Milli-Q® Integral system

Integrated pure and ultrapure water

EMD Millipore is a division of Merck KGaA, Darmstadt, Germany

ALL YOU NEED IS INTEGRAL

By combining proven superior Elix® technology with the best-in-class Milli-Q® solution, the Milli-Q® Integral water purification system offers it ALL .

This new Milli-Q® system produces both pressurized pure and ultrapure water directly from tap water, **giving you complete control** over the quality and volume of water required by your laboratory. Additionally, you benefit from low running costs, thanks to Elix® technology and its ionexchange resins that are continuously regenerated by a weak electric current.

The Milli-Q® Integral system provides **perfect convenience** through separate Points of-Delivery (PODs), which you can adapt with a final polisher to match your specific research and applications.

Your lab-scale water purification system

The new Milli-Q® Integral system is a compact solution that combines the production of Type II (pure) water and Type I (ultrapure) water in a single unit—eliminating the need for a pretreatment stage upstream of the ultrapure water system.

Laboratories considering centralized water purification systems and water distribution loops now have another advantageous choice. The Milli-Q® Integral system is a one-source, state-of-the-art solution that offers:

- Direct control by the end-user over the entire purification process
- Flexible installation and upgrade options to keep pace with changes in laboratory activities or new lab configurations

The system's production unit uses regular tap water as feed, with pure or ultrapure water delivered by independent PODs. Up to three PODs can be conveniently located in different places in the laboratory.

Integrated Elix® technology provides high, consistent water quality at optimum operating cost.	Constant and efficient pure and ultrapure water production Superior electrodeionization technology inside
Resistivity and TOC monit ring allows control over both ionic and organic contaminants that can impact your results.	Total water quality control Ionic and organic monitoring
Placed at the outlet of each dispenser, the system's POD Paks have been designed to remove specific types of contaminants.	Suitable water quality Application-specific final polishing


Quantum® polishing pack
TOC meter
Elix®
technology
Milli-Q® Integral production unit
Final polisher
Final polisher
E-POD® unit Elix® water Point-of-Delivery
Q-POD® unit Milli-Q® water Point-of-Delivery

All the water quality and quantity you want

The Milli-Q® Integral system makes it easy for you to adapt your water purification system to your different laboratory applications.

You can be sure of having the daily volume of water you require at the flow rate you need to keep pace with all your lab needs—up to 360 liters of pure and ultrapure water per day at up to 2 liters per minute when needed !

Day after day, your water quality remains constant, matching the most stringent specifications and helping you achieve optimum reproducibility in your work.

Water specifications

The Milli-Q® Integral system is designed to be fed by potable tap water as described in US-EPA, EP and WHO norms.

Elix® water (at Elix® module outlet)

Parameter	Value	Unit
Resistivity	> 5	MΩ.cm @ 25 °C
TOC	< 30	ppb (µg/l)

Note: If pure water is sourced from an E-POD®, the following water quality specifications are achieved:

Pure (Type II) water quality

Parameter	Value	Unit
Bacteria	< 1 (*)	cfu / ml
Particulates > 0.2 µm	< 1 (*)	Particulates / ml
Pyrogens (Endotoxins)	< 0,001 (**)	EU / ml
RNases	< 0,01 (**)	ng /ml
DNases	< 4 (**)	pg/ µl

(*) With Millipak® filter with EMD Millipore Express® membrane or BioPak® filter as POD Pak
(**) With BioPak® filter as POD Pak

Resistivity, TOC and bacteria levels match the requirements of Type II water as described in ISO® 3696, ASTM D1193 (Type II resistivity, TOC, HBC Table I specification), and Purified Water as described in USP®, EP.

Milli-Q® water (sourced from a Q-POD® unit)

Ultrapure (Type I) water quality

Parameter	Value	Unit
Resistivity	18,2	MΩ.cm @ 25 °C
TOC	< 5	ppb (µg/l)
Bacteria	< 1 (*)	cfu / ml
Particulates > 0.2 µm	< 1 (*)	Particulates / ml
Pyrogens (Endotoxins)	< 0,001 (**)	EU / ml
RNases*	< 0,01 (**)	ng / ml
DNases*	< 4 (**)	pg / µl

(*) With Millipak® filter with EMD Millipore Express membrane or BioPak® filter as POD Pak
(**) With BioPak® filter as POD Pak

The Milli-Q® Integral system is designed to produce ultrapure water in agreement with the quantitative specifications of Type I water as described in ISO 3696, ASTM D1193, and of EP and USP Purified Water, as well as the CLSI® - CLRW.

Water delivery

Pure water production

System	Pure water production (Max l/day)	Pure water delivery at E-POD® (l/min)
Milli-Q® Integral 3	70	Up to 2,0
Milli-Q® Integral 5	120	Up to 2,0
Milli-Q® Integral 10	240	Up to 2,0
Milli-Q® Integral 15	360	Up to 2,0

Ultrapure water production

System	Ultrapure water production (Max l/day)	Ultrapure water delivery at Q-POD® (l/min)
Milli-Q® Integral 3	70	0,05 – 2,0
Milli-Q® Integral 5	120	0,05 – 2,0
Milli-Q® Integral 10	240	0,05 – 2,0
Milli-Q® Integral 15	360	0,05 – 2,0

All the water quality control you require

Monitoring allows control over both ionic and organic contaminants that can impact your results.

Prevention of organic breakthrough

TOC monitoring

The measurement of TOC levels allows the user to verify that the system's organic contaminants removal process is operating within specifications. The TOC monitor uses a 0.5 ml quartz cell to capture ultrapure water.

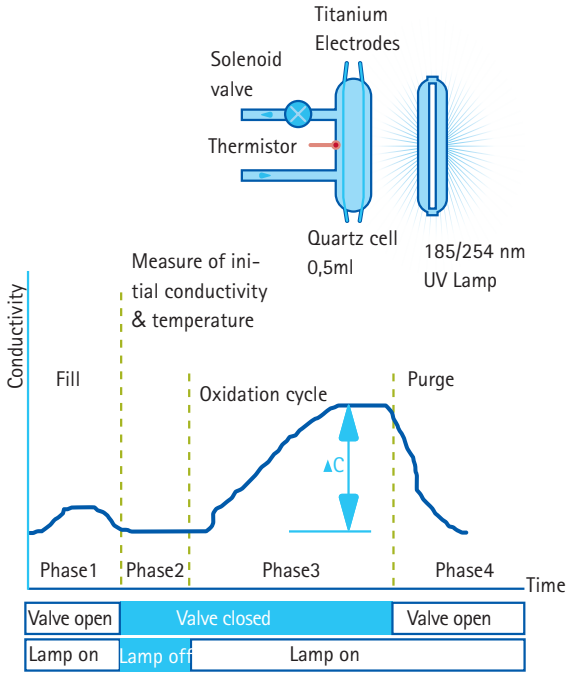
When the A10® UV lamp is on, photocatalytic oxidation of organic compounds occurs.

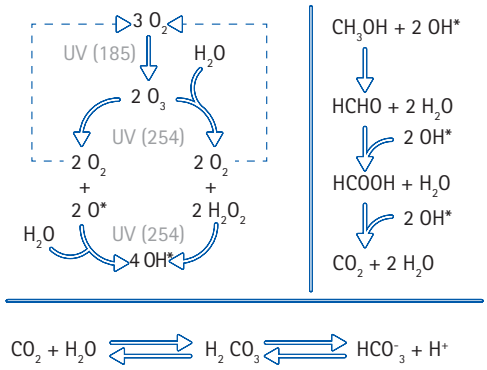
The end product of organic oxidation is carbon dioxide, which dissolves in water and causes conductivity to increase. This change in conductivity (temperature compensated to 25 °C) is monitored regularly by the titanium electrodes in the TOC monitor.

A set of algorithms confirms complete oxidation and calculates the carbon level associated with this conductivity change.

The A10 TOC monitor patented technology offers several benefits:

- Oxidation and conductivity measurements occur in the same cell. As a result, the A10 monitor checks that all organics have been oxidized (end point reaction) in order to deliver an accurate and reproducible TOC value.
- Accurate measurement of TOC between 1 and 999 ppb is provided, based on extended calibration (certificate included).
- The design allows performance of the TOC suitability test as required by USP (§ 643).



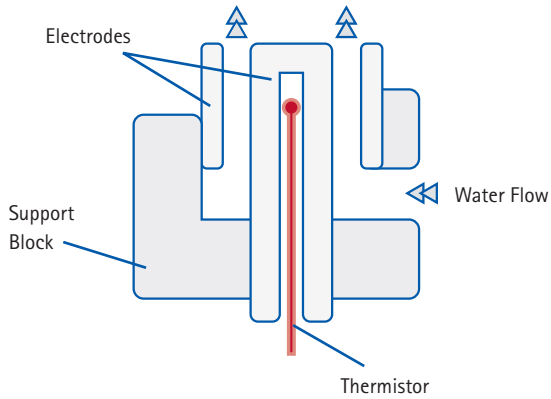


High-precision ionic measurement

Resistivity monitoring

The proper measurement of resistivity is key to making sure that ionic contamination of purified water remains at sub-ppb level. Milli-Q® Integral system high-precision resistivity meters have specific features to ensure that the value displayed on the system screen is meaningful.

- Patented cell design with coaxial electrodes to warrant cell constant stability.
- Flow-through design to make sure that the measurement is representative of the actual ionic concentration in the water
- Low cell constant (0.01 cm-1) for optimum measurement accuracy of low ionic contamination as required by ASTM® norm D 1125-95 (1999).
- Temperature measurement with a 0.1 °C resolution for proper report of temperature-compensated resistivity, as recommended in ASTM norm D 1125-95 (1999).
- Automatic warning messages if the resistivity measurement is compromised by a defect.
- Design allowing performance of resistivity suitability test as required by USP (§ 645).




Milli-Q
MILLIPORE
Elix
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Ready
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Integral
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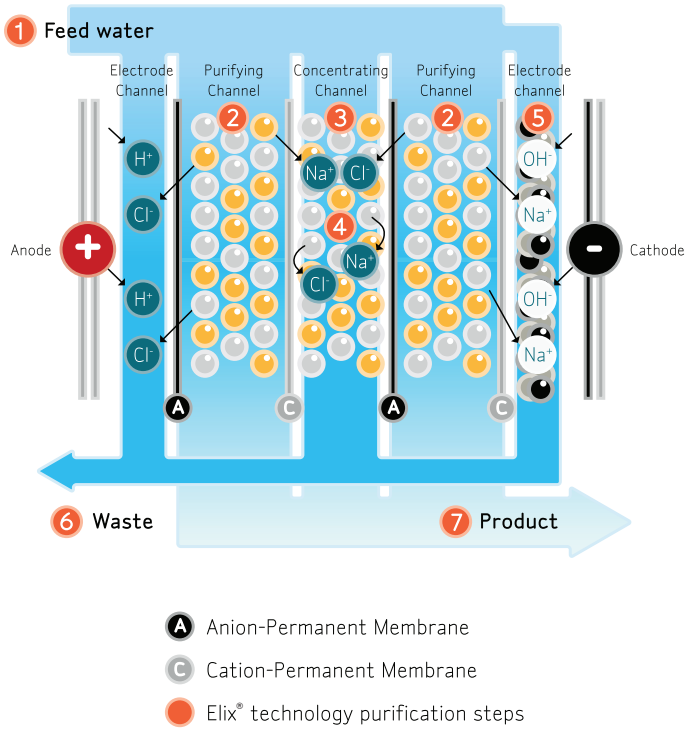
ENTIRE PURIFICATION PROCESS UNDR YOUR CONTROL

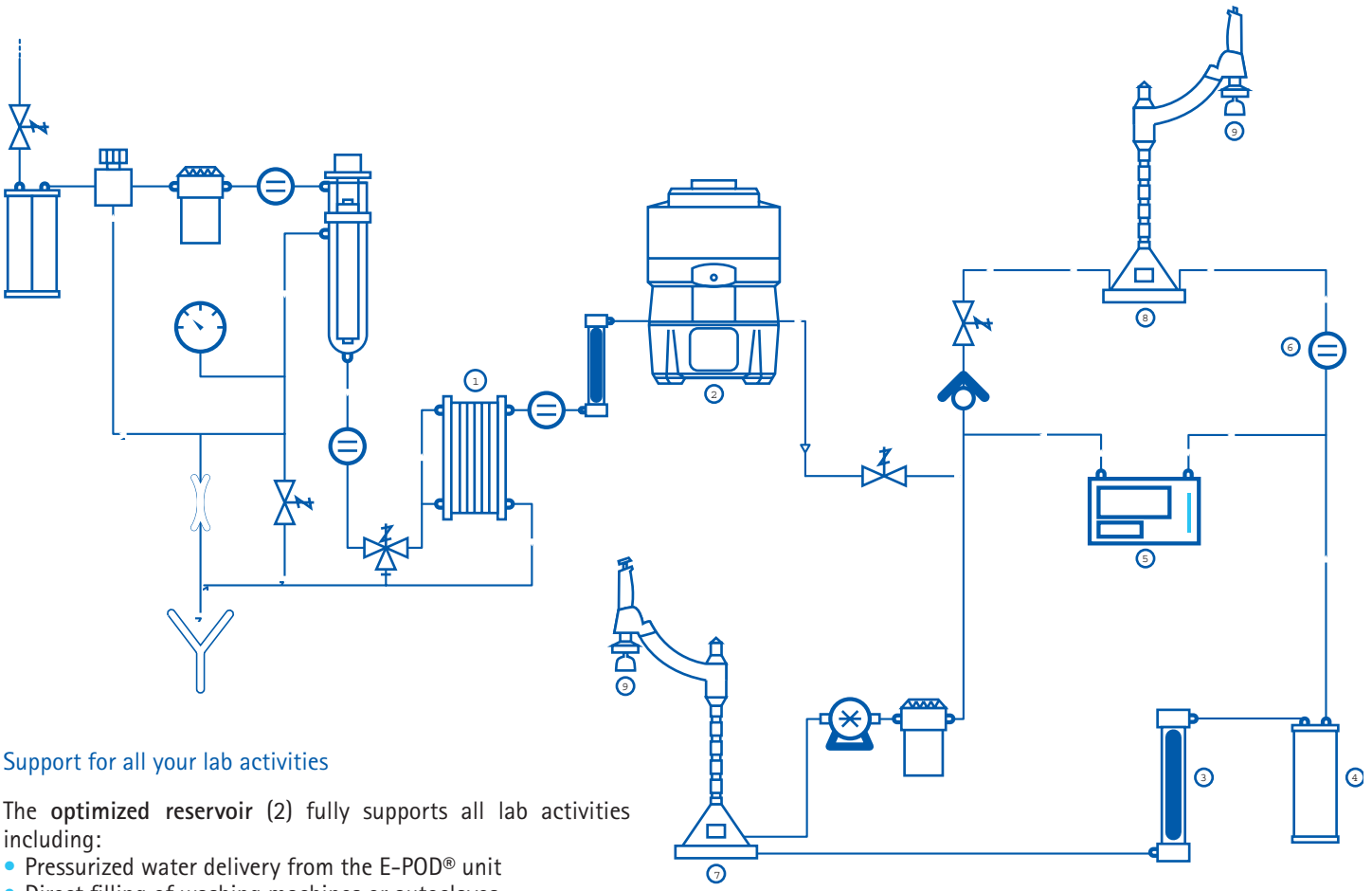
The Milli-Q® Integral system uses regular tap water as feed, with pure and ultrapure water delivered by independent POD s.

All the reassurance you need from integrated Elix® technology



Following a reverse osmosis step, the EMD Millipore-patented **Elix® technology** (1) requires no resin replacement or upstream softening process to produce consistent, superior quality purified water.

- EMD Millipore Elix® modules consist of an anode and a cathode separated by alternating **anion-permeable and cation-permeable membranes.**
- The compartments used for ion removal are filled with **high quality ion-exchange resin** that is permanently and gently regenerated by a weak electric current, eliminating the need for chemical regeneration or replacement of DI resin cartridges.
- **Activated carbon beads** fill the cathode compartment to ensure dispersion of the hydroxyl ions generated over a large volume, preventing the high pH that would lead to $CaCO_3$ precipitation.



Support for all your lab activities

The **optimized reservoir** (2) fully supports all lab activities including:

- Pressurized water delivery from the E-POD® unit
- Direct filling of washing machines or autoclaves
- The polishing process preceding ultrapure water delivery through the Q-POD® unit(s)

Desired water qualities from E-POD® and Q-POD® units

The water is delivered through up to 3 independent PODs (Point-Of-Delivery units) located on a recirculation loop. Each POD can be located up to 290 cm from the main unit or from the former POD on the loop. In each POD, water recirculates through an 80 cm loop up to the water dispenser outlet.

Different PODs, **E-POD®** (7) and **Q-POD®** (8), are available for delivery of pure or ultrapure water.

A choice of **final polishers** (9) can be adapted to the outlet of the different PODs connected to the system's main production unit. Each of these final polishers eliminates contaminants that might interfere with specific applications.

All the performance and reliability from the best-in-class Milli-Q® solution

Measurement of organic and ionic product water quality is performed at the end of the polishing process, using the appropriate calibrated meters:

- Accurate Total Oxidizable Carbon **(TOC) monitor** (5)
- High-sensitivity **resistivity cell** (6)

Both meters are delivered with a certificate of calibration.

Pure water passes into a **185/254 nm UV lamp** (3) that ensures organic molecule oxidation and bacteria destruction.

Next, the **Quantum polishing cartridge** (4) removes ionic and organic contaminants below trace levels to match the water quality required for your application. Radio Frequency Identification (RFID) tag technology ensures full traceability.

ALL THE FLEXIBILITY YOU NEED

Today's laboratories are used for multiple activities, with bench space for researchers' critical experiments often at a premium.

To make the best use of the space you have available, EMD Millipore designed the new Milli-Q® Integral water purification system as two separate components.

- The compact Milli-Q® Integral system water production unit can be conveniently located under the bench—or high on a wall.
- The system's Q-POD® and E-POD® water delivery units also take up very little bench space, or they can be installed on a wall, if you prefer.

MILLI-Q® INTEGRAL SYSTEM INSTALLATION

Production unit dimensions (H x W x D)	POD delivery unit dimen-sions (H x D)	Production unit operating	POD delivery unit operating weight	Distance from production unit to POD	Dispenser tubing length	Electric power cable length	Electric power supply voltage
50 x 33,2 x 48,4 cm (19.7 x 13.07 x 19 in)	57,9 x 23 cm (22.8 x 9 in)	24 - 28 kg kg (52.9 - 61.7 lb)	4,7 kg (10.36 lb)	290 cm (9.5 ft)	80 cm (2.6 ft)	290 cm (9.5 ft)	100 – 230 V +/- 10 % 50-60 Hz

Speisewasseranschluss: 1/2" Außengewinde – Schnittstelle Haupteinheit: Ethernet (RJ45) – POD-Schnittstelle: Parallel-Port (25-pin D-Sub)

DELIVERING IT ALL

Easy operation allows researchers to save valuable time. Water delivery is simple and intuitive, matching your requirements without compromising quality.

Manually

Water can be obtained by pressing the plunger of the POD unit, from drop-by-drop to high flow. Additionally, the dispenser can be removed from its support to facilitate water delivery for applications such as glassware or plate washing.

Automatically

Volumetric water dispensing is set on the base of the POD unit. The user can adjust the volumetric dispensing with the (+) and (-) keys, and then press the volumetric dispensing button to start delivery of the selected volume, with excellent accuracy (< 1 %) and reproducibility (cv < 1 %).

Move the POD dispenser from the arm and just press the plunger.

Adjust the POD arm to accomodate glassware.

Take advantage of the autofill key on the POD base and keep working.

Use the volumetric dispensing function to fill carboys and save valuable time.

The mast and arm supporting the Q-POD® and E-POD® dispensers are designed to accommodate all commonly-used laboratory glassware—ranging from a 250 ml Erlenmeyer flask to a 5 l calibrated flask—even a carboy !

Mastering it all

Researchers must be able to access required information immediately —whenever they need it.

The Milli-Q® Integral system offers three levels of information:

- **Regular use:** all information required is directly visible on the POD screen.
- **Maintenance:** information is available from the main screen with step-bystep directions (texts and drawings) indicating the actions to be performed.
- **System management:** critical parameters, such as set points, are protected by an ID login and a password in the "Manager" menu.

Data on system operation and performance appears on the production unit's main graphic display.

Important user information, such as water quality or system status, can be seen at a glance on the multicolor graphic display of the Q-POD® and E-POD® water dispensers.

A *Quick Reference Guide* is located inside the door.

ALL THE CONFIDENCE YOU NEED

Comprehensive Service Program
covers all your requirements every step of the way

- Installation
- Technical and scientific assistance
- Preventive maintenance visits
- Troubleshooting visits
- Customized user training
- Verification and/or calibration of monitoring devices
- Pharmacopeia suitability tests
- Validation support
- Maintenance plans

Qualification expertise
facilitates laboratory validation procedures

With more than 10 years' experience in water system qualification services, EMD Millipore can assist you in complying with regulatory standards applicable to your industry.
Validation support is provided by trained EMD Millipore Field Service Support Engineers using calibrated equipment and Qualification Workbooks.

Carefree operation

The Milli-Q® Integral system provides users with information on consumables replacement at 15 days' notice, ensuring that you have enough time to obtain the required products. Thanks to the innovative RFID technology, the catalogue and serial numbers of Progard® and Quantum consumables are automatically registered in the system's memory upon insertion, which ensures optimal traceability and also prevents insertion of an incorrect consumable.

Additionally, the system can manage its own service agenda. If you request this option, you'll receive a warning 30 days in advance prompting you to schedule a maintenance service visit.

Quality Insurance

Certificate of Conformity - The product has been assembled and tested according to EMD Millipore's stringent Quality Assurance procedures.
Certificates of Calibration – Included for the built-in resistivity meters and TOC monitor
Declaration of Conformity – (European Union EC Directive)
Certificate of Quality – Included for all system consumables

POD Pak validation – POD Paks are validated for efficient removal of the specific contaminants that they target.
ISO 9001 v. 2000- and ISO 14001-registered manufacturing site – ISO 9001 v. 2000- and ISO 14001-registered manufacturing site.

CE , cUL , FCC – To ensure efficiency and safety of operation, the Milli-Q® Integral system is certified for safety and electromagnetic compatibility.

Photographs: BHL Production. Design: Sysaxe.