Milli-Q®
Lab Water

AFS® 8D / 16D DEGASSED

water purification systems

Cost-effective, low-maintenance solutions for clinical analyzers with degassed pure water needs up to 320 L daily

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

MERCK

cost-effective, low-maintenance solutions

For clinical analyzers with degassed pure water needs up to 320 L daily

Your clinical water purification needs	Our solution: The AFS® D range of clinical water purification systems
A reliable and constant source of degassed* clinical laboratory reagent water (CLRW) that complies with the CLSI® guideline**	Complementary water purification techniques, including complete pretreatment, advanced reverse osmosis (RO), exposure to a bactericidal UV lamp, degassing, and final 0.22 µm filtration, provide **consistent water quality** meeting CLRW standards.
A cost-effective solution to your degassed clinical water purification needs	Optimized lifetimes for pretreatment and polishing packs, as well as low feed water consumption make AFS® D systems **a cost-effective choice.**
A robust system requiring little maintenance	An intuitive icon-based system display facilitates maintenance, and a new ergonomic pack locking system makes pack changes easier than ever. Reduced maintenance saves time and also means **less analyzer downtime.**
A system that fulfills accreditation needs (e.g., CAP 15189℠ accreditation to the ISO® 15189:2007 standard)	AFS® D systems have full monitoring and automatic water quality archiving capabilities. Up to six months of information can be stored for reliable traceability, and **Millitrack® software** activation provides easy access to data.
Professional, rapid service	Our systems are backed by a **responsive, professional service organization** providing **rapid intervention.** Milli-Q® Service Plans offer a full range of support, including preventive maintenance visits.
An adaptable configuration that makes optimal use of lab space	AFS® D systems have a **small footprint**, allowing installation wherever it's convenient: on the wall, on or under the bench, or on a cart. Customize your system with just the **options and accessories** (reservoirs, sanitization kit, aeration kit, etc.) you need. **Add production capacity** by installing a RiOs™ system in duplex.
Confidence in your water purification system supplier	As one of the top three R&D investors in the Life Science Tools industry and with **more than 50 years of experience** in water purification systems manufacturing, we are a partner you can count on.

*For analyzers requiring water with a stable content of dissolved oxygen, AFS® D systems are available with an optional water aeration kit to adjust the dissolved oxygen level of AFS® D product water to 6-8 ppm (typically).

**Clinical and Laboratory Standards Institute, Inc. (CLSI®) guideline: "Preparation and Testing of Reagent Water in the Clinical Laboratory; Approved Guideline – Fourth Edition" (CLSI® C3-A4)

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Degassing for clinical applications

Gases such as oxygen and nitrogen are naturally soluble in water. Like all gases dissolved in liquids, however, they become less soluble at higher temperatures. As the temperature of the water feeding an analyzer increases to the typical clinical assay temperature of 37°C, these gases form bubbles that can interfere with the analyzer's optical measurements, and, in some instruments, can cause inaccurate dispense volumes.

AFS® D water purification systems contain integrated degassing technology designed to provide a solution for applications requiring removal of these soluble and insoluble gases prior to analysis. Degassing successfully prevents the formation of bubbles near optical sensors and in tubing. We use a hollow fiber degassing technique for maximum effectiveness, resulting in fast, effective reduction of soluble gas.

Constant- and reliable-quality degassed clinical laboratory reagent water (CLRW)



Combined purification technologies for the best results

In biomedical laboratories, pure water is an essential reagent that is necessary for delivering consistent, high-quality results, maximizing productivity and improving patient outcomes. Different types of contaminants may interfere with biomedical lab analyses and alter test results, which is why our AFS® D systems employ a combination of purification technologies.

Degassed water produced by AFS® D systems has consistent quality meeting Clinical and Laboratory Standards Institute, Inc. (CLSI®) CLRW standards:

- Resistivity > 10 MΩ·cm @ 25°C
- Bacteria levels < 10 cfu/mL
- Total Organic Carbon (TOC) < 500 ppb
- 0.22 µm filtration

In the AFS® D system water purification sequence, potable tap water is first treated with a Progard® cartridge, and then purified by advanced reverse osmosis to remove up to 99% of contaminants. Regardless of seasonal temperature changes, the AFS® D system produces a constant flow of RO water, ensuring there is always enough pure water.

Optimized control over water quality for low bacterial levels

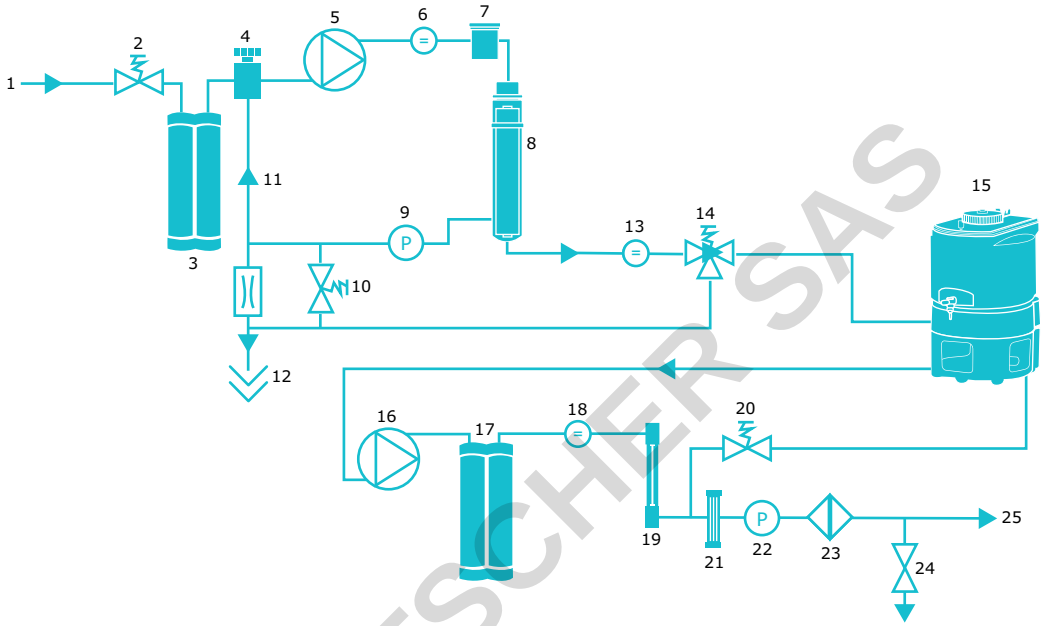
The RO water is stored in a reservoir. For optimal water quality, stored water is automatically recirculated through a Q-Gard® polishing pack and a built-in 254 nm bactericidal UV lamp. As a last step, the pure water is sent through a sterilizing-grade filter before entering the analyzer. This helps to limit downtime resulting from analyzer decontamination.

Depending on your needs, we offer either a 0.22 µm Millipak® filter to remove particles and bacteria, or a BioPak® C clinical ultrafiltration cartridge that will remove bacterial by-products for alkaline phosphatase-free water.

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AFS® D systems' water purification pathway

1. *Feed Water*
2. *Inlet Valve*
3. *Progard® Pretreatment Pack*
4. *Pressure Regulator (RO)*
5. *RO Pump*
6. *Feed Water Conductivity Cell*
7. *Sanitization Port*
8. *RO Membrane*
9. *RO Pressure Sensor*
10. *Flush Valve*
11. *Reject Water Recovery Loop*
12. *Reject*
13. *Permeate Conductivity Cell*
14. *Rinsing Valve*
15. *Reservoir*
16. *Distribution Pump*
17. *Q-Gard® Polishing Pack*
18. *Distribution Resistivity Cell*
19. *UV Lamp (254 nm)*
20. *Recirculation Valve*
21. *Degasser*
22. *Distribution Pressure Sensor*
23. *0.22 µm Final Filter*
24. *Sampling Valve*
25. *Analyzer*



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A cost-effective solution for your degassed clinical water purification needs

Budget-conscious users will appreciate AFS® D systems for their optimized running costs. Advanced AFS® D system design, as well as software with automatic self-maintenance functions significantly reduce tap water use and increase Progard® and Q-Gard® cartridge lifetimes:

- The single Progard® pretreatment pack incorporates several purification media that protect the RO membrane from particles, free chlorine, and scaling.
- An efficient RO-reject water recovery loop greatly reduces tap water use and helps extend the lifetime of the Progard® pack.
- A water distribution booster pump allows the highest contaminant rejection rate; as a result, Q-Gard® polishing cartridge lifetime is increased considerably. Furthermore, the pump and the RO recovery loop both help to ensure constant flow rates.
- Automatic self-maintenance functions (i.e., flush mode, sanitization cycles) keep the system's RO membrane in top operating condition.
- The automatic rinsing valve function ensures that the reservoir will be filled with optimal quality RO water, which also helps extend Q-Gard® pack lifetime.



A low-maintenance, robust system

With only the Progard® pretreatment pack and Q-Gard® polishing pack to change, AFS® D systems provide a low-maintenance solution to your clinical laboratory water purification needs—saving you time and also reducing analyzer downtime.

To help make pack changes even easier, AFS® D systems have a new ergonomic pack locking system. Just pull up on the locking handle to remove the exhausted pack, position the replacement pack in the cabinet, and push down on the handle to lock the new pack in place—it's as simple as that!

In addition, RFID technology prevents insertion of an incorrect purification cartridge in AFS® D systems, and also ensures traceability of pack use and replacement.



Essential information at a glance

AFS® D systems have been designed for easy, effortless operation. Intuitive controls on the compact system cabinet simplify use—you see just the information you need, such as product water quality and reservoir water level. When necessary, icons and the system's backlit LCD screen change color to visually inform users of any actions that should be performed.

- Blue display: normal operation
- Yellow display: maintenance needed
- Red display: urgent action required

When there has been no user interaction with the screen for 15 minutes, and there is no alert or alarm, the system's screen saver ("ECO mode") will be activated automatically.

Additional information on system operation and maintenance is provided by the **Quick Reference Guide** and **User Manual** stored on the water production unit.

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A water purification system fulfilling accreditation needs

Today, recent significant improvements in quality management systems are leading biomedical laboratories more and more frequently to seek accreditation to the ISO® 15189:2007 standard, which is supported by CAP 15189℠ accreditation, or by "The Key to Quality" workbook from the CLSI®.*

As the most commonly used fluidic reagent onboard an analyzer, water is a critical reagent, and its quality must be documented. AFS® D systems have full monitoring and automatic water quality archiving capabilities. Up to six months of information is stored for easy and reliable traceability. Optional activation of Millitrack® software provides quick access to this data, as well as enhanced data management control and remote access capabilities.

AFS® D systems check and archive relevant parameters, helping to control proper operation of the system. Risk management and reduced maintenance are achieved thanks to several adjustable set points that can trigger an alarm in case of deviation. Values such as feed pressure, feed water quality, RO pressure, RO water quality, and RO membrane efficiency (% ion rejection), etc., can be displayed on the system's LCD display.

*International Organization for Standardization (ISO®); College of American Pathologists (CAP); Clinical and Laboratory Standards Institute, Inc. (CLSI®)

An adaptable configuration



Optimal use of lab space

With their small footprint, AFS® D systems can be placed wherever it's convenient — on the wall, on or under the bench, or on a cart.

A wide range of storage reservoirs

Select from a wide range of high-quality polyethylene reservoirs (10 – 350 L) to match your water usage. Our reservoirs benefit from a number of features that maintain consistent purity of stored water and provide effective protection against airborne contaminants:

- A reservoir vent filter protects water from particulates, bacteria and dissolved CO_2.
- An aseptic overflow function maintains water quality by avoiding retro-contamination from the drain.
- The conical reservoir base allows complete draining, and facilitates rinsing during sanitization, while the smooth interior limits biofilm formation.

Customized systems to meet your needs

AFS® D systems are available with a large choice of options and accessories that let you tailor the system to meet your specific needs:*

- **Millitrack® software activation** for quick access to AFS® D data, enhanced data management control, and remote access capabilities
- A **water aeration kit**, for analyzers requiring water with a stable content of dissolved oxygen. The kit, used with a 10 L reservoir, adjusts the dissolved oxygen in AFS® D product water to 6 – 8 ppm (typically) — no matter how low the level of dissolved oxygen in your feed water may be.
- A **water sensor** designed for leak detection and to help avoid water spillage
- **Automatic Sanitization Modules** (ASMs) for further bactericidal protection of stored water
- A **sanitary sampling valve** to permit safe, reliable water sampling for microbiological assays
- A **sanitization kit** for full decontamination of the entire system, including all tubing and the reservoir.**

To add production capacity to your AFS® D system, a RiOs™ system can be installed in duplex to provide up to 40 L/hour of pure water.

*See **MerckMillipore.com/labwater** for additional AFS® D system options and accessories.

**Only to be used by a Milli-Q®-certified Field Service Engineer during a service visit. The kit has been validated with both hydrogen peroxide and chloride dioxide (not provided with the sanitization kit). For more information, please contact us.

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professional, rapid service

AFS® D systems are backed by a responsive, professional service organization providing rapid intervention. When Millitrack® software is activated, this can further facilitate a quick diagnostic from the AFS® D system dashboard. An optional emergency backup function can be installed to provide AFS® D customers with temporary coverage until their system is serviced.

Milli-Q® Service Plans offer a range of support, from a single annual checkup to full system coverage. Our certified Field Service Engineers provide expert, professional support for the installation and maintenance of your AFS® D water purification systems, and our technical hotline support experts are available to investigate, diagnose and solve customer issues.



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Confidence in your water purification system supplier

As one of the top three R&D investors in the Life Science Tools industry and with more than 50 years of experience in water purification systems manufacturing, we are a partner you can count on. Our long history of collaboration with biomedical laboratories has enabled us to develop our expertise concerning end-user applications such as biology, biochemistry, microbiology and immunology, as well as water contaminants.

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



AFS® D system specifications

System Performance

AFS® 8D/16D Systems	
Resistivity	> 15 MΩ.cm @ 25°C
Total Organic Carbon (TOC)	Typically < 30 ppb
Bacteria	< 1 cfu/mL
Dissolved silica	< 0.05 mg/L
Dispensing flow rate to analyzer	Up to 0.6 L/min*
Dispensing pressure to analyzer	1 bar ± 10% (13-16 psi)*
Production flow rate to reservoir	8 L/h (AFS® 8D) 16 L/h (AFS® 16D)
Dissolved oxygen	6 – 8 ppm typically

System Information

Dimensions (H x W x D)	470 x 268 x 426 mm (18.5 x 10.6 x 16.8 in)
Net weight (shipping box)	< 16 kg (35.3 lb)
Operating weight	< 22.2 kg (49 lb)
Voltage	100 – 240 VAC ± 10%
Frequency	50 – 60 Hz
Power consumption	200 W or 250 VA

Feed Water Quality Requirements

Pressure	1 – 6 bar
Flow rate	> 5 L/min at 2 bar
Tap water connection	½ in. Gaz M
Type	Potable
Temperature	5 – 35°C
Conductivity	100 – 2000 µS/cm at 25°C
pH	4 – 10
Langelier Saturation Index (LSI)	< 0.3
Free total chlorine	< 3 ppm
Silt Density Index (SDI)	< 12

*Dispensing to atmosphere (without any flow restriction due to the analyzer).

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To Place an Order or Receive Technical Assistance

In Europe, please call Customer Service:

France: 0825 045 645
Germany: 069 86798021
Italy: 848 845 645
Spain: 901 516 645 Option 1
Switzerland: 0848 645 645
United Kingdom: 0870 900 4645

For other countries across Europe, please call: +44 (0) 115 943 0840

For other countries across Europe and the world, please visit:
MerckMillipore.com/offices

For Technical Service visit:
MerckMillipore.com/techservice

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

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