sartorius

# arium®
# Laboratory Water Systems

## Home to us is the laboratory, wherever in the world that might be

For over 125 years, Sartorius has been designing and manufacturing high-precision laboratory instruments and devices. During this time span, we've taken part in some amazing scientific discoveries.

Scientists and technicians throughout the world have come to rely on Sartorius equipment as essential tools in the development of their experiments from theory through to proof of concept.

Designing and manufacturing instruments and devices that are innovative, accurate, precise and reliable are just some of the goals which our engineers must reach without compromise. Use of the latest construction technologies and materials helps us find innovative solutions in a range of applications from reagent weighing through to protein purification.

In response to the demand from laboratories for highly purified reagent grade water at point of use, we've recently added to our range of laboratory instruments: arium® laboratory water systems. Designed and engineered to meet and exceed current standards [ASTM, NCCLS & ISO], an innovative range of models enables even the most exacting laboratory requirements to be met.

Within this brochure, you will find an overview of the arium® product range; on request we will be happy to send detailed technical specifications and pricing.

# Laboratory reagent grade water
# Requirements, quality and standards

Simply stated, reagent grade water can be defined as water that will not interfere with the laboratory application, method or technique being performed. Regulatory or standards organizations, such as ASTM, define reagent grade water by type or class based on published specifications. In turn, most standardized laboratory methods require a reagent water type or class to ensure consistent and comparable reporting. In reality, purified water for the laboratory is difficult to define in general or specific type terms. Therefore, it may be best to use reagent water that exceeds the most stringent published standards.

**Standards**

There are a number of standards or regulatory agencies that define laboratory reagent grade water based on published specifications. The more familiar agencies consist of the American Society for Testing and Materials (ASTM), National Committee for Clinical Laboratory Standards (NCCLS), International Organization for Standardization (ISO) and others.

Depending on the agency, up to four different types or classes of reagent water may be specified. Each type or class of reagent water is defined by measurable chemical or physical limits. To date, ASTM has the most stringent specifications or limits for Type 1 reagent water.

Where applicable, the ASTM water types can be further classified for biologic content under Type A, B, or C designations. Type A requires the lowest bacteria and endotoxin levels. Therefore, the Type 1, Type A standards represent the highest quality specification for reagent water defined by ASTM [1].
The intent of any reagent water standard is to ensure that the purified water will not interfere with the laboratory method to be utilized. This means that the reagent water used must not contain material that could have a positive or negative effect on the results of a laboratory procedure. So in general terms, reagent water can be defined as purified water that will not interfere with the laboratory application, method or technique being performed. Standard methods and materials ensure that different laboratories perform the same test method utilizing the same standards so results can be validly compared. One could then argue that ASTM Type 1, Type A reagent water meets or exceeds all other reagent water standards and should be universally applied. Specifying Type 1 water as the standard for all laboratory methods would seem to ensure the least chance of method interference.

**Water quality and measurement**
The ASTM Type 1 reagent water standard specifies a minimum electrical resistance of 18.0 megohms × cm or the reciprocal maximum electrical conductivity of 0.056 microsiemens/cm. Because the resistivity or conductivity of water will change with temperature, the measurements are corrected to 25°C. These are standardized measurements used to measure the ability of the water to resist or conduct an electric current. Resistance or conductance measurements can also be used to extrapolate the amount of total dissolved solids (TDS) in water [2].
The theoretical value for purified water free of dissolved solids is 18.2 (18.18 rounded) megohms × cm or 0.055 microsiemens/cm at 25°C. Following the ASTM minimum, 18.0-megohm × cm resistivity would indicate that impurities are present in the water. This would also indicate that the ion exchange resins used to produce the high-quality water are beginning to exhaust. The difference between 18.2-megohm and 18.0-megohm water may only be fractions of a µg/l. However, the difference may be enough to cause interference with some laboratory methods. Add 100.0 µg/l total organic carbon (TOC) to the specification and the chance for method interference increases.

**Interference**
Modern laboratory analytical instruments have extremely low detection levels. Atomic absorption spectroscopy (AAS), inductively coupled plasma mass spectrometers (ICP|MS) and chromatography instruments can routinely operate in the parts per billion and parts per trillion ranges in the proper environment. This requires the purest reagents, an uncontaminated work environment and meticulous quality control procedures. Biotechnology and research facilities also require special procedures to ensure quality work. Because of this, the reagent water used for these techniques must exceed the strictest purity specifications to ensure the best results. The 18.0-megohm × cm resistivity and 100.0 µg/l TOC specifications, as well as most of the other Type 1 water standards, may not be good enough or broad enough to encompass the requirements of the latest laboratory methods. With new or improved lab instruments and techniques at the forefront, the quality of reagent water becomes even more important. Fortunately, modern laboratory reagent grade water systems can produce purified water that exceeds the current published standards.

**References and footnotes**
[1] Standard Specifications for Reagent Water, D1193-99 Vol. 11.01, page 104, Annual Book of ASTM Standards 2000.
[2] For more precise information regarding pure water measurements, contact Thornton Inc. of Waltham MA, USA.



## Regardless of which water standard you need, arium® Tower delivers!

The incorporation of a reverse osmosis (RO) system and an ultrapure water system into a single stand-alone tower provides numerous benefits to the busy laboratory.

Capable of delivering both RO and ultrapure (Type 1) water on demand, the unique design of the tower only requires inlet connections to power and a suitable water source and connection of discharge tubes to a drain. No additional fittings or connections are required.

Ergonomically designed to save bench space, this dedicated workstation is able to supply the needs of a busy laboratory with both reagent grade and purified water in one single system.

By positioning the heaviest part of the system (RO water tank) at the lowest point maximum, stability is achieved even under the most severe conditions.

Designed with the laboratory technician in mind, all user parts are readily accessible making routine maintenance and cartridge changes effortless.

As illustrated on the following pages, the individual components of the tower may be purchased separately to accommodate specific requirements.

# arium® 613 –
# High performance reverse osmosis

Fast, compact and efficient – the arium® 613 RO system sets new standards for laboratory grade water production.

This unit removes up to 99% ionized[1] impurities, 99.9% bacteria, viruses[2] and organic compounds[3] from the feed stream.

With a production rate of up to 15 liters per hour, the arium® 613 is capable of producing up to 360 liters of reverse osmosis (RO) water per day, meeting all but the largest laboratory needs. The practical design allows the system to be benchtop or wall mounted.

A built-in membrane pump provides constant flow rates, enabling uninterrupted operation. Utilizing the latest TFC (thin-film composite) RO membrane technology, arium® 613 is capable of producing permeate in excess of 50% of the initial feed volume. An automatic back-rinsing function, which is initiated once the storage tank is full, maintains the RO membrane performance and effectively extends its service life.

Supplied as an integral part of each arium® 613 system, the pre-pressurized storage tank is hermetically sealed. As the tank requires no venting during filling or emptying, airborne contaminants and gases are excluded from the stored water. In addition to providing ideal pretreatment for Type 1 water systems, the arium® 613 can be deliver pressurized RO water through an accessory port directly to a dishwasher or autoclave.

[1] Depending on the species
[2] Bacterial growth can develop on the membrane in the course of time
[3] Depending on the organic species

# The arium® 611 accessories

**TOC (Total Organic Monitoring) Instrument**
Monitoring of TOC can be critical to many processes. Our TOC meter is a stand-alone analytical instrument, which can be used for monitoring TOCs, in a number of fluids including hig-purity laboratory water systems such as the arium® 611.

The measuring range of the TOC instrument is <2 to 300 ppb TOC. The instrument has three operational modes: automatic, manual and standby. An RS-232 port allows you to output measured values directly to a printer.

All the fittings required to connect the arium® TOC monitor to the arium® 611 LWS are included under one article number to simplify ordering.

**Dispense gun**
This dispenser is designed to meet the needs of busy technicians who require Type1 water to be dispensed at a distance from the arium® 611 system. Washing glassware in the sink up to 2.4 meters from the system is no longer a problem. Once installed, the dispense gun is an integral part of the system's recirculation loop, thereby maintaining the high purity of the water within the system and at the point of use. All parts necessary to connect the dispense gun are included under one number to simplify ordering.

Dispense gun, order no. 611AMDG1


TOC Instrument, order no. 611ATOC1

**Printer**
Record maintenance is an increasing requirement by regulatory authorities worldwide. Obtaining printed hard copies of the arium® 611 performance data is no exception. Pre-programmed and supplied with data and power cables, the printer can be connected to the arium® 611 in a matter of minutes.
No further manipulation of data is required, which avoids corruption of original information. Date, time, resistance or conductivity will be automatically sent to the printer at time intervals as selected. All parts required are included under one number to simplify ordering.

**Under-bench mounting kit**
When bench space is at a premium or there is a need to mount the dispense | display unit remotely from the arium® 611, our under-bench mounting kit provides a solution. Once installed, the under-bench mounting kit allows the dispense | display unit to be located up to 2 meters from the arium® 611 itself. This option makes installation within a laminar flow cabinet, isolator or simply over a sink a reality. All parts required are included under one number to simplify ordering.

arium® system, under-bench mounted with kit, order no. 611AKD1

Printer, order no. 611APR1

# arium® 611 –
# Ultrapure (Type 1) water system

As multifaceted and varied as the demands for laboratory water are, there's an arium® 611 model to meet your needs. Four different configurations offer a solution for a diverse range of applications including:

- Atomic absorption (AA)
- Ion chromatography (IC)
- Inductively coupled plasma mass spectrometry (ICP|MS)
- High-performance liquid chromatography (HPLC)
- Cell culture media
- Protein purification
- Gel electrophoresis
- In vitro fertilization

All arium® 611 models have one thing in common: their outstanding product features – made by professionals for professionals. For example, their longer cartridge life makes them clearly superior to rival products. Different cartridge packs are available to meet specific feed water quality (RO, DI, distilled water, tap water) and application requirements.

The alphanumeric display, superbly legible under all conditions, continuously indicates water quality. The display and dispense unit can be installed at the top or bottom of the chassis door or separate from the system as required. A self-diagnostic control feature monitors and displays the system status.

The integrated, microprocessor-controlled process logic monitors the system status to provide high-purity water on demand around the clock, 24 hours a day. A standby mode recirculates the water for 15 minutes for every hour of inactivity, thereby maintaining purity levels. Inert and high-purity materials used for all wetted parts prevent recontamination of the ultrapure output water.

Every unit of the arium® 611 family includes sterile end filtration with a Sartopore capsule with a 0.2 µm PESU membrane, validated in compliance with HIMA and ASTM F-838-83 guidelines.

Sartorius arium® 611 ultrapure water systems are designed, developed and produced under a DIN|ISO 9001 certified quality management system. Each unit is tested during production for the highest product quality and security. A Validation Guide is available on request.

## Sartorius Service on call locally – worldwide

For Sartorius, premium laboratory performance doesn't end with supplying top-range products, but includes providing highly qualified on-the-spot service. From the moment you purchase, trained specialists are on call for you worldwide.

On request, Sartorius technicians will assemble and certify the systems delivered and provide IQ, installation qualification and OQ, operation qualification. This ensures smooth initial operation. But then we don't just leave you at that. Sartorius offers a broad range of services including calibration, repair and training.

By signing our comprehensive service agreement you'll really be on the safe side. This means you will extend the service life of your unit and can rely on fixed maintenance costs.

## Specifications

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