

MILLIPORE

# Milli-Q<sup>®</sup>

The Standard for Ultrapure Water in the Laboratory



Water Purification  
Systems



# The new Milli-Q range matching specific requirements

*Millipore has developed  
a range of ultrapure water systems  
designed to match specific  
water quality requirements.*

*The systems incorporate  
versatile features that contribute  
to an efficient working environment  
in the laboratory.*



## the standard

Millipore set the standard for the production of ultrapure water in 1972 - when it introduced the first Milli-Q water purification system. Since then, Milli-Q™ water has remained an industry benchmark, and Milli-Q systems have defined the requirements for the production of accurately monitored and consistently reproducible ultrapure water quality.

The new Milli-Q systems have been designed to anticipate trends in the modern analytical laboratory. Dramatic changes have occurred due to the introduction of new test methods and rapid, automated sample processing systems. These changes, as well as an emphasis on accuracy, quality control, and cost-effective practices, demand the use of pure chemical reagents. Because water constitutes more than 99% of most reagent solutions, high-purity water is a critical chemical reagent that should be selected to meet or exceed the purity required for the specific application.



*The purity of a reagent can be trusted only if the right quality parameters are accurately monitored, displayed and recorded, or if the purification techniques have been properly validated for defined operating conditions.*

*Ultrapure water on demand*

# principle

Ultrapure (Type I) water that is ideal for critical laboratory applications needs to match minimum common characteristics, such as resistivity levels of 18.2 Megohm.cm at 25 °C and TOC (Total Organic Carbon) levels below 10 ppb. However based upon different applications, ultrapure water also needs to match more specific requirements. A critical contaminant for one application may have no impact on another. For instance, boron contamination of 100 ng/L will not affect organic analysis, but for a QC laboratory of a semi-conductor plant, it may ruin elemental analysis performed by ICP-MS.

Each of the five new Milli-Q systems is designed to specifically target contaminants detrimental to your applications.

Ultrapure water, being an excellent solvent, cannot be stored in tanks or carboys. It will easily pick up contaminants from air (such as carbon dioxide, ions, organic solvents) or from storage containers (ions and silica from glassware and plasticizers from plastic containers).

- Milli-Q systems produce Type I ultrapure water on demand for immediate use upon dispensing.
- Milli-Q systems are composed of a series of purification stages, each designed to remove a particular range of contaminants.
- Components of Milli-Q polishing systems are constructed of clean, high-purity materials to minimize extractable contaminants.
- The quality of the purification media used in Millipore systems is stringently controlled, and backed up by lot certification - to guarantee optimal performance in terms of reproducibility and ability to prevent re-contamination of purified water due to extractable substances.
- Qualification procedures facilitate validation.

Millipore Application Specialists, Technical Service Representatives and Customer Care Engineers are available around the world to perform tests and guide you in the selection of purification technologies needed for your source water and application requirements.





# The Milli-Q system concept

## standard purification steps

The successful production of high-purity water depends on the careful integration of system design, purification processes, and periodic maintenance for control of water quality parameters. Milli-Q systems include a high-precision resistivity meter to measure trace ionic contaminants. They are designed with a built-in Total Organic Carbon (TOC) monitor, for in-line measurement of TOC levels in ultrapure water. A three-step purification process and periodic recirculation of water ensure delivery of high-purity water immediately upon demand. Millipore systems also include a backlit, integrated display that allows for water quality monitoring and tracking of system maintenance requirements. Components of Milli-Q systems are constructed of clean, high-purity materials to minimize extractable contaminants.



Step 1  
Plug-in Q-Gard® purification packs are tailored to specific feedwater source to optimize the performance of downstream purification media. Q-Gard 1, that contains mainly mixed bed ion-exchange resin, is the recommended pack for water that has been pre-treated by Elix®, RiOs™ or distillation. Q-Gard 2 is the recommended pack for deionized water. It contains a microfilter for particulate removal, activated carbon for organic adsorption and mixed bed ion-exchange resin.



Step 2  
Quantum™ application specific cartridges remove ionic and organic contaminants down to trace levels: select the Quantum IX cartridge to achieve trace levels of ionic contaminants; the Quantum EX cartridge for trace levels of ionic and organic contaminants; or the Quantum VX, if the application requires ultra-low levels of volatile organic contaminants.



Step 3  
Final purification of ultrapure water is carried out at the point-of-use by a pharmaceutical-grade, absolute 0.22 µm Millipak® membrane filter that is recommended for most analytical applications.

*All systems in the new Milli-Q range employ a three-step purification process with in-line detection of trace ionic and organic contaminants ensuring analytical water quality and compliance with USP 24.*

# impact of organics in water

Organic substances can adsorb to the surface of chromatographic separation media causing several problems:

- Irregular baselines, due to organic presence in the mobile phase
- Decreased sensitivity, as the injected analyte competes with the organic substances in the mobile phase to bind to the solid phase
- Decrease in resolution over time, resulting in shorter column life due to fouling of the chromatographic media

Some organics are nutrients that will promote bacteriological growth; others are toxic substances that will prevent cell development in culture media. Some charged organic substances act as complexants and will interfere with ion analysis by ILC. They can also prevent or enhance cell development.

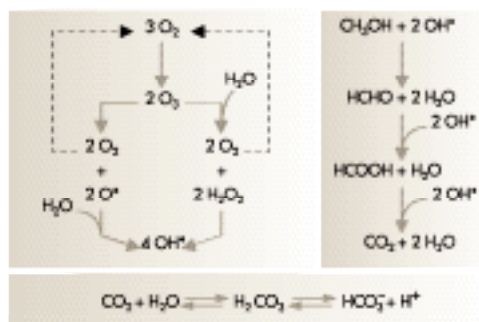
# removal of organics

## photo-oxidation

The photo-oxidation process used in Milli-Q Gradient, Synthesis and Element systems can effectively carry out the destruction of organic molecules. When irradiated by UV at 254 and 185 nm, oxygen dissolved in water will form ozone which in turn will generate hydroxyl radicals. These radicals will oxidize organic compounds dissolved in water and convert them to carbon dioxide. Carbon dioxide in water is in equilibrium with carbonic acid, bicarbonate ions and carbonate ions that will bind to the ion-exchange resins in the Quantum cartridge.

UV radiation at 254 nm also generates the adequate energy required to break down DNA and is therefore highly effective in killing bacteria that might have survived the osmotic pressure of ultrapure water.

The treatment of water by UV oxidation removes organic impurities and improves consistency and sensitivity in applications such as high-performance liquid chromatography (HPLC), ion-exchange chromatography, solid-phase extraction, and UV spectroscopy.



Solution



Technology

Products

Features





# pyrogen and nuclease-free water

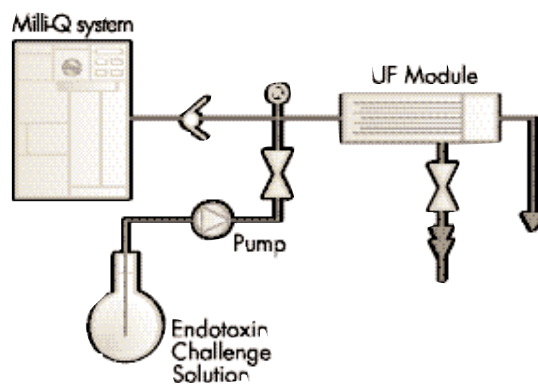
It is well established that ultrafiltration cartridges with the proper cut-off are able to remove pyrogens from water. These cartridges require periodic sanitization to maintain low pyrogen levels. Sodium hydroxide is an efficient sanitization agent that hydrolyzes pyrogens efficiently and is easily removed later by ion-exchange.

To ensure efficient pyrogen removal, an ultrafiltration cartridge with the proper cut-off (NMWL = 5,000 dalton), resistant to sodium hydroxide, was selected and validated.

Validation tests were performed as follows: several UF cartridges were challenged with endotoxin solutions and the pyrogen concentration was measured upstream and downstream of the UF cartridge using a kinetic turbidimetric Limulus Amebocyte Lysate (LAL Associates of Cape Cod, MA, USA). During tests, the Pyrogard™ 5000 ultrafiltration cartridges demonstrate log reduction values (LRV) between 5.6 and 7.65 at contamination levels of 442 and 44,200 Eu/ml.

Extremely fine UF membrane microfibrils are used to construct this capillary fiber cartridge. Purified water is processed at a high internal cross-flow velocity within the fibers, resulting in a rapid rinse to quality on startup and after routine maintenance procedures. To prevent contaminants from building up on the membrane, or flow reduction from air-lock, a built-in program enables automatic sanitization and air purging of the UF cartridge on startup.

The Pyrogard 5000 cartridge is used in the Milli-Q Biocel and Synthesis systems. It removes nucleases, producing RNase-free water without the need for DEPC treatment.



# quality monitoring (USP 24)

Solution

Technology

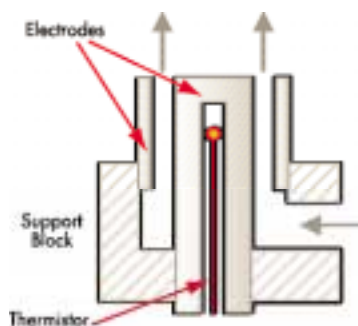
Products

Features

## resistivity

Accurate measurement of resistivity verifies that ionic contamination of purified water remains at sub-ppb levels.

Milli-Q system high precision resistivity meters have specific features to ensure that the value displayed on the screen is meaningful:



- Coaxial electrode design to guarantee cell constant stability
- Flow-through design to make sure that the measurement is representative of the real ionic concentration in water
- Low cell constant ( $0.01 \text{ cm}^{-1}$ ) to ensure optimum accuracy
- Temperature measurement with  $0.1 \text{ }^\circ\text{C}$  accuracy for more precise display of temperature compensated resistivity
- Automatic alert if there is a fault in the resistivity measurement
- Designed according to USP 24 requirements

## TOC

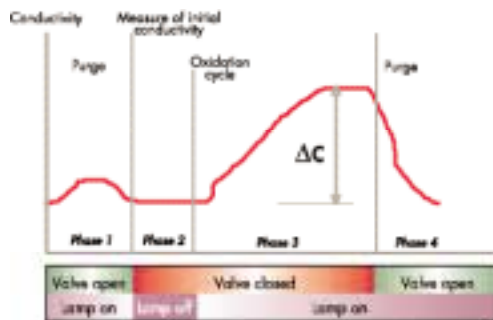
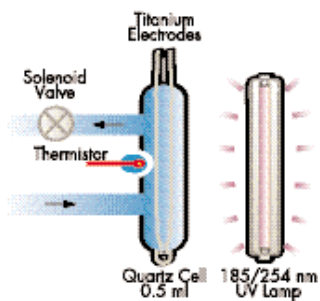
TOC measurement ensures that the Milli-Q organic removal process operates within specifications.

The Milli-Q system A10™ TOC monitor contains a 0.5 ml quartz cell in which ultrapure water is captured. The A10 UV lamp is powered on and the photo-catalytic oxidation of the organic compounds occurs. The end product of the organic oxidation is carbon dioxide that dissolves in water, causing a conductivity increase. This change in conductivity is continually monitored by the titanium electrodes and is temperature compensated to  $25 \text{ }^\circ\text{C}$ . A set of complex algorithms confirms complete oxidation and calculates the carbon level associated with this conductivity change.

Continuous TOC measurements during production and intermittent measurements during non-use periods are performed automatically. This allows you to check the organic water purity regularly.

The meter built into Milli-Q systems enables accurate TOC monitoring between 1 and 999 ppb and passes the USP 24 suitability test.

Both resistivity and TOC values can be printed via the RS232 output when connected to an external printer. There is no risk of compromising your work with undetected ionic or organic breakthrough



# Milli-Q systems at a glance



features for control in the lab

## Targeted

1. Q-Gard pre-treatment packs tailored to feedwater quality
2. Application-specific Quantum ultrapure cartridges
3. Built-in mobile and flexible Point-Of-Use dispenser for easy water delivery into various sized containers placed on the bench or on the floor. Incorporates an LED ensuring that water quality is within specifications.
4. Outlet solenoid valve allows automatic fixed-volume delivery (0.25 to 64.5 l), or manual delivery.
5. Final filter choice: Millipak 0.22  $\mu\text{m}$  pharmaceutical grade membrane filter or Pyrogard D ultrafiltration cartridge for particulate, bacteria, pyrogen and nuclease removal.
6. Backlit display for easy readings: water quality (resistivity, conductivity, temperature, TOC), system status, alert and action messages in several languages: English, French, German, Italian, Portuguese, Spanish and Japanese.

## Efficient

- Built-in second generation TOC monitor for detection of organics complies with USP 24 specifications
- Built-in, high precision resistivity meter for detection of trace ionic contaminants meets USP 24 requirements (display of non-compensated conductivity and temperature)
- Dual-wavelength (185 and 254 nm), powerful (17 Watt) UV lamp for efficient removal of organic contaminants in Gradient, Element and Synthesis systems
- Pyrogard 5000 ultrafiltration cartridge validated for pyrogen removal in Biocel and Synthesis systems
- Inlet solenoid valve for optimum protection during periods of non-use
- Well designed pump for optimum flow rate and silent operation
- Built-in advanced electronics, including real-time clock, allow operation data to be stored in an "automatic log-book" in compliance with GLP requirements
- RS232 interface for easy connection to a printer or a computer

## Versatile

- Complete, multilingual operation manual in printed and electronic (CD-ROM) format
- Numerous options to further tailor the system to your requirements: additional remote mobile Point-Of-Use water dispenser, remote display, foot-pedal for easier operation, Explore Data™ software for easy download of information from the system's memory
- Qualification Workbooks available for full support during validation.
- Built-in wall mounting device, enabling bench operation or wall mounting
- Compact & integrated systems that save laboratory space





Accessible plug-in Q-Gard and Quantum packs make cartridge replacement a snap, literally taking seconds to replace.



### Standard Features

	Academic	Gradient	Biocel	Synthesis	Element
• Q-Gard Cartridge	✓	✓	✓	✓	✓
• Quantum Cartridge	✓	✓	✓	✓	✓
• Millipak Final Filter	✓	✓	✓	✓	✓
• Optimizer™ Filter					✓
• Resistivity Meter	✓	✓	✓	✓	✓
• TOC Meter	✓	✓	✓	✓	✓
• UV Lamp		✓		✓	✓
• Pyrogard 5000 UF Cartridge			✓	✓	
• Remote Water Dispenser					✓
• Foot-pedal					✓

### Optional Features

	Academic	Gradient	Biocel	Synthesis	Element
• Remote Water Dispenser	✓	✓	✓	✓	
• Remote Display	✓	✓	✓	✓	
• Foot-pedal	✓	✓	✓	✓	
• Pyrogard™ D Final Filter	✓	✓			✓
• Explore Data Software	✓	✓	✓	✓	✓

### Product water Specifications\*

	Academic	Gradient	Biocel	Synthesis	Element
• Resistivity (MΩ.cm) @ 25 °C	18.2	18.2	18.2	18.2	18.2
• TOC Level (typical values)	5-10	1-5	5-10	1-5	<5
• Pyrogen Level (Eu/ml)	NA	NA	<0.001	<0.001	NA
• Bacteria (cfu/ml)	<1	<1	<1	<1	<1
• Particulates >0.22µm per ml	<1	<1	<1	<1	<1
• Flow Rate (L/min)	1.5	1.5	1.0	1.0	1.5

\* Test conditions: Milli-Q system equipped with Q-Gard 1 pack, Quantum EX cartridge, feedwater produced by Elix system with resistivity > 1 megohm.cm @ 25 °C, TOC < 50 ppb. Product water quality may vary due to local feedwater conditions.

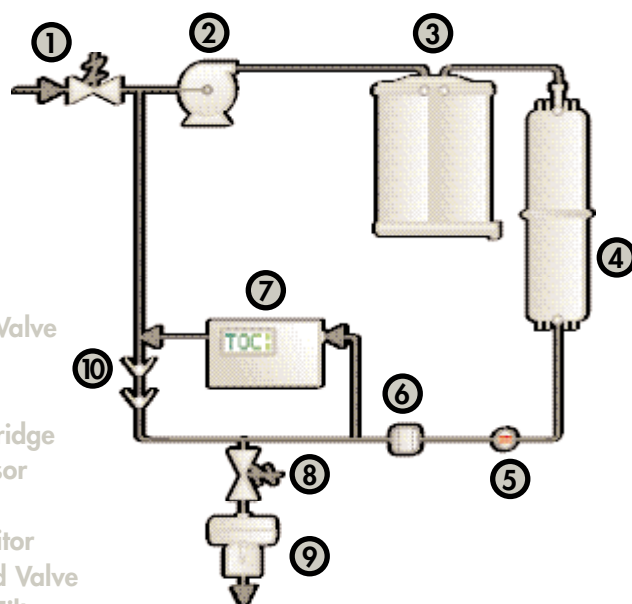


# Milli-Q Academic system

## *Designed for General Laboratory Applications.*

The Milli-Q system employs a three-step purification process. A Q-Gard purification pack tailored to the feed-water source provides initial purification to optimize the performance of the downstream media. Secondary purification is provided by application-specific Quantum polishing cartridges, designed to remove ionic and organic contaminants down to trace levels. Final purification is provided by the 0.22  $\mu\text{m}$  Millipak filter unit at the point-of-use for removal of bacteria and particles above 0.22  $\mu\text{m}$  in size.

The Milli-Q Academic polishing system measures both resistivity and total organic carbon (TOC) in compliance with USP 24 specifications.



1. Inlet Solenoid Valve
2. Pump
3. Q-Gard Pack
4. Quantum Cartridge
5. Resistivity Sensor
6. Strainer
7. A10 TOC Monitor
8. Outlet Solenoid Valve
9. Millipak Final Filter
10. Check Valve



# Milli-Q Gradient system

Solution  
Technology  
Products  
Features

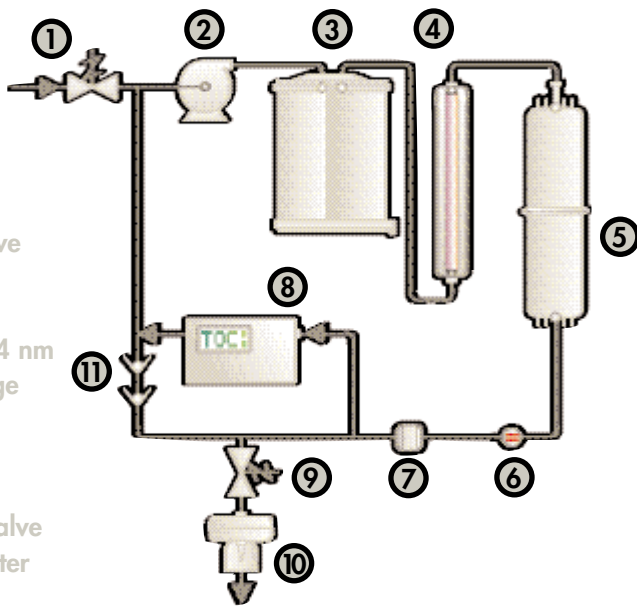


*The preferred system for chromatography (HPLC, LC, ILC, GC-MS).*

The Milli-Q Gradient system incorporates the same purification and monitoring techniques as the Milli-Q Academic. In addition, it includes UV photo-oxidation technology to reduce organics to levels below 5 ppb\* for optimum chromatographic results and increased column life time.

UV radiation is generated by a powerful (17 Watt) low-pressure mercury vapor lamp, constructed of ultrapure quartz to ensure optimal UV 185 and 254 nm transmission. An electro-polished 316 L stainless steel housing provides maximum UV light reflection for optimum efficiency (see page 5 for details of the photo-oxidation process).

The 254 nm wavelength also acts as an effective germicidal treatment maintaining low bacterial levels within the system itself.



\*When fed with reverse osmosis (RO) or Elix (EDI) system pretreated water

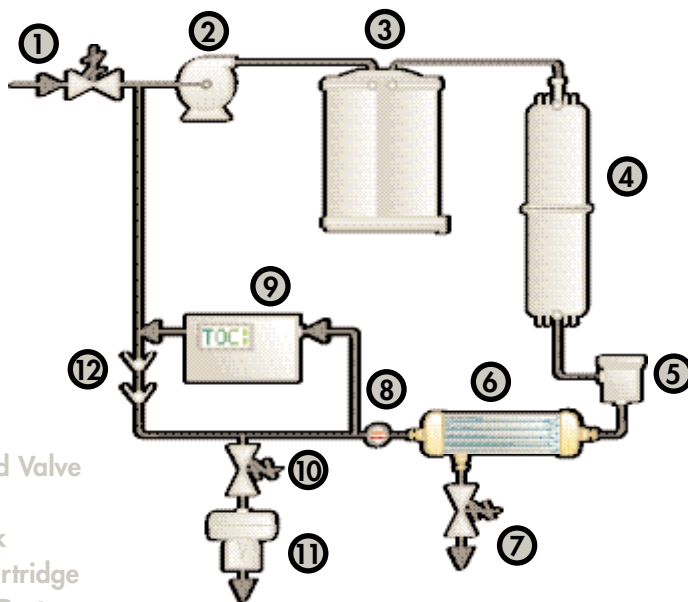


# Bioceel system

## *Designed for Life Science Applications.*

The Milli-Q Bioceel water purification system provides water quality that is ideal for life science applications such as electrophoresis buffers or serum based cell and tissue culture media preparation for plant cells or bacteria development. In addition to the Milli-Q Academic purification and monitoring techniques, the Milli-Q Bioceel system incorporates ultrafiltration technology for removal of pyrogens and other bacterial by-products. The Pyrogard 5000 UF cartridge guarantees very low nuclease and pyrogen levels (see page 6 for details).

Water produced by the Milli-Q Bioceel system conveniently replaces DEPC-treated water.



1. Inlet Solenoid Valve
2. Pump
3. Q-Gard Pack
4. Quantum Cartridge
5. Sanitization Port
6. Pyrogard 5000 UF Cartridge
7. Automatic Flush Solenoid Valve
8. Resistivity Sensor
9. A10 TOC Monitor
10. Outlet Solenoid Valve
11. Millipak Final Filter
12. Check Valve

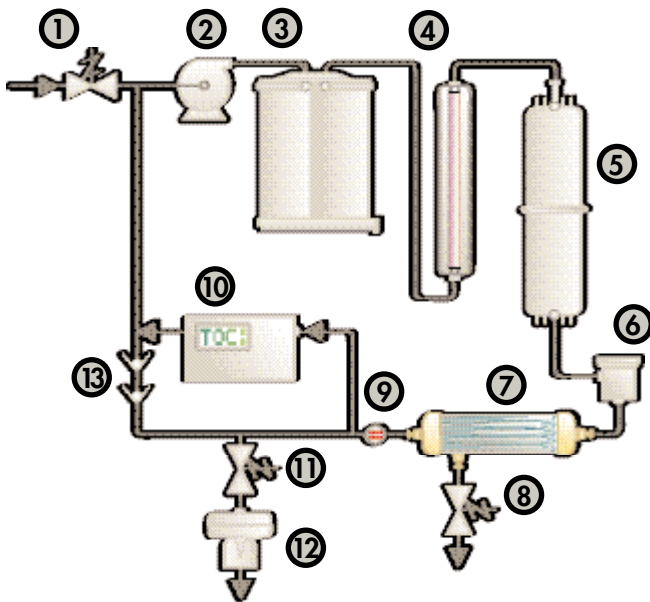


# Milli-Q Synthesis system

Solution  
Technology  
Products  
Features

## *Designed for Critical Biological Applications.*

The Milli-Q Synthesis water purification system combines the Milli-Q Academic purification and monitoring techniques with both UV photo-oxidation and ultrafiltration technologies (see pages 5 and 6 for details). The Milli-Q Synthesis system produces water that has extremely low ionic, organic, pyrogen and nuclease contamination. This water quality is a convenient replacement for DEPC-treated water and is ideal for molecular biology techniques such as PCR, 2-D electrophoresis, and DNA sequencing. It is also recommended for the production of buffers and defined cell culture media used in mammalian cell culture.



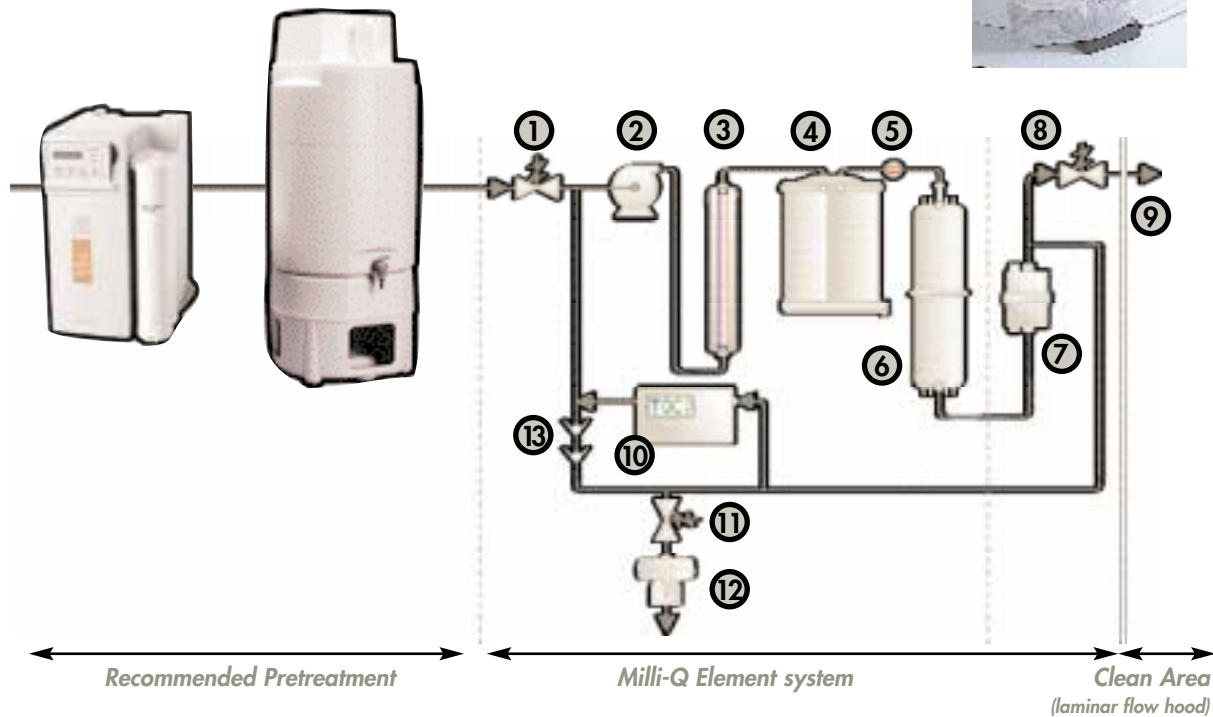
1. Inlet Solenoid Valve
2. Pump
3. Q-Gard Pack
4. UV Lamp 185/254 nm
5. Quantum Cartridge
6. Sanitization Port
7. Pyrogard 5000 UF Cartridge
8. Automatic Flush Solenoid Valve
9. Resistivity Sensor
10. A10 TOC Monitor
11. Outlet Solenoid Valve
12. Millipak Final Filter
13. Check Valve



# Milli-Q Element<sub>system</sub>

*Designed for  
elemental  
ultra-trace  
analysis  
(ICP-MS,  
FAAS, ILC).*

The Milli-Q Element system is designed using ultra-clean materials and an optimized succession of water purification technologies to provide the highest quality water, free of contaminants that are detrimental to trace elemental analysis. Specific consumables (Q-Gard B1, Quantum ICP and Optimizer LW (0.1 µm) final filter are designed to produce ultrapure water reaching detection limits at ppt and ppq levels, depending on the element considered (Millipore brochures are available on request for detailed analysis and experimental conditions). Foot-pedal activation allows for hands-free, contaminant-free operation in a clean area.



1. Inlet Solenoid Valve
2. Pump
3. UV Lamp 185/254 nm
4. Q-Gard Pack
5. Resistivity Sensor

6. Quantum ICP Cartridge
7. Optimizer LW 0.1 µm Final Filter
8. Ultra Clean Solenoid Valve
9. Water Delivery in Clean Area
10. A10 TOC Monitor
11. Outlet Solenoid Valve
12. Millipak Final Filter
13. Check Valve

# Milli-Q bench-integrated system

Solution  
Technology  
Products  
Features



The Milli-Q systems described in the previous pages are also available as bench-integrated systems. Designed for the functions of ultrapure water production, point-of-use dispensing, and water system monitoring to be separately located where most convenient, Milli-Q bench-integrated systems are easily accommodated within all lab environments.

*Design your  
laboratory to  
save bench  
space.*

The water production unit can be conveniently positioned on a roll-out underbench shelf, with the display and monitoring functions built into the bench panel at the point-of-use.



The Milli-Q remote POU dispenser can be located where it is most convenient.

Foot-pedal activation is available as an option for hands-free, contaminant-free operation of a Milli-Q system.

For laboratories requiring a complete purification chain, Millipore offers RiOs and Elix systems for pretreatment to Milli-Q systems, and also offers reservoirs for purified water storage that can all be easily accommodated under the bench.



# New developments that make a difference

*Features to add  
convenience to your  
working environment.*



Bench-operated, wall-mounted or installed under a bench, Milli-Q systems are designed to fit in with your space requirements.



Backlit display for easy access to system information.

Separate display of compensated and non-compensated resistivity and temperature. Resistivity and TOC set point alarm.

## Display

## Remote display



*optional*

### Quality monitoring and operation up to 10' (3m) distance

The backlit display allows users to easily operate and monitor a Milli-Q system installed under a bench, or on a wall. Information flows to and from the remote display and the Milli-Q system by a 3m (10') cable connection, allowing access to operation, display and water delivery functions directly from the lab bench. A built-in RS232 interface connects the remote display to a printer or a computer for data exchange.



New POU dispenser with an ergonomically designed trigger allows easier water delivery and fixed-volume water dispense from 0.25 L to 64.5 L, with 0.25 L incrementation. A green LED indicates that water quality is within specifications during delivery.



## Foot-pedal

### Hands-free water delivery

A foot-pedal allows hands-free operation of the Milli-Q system or remote POU dispenser for variable or fixed water volume delivery.

*optional*

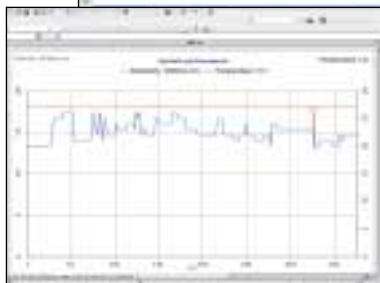
# Software

## Document system performance with ease

Water quality measurements as well as operation and maintenance events are automatically recorded in the system memory log-book for better compliance with Good Laboratory Practices. The date and time are registered based on a built-in real time clock, and will appear on all reports delivered by the system.

Millipore's **new Explore Data software** allows users to access their laboratory water system through a computer interface. Historical data stored in the system memory can be reviewed at a glance. Graphs or tables are displayed and can be easily modified as needed.

*optional*



Solution  
Technology  
Products  
Features



# Remote POINT-OF-USE

## Ultrapure water dispensing up to 8' (2.5 m) distance

The Milli-Q remote point-of-use dispenser allows you to conveniently deliver ultrapure water (up to 2.5 meters or 8' away from your Milli-Q system) in flasks, graduated cylinders or carboys - with automatic volumetric dispensing (0.25 L to 64.5 L). It can be wall-mounted or set on the bench. The dispenser arm can rotate 180° for total flexibility.

*optional*



The **Millipak Express 20** is an efficient bacteria and particulate removal final filter and demonstrates minimum ionic and organic contaminant release when used for sub-ppb analysis of volatile organics or endocrine disrupters.



The **Pyrogard D UF filter** reduces pyrogen levels in ultrapure water below 0.001 Eu/ml and removes nucleases when connected to the outlet of a Milli-Q system.

*optional*



# Final Filters



# Milli-Q system specifications

## feedwater requirements

Parameter	Description / Specification
Pressure	Min 0.1 bar (1.5 psi) / Max 0.3 bar (4.5 psi)
Flow rate	Min 100 L/hour
Temperature	Min 5 °C / Max 35 °C.
Connection	1/2" NPTM

Millipore recommends the use of pure (Type 2 or type 3) water produced by Elix® or RiOs™ systems to feed the Milli-Q system.

## information recording and transmission

High visibility, tilting backlit 2-line, 16-character display for easy view of system status from any angle, even in the dark or under direct sunlight.

RS232 interface for data transmission to the printer or a computer of your choice

## system installation information

### Dimensions

Size : H x W x D = 455 x 255 x 315 mm  
(18"x10"x12.4")

### Operating weight

Milli-Q Academic A10: 16.6 kg (36.6 lb)  
 Milli-Q Gradient A10: 17.4 kg (38.4 lb)  
 Milli-Q Biocel A10: 16.9 kg (37.3 lb)  
 Milli-Q Synthesis A10: 17.7 kg (38.9 lb)  
 Milli-Q Element A10: 19.9 kg (39.8 lb)

### Connections

#### Inlet water:

8 mm OD, 2.5 m long polyethylene tubing supplied with 1/2" NPTF connection with built-in screen

#### UF cartridge reject tubing:

6 mm OD polyethylene tubing, 2.5 m long

Electrical connection: 2.5 m long power cord with plug

Electronic connection: RS232 interface

### Mounting :

bench, wall (wall mounting device built-in) or underbench.

### Clearances:

right-hand side: 95 mm (3.7")  
 top: 80 mm (3.1")  
 front: door: 125 mm (4.9")  
 or extended arm: 452 mm (17.8")

## product water

Quality and Flow Rate: see page 9

### Volumetric dispense:

from 0.25 to 64.5 L with ± 3% accuracy  
 and ± 3% reproducibility

## quality measurements

Milli-Q systems have 2 built-in monitors:

- Resistivity meter with a 0.01 cm<sup>1</sup> nominal cell constant and 0.1 °C accuracy thermistor for accurate monitoring of trace ionic contamination. The resistivity meter reports conductivity (µS/cm) or resistivity (MΩ.cm) compensated or not at 25 °C and meets USP 24 requirements.
- TOC monitor with a 1 to 999 ppb detection range for accurate analysis of organics. The TOC monitor passes the USP 24 suitability test.

## Milli-Q system control, maintenance and warning messages on display

### control display

Product water resistivity (MΩ.cm) compensated at 25 °C
Product water resistivity (MΩ.cm) non-compensated and temperature (°C)
Product water conductivity (µS/cm) compensated at 25 °C
Product water conductivity (µS/cm) non-compensated and temperature (°C)
Product water temperature (°C)
Product water TOC (ppb) (A10 models)
Product water resistivity < set point
Product water conductivity > set point
Product water TOC > set point

### maintenance display


System depressurization
Air purge activated
Fast flush activated (Biocel and Synthesis models)
Start sanitization (Biocel and Synthesis models)
Exchange purification cartridges
Exchange UV lamp (Gradient, Synthesis and Element models)
Exchange A10 UV lamp (A10 models)
A10 cell cleaning (A10 models)

Additional messages are displayed by the system or accessible to the user (for instance, days of operation of the different consumables)— see the operation manual for a complete list.

# Optimal Pretreatment

To provide you with the best water quality at minimum global operating costs, Millipore has developed a complete range of water purification systems. The Elix system uses advanced pretreatment, reverse osmosis and electrodeionization technologies to produce pure (type 2) water from tap water.

The results below show an example of some contaminant concentrations after treatment by an Elix and a Milli-Q Gradient system.



parameter*	tap water	Elix system	Milli-Q Gradient system
Ions (ppb)	250,000	<1	<0.05
Organic (ppb)	1,000	<50	<5
Silica (ppb)	10,000	<10	<0.5

Our application specialists can also help you choose the right design for your installation.

\* Values above are typical and may vary depending on the nature and concentration of contaminants in the tap water.

## the complete solution

*When choosing a water purification system, you can rely on the expertise of our Application Specialists and Technical Service Representatives to provide you with accurate scientific and technical information adapted to your specific needs.*

## Customer Care Service

As a user of our water purification systems you expect optimal performance from your equipment, but you may not have the time to ensure that regular maintenance is performed. Recognizing this need, Millipore offers preventive maintenance plans that ensure you get the best performance from your system.

## Validation

In 1998, we introduced the first complete Qualification Program for Water Purification Systems. This program, designed to facilitate laboratory validation procedures, includes Qualification Workbooks with Installation Qualification, Operational Qualification, Maintenance Procedures and examples of Performance Qualification files, and Calibration Certificates. Qualification Test Equipment is properly maintained and calibrated; validation support is provided by trained Certified Millipore Customer Care Engineers.