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Automated Flushing for Healthy Buildings



Regular Automated Flushing Keeps Building Water Healthier



All life depends on water—including harmful pathogens, such as Legionella, Pseudomonas spp., and nontuberculous mycobacteria. That makes water an excellent disease carrier, especially when it's stagnant, tepid, or both.

These no- and low-flow conditions often occur in building water systems—in a school or residence hall during summer break, an office building closed over a holiday or due to a pandemic, or a hospital room unused for weeks or even a few days.

During these periods, water will take longer to flow from the system entry to where it's ultimately consumed—if it moves at all. Areas where the water stagnates give bacteria and microorganisms an ideal environment to proliferate and concentrate to levels that can cause infections and health issues for building occupants. Legionella is the best known of building-related diseases, but occupants may also be subject to other lung, skin, and gastrointestinal infections. Risk is especially high for individuals who are immunocompromised or elderly. Significantly, conditions for accelerated growth of waterborne pathogens don't occur only during low occupancy.

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Combatting Pathogens with Flushing



Building managers established flushing protocols to help combat growth of bacteria, including *Legionella*. Line flushing proved to be the easiest, quickest, and cheapest way to prepare for occupants to safely return to a building.

But building water circulation can be poor or inconsistent even during business as usual. For example, if hospital personnel choose hand sanitizer over hand washing, water use could be lower. Also, facility managers may implement conservation measures that save water and energy but require lower water flow and temperature. That could increase *Legionella* risk.

In March 2024, the Water Research Foundation published a report on a project assessing flushing as a corrective action and ongoing control strategy to reduce *Legionella* levels in service lines and premise water systems.¹ The report describes several factors that encourage *Legionella* survival and growth. First are biofilms in building pipes that provide the carbon and nutrients the bacteria need to proliferate. Second is water temperature between 70°F to 120°F (20°C to 50°C), which provides a hospitable environment for *Legionella*. Third is loss or absence of residual disinfectant over time.

The researchers note that flushing helps expel accumulated biomass, keep water temperature outside the range where *Legionella* bacteria are active, replenish residual disinfectant to an effective concentration, and reset water age. The report details baseline information to gather before flushing and general recommendations for flushing efficacy.

Additional considerations include flushing frequency and timing.² The researchers recommend a maximum water age of 7 days if residual disinfectant is present and 3 days if not. Flushing should be conducted before water users could be exposed to *Legionella* and outside normal or peak hours of use to minimize hazards.

Sorting Out Standards, Regulations, Guidelines, and Best Practices for Flushing



The industry agrees that flushing complements supplemental disinfection, and water management plans should include a protocol for regular flushing. There has yet to be a consensus on exactly what that should entail, but numerous standards, guidelines, regulations, and authorities require or recommend flushing regularly for various types of facilities. Here are examples of just a few:



- **Joint Commission:** The Joint Commission, a global driver of quality improvement and patient safety, established water management standard EC.02.05.02 on January 1, 2022. In addition to the already required risk assessment, water management plan, testing protocols, and acceptable ranges, the Joint Commission saw a need for more specific requirements for a water management program, including development, management, and maintenance activities such as flushing, and an annual review.³



- **Veterans Health Administration:** Directive 1061 requires that irregularly used or low-flow fittings such as sink taps and showers must be flushed at least twice weekly to prevent water stagnation. If this method is used, the facility must put a policy and procedure in place to document flushing and maintain the files for at least three years to ensure compliance.⁴



- **ASHRAE 514:** For system maintenance, ASHRAE 514 recommends regularly flushing building water systems to reduce water age and achieve microbial control. Conditions that warrant flushing include systems where there are dead legs, during periods when a building is shut down, during low or no occupancy, and when portions of the building water system are not used.⁵ The U.S. General Services Administration⁶ confirmed that at approximately 350 federally owned facilities that meet criteria established in ASHRAE Standard 514 for height and size, they are developing and implementing building-specific water sampling and flushing plans based on ASHRAE recommendations.⁷

“Flushing helps maintain water quality by preventing water stagnation in pipes and reducing the risk of metal accumulation and *Legionella* growth. This proactive measure helps safeguard the health and well-being of occupants, particularly vulnerable populations in childcare centers and healthcare units, by promoting clean and safe water usage.”⁸”

Managing Building Water System Flushing

Preventing biofilm growth is easier than controlling it once it's already coating pipes. So regardless of building occupancy, flushing regularly is a good practice—to remove biofilm, maintain water at temperatures inhospitable for *Legionella*, increase disinfectant residual, and reset water age. It's a nontoxic and environmentally friendly way to mitigate risks of waterborne pathogens. Also, standards organizations agree that flushing is vital to a defensible water management program. In stop-and-go school schedules, for example, an ongoing flushing program can keep water moving without installing or maintaining water treatment equipment or developing complex protocols.

Flushing does not corrode pipes or fittings, potentially extending the life of plumbing equipment. And there's a bonus—flushing doesn't require consumables like chemicals. With the right sensors, facility managers can activate flushing on a regular program or as-needed basis depending on occupancy fluctuations, room turnovers, and even fixture usage.

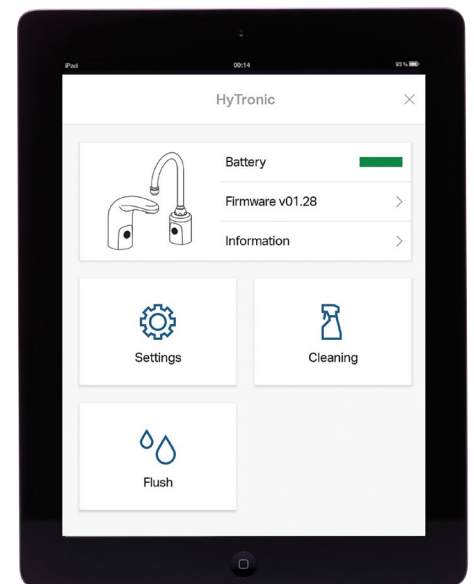
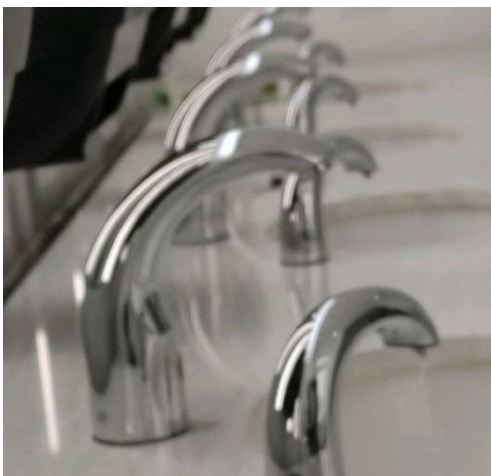
Advantages of Automatic Over Manual Flushing for Faucets with Bluetooth® Low Energy Technology



Selecting Automatic Flushing Features for Streamlined Water Management

Automatic flushing offers a range of benefits, but the specific features depend on the faucet and control application you choose. You'll want a combination with a range of operational modes and data reporting capabilities to deliver time, energy, and water savings. Look for the following capabilities:

- **Maximize performance with the ability to adjust and control faucets using a smartphone or tablet and an easy-to-use mobile app.** Look for the capability to change settings like flow rate or operating mode, allow easy cleaning, or perform routine maintenance with a flush for up to 10 minutes.
- **Keep water lines clear and fresh by scheduling advanced hygiene flushes.** Consider the flexibility to flush at regular intervals, at a predetermined time from last use, or if a minimum amount of water has not passed through the faucet during a predetermined interval. Also, be sure you have pipe flush mode for longer purges that support remediation.
- **Simplify operations by saving flush modes using settings in the app.** After naming each mode as a pre-set, you can use them to transfer settings to other faucets in your facility.
- **Get the flexibility to set the faucet operating mode depending on location and usage.** For example, flush modes might include normal, scrub, metering, watersaver, handwash, or volume.
- **Organize and simplify maintenance with automatic documentation of which faucets were flushed or need updates, and easy download of usage logs.** Valuable capabilities let you match locations for easy individual or group identification, search for faucets in range when you're nearby, or select previously paired faucets.
- **View and download analytics with detailed information on each faucet.** For example, you can view bar graphs for daily, weekly, monthly, and annual activity, including flushes, uses, and water consumption. You can export use logs into Excel or share findings with others.



Codes and Keywords

For Healthcare Facility Water Systems

Codes Discussed in this Paper

[Joint Commission Water Management Standard EC.02.05.02](#)

A new water management program standard for the Hospital, Critical Access Hospital, and Nursing Care Center

[Veterans Health Administration Directive 1061](#)

A directive for prevention of health care-associated *Legionella* disease and scald injury from water systems

[ANSI/ASHRAE Standard 514 for Water System Risk Management](#)

Minimum requirements for managing building water system risk and a framework for systematically developing water management programs, from design and construction to occupancy

Keywords for Healthcare Facility Water Systems

[Flushing](#): Replacing stagnant water in building systems that have had low or no water use with fresh water to reduce the risk of infections.

[Biofilm](#): Clusters of bacteria attached to a surface and/or to each other and embedded in a self-produced matrix of proteins, polysaccharides and DNA.

[Water management plans](#): A plan to reduce the risk and danger of *Legionella* and other microbes growing in a building water system.

[Legionella](#): The bacteria that causes Legionnaire's disease, a serious type of pneumonia. People can get sick when they breathe in small droplets of water or accidentally swallow water containing *Legionella* into the lungs.

[Dead legs](#): Pipes isolated from regular water flow or no longer in use.

References

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- ⁵ “Risk Management for Building Water Systems: Physical, Chemical, and Microbial Hazards,” ANSI/ASHRAE Standard 514-2023, accessed May 28, 2024, <https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-system-risk-management>
- ⁶ “Water quality: Federally owned facilities,” U.S. General Services Administration, last updated January 31, 2024. <https://www.gsa.gov/real-estate/facilities-management/water-quality-management/federally-owned-facilities>
- ⁷ “Guidance for Water System Risk Management,” ASHRAE, accessed March 23, 2024, <https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-system-risk-management>
- ⁸ “Water quality: Federally owned facilities,” U.S. General Services Administration, last updated January 31, 2024. <https://www.gsa.gov/real-estate/facilities-management/water-quality-management/federally-owned-facilities>

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