

Milli-Q®

Lab Water

Elix® High-Throughput Water Purification Systems

Connected, sustainable central pure water
solutions for up to 9000 L daily



The life science business of Merck
operates as MilliporeSigma in the
U.S. and Canada

MERCK

Elix[®] 40/80/120/150 systems

a new range of high-throughput systems backed by decades of water purification expertise

Expertise to match today's changing laboratory environment

Laboratories around the world are evolving continually to keep pace with growing research requirements, new ways of sharing scientific information, the trend toward connectivity, and increasingly stringent environmental regulations. Adapting space and equipment to meet these new needs can be challenging for all involved.

As part of this process, your responsibilities may involve renovating or expanding existing labs — or planning, designing, and engineering entirely new facilities. In either case, you may need to specify water purification systems. That's where our expertise is key.

Merck has over 50 years' of experience in the water purification business. Our products are designed to improve the quality and reliability of results — from research laboratories to QA/QC laboratories in the pharmaceutical industry.

Based on our extensive knowledge of laboratory applications and equipment, pharmaceutical industry

requirements, and water purification technologies, we can help you select the appropriate water purification solution: a comprehensive total water purification package for a single laboratory, a suite of laboratories — or an entire laboratory building.

Our Elix[®] High-Throughput water purification systems and SDS 500 (Storage and Distribution Systems) can be combined in compact and modular installations. One or more Elix[®] High-Throughput systems can be provided in order to ensure the right water quality and quantity for each laboratory or department, and thus avoid very long distribution loops, which can encourage bacterial contamination.

Such installations are not only easier to maintain and sanitize, but also offer greater flexibility in the event that adjustments are required for future lab upgrades or configuration changes. There is also the added benefit of redundancy in case a system backup is ever required.

Point-of-use Milli-Q[®] Advantage A10 polishing systems can be added throughout the installation as needed, in order to meet ultrapure water quality needs for more sensitive applications.



A total water purification systems partnership

To meet a customer's specific requirements, we work closely with stakeholders throughout the different project stages. End-user scientists, architects, consultants, lab and facilities managers, as well as contractors and equipment suppliers all have their own criteria that must be evaluated before any decisions can be made.

We help establish key parameters for the installation, including water quality and quantity, industry standard requirements, and considerations for long-term laboratory use. We're your partner throughout the project.

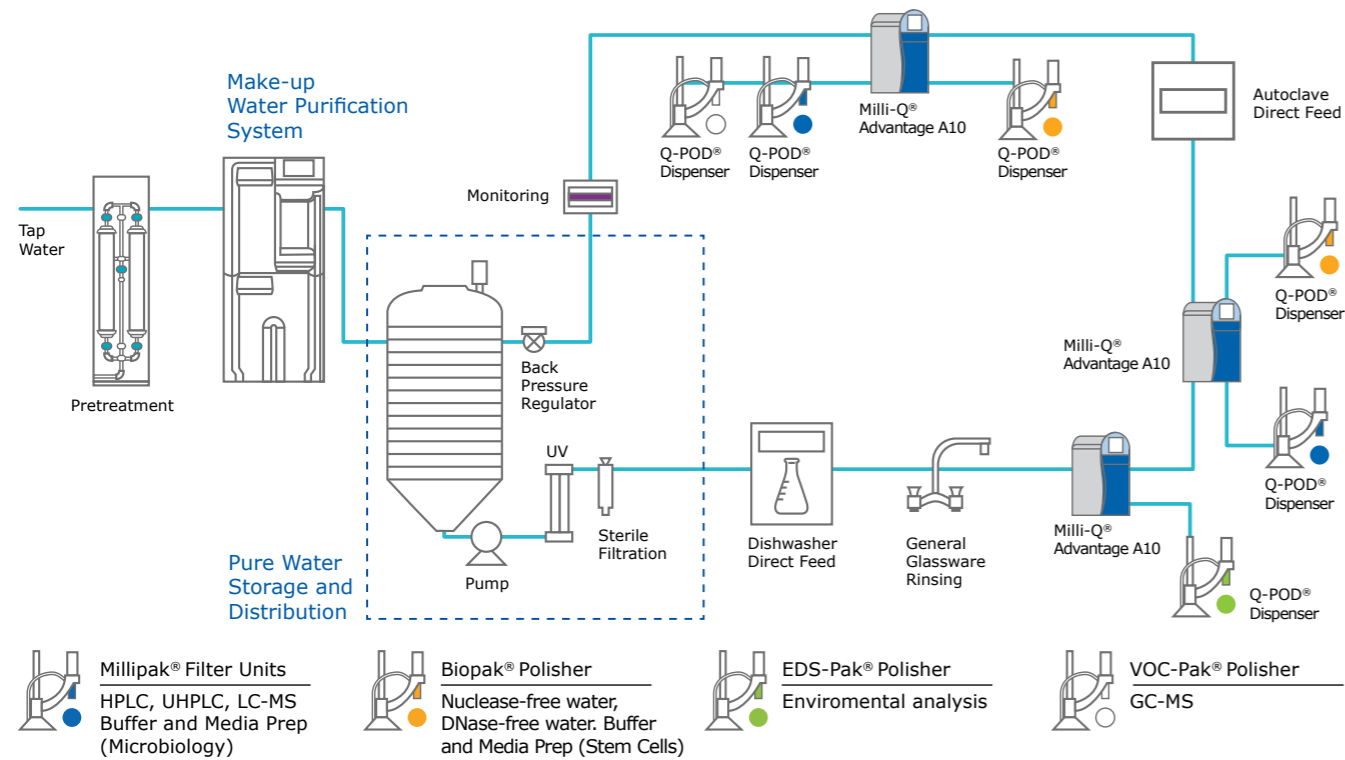
A comprehensive solution to match your needs

Purified water is required for a wide range of applications within a laboratory facility. The water quality needed can range from general laboratory grade to ultrapure water matching the sensitivity of critical research and analytical techniques. In addition, the water quantity can vary from a few liters for a single end-user to several hundred or thousand liters per day for a laboratory facility.

Merck's Elix[®] 40/80/120/150 water purification range is designed for customers who require a few hundred liters per day up to several thousand liters per day of analytical-grade water. Placed at the heart of a total pure water solution, the Elix[®] High-Throughput system and accompanying SDS 500 can be connected to additional components and accessories in order to build a comprehensive water purification system to match a customer's specific needs.



Merck is your partner of choice for total water purification systems — from conception and design, right through to engineering expertise and technical support services.



A Total Water Purification System requires the main water purification system to be integrated into a centralized system.

Elix® High-Throughput systems incorporate the latest purification technologies, and depending on the configuration chosen, can provide overall control and monitoring functions for the total water purification chain.

Because pure analytical-grade water is required for a broad range of laboratory applications, Elix® High-Throughput systems are a perfect fit for labs everywhere, including those in the pharmaceutical, clinical, chemical, metallurgical, cosmetics, food & beverage, electronics and biotech sectors.

Analytical-grade water meets the specifications for Type 2 water defined by a number of regulatory bodies, including:

- ISO® 3696: 1987 Grade 2 Water for Analytical laboratory use
- GB/T6682-2008 Grade 2 Water for Analytical laboratory use
- ASTM® D1193 Type 2 (2006 Reapproved 2011) Reagent Grade Water
- Japanese Industrial Standard JIS K 0557, A3 - 2008

and for Purified Water defined by the:

- European Pharmacopoeia Purified Water 8.0
- United States Pharmacopoeia Purified Water (USP 38)
- Chinese Pharmacopoeia (2010 appendix XVII A-227) Water for Pharmaceutical Purposes
- Japanese Pharmacopoeia (17-2016) Purified Water

It is suitable for the following applications:

- Microbiological media preparation
- Buffer preparation
- Hydroponics
- Manufacturing chemical and biochemical reagents
- Pharmaceutical laboratories

The table below gives minimum specifications for different water types*

Contaminant	Parameter and unit	Type 3	Type 2	Type 1
Ions	Resistivity (MΩ·cm)	> 0.05	> 1.0	>18.0
Organics	TOC (ppb)	< 200	< 50	< 10
Pyrogens	EU/ml	NA	NA	< 0.03
Particulates	Particulates >0.2 μm (units/ml)	NA	NA	< 1
Colloids	Silica (ppb)	< 1,000	< 100	< 10
Bacteria	Bacteria (cfu/ml)	< 1,000	< 100	< 1

*These values are provided only as guidelines, as some specific laboratory applications may require a quality superior to the quality indicated by the norms.

At the heart of your total pure water solution

A total pure water solution consists of not just one system, but rather several integrated parts. At the heart of the solution, the Elix® High-Throughput system serves as

the nerve center for the entire water purification chain, and provides total control of all functions, operating parameters and standard accessory components.

The Elix® High-Throughput water purification system

The Elix® system is the starting point for the installation. It functions as the makeup water system, using tap feed water purified by a combination of purification technologies to produce the required water quality in sufficient volume for use in all the laboratories.

An SDS 500 unit for storage and distribution of pure water

- The SDS unit stores purified water from the Elix® makeup system, helping to meet daily needs and cover peak periods of high demand from the labs. It is important to ensure that the Elix® water production rate and the tanks are sized to meet the labs' daily and peak usage demands for purified water.
- The SDS unit also distributes and maintains top-quality pure water through the piping network at the correct flow rates and pressures. In-line UV lamps and integrated final 0.22 μm sterile filtration devices maintain/improve the quality of distributed water.

Point-of-use delivery and polishing

Throughout the piping distribution network, pure water can be used for a variety of purposes:

- Feed to instruments, clinical analyzers, dishwashers or autoclaves
- General glassware rinsing
- Buffer and media preparation
- Feed to high-throughput ultrapure water purification systems (Super-Q® systems) or point-of-use "polishing" systems, such as Milli-Q® Advantage A10 systems.



inside the Elix[®] High-Throughput water purification solution



State-of-the-art complementary purification technologies

Progard[®] pretreatment packs combine several purification media to protect the Elix[®] High-Throughput system by removing:

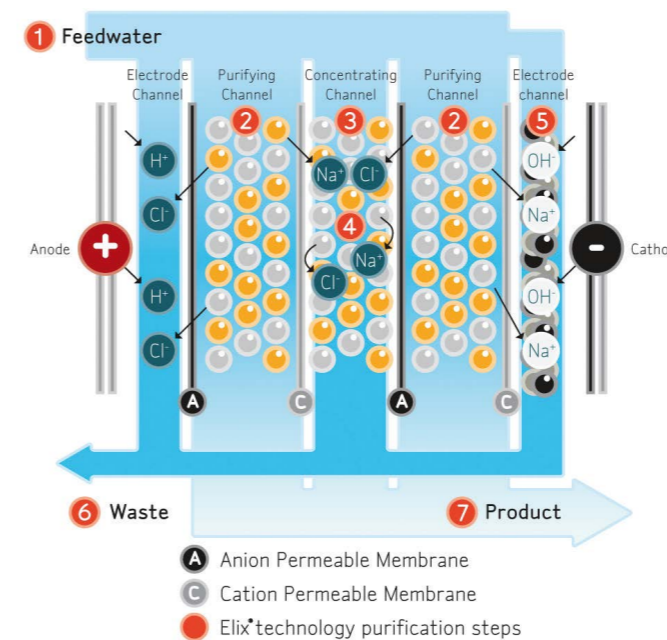
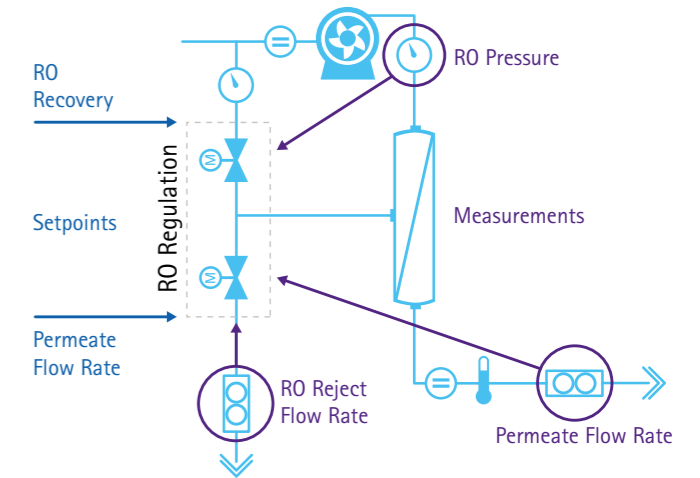
- Particles (0.5 µm filter)
- Free chlorine and colloids (activated carbon filter) from tap water

Other pretreatment such as backwashable carbon filters and ultrafiltration can be added depending on your feed water quality.

Ultrafiltration (UF) Pretreatment Unit

Advanced RO technology and Evolutive Reject Adjustment (E.R.A.[™])* technology decrease water consumption

- Advanced reverse osmosis removes 95-99% of ions and 99% of all dissolved organics (MW > 200 Dalton), microorganisms and particles.
- E.R.A.[™] technology uses an integrated calculator to optimize RO water recovery depending on feed water quality.
 - Production flow and water recovery rates remain constant regardless of feed water temperature.
 - No manual adjustment of valves is needed to maintain flow rate or protect RO cartridge lifetime.
 - Users save time, water and money.
 - Maintenance time is reduced, as well as the risk of human error.
 - System uptime is optimized and reliability is increased.



The Elix[®] electrodeionization module ensures constant quality pure water, productivity and profitability

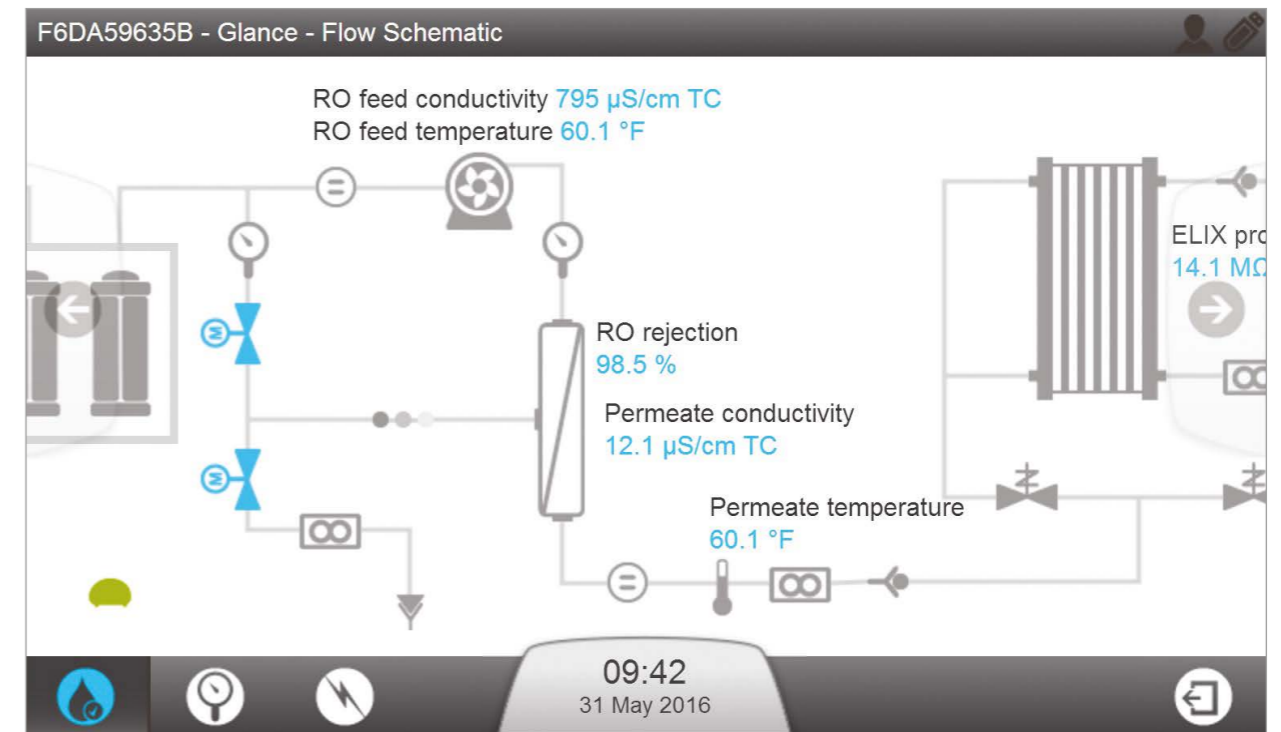
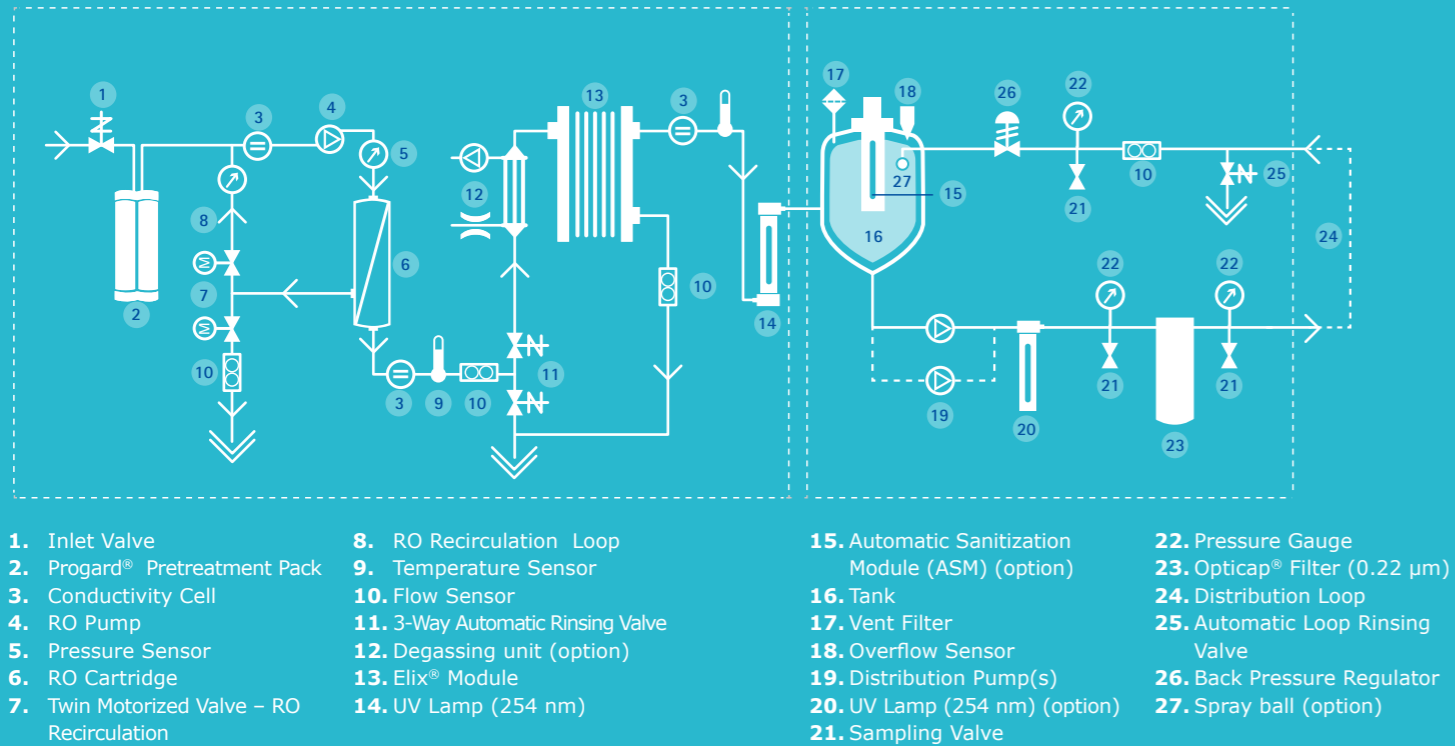
- Remaining ions are removed in the Elix[®] electrodeionization module, where ion-exchange resins are continuously regenerated by an electric field. No hazardous chemical regeneration or costly resin replacement is needed.
- There are no DI cartridges to change, which reduces maintenance time and ensures low and predictable running costs.
- Regardless of feed water quality (conductivity, CO₂ levels), or RO cartridge performance, both running costs and product water quality remain the same — there are no unexpected costs for users.
- Elix[®] patented technology does not require softeners; labs save space and maintenance time.

Merck's Elix[®] module: unique technology is based on anion-permeable and cation-permeable membranes; high-quality ion-exchange resin; and activated carbon beads. Water produced by the Elix[®] module enters the tank with resistivity greater than 5 MΩ·cm @ 25 °C (typically up to 15 MΩ·cm @ 25 °C).

Ultraviolet (UV) lamp and final filtration for full bacterial control

- UV lamp sanitization occurs at three stages: during water production, storage in the SDS 500, and recirculation in the distribution loop. As a result, the water's bacterial count is reduced by a log reduction value of 4 (a bacterial count of 10,000 CFU/mL will be reduced to 1 CFU/mL irrespective of the system's nominal flow rate).
- A pharmaceutical grade Opticap[®] (0.22 µm) filter provides final filtration before water is delivered.
- Optimum-quality Elix[®] water can be used for bacteria-sensitive applications.

* Patent pending



Full control of the installation and water quality parameters

Elix® High-Throughput systems drive and control all additional equipment needed in an installation, including:

- Single and duplex distribution pumps and their alarms
- Bactericidal UV lamp in the distribution loop*
- Automatic Sanitization Module (ASM)* on the SDS 500 unit
- Storage tank levels and alarms
- Vent and final filter consumable management
- TOC and resistivity monitoring in the distribution loop, depending on the configuration chosen
- Optional water detector to prevent water spillage in the lab in the event of a leak*
- Embedded Web server technology compatible with LIMS and BMS via TCP/IP protocol; alarm outputs to LIMS/BMS for monitoring purposes

Following each purification step, the Elix® High-Throughput system checks relevant parameters:

- Feed pressure, feed water quality
- RO pressure, RO water quality, RO membrane efficiency (% ion rejection)
- Elix® water: resistivity, and temperature
- Water quality in the loop return (resistivity and/or TOC*) can also be checked by the system

Compact SDS 500 storage ensures water purity for efficient distribution

The SDS 500, with its state-of-the-art design, is the perfect companion for Elix® High-Throughput systems:

- Distribution flow up to 60 L/minute; single or duplex pump options
- Polyethylene tank with IR polypropylene piping
- Hermetically sealed lid with no overflow to drain for bacterial control
- Optional Automatic Sanitization Module (ASM) to prevent the growth and proliferation of bacteria and resulting biofilm on the inner surface of storage tanks
- Optional spray ball for cleaning purposes
- Flow speed control to guarantee water velocity in the distribution pipes for control of bacteria and biofilm
- Fully drainable with automatic drain function
- Vent filter for protection against airborne contaminants
- Differential pressure sensor for accurate level measurement
- Sanitary connection; sanitary sampling port

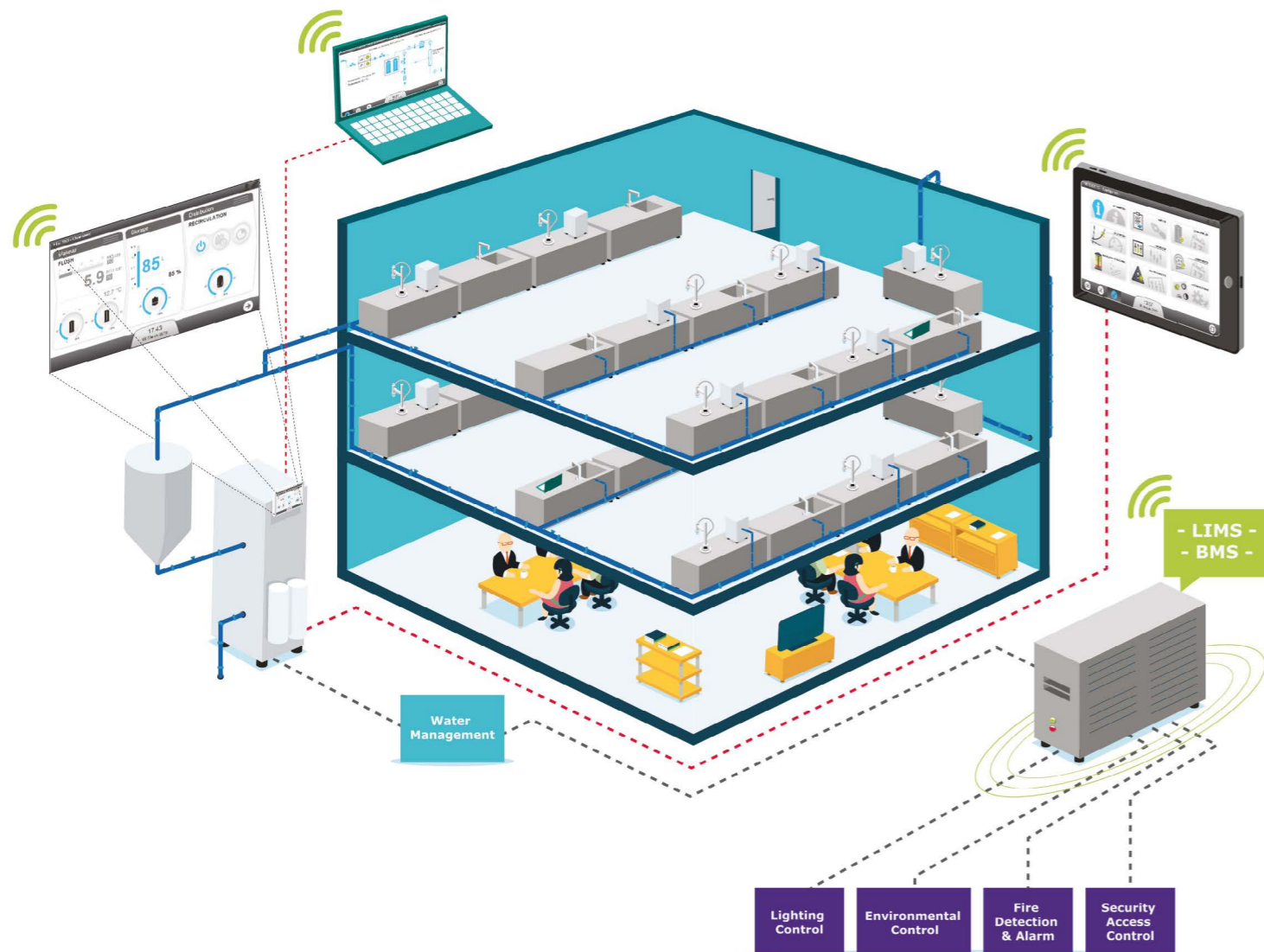
* Available as an option

Connectivity provides flexible monitoring

Through the flexible system interface, users can view real-time web pages in order to monitor Elix® High-Throughput water purification systems operations.

The systems' full connectivity also offers authorized users remote monitoring 24/7 via a computer, tablet or smartphone. Up to three users can remotely access the system at the same time.

Risk management is provided through the Elix® High-Throughput solution's numerous adjustable set points, designed to trigger an alert or alarm in case of deviation. This proactive approach maximizes uptime for the water purification and prevents breakdowns to ensure greater lab productivity.



The Elix® High-Throughput water purification system can be controlled remotely by a PC or tablet device, and can be connected to a Laboratory Information Management System (LIMS) or Building Management System (BMS).

A sustainable solution, today and tomorrow

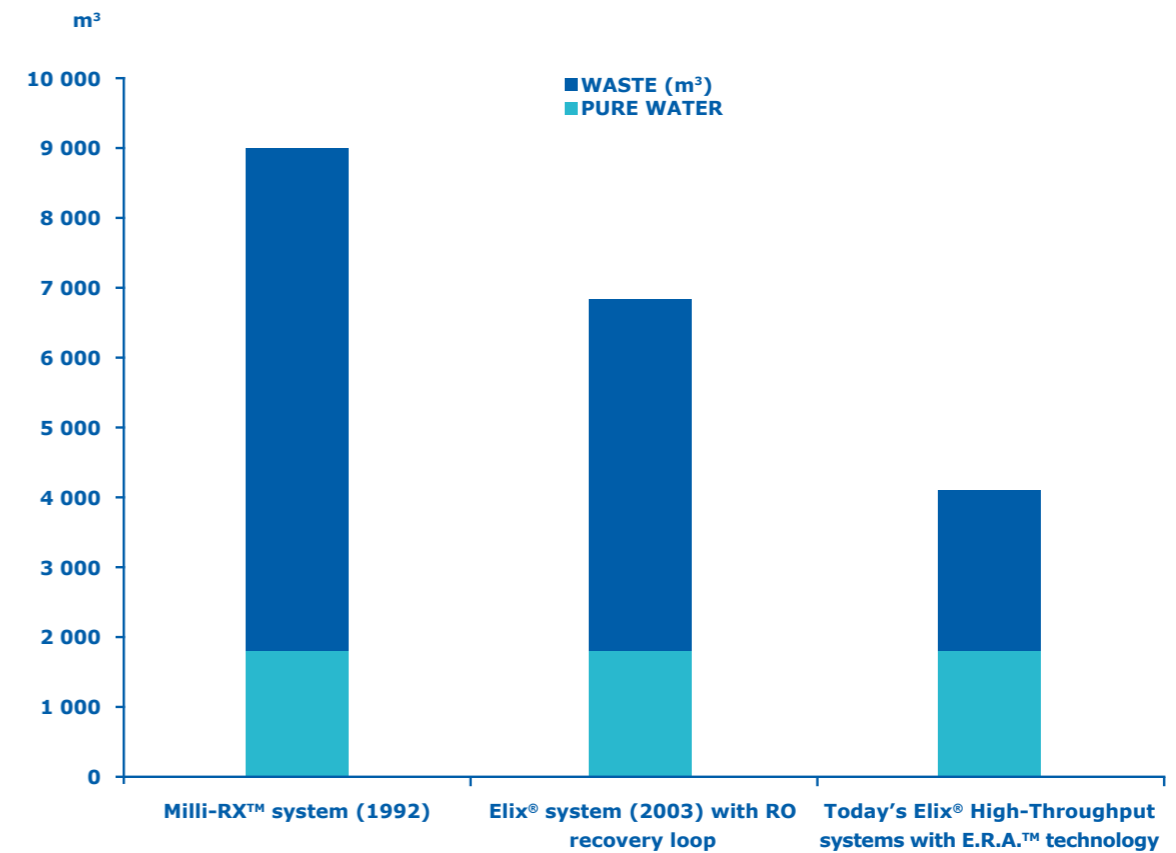
Merck is committed to environmental sustainability. Ongoing developments in Lab Water product stewardship underscore our determination not only to increase our own product sustainability, but also to help our customers move toward sustainable solutions themselves.

Our efforts include using optimized purification technologies that help decrease energy and water consumption, reducing packaging and documentation, and providing consumable recycling where possible.

The Elix® High-Throughput systems incorporate patented Elix® technology, which provides constant-quality water without the need for resin cylinders, softeners, or conditioning systems. In addition, the

new integrated E.R.A.™ technology automatically optimizes water recovery based on feed water quality to decrease tap water usage — up to 50% — reducing costs and helping protect valuable resources. The RO recovery loop also optimizes water consumption by recycling part of the water that has been rejected to the drain, thus further reducing water waste and also extending RO cartridge and Progard® pack lifetimes.

In a busy laboratory environment with a variety of equipment — often installed in a relatively small space — Elix® High-Throughput systems also help reduce noise pollution with an operating noise level of less than 50 decibels (at a distance of one meter).



Over the last 20 years, Merck has dramatically reduced water purification system water consumption, enabling laboratories to save up to several thousand euros per year on tap water expenses. The graph shows water

consumption and the split between Elix® system water and reject water for three Merck water purification systems over a seven-year period (production of 1000 L/day of pure water, 312 days per year).

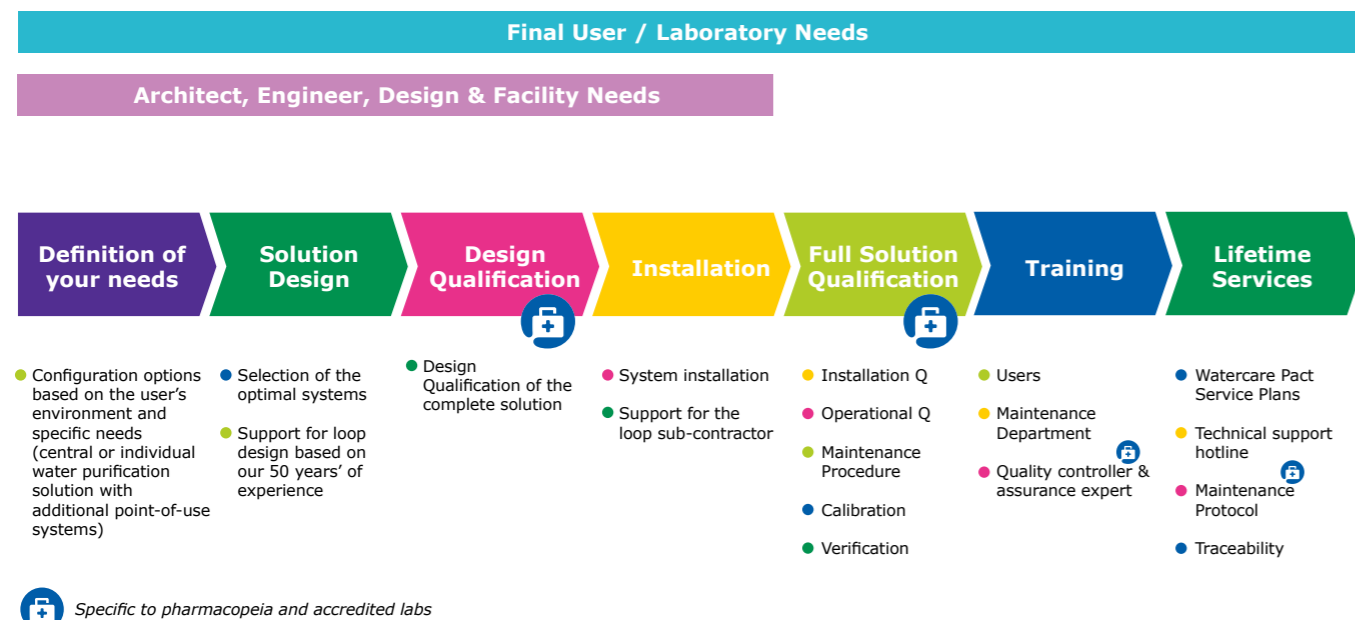
TOP-LEVEL SERVICE FROM A PARTNER YOU CAN DEPEND ON – ANYWHERE IN THE WORLD

Whether your project is a small laboratory renovation — or the design of a new laboratory building — it's critical to have full confidence in the expertise of your water purification supplier.

We're proud of our unequalled service offering, which allows us to pass along outstanding benefits to our Elix® High-Throughput system users. Before installation, a certified Merck Field Service Engineer will analyze the laboratory's feed water quality. Then during the installation procedure, he will record the feed water parameters in the Elix® High-Throughput system memory, making it possible to optimize water recovery and maximize system performance.

Throughout the system's lifetime, we offer Watercare Pact service plans* for our portfolio of water purification systems. These plans can be tailored to meet specific customer needs, and include options ranging from a single annual preventative maintenance visit with replacement of worn parts, to full system coverage, including qualification, calibration, and verification services.

Count on us to support your project with state-of-the-art technologies and manufacturing excellence, wherever you are.



Our stringent Quality system, product development process and manufacturing procedures ensure that our products are robust and reliable. Elix® High-Throughput systems are manufactured in an ISO® 9001- and ISO® 14001-registered site. Additionally, to ensure efficiency and safe operation, systems are

IEC-certified (CE, cULus, FCC, EAC). Furthermore, to reduce environmental impact, all Elix® High-Throughput systems follow European Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) directives.

* Subject to subscription

SPECIFICATIONS FOR ELIX® HIGH-THROUGHPUT WATER PURIFICATION SYSTEMS & SDS 500

Feed Water Requirements

Parameter	Value or Range
Pressure	2 – 6 bar
Flow rate	> 10 L/min at 2 bar
Feed water type	Potable water
Temperature	5 – 35 °C
Conductivity	10 – 2000 µS/cm at 25 °C
pH	4 – 10
Hardness (as CaCO ₃)	< 300 ppm
Silica concentration	< 30 ppm
Carbon dioxide concentration (CO ₂)	< 30 ppm
Langelier Saturation Index (LSI)	< 0.3
Fouling Index (FI ₅) or Silt Density Index (SDI)	≤ 7(*)
Free chlorine for Elix® 40 LC, 80 LC, 120 , 150 systems	< 1.5 ppm
Free chlorine for Elix® 40 HC, 80 HC systems	< 1.5 ppm – 3 ppm

* < 12 when the optional UF pretreatment is installed.

Elix® High-Throughput Systems Performance

Parameter	Value or Range
Resistivity	> 5 MΩ.cm @ 25 °C (10-15 MΩ.cm @ 25 °C typically)
Conductivity	< 0.2 µS/cm @ 25 °C
Total Organic Carbon (TOC)	Typically < 30 ppb
Microorganisms	< 10 CFU/mL

Electrical specifications

System Type	Voltage / Frequency	Power Consumption (VA)
Elix® 40, Elix® 80	220-240 VAC, 50/60 Hz	750
Elix® 120, Elix® 150	220-240 VAC, 50/60 Hz	870
Elix® 40, Elix® 80	120 VAC, 60 Hz	775
Elix® 120, Elix® 150	120 VAC, 60 Hz	900
Elix® 40, Elix® 80	100 VAC , 50/60 Hz	775
Elix® 120, Elix® 150	100 VAC , 50/60 Hz	900

Elix® High-Throughput Systems

Noise level	< 50 db at 1 meter
Communication protocol	TCP / IP / CGI, embedded web server and HTML 5 embedded web site*
Communication ports	Ethernet, USB 2.0
Languages	English, French, Spanish, Portuguese, Italian, German, Russian, Chinese, Japanese

* No additional software needed for remote control.

Dimensions and Weights: Elix® High-Throughput Systems

	Elix® 40	Elix® 80	Elix® 120	Elix® 150
Dimensions (H x W x D) footprint	1240 x 543 x 542 mm (48.8 x 21.4 x 21.3 in)	1240 x 543 x 542 mm (48.8 x 21.4 x 21.3 in)	1240 x 543 x 542 mm (48.8 x 21.4 x 21.3 in)	1240 x 543 x 542 mm (48.8 x 21.4 x 21.3 in)
Net weight (shipping box)	97 kg (213 lb)	105 kg (231 lb)	113 kg (249 lb)	124 kg (273 lb)
Dry weight	78 kg (172 lb)	86 kg (190 lb)	94 kg (208 lb)	105 kg (232 lb)

SDS 500 Specifications

Tank volume	500 liters (132 gallons)
Weight (filled with water)	660 kg (1455 lb)
Dimensions H x W x D	2047 x 790 x 1082 mm (80.6 x 31.1 x 42.6 in)
Floor space required	0.85 m ² (9.15 ft ²)
Pump performance (variable speed pumps)	Nominal: 16-40 LPM @1-4 bar 4-9 GPM @ 14-58 psi Up to: 60 LPM @ 1-3.5 bar 16 GPM @ 14-50 psi Pump operation is controlled by the Elix® High-Throughput water system.

Electrical Specifications

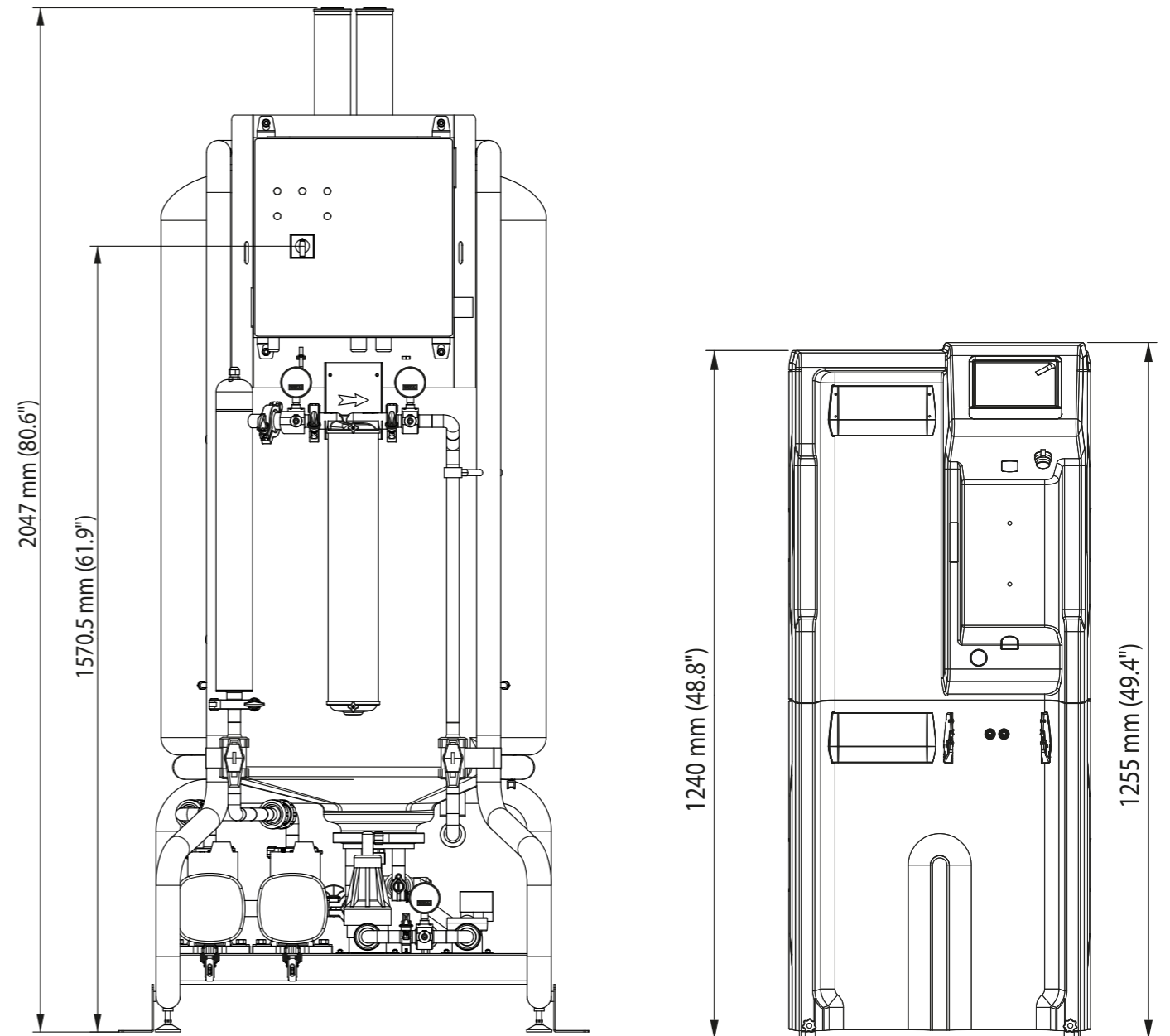
Voltage / Frequency	Maximum Power Consumption	Maximum Intensity
220-240V, 50/60 Hz	2100 VA	< 9A
100-127V, 50/60 Hz	2000 VA (120V) 2000 VA (100V)	< 16A < 20A

Materials

Tank	Polyethylene
Frame	Epoxy painted passivated steel
Valves and fittings	Polypropylene
Tubing	Polypropylene
Pump wetted parts	316 SST and tungsten carbide / carbon and EPDM seals
Pressure gauge	316 SST

Plumbing connections

Pure water inlet to tank	3/4" Sanitary TC
Tank drain	1 1/2" Sanitary TC
Tank loop inlet/return	1 1/2" Sanitary TC





For more information, please visit our website:
www.merckmillipore.com/labwater

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