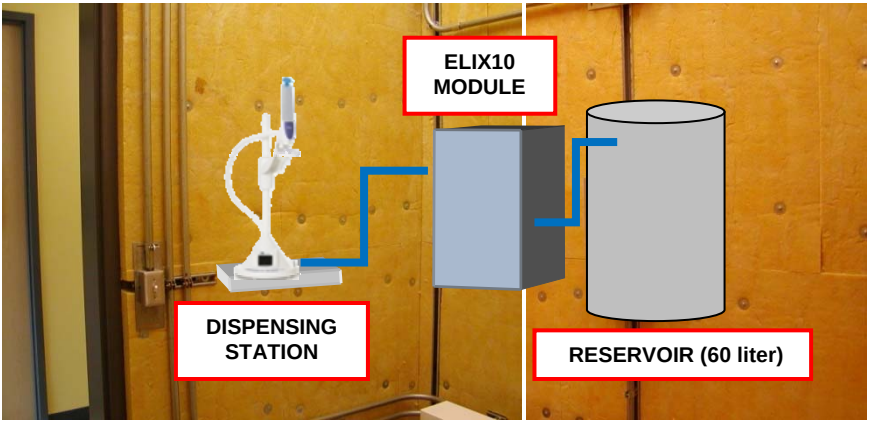
CAP II Water System
Walk-up Unit in PRB 1169M

Final plans are underway to install a "walk-up" CAPII water system from Millipore (ELIX Advantage 10) on the first floor, south end, RM 1169M, near the LN2 Dewar fill station.

This unit will serve researchers with intermittent, small volume needs. The production rate of the unit will be 10 liters per hour with a storage capacity of 60 liters. Additional details of the ELIX Advantage 10 can be found in the Millipore product brochure that follows.

- Location of room 1169M -



- Anticipated wall-mounted configuration -

MILLIPORE™

Elix® Advantage System

The Best in Pure Water

ADVANCING LIFE SCIENCE TOGETHER™

Research. Development. Production.

ELIX ADVANTAGE SYSTEM

THE PURE WATER YOU'VE ALWAYS IMAGINED

Advanced Technology

Reliability

Flexibility

Modularity

Consistency

Quality

Revolutionary

Adaptability

Confidence

Long-lasting

Peace of mind

Efficiency

Millipore's Milli-Q® water has long represented the laboratory standard for ultrapure water. Now, we've concentrated our expertise in the new Elix® Advantage system to bring you the best in pure water technology, while simultaneously raising the bar for pure water quality in the marketplace.

Take your pure water to new heights with the **Elix Advantage** system. This new system provides pure water to meet the most rigorous standards of regulatory bodies around the world. Combining Millipore's patented Elix electrodeionization technology with the most advanced purification technologies, the Elix Advantage system uses potable tap water as feed to produce consistently high quality pure water for *all* your lab's pure water needs.
And that's not all... the advanced ergonomics of the system's **E-POD® (Elix water Point-of-Delivery)** unit let you benefit comfortably from efficient and reliable pure water delivery, *where* you need it, *when* you need it.

THE BEST IN PURE WATER

TO MEET THE MOST DEMANDING NEEDS

Get the best with the new Elix Advantage water purification system: pure water that meets the highest standards, together with an ergonomic state-of-the art water dispensing system. Peace of mind and ease of use—all in one!

Consistency and reliability in pure water quality is crucial in laboratory applications. Regulatory bodies have defined the minimum quality requirements through specific and rigorous standards. The Elix Advantage system is designed to meet or exceed requirements as described by ISO® 3696 (Grade 2 water); ASTM® D1193 (Type II resistivity and TOC Table I specifications); and by the United States, European and Japanese Pharmacopeias for Purified Water.

The Elix Advantage system combines patented, state-of-the-art Elix electrodeionization technology with the best purification technologies (Progard® pretreatment, advanced reverse osmosis, 254 nm UV lamp) to provide the ideal solution for every lab using pure water—from a few liters to several hundred liters per day.

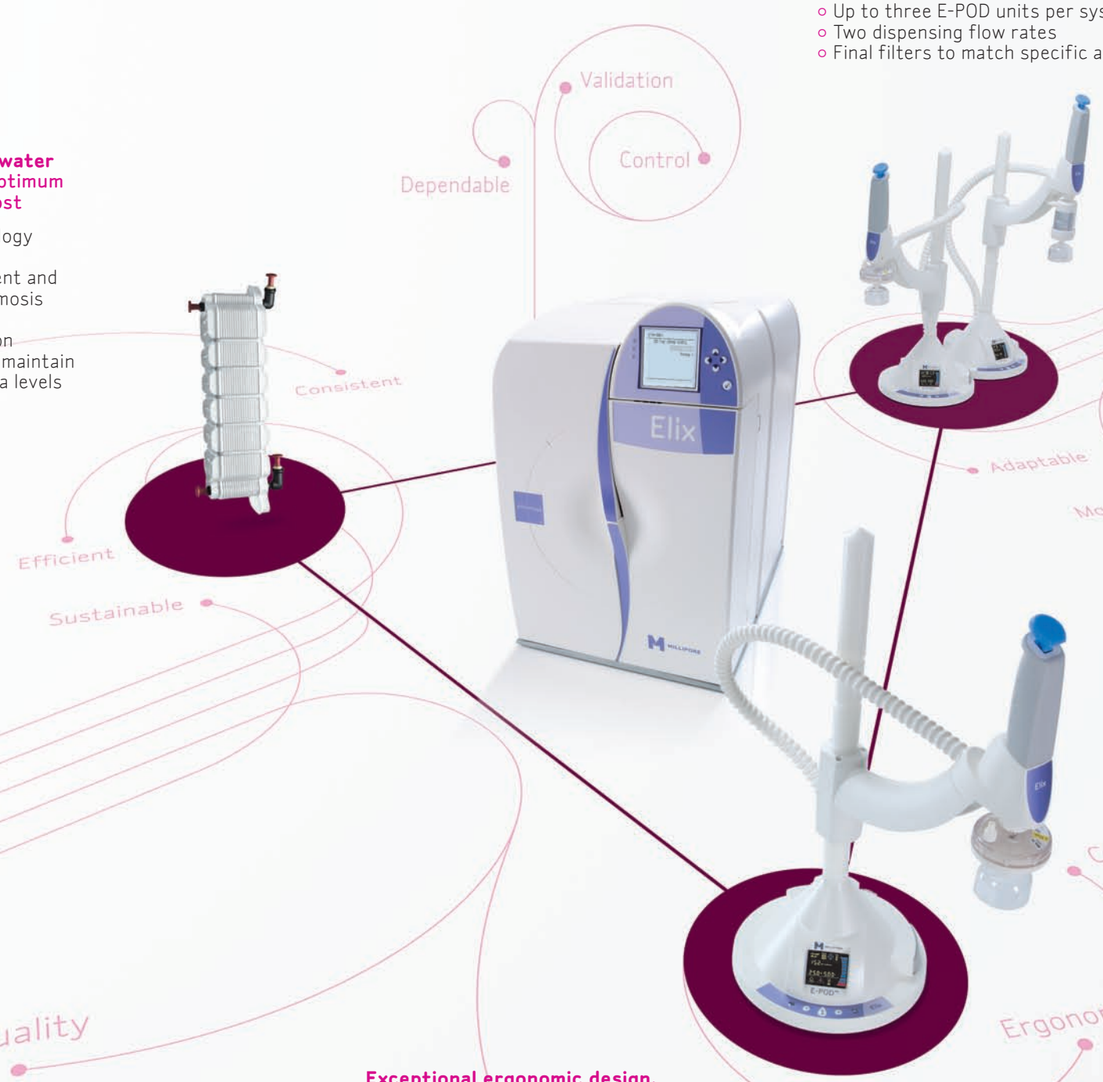
The system's pressurized pure water is delivered by independent E-POD water dispensers. Up to three E-POD units per system can be placed at convenient locations in the lab for easy and flexible water delivery.

Consistent water quality at optimum operating cost

- Elix technology
- Optimized pretreatment and reverse osmosis
- Pure water recirculation
- UV lamp to maintain low bacteria levels

Modular, easily adaptable system to evolve with the changes in your lab—today and tomorrow

- Up to three E-POD units per system
- Two dispensing flow rates
- Final filters to match specific applications



Exceptional ergonomic design, with E-POD units for easy, convenient water dispensing

- Pressurized pure water where you need it
- Manual or volumetric dispensing
- Important information at a glance
- Compact water production unit adapted to laboratory space constraints

SAVING YOU TIME AND MONEY

Millipore's unique and patented Elix module is at the heart of the new Elix Advantage system—giving you benefits that count.

Tomorrow's technology—today

The Elix Advantage system is the only system available today that uses electrodeionization technology in a way that is dependable, efficient and robust. Superior, proven **Elix technology providing high, consistent water quality at optimum operating costs** is gradually making less-effective pure water purification techniques obsolete.

Save time and money; benefit from lower running costs and reduced maintenance

- No polishing pack needed for pure water production.
- No need for an anti-scaling cartridge upstream of the Elix module.
- No extra softeners required.

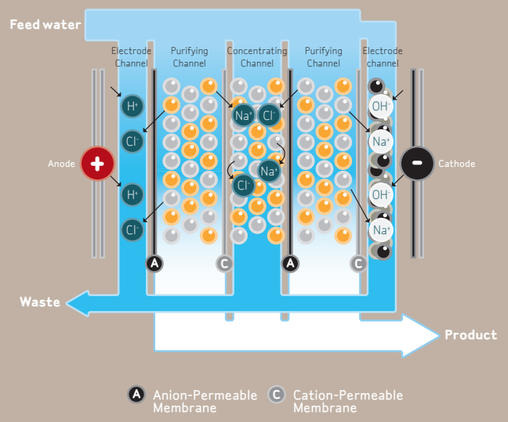
Peace of mind, ease of use

- Consistent water quality.
- High resistance to scaling ensures high Elix module reliability.
- Designed to provide pure water for compliance with industry standards.
- No reliance on third parties to supply regenerated ion-exchange resins.

Planet-friendly, clean technology

- Safe and clean technology.
- Minimal use of disposable purification cartridges limits waste.
- Low electricity consumption.
- No need for the strong bases and acids used to regenerate resins or clean still boilers.
- No additional transportation/space required for shipping and storing resin cartridges or bottled water, etc.

ADVANCED ELIX TECHNOLOGY



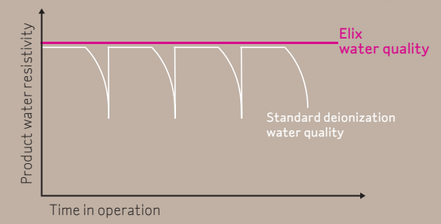
Following a reverse osmosis step, the Millipore-patented **Elix technology** boosts the purification process to produce consistent, superior quality purified water.

- Millipore's Elix module consists 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 on-site, as well as the exchange 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. This patented technology eliminates the need to protect the Elix module by a softener.

PROVIDING CONSISTENTLY PURE WATER

Elix technology vs. replaceable ion-exchange resins

The graph below clearly shows how Elix technology outdistances competitors' systems that use ion-exchange resins which must be chemically regenerated on-site or exchanged.
Unlike these systems, which risk variations in water quality as the resins are gradually exhausted, Elix Advantage systems produce consistently high quality pure water. You can be sure at all times of the quality of the pure water produced by your Elix Advantage system.



The Elix Advantage system produces water that meets the highest standards and ensures consistent quality.

Parameter	Value
Resistivity	> 5 MΩ·cm* @ 25 °C, typically 10 to 15 MΩ·cm @ 25 °C
Conductivity	< 0.2 µS/cm* @ 25 °C, typically 0.067 to 0.1 µS/cm @ 25 °C
TOC typically	< 30 ppb
Bacteria count	< 1 cfu/ml

** $[CO_2] \leq 30$ ppm in feed water*

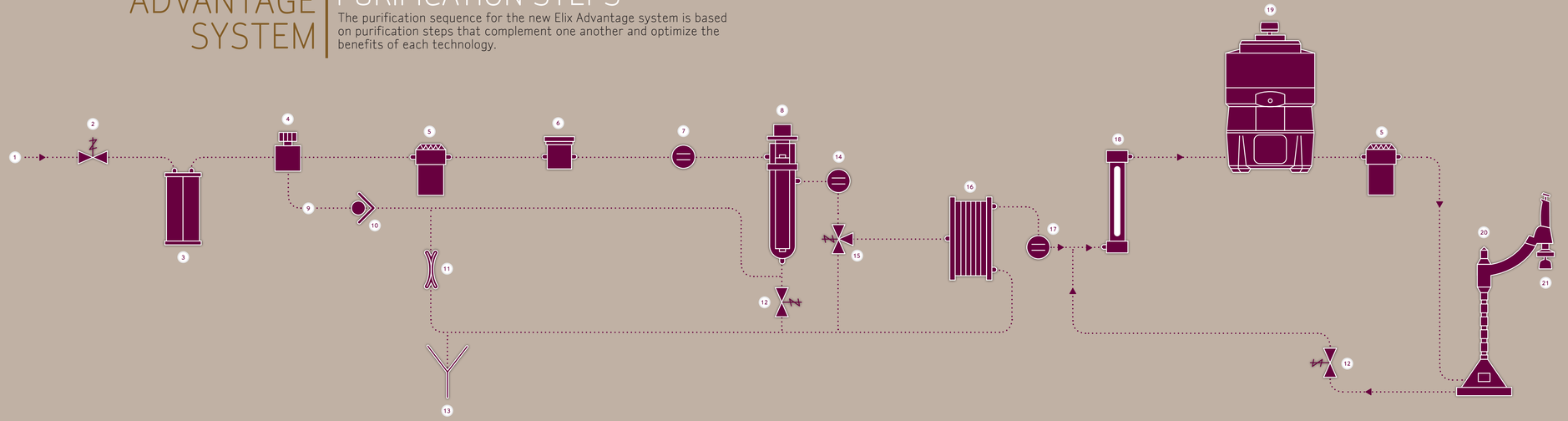

Elix
E-POD
STANDBY
22 Feb 2006 16:52
Ready
Elix
Advantage
MILLIPORE

INSIDE THE ELIX ADVANTAGE SYSTEM

COMPLEMENTARY PURIFICATION STEPS

The purification sequence for the new Elix Advantage system is based on purification steps that complement one another and optimize the benefits of each technology.

1. *Feed water*
2. *Inlet Solenoid Valve*
3. *Progard Pack*
4. *Pressure Regulator*
5. *Pump*
6. *Sanitization Port*
7. *Feed water Conductivity Cell*
8. *RO Cartridge*
9. *Reject Water Recovery Loop*
10. *Check Valve*
11. *Capillary Tubing*
12. *Flush Solenoid Valve*
13. *Reject*
14. *Permeate Conductivity Cell*
15. *Permeate Divert Valve*
16. *Elix Module*
17. *Product Resistivity Cell*
18. *UV Lamp*
19. *Reservoir with ASM*
20. *E-POD unit with final filter*
21. *Product water*



PRETREATMENT

In the first purification step, an all-in-one pretreatment pack efficiently removes the particles, free chlorine and colloids present in potable tap water.

Progard Pretreatment Pack

- The Progard pretreatment pack contains activated carbon, anti-scaling compounds and a prefilter to efficiently protect the RO membrane against oxidation, scaling and plugging.
- Silver-impregnated activated carbon prevents proliferation of the bacteria present in tap water.
- RFID (Radio Frequency Identification Technology) detection eliminates the risk of errors such as incorrect pack installation or pack exhaustion, etc.

Pretreatment Benefits

- Pretreatment with a Progard pretreatment pack provides the best protection for the system's Reverse Osmosis (RO) membrane, guarding it against clogging and helping to extend equipment lifetime.
- In addition, because pack changes are triggered in part by actual water consumption, you obtain optimal use from your pretreatment, as well as two extra benefits: controlled budget expenses for you—and less waste for the environment.

ADVANCED REVERSE OSMOSIS

Reverse Osmosis (RO), the second purification step, removes 95-99 % of ions and 99 % of all dissolved organics (MW > 200 Dalton), microorganisms and particles.

Built-in advanced features for 2 major benefits:

- High water recovery: Part of the RO reject water is recycled back to the RO membrane feed water stream. Water recovery can be adjusted up to 50 % to optimize water consumption, depending on the feed water quality and the pretreatment sequence used.
- Constant product flow rate: Standard RO-based systems typically undergo temperature variations. For example, a feed water temperature decrease of 1 °C decreases the permeate flow rate by 3 %, creating the risk of water shortages during the winter. In Elix Advantage systems, the pump pressure increases when the feed water temperature decreases in order to maintain a steady product flow rate.

ELIX MODULE

In the third purification step, Millipore's patented Elix module uses electrodeionization to remove the remaining ions. (For full details, please see page 6.)

Elix electrodeionization benefits

- Consistent high quality water.
- Minimal electricity consumption: the Elix module uses the equivalent of the energy required by an electric light bulb.
- Uninterrupted water production
  - Continuously regenerated ion-exchange resins eliminate hazardous chemical regeneration or costly resin replacement.
- Best quality resins
  - High-grade quality resins used in module design.
  - Resins do not degrade, as they are not exposed to harsh regeneration chemicals or removed from the system.

UV SANITIZATION DURING WATER PRODUCTION

Optimum low bacterial levels at all stages

- The last purification step consists of sanitizing the pure water using a powerful 254 nm UV lamp, which has a well-known bactericidal effect.

MAINTAINING THE QUALITY OF STORED WATER

In order to ensure the best quality for stored water, Millipore has carefully selected the materials used to manufacture our storage reservoirs.

Polyethylene reservoirs guarantee the purity of your stored water

- Pure water requires a storage system that prevents degradation of your water quality. Millipore's reservoirs are designed to maintain consistent purity of stored water and provide effective protection against airborne contaminants.
  - Optimized design and material
  - Cylindrical shape
  - Polyethylene structure
  - Fully drainable
  - Opaque reservoir walls
  - Advanced vent filter for increased protection
  - Optional Automatic Sanitization Module (ASM) and water sensor

Automatic recirculation

- At regular intervals, the stored purified water is recirculated and sanitized by a UV lamp in order to ensure that stored water bacterial levels remain very low.

Optimum water quality at the point-of-use

- Before delivery, pure water from the Elix Advantage system is again sanitized by a UV lamp and then filtered through a 0.22 µm final filter at the dispensing point. This reduces the bacterial count to less than 1 cfu/ml to provide optimum water quality for bacteria-sensitive applications.

E-POD UNITS FOR CUSTOMIZED PURE WATER DELIVERY

Customized, flexible water delivery and quality

- Simple and intuitive water delivery adapted to your needs
  - Ergonomic and practical E-POD design
  - Different configurations to fit your laboratory environment (up to three E-POD units per system)
  - Choice of automatic or manual water dispensing modes
  - Final filters to match specific applications
- Optimized design: An integral part of the pure water recirculation loop, the E-POD dispenser has no dead-legs in which water can stagnate, thus avoiding bacterial contamination.

Information at a glance for control of daily activities

- All the information you need for regular use is visible on the E-POD water dispenser screen, including:
  - Water quality data
  - System status
  - Tank level
  - Maintenance messages
  - Water dispensing information

SYSTEM FEATURES THAT LET YOU

KEEP IT ALL UNDER CONTROL

System history reports can be downloaded to a computer for storage or to print out a hard copy.

Instant Water Quality report can be printed from the E-POD unit.

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

A Quick Reference Guide is located inside the door.

Important user information, such as water quality or system status can be seen at a glance on the E-POD units' multicolor graphic display.

Different levels of information facilitate system use

The Elix Advantage system offers three levels of information, making it easy for users to access data quickly and efficiently for:

- Daily use: All necessary information is visible on the E-POD screen.
- Maintenance use: Information is visible on the main screen of the water production unit. Step-by-step directions and diagrams indicate the actions to be performed.
- System management: Critical parameters, such as set points, are protected by an ID login and a password in the production unit's "Manager" menu.

Optimized control of water quality

After each purification step, the Elix Advantage system checks the relevant parameters:

- Feed pressure and feed water quality
- RO pressure, RO water quality, RO membrane efficiency (% ion rejection)
- Elix Advantage system water quality and temperature

If an anomaly occurs, you will be alerted by a message on the E-POD and water production unit screens and/or a warning buzzer.

Best-in-class monitoring

The reliability of the resistivity measurement displayed by the Elix Advantage system is ensured by:

- Low cell constant (0.01 cm^{-1}) and the flow-through design of the resistivity cell
- Temperature measurement with a 0.1 degree increment
- The possibility to perform the resistivity suitability test as required by USP <645>

Automatic control and maintenance

The system's reverse osmosis membrane is kept in optimum operating condition by self-maintenance functions that ensure optimal water quality:

- Automatic flush mode: cleans the RO membrane surface with a high water flow.
- Automatic rinsing mode: RO permeate is diverted to drain until the quality meets expectations.
- Automatic cleaning cycle: sanitization of the RO membrane (cleaning frequency can be adjusted according to local feed water quality).

Risk management

Millipore offers an optional water sensor. This water detection feature protects your lab from water damage by isolating the system from the main line, should a leak occur.

Traceability and remote access

To facilitate your daily work in a GLP and GMP (Good Manufacturing Practices) environment, all quality and events-related data is available. The user can access this data via PC for on-screen consultation. Data can also be directly printed out from a printer connected to the E-POD unit.

PROVIDING

ALL THE CONFIDENCE YOU NEED

Carefree operation

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

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

Comprehensive Service Program

Covers 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, Millipore can assist you in complying with regulatory standards applicable to your industry.

- Validation support is provided by trained Millipore Field Service Support Engineers using calibrated equipment and Qualification Workbooks.

Quality Insurance

- Certificate of Conformity – The product has been assembled and tested according to Millipore's stringent Quality Assurance procedures.
- Certificate of Calibration – Included for the built-in resistivity meter
- 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 90001 v. 2000 and ISO 14001-registered manufacturing site – Certificates are available upon request.
- CE, cUL, FCC – To ensure efficiency and safety of operation, the Elix Advantage system is certified for safety and electromagnetic compatibility.

ADDITIONAL SYSTEM CONFIGURATIONS FOR

ALL THE VERSATILITY YOU NEED

Other configurations of the new Elix system are available to provide pure water for additional needs, including use in environmental chambers, weatherometers, clinical chemistry analyzers, glassware washing machines or autoclaves, etc.

To meet these specific needs, various options are available, such as:

- Distribution of pressurized water to feed laboratory equipment
- Compatibility with larger size reservoirs (200-and 350-liter capacity)
- Additional in-line water polisher (E-Gard™ cartridge)

Analyzer

Powder mixer

Environmental chamber

Glassware washer

Weatherometer

LONG-TERM SUSTAINABILITY

At Millipore, we want to ensure that our products respect the environment. The new Elix Advantage system has been designed to reflect our dedication to clean technology and pure processes.

- Tap water savings thanks to the system's high water recovery.
- Reduced electricity consumption: Elix Advantage systems use up to 200 times less energy than conventional distillation equipment.
- Manufacturing process designed to respect the environment: our manufacturing facility is certified to ISO 14001, a voluntary environmental standard.

WATER SPECIFICATIONS

Elix water (at Elix module outlet)

Parameter	Value
Resistivity	> 5 Ω·Mcm @ 25 °C
TOC	< 30 ppb

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

Parameter	Value
Bacteria	< 1 cfu/ml*
Particulates > 0.22 µm	< 1 particulates/ml*
Pyrogens (endotoxins)	< 0.001 EU/ml**
RNases	< 0.01 ng/ml**
DNases	< 4 pg/µl**

With Millipak® filter with Millipore Express® membrane or Biopak® ultrafilter as POD Pak
*** With Biopak ultrafilter as POD Pak*

The Elix Advantage system is designed to meet or exceed requirements as described by ISO 3696 (Grade 2 water); ASTM D1193 (Type II resistivity and TOC Table I specifications); and by the United States, European and Japanese Pharmacopeias for Purified Water.

WATER DELIVERY

System	Pure water production (Max l/day)	Pure water delivery at E-POD (l/min)
Elix Advantage 3	70	Up to 2.0
Elix Advantage 5	120	Up to 2.0
Elix Advantage 10	240	Up to 2.0
Elix Advantage 15	360	Up to 2.0

Millipore offers more innovative technologies and stronger application support to streamline processes and provide consistently reliable results. Our Lab Water experts take the time to evaluate the needs of individual labs and particular applications in order to recommend a system that balances water quality with volume and distribution requirements, removing water quality concerns so customers can focus on their research.

MILLIPORE™

www.millipore.com/offices

Photographs: BHL Productions. Design: Sysaxe.