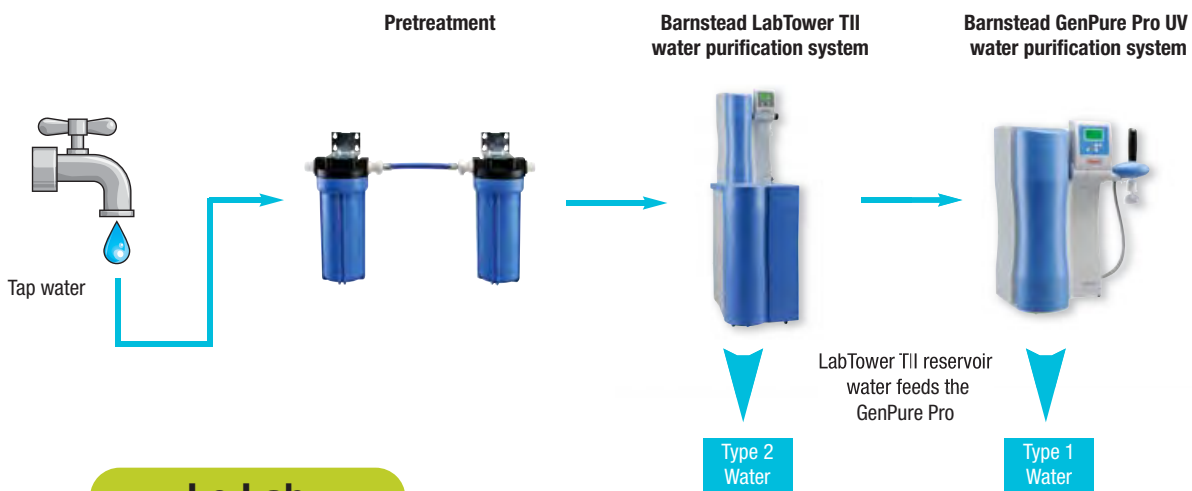
**Applications in the Lab:** Cell and Tissue Culture, PCR, Media Prep and HPLC

**Water Type(s) Needed:** Type 1 (low organics, pyrogens and nucleases) and Type 2 water

**Solution:** Barnstead Pacific TII, 30 L reservoir, and Barnstead GenPure xCAD Plus UV/UF

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

Our Barnstead Pacific TII, which will produce water for the general lab uses, will also serve as feed water for the GenPure xCAD Plus UV/UF.



## 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

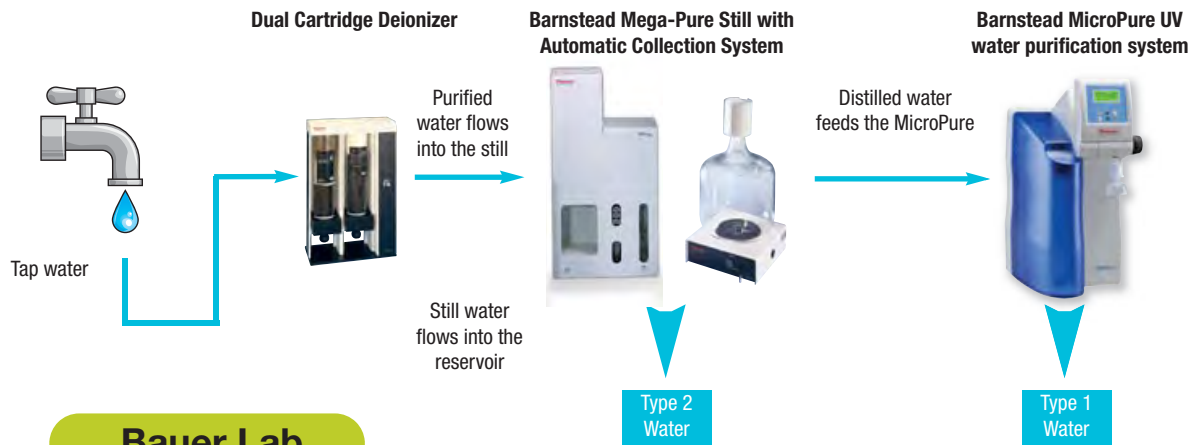
**Solution:** Barnstead LabTower TII and the Barnstead GenPure Pro UV

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 LabTower TII converts tap water into Type 2 water, which is stored in the 100 L integrated reservoir. Water can be drawn from the reservoir or from our Barnstead GenPure Pro UV (which has a 0.2 µm on it to ensure bacteria-free water). The reservoir feeds our Barnstead GenPure Pro system, which will deliver ultrapure (Type 1) 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.



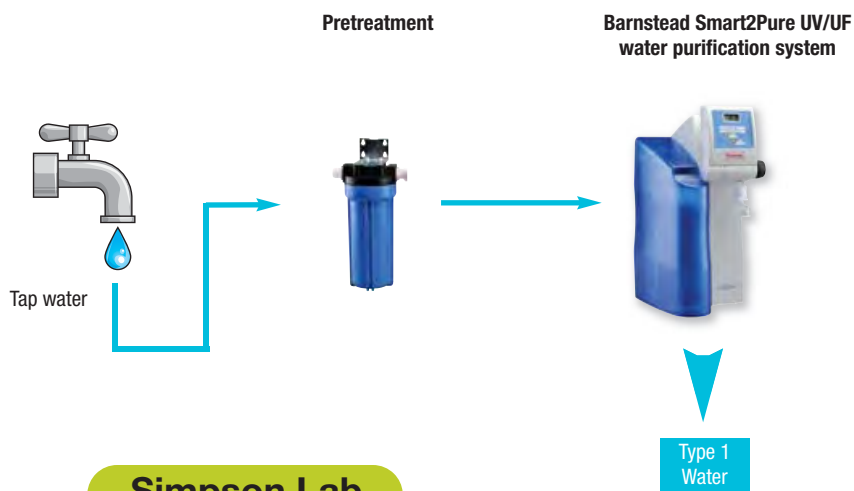
### Bauer Lab

**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

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 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

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 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.

TYPE 1

# ultrapure

## water purification systems

### **What sets Thermo Scientific 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 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



UV Time  
01012 h  
UV Intensity  
96%



## convenience

Quick-change cartridge design simplifies self maintenance

All required parts and accessories ship under one part number



## flexibility

Full system control at the Thermo Scientific Barnstead GenPure xCAD Plus remote dispenser



TYPE 1

# Thermo Scientific 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
<b>Applications</b>	Ultra-low 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, 2-D electrophoresis, cell culture, blotting	UV/UF is the most common combination of technologies – used to reduce organics and remove pyrogens and nucleases
<b>Technology</b>	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
	Total Organic Carbon (TOC) monitor	Real-time monitor of the amount of organic materials in the product water shown on the display
<b>Features</b>	Volumetric Dispensing	Dispense at the push of a button. Control from 0.01-65 liters with an accuracy of <0.5%
	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
<b>Capacity</b>	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	GenPure Pro	GenPure	MicroPure	E-Pure	LabTower EDI	Smart2Pure
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 Type 1 and 2
✓	✓	✓	✓	—	✓	✓
✓	✓	✓	✓	—	—	✓
✓	✓	✓	✓	—	—	✓
✓	✓	✓	—	—	—	—
✓	✓	✓	✓	—	—	—
✓	✓	✓	—	—	—	—
✓	✓	—	—	—	—	—
✓	—	—	—	—	—	—
✓	—	—	—	—	—	—
✓	✓	✓	✓	—	✓	✓
200 L/day	200 L/day	200 L/day	15 L/day	100 L/day*	200 L/day	150 L/day

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

# Thermo Scientific 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.



## APPLICATION INCLUDES:

### Molecular Biology and Microbiology

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

### Analytical Chemistry

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

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

### Simultaneously dispense from up to three dispensers

- Each system ships with a single xCAD Plus remote dispenser
- For increased flexibility, add one or two more xCAD Plus dispensers
- Dispense from all three simultaneously

### Integrated feed water monitoring

- Additional measuring cell monitors feed water conductivity. If the quality of the feed water drops below the set value, a fault message will immediately be displayed.

### 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 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 ultra-low levels

### Leak detection

- Internal leaks can be detected and an error displayed

### Ready-to-use

- Feed water pressure switch, wall bracket, UV lamp, ultrapure cartridge, 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 even mid-operation

### Exact dosing

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

# full control extreme flexibility

## 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

## Quick Look Comparison

	GenPure xCAD Plus system	GenPure xCAD Plus UV system	GenPure xCAD Plus UF system	GenPure xCAD Plus UV/UF system	GenPure xCAD Plus UV - TOC system	GenPure xCAD Plus UV/UF - TOC system
<b>Applications</b>	AA, IC, ICP, standard buffer	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Molecular biology, microbiology, IVF, monoclonal antibodies	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	18.2	18.2
<b>Conductivity, μS/cm</b>	0.055	0.055	0.055	0.055	0.055	0.055
<b>TOC, ppb</b>	5-10	1-5	5-10	1-5	1-5	1-5
<b>RNase, ng/ml</b>	n/a	n/a	n/a	<0.003	n/a	<0.003
<b>DNase, pg/μl</b>	n/a	n/a	n/a	<0.4	n/a	<0.4
<b>Bacteria, CFU/mL</b>	<1	<1	<1	<1	<1	<1
<b>Particles, 0.22 μm/mL</b>	<1	<1	<1	<1	<1	<1
<b>Endotoxins, EU/mL</b>	n/a	n/a	<0.001	<0.001	n/a	<0.001
<b>TOC monitor</b>	n/a	n/a	n/a	n/a	standard	standard
<b>Flow rate, L/min</b>	up to 2	up to 2	up to 2	up to 2	up to 2	up to 2

## Visible ultrapure water quality

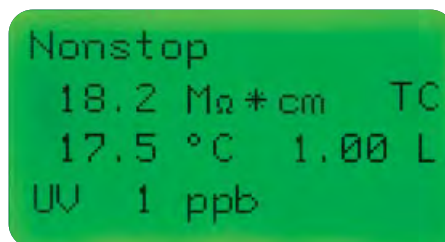
Important measured values of conductivity/resistivity and TOC are easy to see during dispensing.

**Non-Stop:** System ready for dispensing

**18.2 MΩ.cm:** Resistivity of the ultrapure water

**17.5°C:** Temperature measured for conductivity compensation

**UV:** UV lamp is switched on



**TC:** temperature compensation is on

**1.00 L:** Adjustable volume to be dispensed

**1 ppb:** TOC value of the ultrapure water

## Thermo Scientific Barnstead GenPure xCAD Plus water purification system (continued)



Our xCAD Plus remote dispenser shown left. The GenPure system is under the bench (not pictured) freeing up valuable bench space.



For increased flexibility, add up to two more xCAD Plus remote dispensers.

### Thermo Scientific xCAD Plus remote dispenser – full system control in a compact design

- xCAD is short for “Extended Control and Dispenser.” The system provides more flexibility for ultrapure water dispensing with an action radius of 32 inches (80 cm)
- Ergonomic dispensing arm provides precise volume dosing at the press of a button
- Turned, height adjusted or extended 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 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 handling more practical and provides a clear view of critical settings
- In addition to flexible xCAD Plus installation options, 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 main system.



Complete water purification system control via the xCAD Plus remote dispenser

xCAD Dimensions	
	Dimensions W x D x H in (mm)
<b>Benchtop xCAD</b>	10.2 x 21 x 28.5 (260 x 530 x 725)
<b>Wall mount xCAD</b>	10.2 x 21 x 25.8 (260 x 530 x 655)

Feed water Requirements*	
<b>Source</b>	Potable tap water, pretreated by reverse osmosis, ion exchange or distillation
<b>Feed water conductivity, <math>\mu\text{S/cm}</math></b>	< 2
<b>TOC, ppb</b>	max 50
<b>Bacteria count, CFU/mL</b>	< 100
<b>Turbidity, NTU</b>	< 1.0
<b>Temperature, <math>^{\circ}\text{C}</math></b>	2-35
<b>Pressure, psi (bar)</b>	1.4-87 (0.1-6)

\* 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 2 L/min	29-87 psi (2-6 bar)	90-240V, 50/60Hz	0.1kW	3/4" NPT	14.6 x 13 x 24 (372 x 330 x 615)

System Options		GenPure xCAD Plus	GenPure xCAD Plus UV	GenPure xCAD Plus UF	GenPure xCAD Plus UV/UF	GenPure xCAD Plus UV - TOC	GenPure xCAD Plus UV/UF - TOC
<b>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	50136149	50136152	50136150	50136151	50136153	50136146
	with xCAD Plus wall version	50136165	50136170	50136167	50136169	50136171	50136172

Optional Accessories							
<b>Stainless steel DI cartridge, DI 1500</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.		02.1500	02.1500	02.1500	02.1500	02.1500	02.1500
<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	50136494	50136494
	wall version	50136505	50136505	50136505	50136505	50136505	50136505
<b>Disinfection cartridge</b> Reusable cartridge needed to clean the water purification system.		09.2201	09.2201	09.2201	09.2201	09.2201	09.2201
<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	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207	09.2207	09.2207	09.2207	09.2207
<b>Storage reservoir, 30 L, to feed system</b> Polyethylene tank, opaque to light 23.5 x 14.9 in (598 x 380 mm), H x W Wall mount accessory is 06.5015		06.5038	06.5038	06.5038	06.5038	06.5038	06.5038
<b>Storage reservoir, 60 L, to feed system</b> Polyethylene tank, opaque to light 35.9 x 14.9 in (912 x 380 mm), H x W Wall mount accessory is 06.5016		06.5068	06.5068	06.5068	06.5068	06.5068	06.5068

Replacement Consumables							
<b>Ultrapure polisher cartridge</b>		09.2005	09.2005	09.2005	09.2005	09.2005	09.2005
<b>Sterile filter, 0.2 <math>\mu\text{m}</math></b>		09.1003	09.1003	09.1003	09.1003	09.1003	09.1003
<b>Ultrafilter</b>		n/a	n/a	50133980	50133980	n/a	50133980
<b>UV lamp</b>		n/a	09.2002	n/a	09.2002	09.2002	09.2002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25	CMX25	CMX25	CMX25

# Thermo Scientific 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 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 inches (60 cm) away from the unit.



## APPLICATION INCLUDES:

### Molecular Biology and Microbiology

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

### Analytical Chemistry

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

All GenPure systems exceed international standards ASTM Type I, ISO 3696 Grade 1, ASTM D 1193 and CLSI.

### Dispensing for a variety of tasks

- New flexible dispenser offers a radius of 24 inches (60 cm) from the system for filling larger vessels or glassware washing

### Leak detection

- Internal leaks can be detected and an error displayed

### Integrated feed water monitoring

- An additional measuring cell monitors feed water conductivity. Any exceeding of the limiting value is immediately displayed to maximize 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 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 ultra-low levels

### Ready-to-use

- Feed water pressure switch, wall bracket, UV lamp, ultrapure cartridge, sterile filter, all included in one part number
- Leak detection standard and will alert user to leaks

### 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 even mid-operation

### Exact dosing

- High precision POM draw-off valve for dispensing with sterile filter
- Electronic dosing for fully automatic volume control of 0.01-65.0 L with < 2% accuracy





Push button simplicity for easy dispensing

### 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

### 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 Comparison

	GenPure Pro system	GenPure Pro UV system	GenPure Pro UF system	GenPure Pro UV/UF system	GenPure Pro UV - TOC system	GenPure Pro UV/UF - TOC system
<b>Applications</b>	AA, IC, ICP, standard buffer	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Microbiology, IVF, monoclonal antibodies	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	18.2	18.2
<b>Conductivity, μS/cm</b>	0.055	0.055	0.055	0.055	0.055	0.055
<b>TOC, ppb</b>	5-10	1-5	5-10	1-5	1-5	1-5
<b>RNase, ng/ml</b>	n/a	n/a	n/a	<0.003	n/a	<0.003
<b>DNase, pg/μl</b>	n/a	n/a	n/a	<0.4	n/a	<0.4
<b>Bacteria, CFU/mL</b>	<1	<1	<1	<1	<1	<1
<b>Particles, 0.22 μm/mL</b>	<1	<1	<1	<1	<1	<1
<b>Endotoxins, EU/mL</b>	n/a	n/a	<0.001	<0.001	n/a	<0.001
<b>TOC monitor</b>	n/a	n/a	n/a	n/a	standard	standard
<b>Flow rate, L/min</b>	up to 2	up to 2	up to 2	up to 2	up to 2	up to 2

**flexible dispensing**  
precise purity monitoring

# Thermo Scientific Barnstead GenPure Pro water purification system (continued)



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 GenPure Pro water purification system with one touch dispensing

Feed Water Requirements*	
Source	Potable tap water, pretreated 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	Operating pressure min/max	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
up to 2 L/min	29-87 psi (2-6 bar)	90-240V, 50/60Hz	0.1kW	3/4" NPT	18.6 x 13 x 24.2 (472 x 330 x 615)

System Options	GenPure Pro	GenPure Pro UV	GenPure Pro UF	GenPure Pro UV/UF	GenPure Pro UV - TOC	GenPure Pro UV/UF - TOC
<b>GenPure Pro System*</b> 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	50131956	50131952	50131954	50131950	50131948	50131922

Optional Accessories							
<b>Stainless steel DI cartridge, DI 1500</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.		02.1500	02.1500	02.1500	02.1500	02.1500	02.1500
<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	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207	09.2207	09.2207	09.2207	09.2207
<b>Storage reservoir, 30 L, to feed system</b> Polyethylene tank, opaque to light. 23.5 x 14.9 in (598 x 380 mm), H x W. Wall mount accessory is 06.5015		06.5038	06.5038	06.5038	06.5038	06.5038	06.5038
<b>Storage reservoir, 60 L, to feed system</b> Polyethylene tank, opaque to light. 35.9 x 14.9 in (912 x 380 mm), H x W. Wall mount accessory is 06.5016		06.5068	06.5068	06.5068	06.5068	06.5068	06.5068
<b>Disinfection cartridge</b> Reusable cartridge needed to clean the water purification system.		09.2201	09.2201	09.2201	09.2201	09.2201	09.2201

Replacement Consumables							
<b>Ultrapure polisher cartridge</b>		09.2005	09.2005	09.2005	09.2005	09.2005	09.2005
<b>Sterile filter, 0.2 <math>\mu\text{m}</math></b>		09.1003	09.1003	09.1003	09.1003	09.1003	09.1003
<b>Ultrafilter</b>		n/a	n/a	50133980	50133980	n/a	50133980
<b>UV lamp</b>		n/a	09.2002	n/a	09.2002	09.2002	09.2002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25	CMX25	CMX25	CMX25



# Thermo Scientific Barnstead GenPure water purification system

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



## 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

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

### Integrated feed water monitoring

- An additional measuring cell monitors feed water conductivity. Any exceeding of the limiting value is immediately displayed maximizing 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 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 ultra-low levels

### Ready-to-use

- Feed water pressure switch, wall bracket, UV lamp, ultrapure cartridge, sterile filter, all included with 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 even mid-operation

### 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

### Tilting control panels for easy viewing

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

# basic configuration

with options to meet your needs

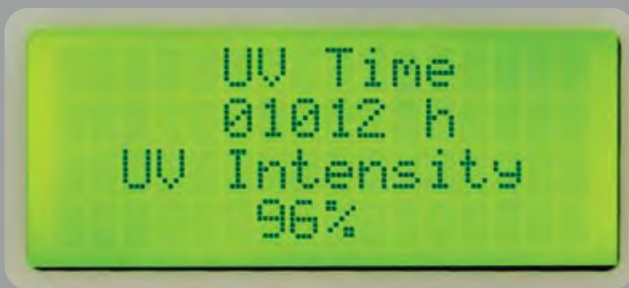
Quick Look Comparison						
	GenPure system	GenPure UV system	GenPure UF system	GenPure UV/UF system	GenPure UV - TOC system	GenPure UV/UF - TOC system
<b>Applications</b>	AA, IC, ICP, standard buffer	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Microbiology, IVF, monoclonal antibodies	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	18.2	18.2
<b>Conductivity, µS/cm</b>	0.055	0.055	0.055	0.055	0.055	0.055
<b>TOC, ppb</b>	5-10	1-5	5-10	1-5	1-5	1-5
<b>RNase, ng/ml</b>	n/a	n/a	n/a	<0.003	n/a	<0.003
<b>DNase, pg/µl</b>	n/a	n/a	n/a	<0.4	n/a	<0.4
<b>Bacteria, CFU/mL</b>	<1	<1	<1	<1	<1	<1
<b>Particles, 0.22 µm/mL</b>	<1	<1	<1	<1	<1	<1
<b>Endotoxins, EU/mL</b>	n/a	n/a	<0.001	<0.001	n/a	<0.001
<b>TOC monitor</b>	n/a	n/a	n/a	n/a	standard	standard
<b>Flow rate, L/min</b>	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2	Up to 2



## Thermo Scientific Barnstead GenPure water purification system (continued)



GenPure systems feature tilting control panels for optimal viewing



UV intensity monitoring provides superb reliability



Easy cartridge replacement

Feed Water Requirements*	
Source	Potable tap water, pretreated 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	Operating pressure min/max	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H in (mm)
up to 2 L/min	29-87 psi (2-6 bar)	90-240V, 50/60Hz	0.1kW	3/4" NPT	14.6 x 13 x 24.2 (372 x 330 x 615)

System Options	GenPure	GenPure UV	GenPure UF	GenPure UV/UF	GenPure UV - TOC	GenPure UV/UF - TOC
<b>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	50131211	50131243	50131235	50131217	50131229	50131256
<b>Optional Accessories</b>						
<b>Stainless steel DI cartridge, DI 1500</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.	02.1500	02.1500	02.1500	02.1500	02.1500	02.1500
<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	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207	09.2207	09.2207	09.2207
<b>Disinfection cartridge</b> Reusable cartridge needed to clean the water purification system.	09.2201	09.2201	09.2201	09.2201	09.2201	09.2201
<b>Storage reservoir, 30 L, to feed system</b> Polyethylene tank, opaque to light. 23.5 x 14.9 in (598 x 380 mm), H x W. Wall mount accessory is 06.5015	06.5038	06.5038	06.5038	06.5038	06.5038	06.5038
<b>Storage reservoir, 60 L, to feed system</b> Polyethylene tank, opaque to light. 35.9 x 14.9 in (912 x 380 mm), H x W. Wall mount accessory is 06.5016	06.5068	06.5068	06.5068	06.5068	06.5068	06.5068
<b>Replacement Consumables</b>						
<b>Ultrapure polisher cartridge</b>	09.2005	09.2005	09.2005	09.2005	09.2005	09.2005
<b>Sterile filter, 0.2 <math>\mu\text{m}</math></b>	09.1003	09.1003	09.1003	09.1003	09.1003	09.1003
<b>Ultrafilter</b>	n/a	n/a	50133980	50133980	n/a	50133980
<b>UV lamp</b>	n/a	09.2002	n/a	09.2002	09.2002	09.2002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25	CMX25	CMX25



# Thermo Scientific Barnstead MicroPure water purification system

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



## 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

### Smart features

- Backlit display tilts for easy viewing
- Variable speed dispensing
- Optional integrated 6 L feed water reservoir so you can place the system without direct access to a water line

### Monitor feed water quality

- Good feed water quality leads to consistently ultrapure water and a longer cartridge service life to maximize 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 and 0.2  $\mu\text{m}$  sterile filter

### Superior filters

- Ultrafilter is flushed automatically to assure the highest retention of endotoxins and nucleases, which produces a long two year lifetime
- Validated 0.2  $\mu\text{m}$  final filter with folded membrane can be sterilized up to 5 times

### UV Photo-oxidation 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 ultra-low levels

# compact system

for small ultrapure water demands



Quick Look Comparison				
	MicroPure system	MicroPure UV system	MicroPure UF system	MicroPure UV/UF system
<b>Applications</b>	Instrumental analytical methods such as AAS, IC, ICP	High-sensitivity instrumental analytical methods, such as HPLC, ICP-MS, TOC-analyses	Molecular biology, cell culture, monoclonal antibodies	Microbiology, molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
<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>	5-10	1-5	5-10	1-5
<b>RNase, ng/ml</b>	n/a	n/a	n/a	<0.003
<b>DNase, pg/µl</b>	n/a	n/a	n/a	<0.4
<b>Bacteria, CFU/mL</b>	<1	<1	<1	<1
<b>Particles, 0.22 µm/mL</b>	<1	<1	<1	<1
<b>Endotoxines, EU/mL</b>	n/a	n/a	<0.001	<0.001
<b>Flow rate, L/min</b>	1.5	1.5	1	1



18.2 MΩ.cm water  
in a compact system

## Thermo Scientific Barnstead MicroPure water purification system (continued)



Dispense water which allows for drop by drop or quick dispensing



**One, two, three...**

Rapid cartridge change with Aquastop quick-connect design



The MicroPure-ST series includes an optional 6 L feed water reservoir for pretreated water storage.

Feed Water Requirements*	
<b>Source</b>	Potable tap water pretreated by reverse osmosis, ion exchange or distillation
<b>Feed water conductivity, <math>\mu\text{S/cm}</math></b>	< 5
<b>TOC, ppb</b>	max 50
<b>Turbidity, NTU</b>	< 1.0
<b>Temperature, °C</b>	2-35
<b>Pressure, psi (bar)</b>	1.4-87 (0.1-6)

\* 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 MicroPure (no reservoir) W x D x H in (mm)	Dimensions MicroPure-ST W x D x H in (mm)
up to 1.5 L/min	29-87 psi (2-6 bar)	90-240 V, 50/60Hz	0.06kW	3/4" 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)

System Options	MicroPure	MicroPure UV	MicroPure UF	MicroPure UV/UF
<b>MicroPure system*</b> All systems include an ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, pressure regulator, UV lamp and/or ultrafilter where applicable.	50132366	50132373	50132368	50132370
<b>Stainless steel DI cartridge, DI 1500</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life for line-fed systems. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.	02.1500	02.1500	02.1500	02.1500
Optional Accessories				
<b>Wall mounting bracket</b>	09.2212	09.2212	09.2212	09.2212
<b>Disinfection cartridge</b> Reusable cartridge needed to clean the water purification system. Only for line-fed units.	09.1102	09.1102	09.1102	09.1102

System Options	MicroPure with storage tank	MicroPure UV with storage tank	MicroPure UF with storage tank	MicroPure UV/UF with storage tank
<b>MicroPure with Storage tank system*</b> All systems include a 6L internal reservoir, ultrapure polisher cartridge, sterile 0.2 $\mu\text{m}$ filter, pressure regulator, UV lamp and/or ultrafilter where applicable	50132367	50132374	50132369	50132372
Optional Accessories				
<b>Stainless steel DI cartridge, DI 1500</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life for line-fed systems. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.	02.1500	02.1500	02.1500	02.1500
<b>Wall mounting bracket</b>	09.2212	09.2212	09.2212	09.2212
Replacement Consumables for MicroPure systems and MicroPure with Storage Tank System				
<b>Ultrapure polisher cartridge</b>	09.1006	09.1006	09.1006	09.1006
<b>Sterile filter, 0.2 <math>\mu\text{m}</math></b>	09.1003	09.1003	09.1003	09.1003
<b>Ultrafilter</b>	n/a	n/a	50133981	50133981
<b>UV lamp</b>	n/a	09.1002	n/a	09.1002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202
	North America/ Latin America	CMX25	CMX25	CMX25



# Thermo Scientific Barnstead E-Pure water purification system

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



## APPLICATIONS INCLUDE:

### Molecular Biology and Microbiology

- Cell culture
- Buffer preparation
- Electrophoresis

## Product Features

- Resistivities up to 18.2 M $\Omega$ .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
- 0.2  $\mu$ m absolute final filter 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  $\mu$ m final filter
- 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

- If you are feeding your E-Pure system from a pressurized feed line, it is to your advantage to ensure that the pump is fully protected with the use of the low pressure pump protector
- Interrupts power if pressurized feed water line pressure falls below 5 psig (0.35 kg/cm<sup>2</sup>)
- Includes 6 ft (1.8 m) cord which plugs directly into the E-Pure
- Complete with 1/4 inch NPT "T" to install in your feed line

### Low water level pump protector

- If feeding your E-Pure from a storage reservoir, it is recommended that a low water pump protector be added to the E-Pure system. This will ensure that the pump is protected in the event the reservoir does not have a sufficient quantity of water to satisfy the requirements of the system.
- Adaptable to most storage reservoirs, providing a 1/2 inch NPT connection is available. Includes 6 ft (1.8 m) cord which plugs directly into the E-Pure

## Quick Look Comparison

Resistivity at 25°C, M $\Omega$ .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 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
E-Pure 3-holder	29 x 28 x 7.5 in (73.7 x 71.1 x 19.1 mm)	1/4 in NPTF	40-120°F/4-49°C
E-Pure 4-holder	35 x 28 x 7.5 in (88.9 x 71.1 x 19.1 mm)	1/4 in NPTF	40-120°F /4-49°C

System Options	Electrical requirements	Max Flow Rates	3-Holder	4-Holder
E-Pure systems* Ships with wall bracket and cartridge o-rings	120V	2 L/min	D4631	D4641
	240V	2 L/min	D4632-33	D4642-33

Required Accessories				
<b>Cartridge kits</b> Choose the cartridge pack according to your feed water and need for organic free water	Tap feed			D5028 D0835 Pretreatment (1) D0803 High Capacity (1) D5027 Ultrapure (2)
	Tap feed, Organic free			D5023 D0836 Macropure (1) D0803 High Capacity (1) D5027 Ultrapure (1) D5021 Organic Free (1)
	Pretreated feed	D5029 D0835 Pretreatment (1) D5027 Ultrapure (2)		D50227 D0835 Pretreatment (1) D0809 Ultrapure (1) D5027 Ultrapure (2)
	Pretreated feed, Organic free	D5022 D0836 Macropure (1) D5027 Ultrapure (1) D5021 Organic Free (1)		D50228 D0836 Macropure (1) D0809 Ultrapure (1) D5027 Ultrapure (1) D5021 Organic Free (1)
<b>0.2 µm final filter</b>			D3750	D3750
Optional Accessories				
<b>Remote dispenser</b> 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
<b>Low pressure pump protector</b> Alerts the E-Pure of an inadequate feed water condition in a pressurized feed line			D2706	D2706
<b>Low water level pump protector</b> Alerts the E-Pure of an inadequate feed water condition when fed from a reservoir	120V		D0603	D0603
	240V		D0606	D0606
Replacement Consumables				
<b>Cleaning cartridges</b> Set of three.			D50223	D50223



# Thermo Scientific 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!



## APPLICATIONS INCLUDE:

### Type 1 Water Applications

- Cell and tissue culture
- PCR, DNA sequencing
- 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

Ultrapure water which exceeds ASTM Type I standards, with a resistivity of 18.2 M $\Omega$ .cm and TOC 1-5 ppb with standard UV lamp. High purity water ASTM Type II water, with resistivity of 15-10 M $\Omega$ .cm, is ideal for daily needs of 100 to 500 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

- Feed water pressure switch, all 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 reverse osmosis 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		
	LabTower EDI 15 system	LabTower EDI 30 system
<b>Type 1 Water</b>		
Resistivity at 25°C, M $\Omega$ .cm	18.2	18.2
Conductivity, $\mu$ S/cm	0.055	0.055
TOC, ppb	1-5	1-5
RNase, ng/ml	<0.003*	<0.003*
DNase, pg/ $\mu$ l	<0.4*	<0.4*
Bacterial content in CFU/mL	<1	<1
Particles, 0.22 $\mu$ m/mL	<1	<1
Endotoxines, EU/mL	<0.001	<0.001
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	15-10	15-10
Conductivity	0.067-0.1	0.067-0.1

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

# dual quality system with EDI technology

## Compact, stylish, mobile

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

## Safe operation

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

## 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

## 100 L Integrated polyethylene reservoir safely stores Type 2 water

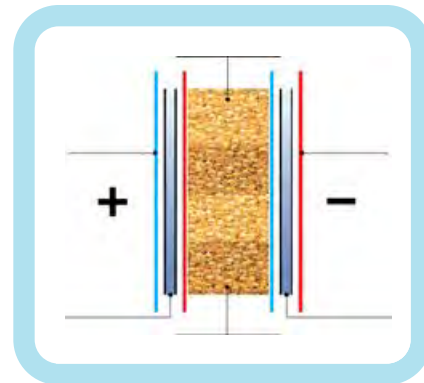
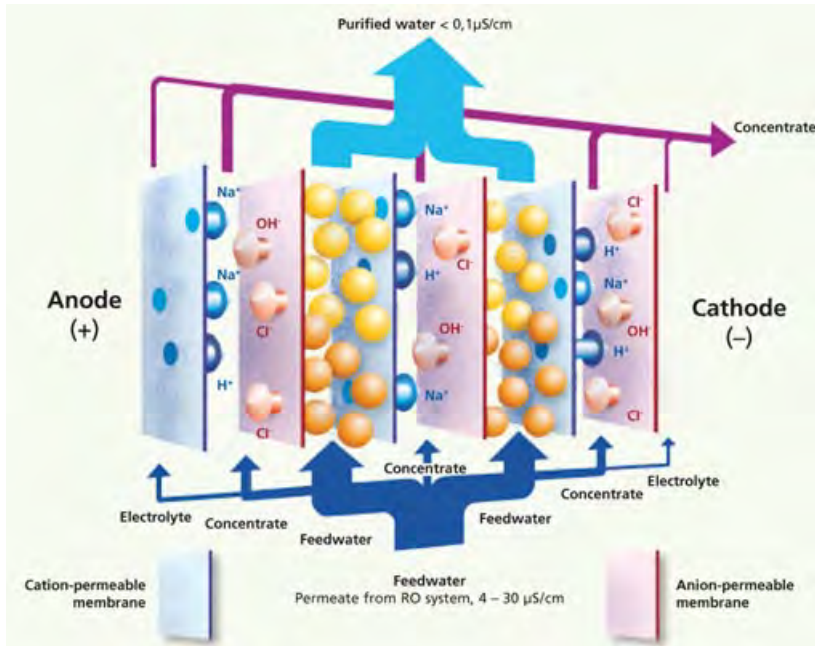
- Automatic water recirculation in the reservoir moves water across a special polisher module ensuring fresh Type 2 water on demand
- High-purity water reservoir outlet for convenient drainage
- Efficient cleaning and disinfection enhanced by conical bottom design for completely emptying reservoir
- Integrated reservoir provides 100 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 LabTower controller
- Customize volume stored in the reservoir via the controller



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



# Thermo Scientific Barnstead LabTower EDI water purification system (continued)



**Electrodeionization, 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 consistently high quality water
- No regeneration chemicals required and no disposal of cartridges, making this technology friendly for the environment
- No exchange of spent resins or cartridges saves cost
- High-purity water when you need it with no wait time



Optional hand dispenser

## 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.

The  $\text{H}^+$  and  $\text{Na}^+$  cations 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  $\text{H}_2\text{O}$ .



Feed Water Requirements*	
Source	Potable tap water softened or hardness stabilized
Conductivity, $\mu\text{S}/\text{cm}$	<1500
Colloid index	< 3
pH-range	4-11
Temperature, $^{\circ}\text{C}$	2-35
Pressure, psi (bar)	1.4-87 (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)	90-240V, 50/60Hz	0.25 kW	3/4" NPT	17.7 x 22.8 x 59.1 (450 x 580 x 1500)

System Options		LabTower EDI 15	LabTower EDI 30
<b>LabTower EDI system*</b> 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 inch 1 $\mu\text{m}$ filter (reservoir outlet) and pressure regulator		50132395	50132396
Required Accessories			
<b>Sterile overflow for reservoir</b> Prevents the penetration of bacteria and other microorganisms		50132714	50132714
<b>CO<sub>2</sub> adsorber + sterile filter, 0.2 <math>\mu\text{m}</math></b> 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
<b>Mix Multi Mini water softener</b> Required if feed water silt density index (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.	120V, 50/60Hz	50129892	50129892
	240V	50130297	50130297
<b>Softener salt</b> Required for use with the water softener	North America/Latin America	50129893	50129893
	Europe and Asia Pacific	06.2000	06.2000
<b>5 <math>\mu\text{m}</math> filter with carbon cartridge</b> Required when Mixed Multi is purchased		50134022	50134022
<b>Hardness detection kit – required with purchase of softener</b> Alerts user when water is no longer softened	Europe	06.1000	06.1000
	North America/Latin America Asia Pacific	50134335	50134335
Optional Accessories			
<b>Sterile 0.2 <math>\mu\text{m}</math> filter for reservoir outlet</b>		06.5555	06.5555
<b>Disinfection cartridge</b> Reusable cartridge needed to clean the water purification system.		09.2201	09.2201
<b>Ultrafilter</b> Point-of-use ultrafilter to reduce levels of pyrogens and nucleases in the product water.		09.1022	09.1022
<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	120V, 50/60Hz	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank (to dispense Type 2 water). Ships with a 0.2 micron final filter.		50138221	50138221
<b>Qualification documents (IQOQ)</b>		IOQDOCE50133916	IOQDOCE50133916
Replacement Consumables			
<b>Ultrapure polisher cartridge</b>		09.2005	09.2005
<b>5 <math>\mu\text{m}</math> filter and hardness stabilizer</b>		06.5204	06.5204
<b>Sterile 0.2 <math>\mu\text{m}</math> filter for system</b>		09.1003	09.1003
<b>UV lamp for system</b>		09.2002	09.2002
<b>Cleaning solution</b>	Europe/ Asia Pacific	09.2202	09.2202
	North America/Latin America	CMX25	CMX25
<b>Reverse osmosis membrane</b>		22.0046 (requires 2)	22.0087 (requires 2)



# Thermo Scientific Barnstead Smart2Pure water purification system

All in one! The Barnstead Smart2Pure system is a compact system which converts tap water into both ASTM Type I and II water. The Smart2Pure 3 and 6 feature a built-in 6 L reservoir to store the Type 2 water. The Smart2Pure 12 offers the choice of a 30 or 60 L reservoir for customizable storage capacity.



## 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 Laboratory Work

- Preparing and diluting buffers and reagents
- Rinsing lab glassware
- Supplying autoclaves and other small lab equipment

### Powerful performance

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

### Lasting economy

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

**Module 1** – Combination of pretreatment and the 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
- Optional UV bulb and ultrafilter to customize ultrapure water quality

### Placement options

- Position on laboratory bench
- Mount it on the wall

### 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

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

- Large opening for easy and effective cleaning by hand
- 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 protects the high purity water from bacterial growth during standstills and maintains the low conductivity value
- Wall-mount optional for simple space-savings
- Conical bottom outlet allows for complete draining and efficient cleaning and disinfection

**compact**  
dual quality system

Quick Look Comparison				
	Smart2Pure system	Smart2Pure UV system	Smart2Pure UF system	Smart2Pure UV/UF system
Type 1 Water				
Applications	AA, IC, ICP, standard buffer	Inorganic and organic trace analysis, HPLC, ICP-MS, IC, TOC analysis	Microbiology, IVF, monoclonal antibodies	Molecular biology, PCR, DNA, monoclonal antibodies, cell culture media
Resistivity 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 value, ppb	5-10	1-5	5-10	1-5
RNase, ng/ml	n/a	n/a	n/a	<0.003
DNase, pg/μl	n/a	n/a	n/a	<0.4
Bacterial content, CFU/mL	<1	<1	<1	<1
Particles, μm/mL	<1	<1	<1	<1
Endotoxines, EU/mL	n/a	n/a	<0.001	<0.001
Flow rate, L/min	1	1	1	1
Type 2 Water				
Pure water production at 15°C, L/h	3, 6 or 12	3, 6 or 12	3, 6 or 12	3, 6 or 12
Resistivity at 25°C, MΩ.cm	15-10	15-10	15-10	15-10
Conductivity, μS/cm	0.067-0.1	0.067-0.1	0.067-0.1	0.067-0.1

#### Feed Water Requirements\*

Source	Tap water
pH range	4-11
Temperature, C°	2-35
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 Smart2Pure system on the benchtop or mount it directly to the wall, as shown by the Thermo Scientific MicroPure, for more bench space



# Thermo Scientific Barnstead Smart2Pure water purification system (continued)



### Economical Design

The RO membrane with pretreatment cartridge is separate from the DI cartridge, ensuring you only replace each cartridge as needed



### UV-Oxidation 185/254 nm

Optional UV-oxidation for reducing the content of microorganisms and their metabolites



### Flexible

Gain increased flexibility by adding a hand dispenser with 3 meter cord



### Flexible Storage

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

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)

Storage Reservoir Options for Smart2Pure 12 System Only	30L	60L
<b>Tank</b> Choose a tank to meet your capacity needs	06.5040	06.5070
<b>Required Accessories</b>		
<b>Sterile overflow for reservoir</b>	06.5001	06.5001
<b>CO<sub>2</sub> adsorber + sterile filter, 0.2 µm</b>	06.5002	06.5002
<b>Optional Accessories</b>		
<b>UV lamp assembly for the tank, 230V, 50Hz</b> Ships complete with assembly and UV lamp	06.5006	06.5006
<b>Wall mounting bracket</b>	06.5015	06.5016
<b>Replacement Consumables</b>		
<b>Replacement UV lamp (reservoir), 230V, 50Hz</b>	09.5002	09.5002

Product Specifications - Smart2Pure 3, 6, 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	90-240V, 50/60Hz	0.06kW	3/4" NPT	12 x 15.7 x 21.5 (305 x 400 x 545)

System Options for Smart2Pure	Permeate flow at 15°C	Smart2Pure Standard	Smart2Pure UV	Smart2Pure UF	Smart2Pure UV/UF
<b>Smart2Pure System 3 and 6 L/hr*</b> All systems include an RO/pretreatment cartridge, ultrapure polisher cartridge, sterile 0.2 µm filter, pressure regulator, UV lamp and/or UF filter where applicable. The 3 and 6 lph models also include an internal 6L tank with vent filter.	<b>3 L/hr</b>	50129869	50129872	50129870	50129688
	<b>6 L/hr</b>	50129873	50129885	50129874	50129887

Required Accessories					
<b>Pretreatment filter</b> Required to prolong cartridge life. Ships with a filter housing and 1µm filter.		09.4003	09.4003	09.4003	09.4003

Optional Accessories					
<b>Wall mounting bracket</b>		09.2212	09.2212	09.2212	09.2212
<b>Qualification documents (IQOQ)</b>		IQQDOCE50133911	IQQDOCE50133911	IQQDOCE50133911	IQQDOCE50133911
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Ships with a 0.2 micron final filter.		50138221	50138221	50138221	50138221

System Options for Smart2Pure 12	Smart2Pure 12 Standard	Smart2Pure 12 UV	Smart2Pure 12 UF	Smart2Pure 12 UV/UF
<b>Smart2Pure System 12 L/hr*</b> Systems include an RO/pretreatment cartridge, an ultrapure polisher cartridge, sterile 0.2 µm filter, pressure regulator, UV lamp and/or UF filter where applicable	50129888	50129890	50129889	50129845

Required Accessories				
<b>Smart2Pure Reservoir</b> Choose a reservoir that fits your needs	See "Storage Reservoir Options"			

<b>Pretreatment filter</b> Required to prolong cartridge life Ships with a 10 inch filter housing and 1 µm filter	09.4003	09.4003	09.4003	09.4003
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Optional Accessories				
<b>Wall mounting bracket for the system</b>		09.2212	09.2212	09.2212
<b>Qualification documents (IQOQ)</b>		IQQDOCE50133912	IQQDOCE50133912	IQQDOCE50133912
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Ships with a 0.2 micron final filter.		50138221	50138221	50138221

Replacement Consumables - Smart2Pure 3, 6, 12 L/hr					
<b>RO membrane with integrated pretreatment</b>	<b>3 L/hr</b>	09.2003	09.2003	09.2003	09.2003
	<b>6 L/hr</b>	09.2006	09.2006	09.2006	09.2006
	<b>12 L/hr</b>	09.2012	09.2012	09.2012	09.2012
<b>Ultrapure polisher cartridge</b>		09.1020	09.1020	09.1020	09.1020
<b>Sterile 0.2 µm filter for system</b>		09.1003	09.1003	09.1003	09.1003
<b>Ultrafilter</b>		n/a	n/a	50133981	50133981
<b>System UV-lamp</b>		n/a	09.1002	n/a	09.1002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202
	North America/ Latin America	CMX25	CMX25	CMX25	CMX25
<b>1 micron prefilter for 09.4003</b>		06.5101	06.5101	06.5101	06.5101
<b>Sterile vent filter for tank</b>	<b>3 L and 6 L/hr</b>	22.0091	22.0091	22.0091	22.0091

TYPE 2

# pure

## water purification systems

### **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



## convenience

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



## flexibility

Gain more space with numerous installation options – on the bench, wall or standalone



## TYPE 2

# Thermo Scientific Barnstead pure water purification system selector guide

### Technology / Feature



### Benefits



<b>Capacity</b>	Optimal amount of water to use 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
<b>Technology</b>	UV Oxidation	Protects against microorganism
<b>Features</b>	Automatic operation	Total operation of the system is automatic
	Multiple choices of dispense	Flexible options for dispensing
	Upgradable	If capacity needs increase, the system can be upgraded



## REVERSE OSMOSIS AND DEIONIZATION

## DISTILLATION



**Pacific TII**  
water purification system

**LabTower TII**  
water purification system

**Mega-Pure Stills**

**Cabinetized Stills**

**Classic Stills**

Multiple capacities available

Flexible dispensing

All glass design

Classic tin-lined still with  
space saving design

Tin-lined

3-40 L/hr

20-40 L/hr

1.4-13 L/hr

7.6-19 L/hr

1.9-38 L/hr

Optional

Optional

—

Optional for reservoir

Optional for reservoir

Standard

Standard

Optional

Standard

Optional

—

Standard

—

—

—

Standard

Standard

—

—

—

# Thermo Scientific Barnstead Pacific TII water purification system

The Barnstead Pacific TII water purification system converts tap water into high purity water. The ultimate system for the automatic and economical production of Type 2 water, the Pacific TII system supports daily requirements from 20 to 200 liters.



## ROUTINE LABORATORY WORK

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



### Multiple options for Type 2 water

- Five system options with permeate flows of 3, 7, 12, 20, or 40 L/hr
- Future system upgrades accommodate greater capacities to meet growing water demands
- 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 standstill periods
- 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”, “cleaning” or “disinfection” modes
- Reservoir fill-level shown as %
- System parameters are code-protected to prevent accidental changes to set points
- Water is dispensed directly from storage tank

### GLP-Compliant documentation

- Optional printer connects to RS-232 port for data recording and traceability
- Cell constant of 0.01cm<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 Pacific TII display

### Clear information

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

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

# type 2 water system

## with ultimate flexibility

Quick Look Comparison					
	Pacific TII 3 L/hr system	Pacific TII 7 L/hr system	Pacific TII 12 L/hr system	Pacific TII 20 L/hr system	Pacific TII 40 L/hr system
Pure water production at 15°C, L/hr	3	7	12	20	40
Resistivity at 25°C, MΩ·cm	15-10	15-10	15-10	15-10	15-10
Conductivity, μS/cm	0.067-0.1	0.067-0.1	0.067-0.1	0.067-0.1	0.067-0.1
TOC, ppb	<30	<30	<30	<30	<30
Removal, bacteria and particles, %	99	99	99	99	99
Silicate removal, %	> 99.9	> 99.9	> 99.9	> 99.9	> 99.9

## Technologies that produce high purity water —



### Reverse osmosis membrane

The high performance reverse osmosis 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 reverse osmosis 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 of wavelength 254 nm acts as germicide.

### Recirculation

Recirculation of the water between the storage reservoir and Pacific TII 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)

# Thermo Scientific Barnstead Pacific TII water purification system (continued)

The Barnstead Pacific TII system converts tap water to 15-10 MΩ·cm high purity water.



### Pacific TII reservoirs

- Store high purity water safely and conveniently!

### Large opening

- For easy and effective cleaning by hand

### 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

### Polyethylene reservoir

- Constructed with inert materials opaque to light

### Recirculation pump

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

### Wall mount

- Simple and space-efficient wall mounting

### Conical bottom outlet

- Allows complete draining and efficient cleaning and disinfection

## Specifications and Ordering Information

Feed Water Specifications*	
Source and pre-treatment	Tap water, softened or hardness stabilized
Conductivity, μS/cm	< 1500
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

Pacific TII System					
Operating pressure	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H	Ambient temperature
29-87 psi (2-6 bar)	90-240V, 50/60Hz	0.08kW	3/4" 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)

System Options	UV option	Pacific TII 3	Pacific TII 7	Pacific TII 12	Pacific TII 20	Pacific TII 40
<b>Pacific TII Systems</b> All systems have a built-in wall bracket and include an RO membrane, a high purity water cartridge, pressure regulator, and UV lamp where applicable	<b>System with UV</b>	50132129	50132131	50132132	50131982	50132133
	<b>System without UV</b>	50132121	50132123	50132124	50132125	50132127
<b>Required Accessories</b>						
<b>Pacific TII Reservoir</b> Choose a reservoir that fits your needs		See "Storage Reservoir Options" below				
<b>Double cartridge pretreatment system</b> A 5 µm filter with activated carbon cartridge and a hardness stabilizer cartridge ship complete with two 10 inch filter housings to control chlorine, organic impurities and control hardness <250ppm TIS For full pretreatment options, see p. 86		09.4000				
<b>Optional Accessories</b>						
<b>Qualification documents (IQ00)</b>		IQQDOCE50133915	IQQDOCE50133915	IQQDOCE50133915	IQQDOCE50133915	IQQDOCE50133915
<b>Water watcher</b> Alerts the user to leaks – available as 230V, 50Hz only		16.0129	16.0129	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	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207	09.2207	09.2207	09.2207
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Use only with a tank equipped with a pressure pump (06.5032, 06.5062, 06.5082). Ships with a 0.2 micron final filter.		50138221	50138221	50138221	50138221	50138221
<b>Replacement Consumables</b>						
<b>High purity water cartridge</b>		09.4011	09.4011	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 and 40 require two membranes as indicated		22.0046	22.0046	22.0046	22.0046 (order 2)	22.0087 (order 2)
<b>System UV lamp</b>		09.4002	09.4002	09.4002	09.4002	09.4002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25	CMX25	CMX25
<b>Activated carbon cartridge with 5 µm prefilter</b>		06.5201	06.5201	06.5201	06.5201	06.5201
<b>Hardness stabilizing cartridge</b>		06.5452	06.5452	06.5452	06.5452	06.5452
<b>Storage Reservoir Options for Pacific TII</b>				<b>30 L</b>	<b>60 L</b>	<b>100 L</b>
<b>Reservoir</b> Choose a tank to meet your capacity and pump	with level display			06.5033	06.5063	06.5083
	with level display and recirculation/pressure pump			06.5032	06.5062	06.5082
<b>Required Accessories</b>						
<b>Sterile overflow for reservoir</b>				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>						
<b>UV lamp assembly for reservoir with lamp, 230V, 50Hz</b>				06.5006	06.5006	06.5006
<b>Wall mounting bracket</b>				06.5015	06.5016	na
<b>Replacement Consumables</b>						
<b>Replacement UV lamp (Reservoir)</b>				09.5002	09.5002	09.5002
<b>Sterile 0.2 µm filter for system</b>				09.1003	09.1003	09.1003

# Thermo Scientific Barnstead LabTower TII water purification system

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



## ROUTINE LABORATORY WORK

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

### Consistent water quality

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

### Compact mobile design

- Two system options with permeate flows of 20 or 40 L/hr
- Stand-alone design with integrated 100 L reservoir takes up zero bench space
- Castors allow easy relocation
- Systems can be upgraded later to accommodate growing water demands

### 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 100 L 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 setting for 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 sanitization, 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

# pure water system

## with integrated 100 L tank

Quick Look Comparison		
	LabTower TII system	LabTower TII + UV system
Pure water production at 15°C, L/hr	20 or 40	20 or 40
Resistivity at 25°C, MΩ·cm	10-1	10-1
Conductivity, μS/cm	0.1-1	0.1-1
Bacteria content, CFU/mL, with sterile filter	< 1	< 1
Particle content (0.2 μm) per mL with sterile filter	< 1	< 1

### 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 stage from hard water

### Reverse osmosis and reservoir

- Pretreated water is pressure-forced through the permeable reverse osmosis module removing 97–99% 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 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



LabTower TII with optional hand dispenser

## Thermo Scientific Barnstead LabTower TII water purification system





## Specifications and Ordering Information

Feed Water Specifications*	
Source	Potable tap water softened or hardness stabilized
Blocking index (SDI)	< 3, with higher values, an upstream pretreatment (model no. 09.4000) is to be installed
Conductivity, µS/cm	< 1500
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					
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)	90-240V, 50/60Hz	0.12kW	3/4" NPT	17.7 x 22.8 x 59 (450 x 580 x 1500)	2-35°C
System Options	UV option	LabTower TII 20	LabTower TII 40	LabTower TII 60	
<b>LabTower TII Systems*</b> All systems include an RO membrane, a high purity water cartridge, 10 inch 5 µm prefilter with hardness stabilizer cartridge, pressure regulator, 0.2 µm filter, integrated 100 L reservoir and UV lamp where applicable	System with UV	50132193	50132141	50132394	
	System without UV	50132191	50132196	50132393	
Required Accessories					
<b>LabTower TII Pretreatment</b> Both cartridges are required for complete pretreatment	5µm filter with activated carbon and a 10" filter housing	50134022	50134022	50134022	
	1µm filter with a 10" filter housing	09.4003	09.4003	09.4003	
<b>Sterile vent filter for reservoir</b>		50135142	50135142	50135142	
<b>Sterile overflow for reservoir</b>		50132714	50132714	50132714	
Optional Accessories					
<b>UV lamp assembly for reservoir, 230V, 50Hz only</b> Includes holder and UV lamp		06.5006	06.5006	06.5006	
<b>Water watcher</b> Alerts the user to leaks. Available as 230V, 50Hz 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	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1	
	230V, 50Hz	09.2207	09.2207	09.2207	
<b>Qualification documents (IQ/OQ)</b>		IQQDOCE50134156	IQQDOCE50134156	IQQDOCE50134156	
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Ships with a 0.2 micron final filter.		50138221	50138221	50138221	
Replacement Consumables					
<b>High purity water cartridge</b>		02.2850-LAB	02.2850-LAB	02.2850-LAB	
<b>Reverse Osmosis membrane</b> LabTower TII 20 and 40 require two membranes, and LabTower TII 60 requires four membranes, as indicated		22.0046 (must order 2)	22.0087 (must order 2)	22.0087 (must order 2) and 22.0046 (must order 2)	
<b>System UV-lamp</b>		09.4002	09.4002	09.4002	
<b>Sterile 0.2 µm filter</b>		09.1003	09.1003	09.1003	
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	
	North America/Latin America	CMX25	CMX25	CMX25	
<b>Activated carbon cartridge with 5 µm prefilter</b>		06.5201	06.5201	06.5201	
<b>Hardness stabilizing cartridge</b>		06.5452	06.5452	06.5452	
<b>Replacement UV lamp (reservoir, 230V, 50Hz only)</b>		09.5002	09.5002	09.5002	
<b>5 µm prefilter and hardness stabilizer</b>		06.5204	06.5204	06.5204	

# Thermo Scientific 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 five production capacities
- Units are easily wall- or bench-mounted
- Vertical condenser design provides maximum purity
- High temperature cut-off 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) assures a 24-hour automatic system
- Includes feed water solenoid valve for automatic operation
- Produces water with a resistivity of 1-10 MΩ·cm, depending on feed water purity

## MP-1

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

## MP-3A, MP-6A and MP-11A

- Ideal for larger volume demands with storage and options

## MP-12A

- Built-in deionizer for pretreated feed to boiler. Distillate cooler allows product water to be used as it is produced, cooling it from 85-55°C for ease of handling. No need to wait for cooling

## ROUTINE LABORATORY WORK

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

Quick Look Comparison

	MP-1	MP-3A	MP-6A	MP-11A	MP-12A
<b>System features</b>	Compact, easy-to-use	Stills for larger volume demands			Deionizer and distillate cooler
<b>Product water capacity, L/hr</b>	1	3	6	13	12
<b>Cooling water capacity, L/hr</b>	11.3	30.3	53	130	130
<b>Number of heaters</b>	1	1	2	4	4
<b>Resistivity at 25°C, MΩ·cm</b>	1-10	1-10	1-10	1-10	1-10

# glass stills ideal for biological applications

## Product Accessories

### Automatic Collection System (ACS)

- All glass system designed to collect water from the 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 Mega-Pure Glass Stills
- Mega-Pure single or dual cartridge deionizer reduces scale build up and increases distillate purity
- Greater flexibility in meeting varying feed water qualities
- Temperature-compensated purity meter measures water quality and indicates when cartridges are exhausted
- Built-in drain valve for simple cartridge changes
- Large cartridge capacity for extended cartridge use
- Unit can be wall- or bench-mounted



Plastic Bottle (413964)



Glass Bottle (410535)



Automatic Collection System



Mega-Pure Deionizer D2

# Thermo Scientific Barnstead Mega-Pure Glass Stills (continued)

## Specifications and Ordering Information

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							
	Volume output (L/hr)*	Overall dimensions W x H x D in (mm)	Electrical (50/60 Hz)			Model number	
			Volts	Amps	Phase	Unit	6 L bottle included
<b>MP-1**</b>	1.4	18 x 34 x 9.75 (45.7 x 86.4 x 24.8)	120	9	1	A440266	A440267
			240	4.5	1	A7981	A7982
<b>MP-3A**</b>	3.4	23 x 45 x 12 (58.4 x 114.3 x 30.5)	240	11	1	A440367	–
			208	13	1	A440696	–
<b>MP-6A**</b>	6	23 x 45 x 12 (58.4 x 114.3 x 30.5)	240	21	1	A440518	–
			208	25	1	A440697	–
<b>MP-11A**</b>	13	29.2 x 53 x 14.4 (74.2 x 134.6 x 36.6)	240	42	1	A440118	–
			208	49	1	A440117	–
<b>MP-12A</b> Built-in deionizer (holds two cartridges) and distillate cooler	12	29.2 x 53 x 14.4 (74.2 x 134.6 x 36.6)	240	42	1	A442011	–
			208	49	1	A442012	–

Required Accessories		Model Number
<b>Dual solenoid</b> Required if using pretreated boiler feed water and untreated cooling water	MP-1 (240V), MP-3, MP-6A and MP-11A	440236
	MP-1 (120V)	RY798X2A
<b>Deionization cartridges</b> Required for MP-12A. See Optional Accessories		
<b>Storage solutions</b> See Storage Options		

Optional Accessories		Model Number
<b>Single cartridge deionizer (D1)</b> Single cartridge deionizer removes inorganic contaminants. Order one deionization cartridge to complete your system. Dimensions: W x H x D – 10.5 x 25.5 x 7.5 in (26.7 x 64.8 x 19 cm)		D440046
<b>Dual cartridge deionizer (D2)</b> Provides increased capacity with chlorine and organic removal. Order two deionization cartridges to complete your system. Dimensions: W x H x D – 16.75 x 25.5 x 7.5 in (42.6 x 64.8 x 19 cm)		D440066
<b>Deionizer accessories</b>	<b>Still adapter kit</b> Required to connect the Deionization System to any Mega-Pure Glass Still	440376
	<b>Solenoid valve accessory kit</b> For use with the D1 or D2 when used as stand alone units	440375
<b>Deionization cartridges</b>	<b>High purity cartridge</b> Used in the MP-12A, D1 and D2 unit for high purity	D400377
	<b>High capacity cartridge</b> Used in MP-12A, D1 and D2. Removes ionized solids for extended capacity	D400499
	<b>Organic removal cartridge</b> Used in D2 for organic and chlorine removal	D440265

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



Storage Options		Model Number
<b>Storage bottles</b> For manual operation	<b>Plastic bottle, 6 L capacity</b> For use with MP-1 and MP-3A stills	413964
	<b>Glass bottle, 9 L capacity</b> For use with MP-1 and MP-3A stills	410535
	<b>Glass bottle, 13 L capacity</b> For use with any Mega-Pure Glass Still	413934
	<b>Glass bottle, 45 L capacity</b> For use with any Mega-Pure Glass Still	410164
<b>Automatic collection system (ACS)</b> For use with any Mega-Pure Glass Still. 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)	<b>Automatic collection system (ACS) unit</b>	B440704
	<b>Flexible tubing adapter kit</b> Needed when the supplied glass tubing is either too long or too short to reach still. Flexible tubing is not included. 0.5 inch Teflon tubing able to handle 80-90°C water is recommended	440138
	<b>ACS wall mounting bracket</b>	400634
	<b>Adapter for ACS washer hook-up for glassware washers</b>	440241



# Thermo Scientific Barnstead Classic Stills

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.



## ROUTINE LABORATORY WORK

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

### 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 set-up
- Includes low water cut-off for safety protection
- Bench-mounted

### Floor Model Electric Stills

- Come standard with floor mounting stand
- New over temperature protection system improves safety
- New plug-and-play hardware allows for easier installation
- Capacities from 1 to 10 gal/hr
- Low water cut-off protects heating elements when water supply is interrupted
- Optional fully 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

### 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				Steam Stills
Product water capacity, gal/hr	1/2	1	2	5	10	10
Mounting	Bench	Floor				Floor



## Specifications and Ordering Information

### Tin-Coated Storage Reservoir Specifications

	Output gal/hr(L/hr)	Cooling water gal/hr (L/hr)	KW	Electrical (50/60 Hz)		Phase	Dimensions W x H x D in (cm)			Model number	
				Volts	Amps						
<b>Electric stills*</b> Floor stand included (except A1007)	<b>1/2 gal/hr Portable</b>	0.5 (1.9)	4 (15)	1.3	120	12	1	21 (52)	19 (49)	10 (26)	A1007
	<b>1 gal/hr</b>	1 (3.8)	8 (30)	2.6	120	23	1	22 (56)	66 (168)	10 (25)	A1011-A
		1 (3.8)	8 (30)	2.6	240	12	1	22 (56)	66 (168)	10 (25)	A1011-B-61
	<b>2 gal/hr</b>	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
	<b>5 gal/hr</b>	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	
<b>10 gal/hr</b>	10 (38)	80 (303)	26	240	66	3	37 (94)	89 (226)	14 (36)	A1016-D	
<b>Steam stills*</b>	Output gal/hr (L/hr)	Cooling water gal/hr (L/hr)	Steam pressure (PSI)	Boiler horsepower	Steam lb/hr (kg/hr)	Dimensions W x H x D in (cm)			Model Number		
	<b>10 gal/hr</b>	10 (38)	38 (144)	35-50	3.5	90 (41)	37 (94)	90 (229)	14 (36)	A1213	

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

Required Accessories		Model Number
<b>Steam still floor stand</b>	For 10 gal/hr steam stills only	G1000
<b>Storage reservoir</b>	Choose a storage reservoir that best fits your needs – go to Thermo Scientific Barnstead Classic Still Storage Reservoirs and Accessories on pages 70-71	
Optional Accessories		
<b>Fully automatic controls</b> 120V (50/60Hz) 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
	For use with 10 gal/hr electric still	G2125
	For use with 10 gal/hr steam still	G2020



**tin lined for**  
pure water

# Thermo Scientific Barnstead Classic Still Storage Reservoirs and Accessories

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



## Storage reservoirs

- Available in 10 to 200 gallon reservoir options
- Crafted from copper and 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 (10 and 25 gallon reservoirs only) for proper installation

## Required Accessories

### Floor stand and wall bracket

Choose either a floor stand or wall bracket for proper installation of reservoir

#### Floor stands

- 10, 25 and 50 gallon reservoir stands are fabricated from heavy gauge sheet metal and have adjustable feet
- 100 and 200 gallon reservoir stands are fabricated of thick steel angle-iron

#### Wall brackets

- 10 gallon reservoir brackets are fabricated from heavy gauge aluminum
- 25 gallon reservoir brackets are fabricated of thick steel angle-iron

### 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

### 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



Storage Reservoir Floor Stand



Storage Reservoir Wall Bracket



## Specifications and Ordering Information

System Options						
Reservoir options	Distribution outlet (NPT)	Drain outlet (NPT)	Overall dimensions in (cm)			Model number
			W	H	D	
10 gal*	1/2 in	n/a	10.25 (26)	29 (74)	17 (43)	B3043
25 gal*	1/2 in	n/a	18 (46)	29 (74)	25 (64)	B3045
50 gal*	1 in	1/2 in	22 (56)	36 (91)	28 (71)	B3046
100 gal*	1 in	1/2 in	29 (74)	43 (110)	35 (89)	B3047
200 gal*	1 1/2 in	1 in	38 (96)	50 (128)	45 (114)	B3049

Required Accessories							
<b>Mounting options</b> Choose the mounting option that best suits your needs.	<b>Floor stands</b>	For the 10 gal reservoir	11 (28)	27 (69)	11 (28)	H1000	
		For the 25 gal reservoir	19 (48)	27 (69)	19 (48)	H1001	
		For the 50 gal reservoir	22 (56)	20 (51)	22 (56)	H1002	
		For the 100 gal reservoir	29 (74)	11 (28)	29 (74)	H1003	
		For the 200 gal reservoir	39 (99)	22 (56)	39 (99)	H3230	
	<b>Wall brackets</b>	For the 10 gal reservoir					H3240
		For the 25 gal reservoir					H3242
<b>UV light assembly</b> Maintains water sterility in reservoir. Includes housing, on/off switch, 6 ft. cord, lamp and ballast						H4005	
<b>Ventgard air filter and water seal</b>						H3111	
Replacement Consumables							
<b>Replacement UV lamp</b>						04141	
<b>Ventgard air filter</b> Protects stored water against airborne particulates, organics and CO <sub>2</sub>						H3120	
<b>Replacement water seal</b> Prevents air from entering storage reservoirs via condenser atmospheric vent						H3130	
<b>Ventgard filter element</b> The consumable portion of the Ventgard filter assembly						25001-DB	



# Thermo Scientific Barnstead Cabinetized Stills

Our Barnstead Cabinetized Stills include a still and an appropriately matched tin-coated storage reservoir in a compact storage cabinet. This space saving design uses less space than conventional units and allows for faster installation.

## all-in-one tin-lined still and reservoir



The inside of a Barnstead Cabinetized Still

### Product Features

- Choice of two sizes; 2 or 5 gal/hr
- Q-Baffle ensures high quality pyrogen free product water
- Fully automatic operation allows for unattended operation. Still turns off when the reservoir is full and restarts when reservoir empties. Automatically drains the boiling chamber every time the unit is off and every 4 hours of operation, helping to keep your still clean.

### Model 210 Still – 2 gal/hr with 10 gallon reservoir

- Purity meter alerts user of distilled water purity in storage reservoir
- Includes low water cut-off for safety protection

### Model 525 Still – 5 gal/hr with 25 gallon reservoir

- Purity meter alerts user of distilled water purity in storage reservoir
- Optional recirculation pump and base mounting stand available
- Storage tank equipped with a UV lamp for improved bacterial control

### ROUTINE LABORATORY WORK

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

### Quick Look Comparison

	Model 210	Model 525
<b>Flow rate</b>	2 gal/hr	5 gal/hr
<b>Storage reservoir</b>	10 gal	25 gal

### Optional Accessories

<b>Bench stand</b> Model 210 only.	A1066
<b>Floor stand</b> For Model 525 only. L x W x D: 36 x 18.8 x 35 in (93 x 48 x 89 cm)	A1521
<b>Recirculation pump</b> For Model 525 only. Floor stand (A1521) included.	A1522

### Specifications and Ordering Information

Product Specifications								
System options	Output gal/hr (L/hr)	Voltage (50/60 Hz)		Amps	Phase	Wire	Dimensions W x H x D	Model number
		Controller	Heating element					
<b>210 still</b> <b>2 gal/hr</b>	2 (7.6)	120	240	26	1	2	24 x 41 x 15.25 in (60 x 103 x 39 cm)	A1065-B
	2 (7.6)	120	208	17	3	4	24 x 41 x 15.25 in (60 x 103 x 39 cm)	A1065-C
	2 (7.6)	120	240	15	3	3	24 x 41 x 15.25 in (60 x 103 x 39 cm)	A1065-D
<b>525 still</b> <b>5 gal/hr</b>	5 (19)	120	240	55	1	2	36.5 x 48 x 18.75 in (91 x 122 x 48 cm)	A1085-B
	5 (19)	120	208	36	3	4	36.5 x 48 x 18.75 in (91 x 122 x 48 cm)	A1085-C
	5 (19)	120	240	33	3	3	36.5 x 48 x 18.75 in (91 x 122 x 48 cm)	A1085-D

# distillation 101

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

## Thermo Scientific Barnstead products include a broad range of stills

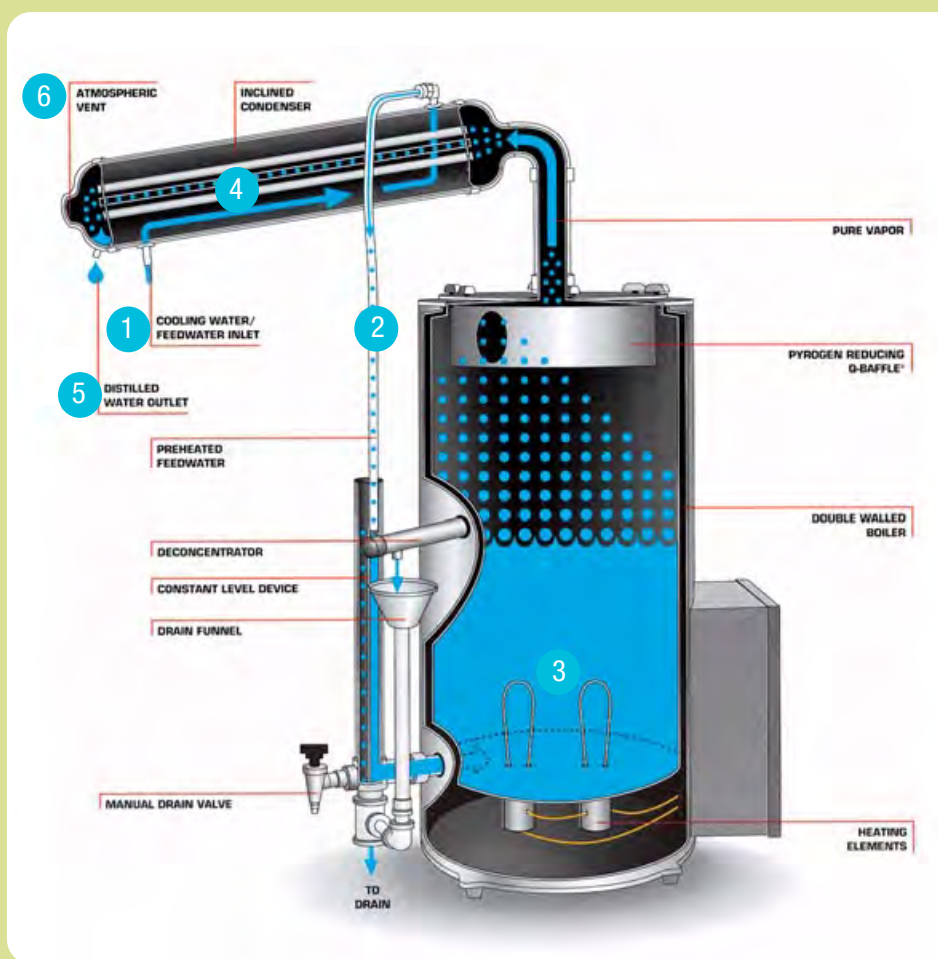
Our stills range in size from 1.4 to 38 L/hr. Select from stills constructed of tin or glass. Many models offer fully automatic options or pretreatment options to minimize scaling.

### 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. It 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.

## 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.



# reverse osmosis

## water purification systems

Water purified using reverse osmosis 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

### Reverse osmosis is economical

Reverse osmosis 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.

### Reverse osmosis 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.

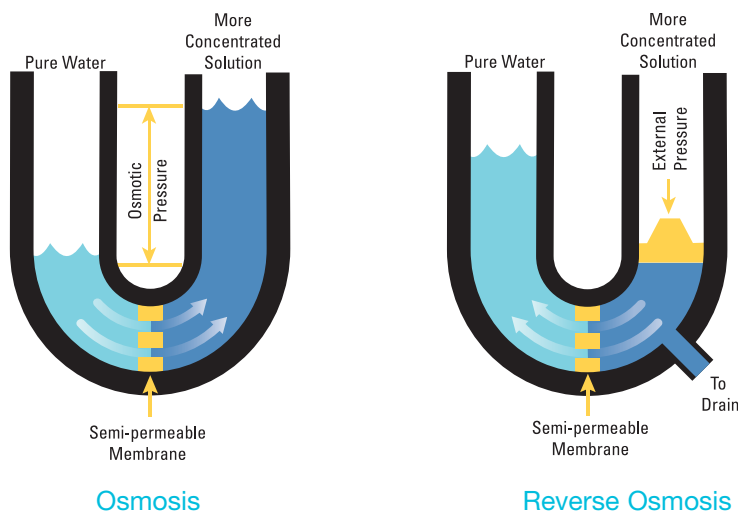
### Reverse osmosis is effective

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 product 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 our Thermo Scientific H<sub>2</sub>O Select Analysis Kit, our free comprehensive testing program which 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. Reverse osmosis 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 reverse osmosis 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 Thermo Scientific Barnstead Pacific RO and Thermo Scientific 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. Again, both Pacific RO and LabTower RO 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.

### **SDI (Silt Density Index)**

Suspended solids and colloidal materials in feed water are one of the biggest problems in reverse osmosis systems. In order to have some measure of the degree of this fouling problem, a concept called Silt Density Index 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.



LabTower RO with optional hand dispenser

# Thermo Scientific Barnstead

## reverse osmosis purification system selector guide

### Technology / Feature

### Benefits

	Technology / Feature	Benefits
<b>Capacity</b>	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.
<b>Features</b>	Upgradable	If capacity needs increase, the system can be upgraded
	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





Pacific RO	LabTower RO
Flexible mounting options	Integrated 100 L Reservoir
3, 7, 12, 20, 40 L/hr	20, 40 L/hr
Standard	Standard
Standard	Standard
—	Standard
—	Standard



# Thermo Scientific Barnstead LabTower RO water purification system

The Barnstead LabTower RO Converts Tap Water into RO Water and stores it in an integrated 100 L reservoir



## ROUTINE LABORATORY WORK:

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

### Advanced technology in a mobile design

- An ultra-modern controller provides easy-to-read system parameters
- Completely drainable integrated 100 L high-purity water reservoir has a low-noise pressure booster as a standard component
- Mounted on casters, the compact 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, consisting of a hardness stabilizer for protection of the reverse osmosis module from hardness formers
- An activated carbon/5µm combi-cartridge protects the system against free chlorine and particles, ensures the long service life of downstream purification stages

### Compact and mobile design

- Two system options with permeate flows of 20 or 40 L/h
- Stand-alone design with integrated 100 L tank takes up ZERO bench space
- Casters allow for easy relocation
- Systems can be upgraded later to accommodate growing water capacity demands

### Integrated 100 L reservoir

- 100 L RO water storage 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 “cleaning” 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	LabTower RO 20	LabTower RO 40
Pure water production at 15°C , L/hr	20	40
Withdrawal performance from reservoir at 1.5 bar, L/hr	180	180
Retention quota for inorganics, %	> 98	> 98
Bacteria content, %	> 99	> 99
Retention quota for particles, %	> 99	> 99

# RO water delivered from an integrated system

Feed Water Requirements*	
Source	Potable tap water that has been softened or hardness stabilized
Silt density index (SDI)	< 5. With higher values a pretreatment (model no. 09.4000) must be installed upstream of the system.
Conductivity, $\mu\text{S}/\text{cm}$	< 1500
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

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)	90-240V, 50/60Hz	0.25kW	3/4" NPT	17.7 x 22.8 x 59 in (450 x 580 x 1500 mm)	2-35°C

System Options	LabTower RO 20	LabTower RO 40	LabTower RO 60
<b>LabTower RO Systems*</b> All systems include an RO membrane(s), integrated 100 L reservoir, and pressure regulator	50132390	50132391	50132392

Required Accessories				
<b>Pretreatment cartridges</b> Both are required for complete pretreatment solution	5 $\mu\text{m}$ filter with activated carbon and a 10 inch filter housing	50134022	50134022	50134022
	1 $\mu\text{m}$ filter with a 10 inch filter housing	09.4003	09.4003	09.4003
<b>Sterile vent filter for reservoir</b>		50135142	50135142	50135142
<b>Sterile overflow for reservoir</b>		50132714	50132714	50132714

Optional Accessories				
<b>Printer Utilizes</b> RS-232 interface for safe documentation of all measured values and faults with date and time in compliance with GLP guidelines	120V, 50/60Hz	AY1137X1	AY1137X1	AY1137X1
	230V, 50Hz	09.2207	09.2207	09.2207
<b>UV lamp assembly for the reservoir with lamp, 230V, 50Hz only</b>		06.5006	06.5006	06.5006
<b>Water watcher</b> Alerts the user to leaks. Available as 240V only.		16.0129	16.0129	16.0129
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Ships with a 0.2 micron final filter.		50138221	50138221	50138221

Replacement Consumables				
<b>Reverse Osmosis membrane</b> LabTower TII 20 and 40 require two membranes, and LabTower TII 60 requires four membranes, as indicated		22.0046 (must order 2)	22.0087 (must order 2)	22.0087 (must order 2) and 22.0046 (must order 2)
<b>10" 5<math>\mu\text{m}</math> filter with hardness stabilizer cartridge</b>		06.5204	06.5204	06.5204
<b>Replacement reservoir UV Lamp (230V, 50Hz only)</b>		09.5002	09.5002	09.5002
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25
<b>1<math>\mu\text{m}</math> filter prefilter for 09.4003</b>		06.5101	06.5101	06.5101
<b>5<math>\mu\text{m}</math> prefilter + activated carbon 10 inch cartridge</b>		06.5201	06.5201	06.5201

# Thermo Scientific 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.



## ROUTINE LABORATORY WORK:

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

### Product Features

- Five system options with permeate flows of 3, 7, 12, or 20, or 40 L/h
- 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
- Simple system upgrade accommodates future pure water capacity requirements

### 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 “cleaning” modes
- Reservoir fill-level shown as %

### Integrated feed water monitoring

- Good quality feed water is a prerequisite for high purity water and extends cartridge service life

### GLP-compliant documentation

- Real-time clock records system errors and faults
- Ongoing data storage collects four weeks information displayed in clear 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

- Two 10 inch (25.4 cm) cartridge filter housings with a 5 µm prefilter + activated carbon to prevent entry of particles > 5 µm and high concentrations of free chlorine. Also includes hardness stabilizer cartridge which binds calcium and prevents its precipitation.

### Worry-free pure water storage

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

# flexible configurations

## for your RO water needs

Quick Look Comparison					
	Pacific RO 3 L/hr systems	Pacific RO 7 L/hr systems	Pacific RO 12 L/hr systems	Pacific RO 20 L/hr systems	Pacific RO 40 L/hr systems
Pure water production at 15°C , L/h	3	7	12	20	40
Salt retention, %	98	98	98	98	98
Retention, bacteria and particles, %	99	99	99	99	99

Feed Water Requirements*	
Source	Potable tap water that has been softened or hardness stabilized
Silt density index (SDI)	< 5, With higher values, a pretreatment (model no. 09.4000 must be installed upstream of the system)
Conductivity, µS/cm	< 1500
Prefiltration	5 µm + 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



## Thermo Scientific Barnstead Pacific RO water purification system (continued)

Storage Reservoir		
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)

Pacific RO Product Specifications					
Operating pressure, psi (bar)	Electrical requirements	Power consumption	Feed water connector	Dimensions W x D x H	Temperature
29-87 (2-6)	90-240 V, 50/60Hz	0.1 kW	3/4" NPT	14.6 x 13 x 23.7 in (372 x 330 x 603 mm)	2-35°C

Ordering Table	Pacific RO 3	Pacific RO 7	Pacific RO 12	Pacific RO 20	Pacific RO 40
<b>Pacific RO Systems*</b> All systems have an integrated wall bracket and include an RO membrane and pressure regulator	50132385	50132386	50132387	50132388	50132389
<b>Required Accessories</b>					
<b>Pacific RO Pretreatment</b> Includes two 10 inch (25.4 cm) cartridge housings, a 5 µm prefilter + activated carbon cartridge and hardness stabilizer cartridge	09.4000	09.4000	09.4000	09.4000	09.4000
<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 230V, 50Hz only.	16.0129	16.0129	16.0129	16.0129	16.0129
<b>Hand Dispenser Kit</b> Hand dispenser with 3 meter cord that connects to tank. Use only with a tank equipped with a pressure pump (06.5034, 06.5064, 06.5084). Ships with a 0.2 micron final filter.	50138221	50138221	50138221	50138221	50138221
<b>Replacement Consumables</b>					
<b>Reverse Osmosis membrane</b> Pacific RO 3, 7, 12 only require a single RO membrane. Pacific RO 20 and 40 require two membranes as indicated.	22.0046	22.0046	22.0046	22.0046 (order 2)	22.0087 (order 2)
<b>5µm prefilter + activated carbon 10 inch cartridge</b>	06.5201	06.5201	06.5201	06.5201	06.5201
<b>Hardness stabilizing 10 inch cartridge</b>	06.5452	06.5452	06.5452	06.5452	06.5452
<b>Cleaning solution</b>	Europe/Asia Pacific	09.2202	09.2202	09.2202	09.2202
	North America/Latin America	CMX25	CMX25	CMX25	CMX25



Storage Reservoir Options for Pacific RO		30 L	60 L	100 L
<b>Reservoir</b>	with level display	06.5033	06.5063	06.5083
	with level display and pressure pump	06.5034	06.5064	06.5084
<b>Required Accessories</b>				
<b>Sterile overflow for reservoir</b>		06.5001	06.5001	06.5001
<b>Vent filter</b> Choose the vent filter for your application needs	Sterile filter, 0.2 µm	50135142	50135142	50135142
<b>Optional Accessories</b>				
<b>UV lamp assembly for the reservoir with lamp, 230V, 50Hz only</b>		06.5006	06.5006	06.5006
<b>Wall mounting bracket</b>		06.5015	06.5016	na
<b>Replacement Consumables</b>				
<b>Replacement UV lamp (Reservoir)</b>		09.5002	09.5002	09.5002



# 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.



### Mixed Multi 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 silt density index (SDI) that is greater than 3 or the total ionized solids (TIS) is greater than 250 ppm



Mixed Multi Water Softener

### Single Pretreatment Cartridge

- Easy-to-use pretreatment cartridge protects the RO membrane in a system against particles
- Ships with 10-inch filter housing and a 1  $\mu\text{m}$  filter
- Ideal when feed water Silt Density Index (SDI) is 2-3

Double Pretreatment System

### Double Pretreatment System

- Ships with two 10-inch filter housings, a combi-cartridge which contains a 5  $\mu\text{m}$  filter and activated carbon, and a hardness stabilizer cartridge
- Removes chlorine, organics, and hard ions

### Triple Pretreatment System

- Ships with three 10 inch filter housings a combi-cartridge which contains a 5  $\mu\text{m}$  filter and activated carbon, and a hardness stabilizer cartridge, and a 1  $\mu\text{m}$  filter
- An effective triple pretreatment system removes chlorine, organics, hard ions, and particles larger than 1  $\mu\text{m}$



## Not sure what you need?

Request a complimentary Thermo Scientific 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.

# 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	Model Number
RO Water	<b>DI 1500 cartridge</b> Required only when feed water does not meet feed water requirements. Prolongs system cartridge life. For new installations, 04.1690 is a required hose kit to adapt cartridge to system.		stainless steel cartridge >	02.1500
Deionized or Distilled Water	<b>Deionized and distilled water</b> will meet the feed water requirements for the Thermo Scientific GenPure and MicroPure families. No pretreatment is typically required.			
Tap Water	<b>Pacific TII and reservoir or LabTower TII</b> Utilize a Type 2 system to pretreat the GenPure and MicroPure families			see pages 56-63
	<b>Pretreatment Filter, 1 µm filter</b>		10 inch 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 TIS of more than 10ppm. Additionally, you will need to replace the hardness stabilizer cartridge that ships with the unit with a 5 µm filter with activated carbon.	<b>120V, 50/60Hz</b>	Mixed multi softener > 5 µm filter with activated carbon >	50129892 06.5201
<b>230V, 50Hz</b>		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 inch filter housing <i>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 1µm filter for optimal performance. Designed for customers without chlorine in their tap water – typically Europe and Asia Pacific</i>		10 inch 1 µm filter with housing >	09.4003
	<b>Pretreatment Filter with carbon</b> <b>5 µm filter with activated carbon, 1 µm filter</b> Ships with two 10 inch filter housings <i>Designed for customers with chlorine in their tap water – typically North America, Latin America and UK</i>		5 µm filter with carbon > 10 inch 1 µm filter with housing >	50134022 09.4003
	<b>Single Pretreatment System</b> <b>5 µm filter with hardness stabilizer cartridge</b> Ships with two 10 inch filter housings <i>Great option for customers with little/no chlorine in their tap water – typically Europe and Asia Pacific</i>		5 µm filter with hardness stabilizer >	09.4001
	<b>Double Pretreatment System</b> <b>5 µm filter with activated carbon cartridge, hardness stabilizer cartridge</b> Ships with two 10 inch filter housings <i>Designed for customers with chlorine in their tap water – typically North America, Latin America and UK</i>		5 µm filter with carbon and a hardness stabilizer cartridge >	09.4000
	<b>Triple Pretreatment System</b> <b>5 µm filter with activated carbon cartridge, hardness stabilizer cartridge, 1µm filter</b> Ships with two 10 inch filter housings		5 µm filter with carbon and a hardness stabilizer cartridge > 1µm 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. Ships with two 10 inch filter housings	<b>120V, 50/60Hz</b>	Mixed multi softener > 5 µm filter with activated carbon > 1µm filter >	50129892 50134022 09.4003
		<b>230V, 50Hz</b>	Mixed multi softener > 5 µm filter with activated carbon > 1µm 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.	<b>120V, 50/60Hz</b>	Mixed multi softener > 5 µm filter with activated carbon >	50129892 06.5201
<b>230V, 50Hz</b>		Mixed multi softener > 5 µm filter with activated carbon >	50130297 06.5201	

TYPE 1

TAP TYPE 1

TYPE 2

RO



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

\*Ships with 5µm filter with hardness stabilizer



# pretreatment selector guide

(continued)

Replacement Consumables			
Pretreatment Description	Pretreatment Model Number(s)	Component Description(s)	Component Model Numbers
Single Pretreatment Cartridge	09.4001	10 in (25.4 cm) 5 µm filter and hardness stabilizer	06.5204
Single Pretreatment System	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 09.4003	10 in (25.4 cm) 5 µm filter with activated carbon cartridge	06.5201
		10 in (25.4 cm) Hardness stabilizing cartridge	06.5452
		10 in (25.4 cm) 1 µm filter	06.5101
Mix Multi Mini, 230V, 50Hz	50130297	Salt, 25kg	06.2000
		Hardness measurement kit	06.1000
		5 µm filter with carbon	06.5201
Mix Multi Mini, 120V, 50/60Hz	50129892	Salt, 40 lb	50129893
		Hardness measurement kit	50134335
		5 µm filter with carbon	06.5201

Mix Multi Mini, 230V, 50Hz	
Max flow rate, L/h	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)
Model number	50130297

## What is SDI?

**SDI stands for silt density index (SDI). 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 Thermo Scientific Bantam Deionizer, 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 costs of service calls



## flexibility

Versatile configurations meet an array of specific applications

Are the water systems  
you're purifying  
under pressure?

# Thermo Scientific Barnstead cartridge & 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
	Pura-Lite "Go/No Go" / 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 – 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	



# PRESSURIZED SYSTEMS

# 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

# Thermo Scientific Barnstead B-Pure water system

The Barnstead B-Pure 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 four 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 four L/min
- Simple system without a draw-off valve or purity indicator

#### Double holder

- Produces up to four 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 B-Pure systems
- Small size allows for flexibility in mounting location



#### APPLICATIONS INCLUDE:

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

#### Quick Look Comparison

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

# customizeable for your pretreatment or deionization needs

## Harvey DI+ Cartridge System

- Turn-key system ships complete with a remote dispenser, Pura-Lite (50 K $\Omega$ -cm) indicator and a high capacity, two-bed ion exchange cartridge to remove calcium, magnesium, and other ions from water
- The Harvey DI+ system accepts a broad range of other cartridges to remove impurities and produces pure water at a flow rate of 4 L/min



Product Specifications					
	Overall dimensions W x H x D	Inlet connection	Feed water temperature	Max feed water pressure	Max flow rate
<b>Single holder</b>	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
<b>Double holder</b>	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
<b>Half size holder</b>	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
<b>Harvey DI+</b>	7 x 26 x 7 in (17.8 x 63 x 17.8 cm)	1/2 NPTF	4-49°C (40-120°F)	100 psig	4 L/min

## Thermo Scientific Barnstead B-Pure (continued)



Cartridges	
Size	Dimensions Length x Diameter
Full Size Cartridge	17.5 x 3.4 in
Half Size Cartridge	10.95 x 3.4 in

System Options	Electrical	Model number
Single holder	–	D4511
Double holder with digital purity meter	120 VAC	D4521
	240 VAC	D4522-33*
Double holder with Pura-Lite indicator (50 k $\Omega$ )	120 VAC	D4524
Double holder with Pura-Lite indicator (200 k $\Omega$ )	120 VAC	D5831
Double holder with Pura-Lite indicator (1 M $\Omega$ )	120 VAC	D5833
Half size holder	–	D4505
Harvey DI+	120V	AY1273X4

\*  

Required Accessories				
Choose the cartridge(s) according to your needs.	Resin type(s)	Cartridge size	Capacity as CaCO <sub>3</sub>	Model number
<b>Anion removal</b> Effective removal of weakly ionized impurities, raises the pH of solutions, recovers precious metal complex	Strong anion exchange	Full	1680 grains	<b>D0760</b>
<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	3170 grains	<b>D0815</b>
<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	1760 grains	<b>D0803</b>
<b>Pretreatment macropure</b> Effectively removes colloids and bacteria, increases filter life	Macroreticular, activated carbon	Full	2000 gal	<b>D0836</b>
<b>Organic removal</b> Removes organics and chlorine.	Activated carbon	Full	5000 gal	<b>D0813</b>
		Half	5000 gal	<b>D50215</b>
<b>Organic removal</b> Removes organics and chlorine. Ideal for pretreating water systems with high organic levels in the feed water.	Extruded carbon	Full	5000 gal	<b>D63112</b>
<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	<b>D0811</b>
		Half	18 g	<b>D50214</b>
<b>Oxygen and demineralization</b>	Oxygen removal mixed-bed	Half	275 grains / 9 g	<b>D50216</b>
<b>Ultrapure</b> Removes ionized impurities to produce high resistivity water with a neutral pH	Mixed-bed	Full	875 grains	<b>D0809</b>
		Half	550 grains	<b>D50213</b>
<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 / 1000 gal	<b>D0832</b>
		Half	275 grains / 2000 gal	<b>D50217</b>
<b>Ultrapure and oxygen removal</b>	Ultrapure, oxygen removal	Full	455 grains / 30 g	<b>D8809</b>
<b>Ultrapure, oxygen, and organic removal</b>	Ultrapure, oxygen and organic removal	Full	365 grains / 2000 gal / 12 g	<b>D8811</b>

Optional Accessories			
		Voltage	
		120	240
<b>Digital Purity Monitor</b> – Resistivity range of 0.1-18.2 MΩ.cm		<b>D2770</b>	<b>D2769</b>
<b>Pura-Lite</b>	Indicator light at 50,000 Ω.cm	<b>E3450</b>	<b>E3454</b>
	Indicator light at 200,000 Ω.cm	<b>E3451</b>	<b>E3455</b>
	Indicator light at 1,000,000 Ω.cm	<b>E3452</b>	<b>E3456</b>
<b>Flow meters</b>	1 to 75 L/hr using 1/8 inch NPT inlet	<b>D0787</b>	<b>D0787</b>
	0 to 190 L/hr using 1/8 inch NPT inlet	<b>D0788</b>	<b>D0788</b>
<b>0.2 µm final filter</b> – For use on Double Holder units		<b>D3750</b>	<b>D3750</b>

# Thermo Scientific Bantam Deionizer

The Bantam Deionizer is an economical way to deionize your water. Easily view resistivity readings directly from unit. Customizable to specific applications by selecting the appropriate cartridge listed below.

## simple deionization system



- 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 Ω-cm	Up to 38 L/hr

### System Options

	Overall dimensions W x H x D	Feed water pressure	Electrical	Model number
<b>Bantam Deionizer*</b>	6 x 28.5 x 8.75 in (15.2 x 72.4 x 22.2 cm)	5-70 psi	120 VAC	<b>D0800</b>
			240 VAC	<b>D0805</b>

### Required Accessories

Choose the cartridge based on your application needs.	Resin Type(s)	Capacity	Model Number
<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	<b>D0803</b>
<b>Ultrapure</b> Removes ionized impurities to produce highest resistivity water with a neutral pH	Mixed-Bed	875 grains	<b>D0809</b>
<b>Ultrapure and organic removal (pretreatment)</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	785 grains / 1000 gal	<b>D0832</b>

### ROUTINE LABORATORY WORK:

- Pretreatment
- Deionization
- Organic and chlorine removal

\*

# Thermo Scientific Barnstead Hose Nipple Cartridges

The Barnstead Hose Nipple Cartridges are an economical way to purify water volumes up to 75 L/hr Applications include softening, deionization, organic and chlorine removal.

## easily customizable cartridge holder



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

Product Specifications	
Cartridge size	Dimensions Length x Diameter
<b>1/2 Size</b>	10.2 x 3.25 in (25.9 x 8.25 cm)
<b>2/3 Size</b>	13.3 x 3.25 in (33.8 x 8.25 cm)
<b>Full Size</b>	18.7 x 3.25 in (47.5 x 8.25 cm)

System Options	Model number
<b>Hose nipple cartridge holder</b> For easy wall mounting	<b>D8900</b>

Required Accessories				
Choose the cartridge based on your needs.	Resin type(s)	Capacity	Color indicator <sup>1</sup>	Model number
<b>1/2 size mixed-bed</b>	Ultrapure ion exchange	430 grains	No	<b>D50220</b>
<b>1/2 size mixed-bed with oxygen removal</b>	Ultrapure mixed-bed with strong anion exchange	280 grains / 4.4 g	No	<b>D8822</b>
<b>2/3 size high capacity</b>	Two-bed ion exchange with strong cation exchange	1100 grains	Yes	<b>D8950</b>
<b>2/3 size mixed-bed and organic removal</b>	Mixed-bed ion exchange with activated carbon	470 grains / 2000 gal	Yes	<b>D8951</b>
<b>Full size cation removal</b>	Cation exchange	3000 grains	Yes	<b>D8905</b>
<b>Full size high capacity</b>	Two-bed ion exchange	1650 grains	Yes	<b>D8901</b>
<b>Full size macroreticular, cation removal</b>	Macroreticular cation exchange	n/a	No	<b>D8908</b>
<b>Full size organic removal</b>	Activated carbon	5000 gal	No	<b>D8904</b>
<b>Full size oxygen removal</b>	Strong anion exchange	30 g	No	<b>D8903</b>
<b>Full size pretreatment and scale eliminator</b>	Mixed-bed and strong cation exchange, activated charcoal	1250 grains / 1000 gal	Yes	<b>D8921</b>
<b>Full size ultrapure</b>	Ultrapure ion exchange	915 grains	No	<b>D8911</b>
<b>Full size ultrapure</b>	Ultrapure mixed-bed ion exchange	915 grains	Yes	<b>D8902</b>
<b>Full size ultrapure with organic removal</b>	Mixed-bed ion exchange with activated carbon	730 grains / 2000 gal	Yes	<b>D8922</b>

<sup>1</sup> Alcohol-containing samples can not be used in cartridges containing the color indicator

### ROUTINE LABORATORY WORK:

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

# Thermo Scientific Barnstead 1/2 Size B-Pure Filter

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

## Choose from two holder options:

### 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 inch (25.43 cm) pre- and post-filters
- Wall mounting bracket comes standard

### Economy Filter Holder

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

## Optional accessory

### Pressure Gauge Kit

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

## ROUTINE LABORATORY WORK:

- Particulate and bacteria removal



Economy Filter Holder



# flexible filtration system

## System Options Product Specifications

	Overall dimensions W x H x D	Inlet connection	Feed water temperature	Max feed water pressure	Max flow rate	Model number
<b>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	<b>D5839</b>
<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	<b>15840</b>

## Required Accessory

	Pore Size	Length in (cm)	Diameter in (cm)	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)	<b>FL583X4</b>	<b>18024</b>
	5 µm Pre-filter	10 (25.4)	2.5 (6.5)	<b>FL583X1</b>	<b>D2729</b>
	10 µm Pre-filter	10 (25.4)	2.5 (6.5)	<b>FL583X2</b>	<b>18011</b>
	15 µm Pre-filter	10 (25.4)	2.5 (6.5)	<b>FL583X3</b>	<b>18018</b>
	0.2 µm Final Filter	10 (25.4)	2.5 (6.5)	<b>FL583X6</b>	–
	0.45 µm Final Filter	10 (25.4)	2.5 (6.5)	<b>FL583X5</b>	–

## Optional Accessories

<b>Dual pressure gauge kit</b>	<b>D2780</b>	–
<b>Single pressure gauge</b>	<b>D0780</b>	–



## 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.


### Thermo Scientific Barnstead NanoPure System Consumables

		NanoPure Analytical	NanoPure Analytical UV	NanoPure Biological UF	NanoPure Life Science UV/UF
	<b>Standard unit</b>	D11901	D11911	D11921	D11931
	<b>+ TOC monitor</b>	D11941	D11951	D11961	D11971
<b>Replacement Consumables</b>					
<b>Diamond cartridge pack</b> Choose the cartridge pack according to your feed water and system. Ships with 0.2 µm final filter (D3750)	<b>Deionized feed</b>	D50283	D50281	D50283	D50281
	<b>RO or distilled feed</b>	D50282	D50280	D50282	D50280
<b>0.2 µm final filter</b>		D3750	D3750	D3750	D3750
<b>Ultraviolet lamp (system)</b>		n/a	LMX13	n/a	LMX13
<b>Ultrafilter</b>		n/a	n/a	FL1192X1	FL1192X1
<b>Cleaning syringe</b>		CMX25	CMX25	CMX25	CMX25
<b>Ultraviolet lamp (TOC)</b>		LMX26	LMX26	LMX26	LMX26

Thermo Scientific Barnstead EasyPure II System Consumables

		EasyPure II	EasyPure II UV	EasyPure UF	EasyPure II UV/UF
		D7381	D7401	D7411	D8611
<b>Replacement Consumables</b>					
<b>Cartridge pack</b> Choose the cartridge pack according to your feed water and system	<b>Deionized feed</b>	D502126	D502124	D502126	D502124
	<b>RO or distilled feed</b>	D502127	D502125	D502127	D502125
<b>0.2 µm final filter</b>		D3750	D3750	D3750	D3750
<b>Ultraviolet lamp</b>		n/a	LMX13	n/a	LMX13
<b>Ultrafilter</b>		n/a	n/a	FL1192X1	FL1192X1
<b>Cleaning syringe</b>		CMX25	CMX25	CMX25	CMX25


Thermo Scientific Barnstead EasyPure RF System Consumables

		EasyPure RF	EasyPure RF UV
		D7031	D7035
<b>Replacement Consumables</b>			
<b>Cartridge pack</b> Choose the cartridge pack according to your feed water and system	<b>Deionized feed</b>	D502126	D502124
	<b>RO or distilled feed</b>	D502127	D502125
<b>0.2 µm final filter</b>		D3750	D3750
<b>Ultraviolet lamp</b>		n/a	LMX13
<b>Ventgard™ reservoir cap</b>		CV703X4A	CV703X4A
<b>Set of three empty cartridges for cleaning</b>		D7034	D7034


Thermo Scientific Barnstead EasyPure RoDi System Consumables

		EasyPure RoDi
		D13321
<b>Replacement Consumables</b>		
<b>Cartridge kit</b> Includes pre-filter, ultrapure mixed bed cartridge, and EasyPure high purity/low TOC cartridge		D502133
<b>0.2 µm final filter</b>		D3750
<b>Ultraviolet lamp</b>		LMX13
<b>Ventgard™ reservoir cap</b>		CV742X5A
<b>Reverse osmosis membrane</b>		FL1332X2
<b>Set of three empty cartridges for cleaning</b>		D7034

Thermo Scientific Barnstead TII System Consumables

		Barnstead TII
	<b>TII 12 L/h</b>	D14031
	<b>TII 24 L/h</b>	D14041
<b>Replacement Consumables</b>		
<b>TII DI cartridge pack</b> Ships with 0.2 µm final filter (D3750)		D502137
<b>1 µm pre-filter</b>		D502113
<b>MPS cartridge</b>		D502114
<b>Extruded carbon cartridge</b>		D502115
<b>0.2 µm final filter</b>		D3750
<b>Reverse osmosis membrane</b>		FL1265X1
<b>Ultraviolet lamp (system)</b>		LMX13
<b>Ultraviolet lamp (reservoir)</b>		LMX31
<b>Ventgard reservoir cap</b>		25001-DB

Thermo Scientific Barnstead RO System Consumables

		Barnstead RO
	<b>RO 6 L/h</b>	D12671
	<b>RO 12 L/h</b>	D12651
	<b>RO 24 L/h</b>	D12661
<b>Replacement Consumables</b>		
<b>Reverse osmosis membrane</b>	<b>6 and 12 L/h</b>	FL1265X1
	<b>24 L/h</b> Requires 2 RO membranes	FL1265X1 (please order 2)
<b>1 µm pre-filter</b>		D502113
<b>MPS cartridge</b>		D502114
<b>Extruded carbon cartridge</b>		D502115
<b>Ventgard reservoir cap</b>		CV742X5A

# support and maintenance



## Contact the Lab Water Experts

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.



## 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/GLP regulations, certifying that your system is performing to pre-determined technical specifications. Our validation services provide you with:

- **Factory-trained experts** – experienced in cGMP/GLP environments and Good Document Practice
- **IQ/OQ factory-developed validation protocols**

*Please ask your local sales representative for additional information about service offerings in your area.*

## 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

Common Conversions for Pure Water	
<b>Volume</b>	1 U.S. Gallon (gal) = 231 Cubic in (in <sup>3</sup> ) = 3.785 Liters (L)
	1 Cubic Meter (m <sup>3</sup> ) = 35.3 Cubic Feet (ft. <sup>3</sup> )
	1 U.S. Ounce (oz) = 29.57 Milliliters (mL)
<b>Density</b>	1 U.S. Gallon (gal) = 8.33 lb. Water
	1 Cubic Foot (ft. <sup>3</sup> ) = 62.3 lb. Water
<b>Temperature</b>	$^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$
	$\text{K} = ^{\circ}\text{C} + 273$
	$^{\circ}\text{F} = (\text{K} - 273.15) \times 9/5 + 32$
<b>Mass</b>	1 lb = 453.6 grams (g) = 7000 grains (gr.)
	1 kg = 2.205 lb.
<b>Pressure</b>	1 Atmosphere = 14.7 Pounds Per Square Inch (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
<b>Total ionized solids concentration</b>	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
<b>Resistivity/Conductivity</b>	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.

**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.

# glossary

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**Salt Rejection** – In reverse osmosis, the ratio of salts removed (rejected) to the original salt concentration. *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 Dalton (molecular weight) UF membrane, for example, will remove bacterial pyrogens, which are typically in the range of 20,000 Daltons.

**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.





[www.thermoscientific.com/purewater](http://www.thermoscientific.com/purewater)

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