

AFS[®] 40E / 80E / 120E / 150E Water Purification Systems

Incorporating Elix[®] electrodeionization technology

Economical and reliable high-performance water purification systems for analyzers with pure water needs up to 3000 L daily



High-performance water purification systems with 24/7 real-time monitoring and remote control

Your water purification needs for the clinical diagnostics environment	Our solution: the AFS® 40E /80E /120E /150E range of analyzer feed systems
A robust system with reliable performance	The AFS® E systems combine 24/7 real-time monitoring, remote control, cutting-edge water purification technologies, and an advanced user interface to improve lab productivity.
Outstanding, rapid service	System users benefit from an unprecedented level of service. A pre-installation feed water analysis, combined with our Watercare Pact plans enhanced with remote connection capabilities, will maximize your system's performance and reliability.
Low and predictable running costs	Patented Elix® technology provides constant-quality water without the need for resin cylinders, softeners, or conditioning cartridges, which means reduced maintenance, less analyzer downtime, low running costs – and greater productivity.
An environmentally responsible system with optimized water consumption	Users benefit from reduced water waste and extended RO cartridge lifetime thanks to the systems' reverse osmosis (RO) recovery loop. The integrated E.R.A.™ technology automatically optimizes water recovery based on feed water quality to decrease water usage expenses.
A water purification system that helps fulfill accreditation requirements (e.g., CAP 15189 SM)	AFS® E systems provide full monitoring capabilities and automatic e-record archiving for up to two years, ensuring traceability, which facilitates laboratory accreditation and reaccreditation processes.
A user-friendly system interface with all relevant information at a glance	A large, color touch screen shows relevant and concise information about system operation; an intuitive dashboard displays all important data at a glance.
An easy-to-use, low-maintenance system	Designed to keep maintenance time to a minimum, AFS® E systems provide step-by-step touch screen instructions for fast and easy maintenance; RFID technology for automatic traceability; and UV lamps to keep bacteria low and reduce AFS® E system and analyzer sanitization needs.
A mobile, customizable system that makes optimal use of lab space and fits your specific requirements	AFS® 40E /80E /120E /150E systems are compact and mounted on wheels, allowing installation wherever it is convenient. Choose just the options you require (such as a TOC monitor) from a range of available accessories.
Confidence in the expertise of your water purification system supplier	As one of the top three R&D investors in the Life Science Tools industry, Merck Millipore's history of strong partnerships with major clinical analyzer manufacturers has enabled us to develop dedicated water purification solutions to feed their analyzers, making us a partner you can count on.

Robust and reliable performance for the best lab productivity

Water is the most frequently used fluidic reagent onboard a clinical analyzer. In busy and demanding biomedical laboratories, where sample throughput often reaches several thousand samples per day, the choice of the lab's [water purification system](#) is key to smooth and uninterrupted daily lab operation.

The water purification solution chosen must [ensure robust and reliable performance](#), while providing clinical analyzers with [consistent water quality](#) meeting Clinical and Laboratory Standards Institute® (CLSI®) clinical laboratory reagent water (CLRW) standards.

The AFS® 40E /80E /120E /150E systems incorporate the latest and most advanced water purification technologies, such as our [Elix® electrodeionization \(EDI\) module](#) and [E.R.A.™ \(Evolutive Reject Adjustment\) technology](#), making it easy for biomedical lab users to focus on their work, save time, and reduce running costs – helping labs attain the highest level of efficiency and productivity.



These analyzer feed systems provide even greater control over [lab productivity](#). Thanks to our systems' unique technology, authorized users enjoy [24/7 real-time remote monitoring](#) of their water purification systems, as well as a [new generation of enhanced services](#). AFS® E full monitoring and remote control help maximize uptime for the water purification system and analyzer alike.

For additional control and ease-of-use, the system benefits from a [smart, touch screen](#) user interface for [simple and intuitive system navigation](#). Users can access this flexible interface on the system screen or from any location, using a PC, tablet, or smartphone through a web browser.*

*Web access is managed by the facility's LAN/intranet rules and device compatibility rules.

Breakthrough services tailored around your needs



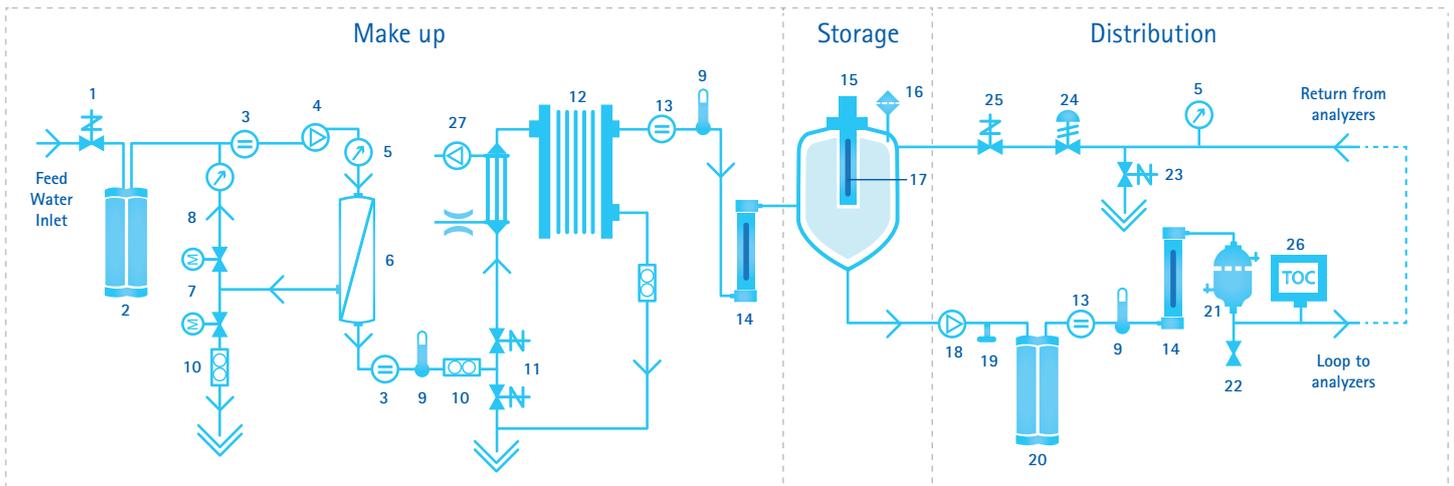
Feed water analysis to enable maximum performance and reliability of your water purification system

An unprecedented level of service will be available with the new AFS® E range. Every lab situation is different, which is why a certified Merck Millipore Field Service Engineer will perform a feed water analysis and configure the key parameters in the system to enable maximum performance and reliability based on your feed water quality.

This AFS® E range has been specifically designed to prevent potential problems, allowing our service teams to be proactive, providing quick and precise remote diagnostics before downtime occurs.

Our Watercare Pact service plans* can be customized around your needs, ranging from a single annual preventative maintenance visit to an all-inclusive system coverage offering qualification, calibration, and verification services. For even greater convenience and peace of mind, our service plans can be enhanced with remote diagnostic services, taking advantage of the connection capabilities embedded in these systems to offer faster, more accurate diagnosis and reduced downtime.

AFS® 40E/ 80E/ 120E/ 150E Water Purification Process Flow



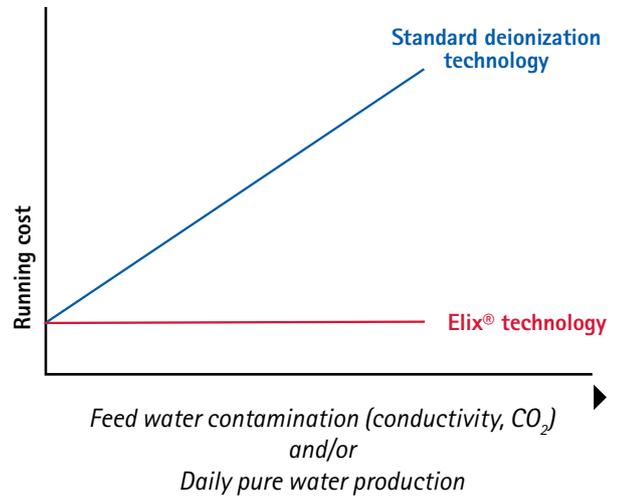
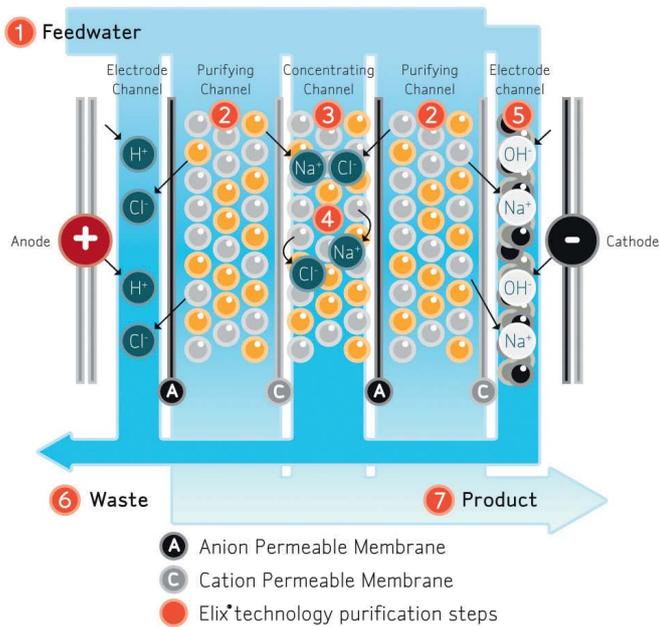
- | | | | |
|--|-----------------------------------|---|----------------------------------|
| 1. Inlet Valve | 8. RO Recirculation Loop | 16. Sanitary Overflow Sensor | 22. Sampling Valve |
| 2. Progard® Pretreatment Pack | 9. Temperature Sensor | 17. Automatic Sanitization Module (ASM) | 23. Automatic Loop Rinsing Valve |
| 3. Conductivity Cell | 10. Flow Sensor | 18. Distribution Pump | 24. Back Pressure Regulator |
| 4. RO Pump | 11. 3-Way Automatic Rinsing Valve | 19. Emergency Back Up – Quick Connector | 25. Recirculation Loop Valve |
| 5. Pressure Sensor | 12. Elix® Module | 20. Q-Gard® Polishing Pack | 26. TOC Monitor (Option) |
| 6. RO Cartridge | 13. Resistivity Cell | 21. Opticap® Filter (0.22µm) | 27. Degassing Unit (Option) |
| 7. Twin Motorized Valve – RO Recirculation | 14. UV Lamp (254 nm) | | |
| | 15. Vent Filter | | |

Low and predictable running costs with Elix® technology

The AFS® E range relies on complementary water purification techniques, including state-of-the-art Elix® electrodeionization technology, to ensure production of constant- and reliable-quality water to meet CLRW standards – at low and predictable running costs.

In the AFS® E range, potable tap water is first treated with a Progard® pack and purified by reverse osmosis (RO) to remove up to 99 % of contaminants. The resulting RO permeate water then enters the Elix® electrodeionization module, where ion-exchange resins are continuously regenerated by a small electrical field.

Elix® technology provides consistently high quality pure water – with no maintenance (or maintenance-related costs) required for the Elix® module. There is no need to replace resin cylinders, or to use softeners and conditioning cartridges. Water purification system maintenance is thus reduced, resulting in less analyzer downtime – and greater lab productivity.



Merck Millipore'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 reservoir with resistivity greater than 5 MΩ-cm @ 25 °C (typically up to 15 MΩ-cm @ 25 °C)*.

The graph shows running costs for a water purification system using Elix® electrodeionization technology or standard ion-exchange resins that must be exchanged or chemically regenerated. With Elix® technology, running costs remain constant, and are independent of feed water quality, RO membrane efficiency, or pure water use – making it easy to predict the running cost of your AFS® E system.

An environmentally responsible system with E.R.A.™ technology to optimize water consumption

The AFS® 40E /80E /120E /150E systems incorporate our new E.R.A.™ (Evolutive Reject Adjustment) technology – providing users with even greater savings.

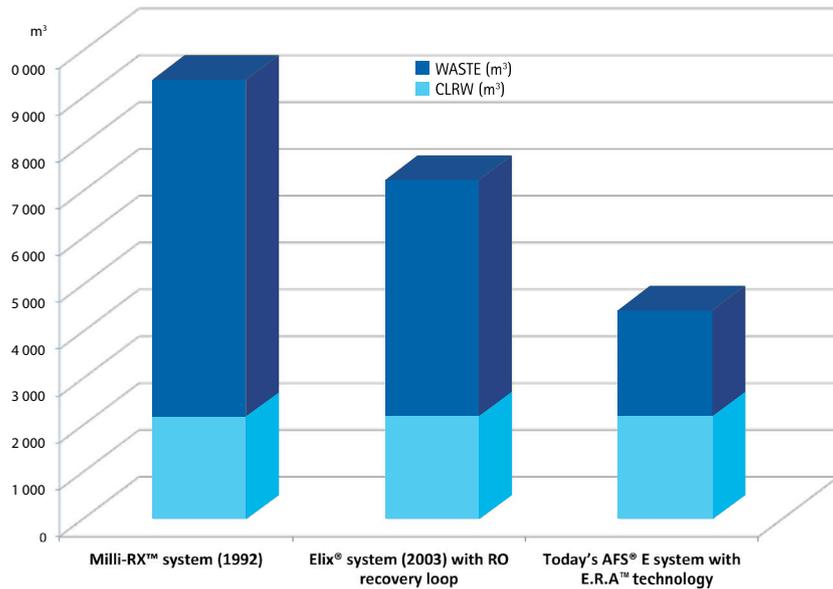
With its innovative and efficient reverse osmosis (RO) recovery loop, this AFS® E range optimizes water consumption by recycling part of the water rejected to the drain, thus reducing water waste and also extending RO cartridge and Progard® pack lifetimes.

Furthermore, depending on the feed water quality analysis, these AFS® E systems will calculate the best water recovery and will automatically optimize water consumption by means of motorized valves.

*When CO₂ dissolved in feed water is less than 30 ppm.

No matter what the feed water temperature, inlet pressure, or conductivity may be, the E.R.A.™ technology's automated valves ensure that AFS® E system flow rate and water recovery remain constant.* Users no longer need to manually adjust valves to maintain production flow rate and protect RO cartridge lifetime.

These latest RO technologies illustrate Merck Millipore's dedication to developing environmentally responsible water purification solutions to reduce tap water and system consumables use. The solutions reduce maintenance time, as well as the risk of human error – letting users save money on system operation, and also enjoy peace of mind with higher reliability, and optimized water purification system / analyzer uptime.



Over the last 20 years, Merck Millipore 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 CLRW produced and reject water for three Merck Millipore water purification systems over a seven-year period (production of 1000 L/day of CLRW-quality water, 312 days per year).

A water purification system that facilitates accreditation

The water used to feed an analyzer is a critical reagent, and its quality must be documented for biomedical laboratories seeking accreditation (or reaccreditation) to the ISO® 15189: 2012 standard (supported by CAP 15189SM accreditation, or by "The Key to Quality" workbook from the CLSI®).**

To facilitate compliance with worldwide regulatory organization guidelines, the AFS® 40E/80E/120E/150E water purification range incorporates full monitoring capabilities, as well as automatic e-record archiving for up to two years, in order to ensure traceability of all water-related daily operations, measurements, and events.

Records archived in electronic format have the advantage of being less time-consuming and less expensive to manage than paper documents: there is no need to check the water purification system daily and record several parameters in a lab book, or to physically archive years of paper data. The e-records can be retrieved remotely or via USB key from system memory whenever needed – for example, during an audit for lab accreditation.



* Please refer to Feed Water Requirements in the Specifications Table.

** International Organization for Standardization (ISO®); College of American Pathologists (CAP)

User-friendly system interface with all relevant information at a glance

With its large, innovative touch screen, the system is designed for intuitive operation, with all information available at a glance in a dashboard format. Nine different languages are available for greater convenience. Navigating and interacting with your water purification system has never been easier!

1

System status zone

Large display shows water qualities and storage volume

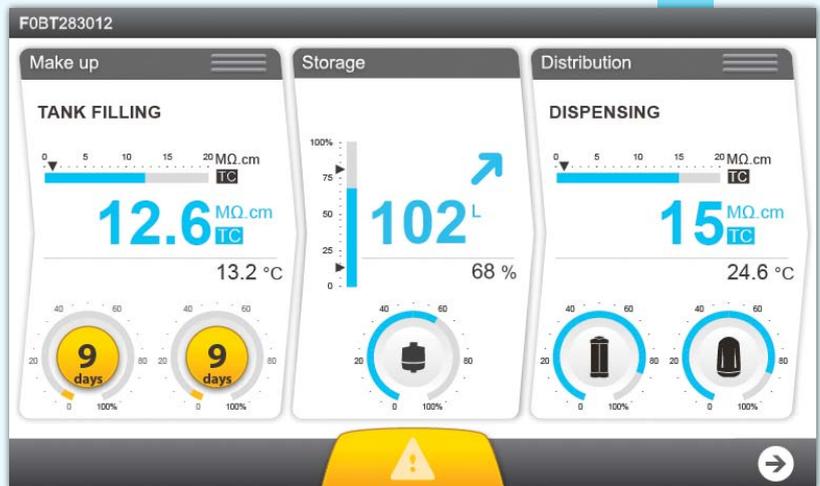
Clear, visible status of all consumables



Notification zone for alerts and alarms

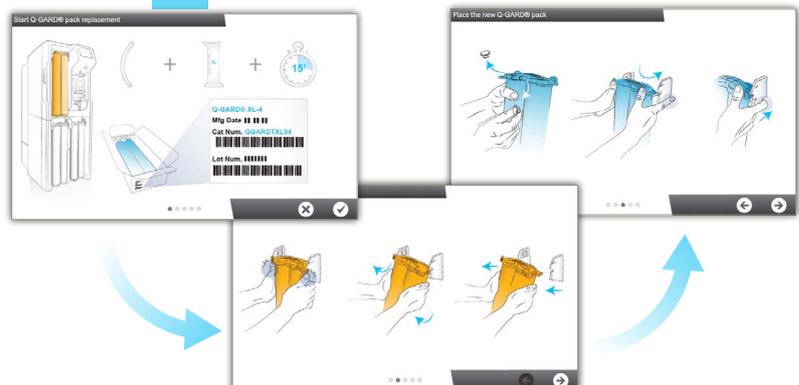
2

If a consumable change is required, the system will display a yellow, blinking alert 15 days in advance. Just touch the yellow alert symbol to open a new screen...



3

... where a wizard will guide you through the maintenance procedure with easy, step-by-step instructions. You don't need to be an expert to perform regular maintenance on your system !



An easy-to-use, low-maintenance system

Low maintenance saves time and increases profitability

- ▶ Robust and patented Elix® technology ensures consistent pure water, and low and predictable running costs – regardless of your feed water quality or RO cartridge performance.* No maintenance is required for the Elix® module.
- ▶ The system's large color touch screen alerts you to any needed maintenance procedures. For replacement of system consumables, a wizard guides you through the steps onscreen with easy-to-use instructions.
- ▶ An ergonomic patented pack locking system lets you change packs easily and quickly.
- ▶ RFID technology prevents insertion of an incorrect purification cartridge in AFS® E systems, and also ensures automatic traceability of pack use and replacement, saving time for the user.
- ▶ Automatic self-maintenance functions significantly reduce tap water use and increase cartridge lifetime:
 - The Progard® pretreatment pack incorporates several purification media in just one consumable to protect the RO membrane from particles, free chlorine, and scaling. Maintenance is easier and quicker with only one pack to change!
 - The system's flush mode and cleaning cycles keep the reverse osmosis membrane in top operating condition.



Ergonomic patented pack locking system.

Never before has it been so easy – or so time-saving – to use and maintain your water purification system!



Easy and reliable microbiological testing of water purified by the AFS® E system is possible thanks to a sanitary sampling valve.

The best control over bacterial levels ever achieved

Bacteria and their by-products interfere with chemistry assays or enzyme immunoassays, leading typically to unstable analyzer calibrations, high absorbance of blanks, reference drifts and errors on mean patient values.

This new AFS® E range has been designed specifically to maintain the best water quality at each step in the purification process, dramatically reducing the frequency of system sanitization.

- ▶ A first built-in 254 nm bactericidal UV lamp inactivates bacteria during the water production stage.
- ▶ A second UV lamp in the tank (ASM - Automatic Sanitization Module) regularly irradiates the stored water and the tank walls to prevent bacterial growth and the formation of biofilm.
- ▶ Finally, water is automatically recirculated in the distribution loop through a third UV lamp and a pharmaceutical grade Opticap® 0.22 µm sterilizing filter before entering the analyzer.

These AFS® E systems benefit from most advanced technologies and automated processes to ensure the best water quality with minimal maintenance time. This is the best way to avoid downtime due to decontamination of your water purification system and/or analyzer.

A mobile, customizable system

Optimal use of lab space

AFS® 40E /80E /120E /150E systems are compact, quiet, and mounted on wheels with brakes, so they can be placed wherever it's convenient – and moved to another location as the lab configuration grows or evolves.

Customizable systems to fit your specific requirements

A number of options and accessories are available for this AFS® E range, to fit your specific requirements and to improve water quality monitoring:

- ▶ **An online TOC (Total Organic Carbon) monitor** to allow verification that the TOC level of system water is below 500 ppb as required for CLRW quality. Better yet, users can save time and money by using the monitor to verify that TOC levels remain at low and stable levels, thus avoiding the need for duplicate assays or repeated analyzer calibrations.
- ▶ **Degassing option** to provide a solution for feed water highly contaminated with gases, such as a carbon dioxide concentration above 30 ppm.
- ▶ **RO regeneration tool** for use when feed water quality is poor to provide additional RO membrane cleaning, and to complete the action of the Progard® Autoclean pack.
- ▶ **Sanitary sampling valve** for safe and reliable water sampling for microbiological analysis.

Water sensor(s) and alarm **output(s)** also can be easily added to your AFS® E system.



Confidence in the expertise of your water purification system supplier

Merck Millipore is a partner you can count on. One of the top three R&D investors in the Life Science Tools industry, we have a long history of strong partnerships with both biomedical laboratories and major clinical analyzer manufacturers. This valuable experience has enabled us to develop our expertise concerning end-user applications such as biology, biochemistry, microbiology and immunology, and to design top-quality water purification solutions dedicated to feeding clinical analyzers.

AFS® E systems are manufactured in an ISO® 9001- and ISO® 14001-registered site. Additionally, to ensure efficiency and safety of operation, systems are CE-, cULus-, and FCC-certified. Furthermore, to reduce environmental impact, all AFS® E systems follow European Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) directives.

AFS® 40E / 80E / 120E / 150E Analyzer Feed System Specifications

Clinical Laboratory Reagent Water (CLRW) Quality

Resistivity	> 10 MΩ.cm @ 25 °C
Total Organic Carbon (TOC)	< 500 ppb
Microorganisms	< 10 cfu/mL
Filtration	0.22 μm

AFS® E Systems Performance

	AFS® 40E	AFS® 80E	AFS® 120E	AFS® 150E
Make-up flow rate to reservoir*	40 L/h (10.6 gal/h)	80 L/h (21.1 gal/h)	120 L/h (31.7 gal/h)	150 L/h (39.6 gal/h)
Make-up resistivity	> 5 MΩ.cm @ 25 °C (10-15 MΩ.cm @ 25 °C typically)			
Built-in reservoir volume (Net volume)	90 L		140 L	
Distribution flow rate to analyzers	4 L/min			
Distribution pressure to analyzers	Adjustable: 0.9 up to 2.1 bar**			

Water quality distributed to analyzers	
Resistivity	> 15 MΩ.cm @ 25 °C
Total Organic Carbon (TOC)	Typically < 30 ppb
Microorganisms	Typically < 1 cfu/mL
Dissolved silica	< 0.05 mg/L

* Nominal flow rates ± 10% between 10 and 35 °C. Additional derating of -3 % per °C from 10 °C to 5 °C.

** With a distribution loop length of 20 m.

Dimensions and Weights

	AFS® 40E	AFS® 80E	AFS® 120E	AFS® 150E
Dimensions (H x W x D)	1255 x 543 x 797 mm (48.8 x 21.4 x 31.4 in)	1255 x 543 x 797 mm (48.8 x 21.4 x 31.4 in)	1255 x 543 x 947 mm (48.8 x 21.4 x 37.3 in)	1255 x 543 x 947 mm (48.8 x 21.4 x 37.3 in)
Net weight (shipping box)	134 kg (295.4 lb)	143 kg (315.3 lb)	155 kg (341.7 lb)	167 kg (368.2 lb)
Operating weight	222 kg (489.4 lb)	234 kg (515.9 lb)	303 kg (668 lb)	318 kg (701.1 lb)

AFS® 40E / 80E / 120E / 150E

Analyzer Feed System Specifications

Feed Water Requirements

Pressure	2 – 6 bar
Flow rate	> 10 L/min at 2 bar
Tap Water Connection	¾" Gaz M
Type	Potable
Temperature	5 – 35 °C
Conductivity	10 – 2000 µS/cm at 25 °C
pH	4 – 10
Total Hardness (as CaCO ₃)	< 300 ppm
CO ₂	< 30 ppm
Silica	< 30 ppm
Langelier Saturation Index (LSI)	< 0.3
Fouling Index (FI _s) or Silt Density Index (SDI _s)	≤ 7*
Total organic carbon (TOC)	≤ 1 ppm
Free chlorine	< 1.5 ppm **
Drain requirements (gravity fall with air gap)	≥ 10 L/min

*FI_s > 7: An additional external pretreatment is required.

** Up to 3 ppm for AFS® 40E and AFS® 80E HC models.

General Specifications

Voltage and frequency*	230 VAC (± 10%), 50/60 Hz or 120 VAC ± 10% , 60 Hz or 100 VAC ± 10% , 50/60 Hz	
Power consumption (VA)	900 (AFS® 40E/ AFS® 80E)	1100 (AFS® 120E / AFS® 150E)
Noise level	< 50 db	
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	

* Depending on the system catalog number

** No additional software needed for remote control.



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

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