

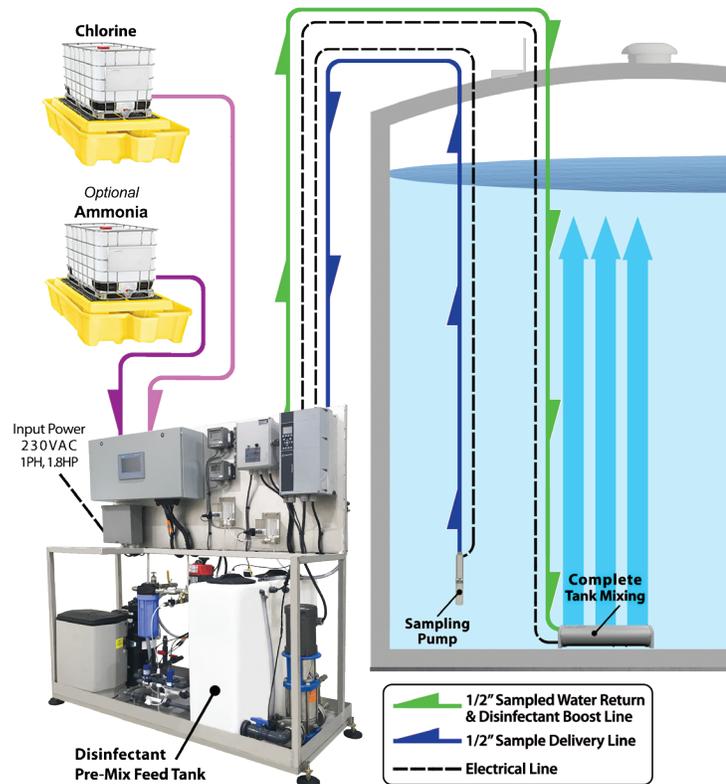
ResidualHQ[®]

Automated Disinfectant Control

1) How does the ResidualHQ[®] “precisely and carefully” bring in and mix bulk disinfectant at the Pre-Mix Tank?

Bulk liquid disinfectant is brought into the ResidualHQ[®] using a vacuum-based system (no pump, no vapor lock) then delivered to the Pre-Mix Feed Tank. This process is monitored & measured in a number of ways:

- 1. Flow Verification Sensors:** These sensors track disinfectant flow continuously and have been empirically tested for accuracy by both IXOM Watercare and the manufacturer. Additionally, the ResidualHQ[®] incorporates adjustable parameters allowing Users to further calibrate the flow verification sensors if ever needed.
- 2. Electrically Actuated Valves:** Two electrically actuated valves control chemical feeds. The ResidualHQ tracks each actuation and the current state of the valves at all times.
- 3. Bulk Disinfectant Storage Monitoring:**
Optional accessory. Bulk storage monitoring is available and can alert the User of low levels below threshold or any unaccounted loss of disinfectant chemical.



While metering pumps will drift as they age, the ResidualHQ[®] monitors flow continuously and automatically alters its pulse width modulation (PWM) algorithm in real-time to adapt to changing flow conditions.

Example: The ResidualHQ utilizes filter screens to protect sensors and components. As these near maintenance intervals, particle accumulation may cause the system flow to reduce slightly*. The ResidualHQ[®] will recognize this and automatically alter its PWM duty cycles to achieve desired flow rates. The ResidualHQ[®] will also generate alerts to notify Operators of a possible flow restriction.

**ResidualHQ filter screens require no tools to clean and do not require the system to be taken offline.*

2) What type of venturi injector are used and how are they controlled?

We use commercially available venturi injectors constructed for safe contact with potable water and concentrated disinfectants. They are placed in the motive flow path and utilize:

- inlet pressure regulators to ensure constant suction,
- electrically actuated pulse width modulation (PWM) valves for suction control and
- check valves on the suction line to protect bulk disinfectant feed lines and/or bulk disinfectant storage tanks.

ResidualHQ[®] Frequently Asked Questions (cont'd)

3) How does the Pre-Mix Feed Tank utilize sheet flow mixing?

Any water or disinfectant entering the Pre-Mix Feed Tank goes through miniaturized sheet flow mixers. They are not mechanical but powered via existing motive flow pressure. This allows the ResidualHQ to quickly and efficiently mix any incoming constituents and is pivotal for a batchless feed system.

4) Why is soft water incorporated into the system?

The ResidualHQ utilizes vacuum injection to feed sodium hypochlorite and/or liquid ammonium sulfate solutions. The incorporation of soft water during disinfectant feed operations is a proven technique to eliminate scaling issues commonly associated with concentrated disinfectant injection with hard water.

5) Is the Pre-Mix Feed Tank flushed with soft water after the final disinfectant feed is delivered to the mixer?

The ResidualHQ is a continuous flow, batchless system. In municipal distribution tanks, water is constantly pumped from the tank to the ResidualHQ then returned to the tank.

Before bulk disinfectant is brought into the ResidualHQ Pre-Mix Feed Tank, it will transition from normal water to soft water and will continue to be diluted with soft water throughout the feed process.

Once the feed is complete, the ResidualHQ[®] will flush with soft water then transition back to normal water for residual monitoring.

6) What happens if a valve fails in the “disinfectant open” position? How will the ResidualHQ respond? Will concentrated disinfectant come unchecked into the system?

The ResidualHQ utilizes a series of redundant checks to ensure valve actuation and subsequent feed operations are predicted, monitored, and verified. Should the system recognize a valve or other critical failure, the ResidualHQ will cease circulation & feed operations (sample and delivery pumps will shut down) and User Alerts will be generated.

7) Can you explain how chlorine and ammonia are brought together to form chloramine?

The number one goal is to make sure chloramine formation is safely and effectively achieved. The ResidualHQ dilutes and alternates bulk disinfectant introduction into the Pre-Mix Feed Tank using pulse width modulation (PWM). This ensures chloramine creation at very low, safe, and manageable concentrations.

8) Does the ResidualHQ have the flexibility to adjust the chlorine to ammonia ratio?

Yes. The ResidualHQ has an adjustable “Feed Ratio” (chlorine to ammonia) parameter. The system default is at 5.0 : 1; however, some of our Customers have optimized their Feed Ratio to better suit their needs.

9) How does the ResidualHQ operate/communicate with the break point curve?

The ResidualHQ contains an algorithm that primarily monitors Total Chlorine data to stay in the desired monochloramine part of the break point curve (just left, near the top of the first peak). The ResidualHQ also monitors and compares Free Chlorine data to further verify the position on the breakpoint curve.