MASSPHOTON

Medical Application Scenario:

Providing Sterile Water Assurance for Endoscope Cleaning

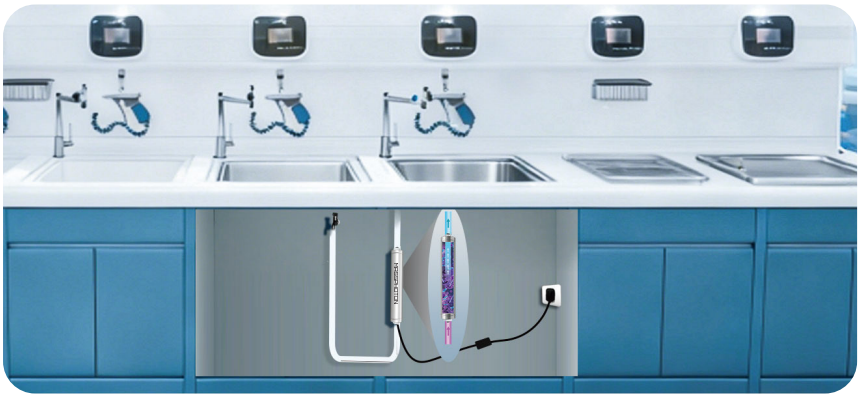
Key Challenges

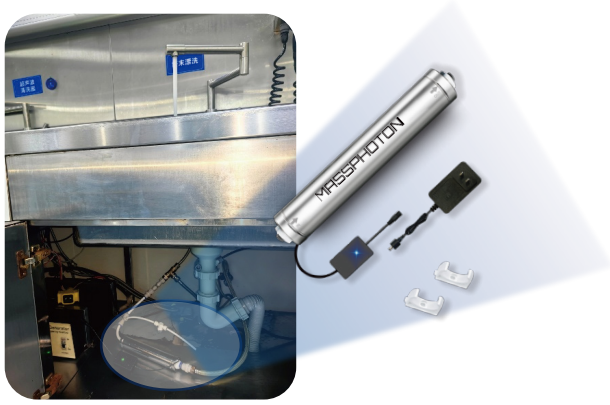
1. **Prominent Risks of Water Source and Pipeline Contamination:** Pipeline Bacterial Growth: Purified water in the delivery network's "dead water zones" and "pipeline biofilms" is prone to breeding drug-resistant bacteria such as Burkholderia cepacia, causing patient infections through residual endoscope channels. Delayed Equipment Maintenance: Untimely replacement of filter cartridges in purified water equipment directly leads to water quality exceeding standards.
2. **Inherent Defects in Traditional Disinfection Methods:** Hazards of Chemical Disinfection Residues: Chlorine-containing disinfectants and other chemicals easily remain in pipelines, irritating patient mucous membranes during endoscope rinsing and even causing allergies. Ineffective Biofilm Removal: Traditional disinfection struggles to penetrate bacterial biofilms, and long-term use leads to bacterial resistance, falling into a vicious cycle of "the more disinfection, the more pollution.

Solution

Full-Process UVC Sterilization, Blocking Pollution at the Source

- **Disinfection of purified water preparation terminal:** Integrate MASSPHOTON UVC LED ultraviolet module at the water output end of the reverse osmosis purified water machine to ensure compliant output water.
- **Pipeline Circulation Disinfection:** Install fixed UVC disinfectors in main pipelines, branch ends, and storage tank inlets, automatically cycle disinfection for 1 hour every early morning to remove biofilms and drug-resistant bacteria.
- **Cleaning Machine Inlet Disinfection:** Embed small MASSPHOTON UVC LED components at the inlet of fully automatic cleaning and disinfection machines to ensure sterile rinsing water.





Value Embodiment

- **Efficient Killing of Drug-Resistant Bacteria:** UVC technology penetrates biofilms, thoroughly killing stubborn microorganisms like Burkholderia cepacia. Post-disinfection water quality colony count drops below 1CFU/100mL, with no drug-resistant bacteria detected, cutting off cross-infection paths caused by water quality at the source.
- **Eliminate Disinfection Residue Risks:** No need for chemical agents; disinfection products are harmless substances, avoiding irritant residues on patient mucous membranes, especially suitable for high-risk groups like immunocompromised cancer patients and post-operative follow-up patients.
- **Extend Equipment and Endoscope Lifespan:** By removing pipeline biofilms and mineral deposits, reduce blockages and corrosion in purified water equipment, AER equipment, and endoscope channels, extending service life by over 30% and lowering replacement and maintenance costs.

Pilot Cases:

成都市第七人民医院 Chengdu Seventh People's Hospital

徐州醫科大学 XUZHOU MEDICAL UNIVERSITY

Chengdu Seventh People's Hospital, Xuzhou Medical University

MASSPHOTON

Medical Application Scenario:

Providing Sterile Assurance for Daily Water Use in Low-Immunity Patients

Key Challenges

1. **Zero Tolerance for Microbial Infection Risks:** Bone marrow transplant patients are in an "immune blank period" for 100 days post-surgery, where opportunistic pathogens like Pseudomonas aeruginosa and Stenotrophomonas maltophilia in water can invade the body through drinking, mouth rinsing, skin cleaning (e.g., wipe baths), causing infections with mortality rates up to 40%-60%, one of the main causes of non-relapse deaths in bone marrow transplant patients.
2. **Difficult Biofilm Removal in Water Supply Systems:** Inner walls of water supply pipelines easily form biofilms (protective structures formed by bacterial aggregation); traditional chemical disinfection only kills surface bacteria, cannot penetrate biofilms, and drug-resistant bacteria persist.

Solution

Full-Process UVC Sterilization, Blocking Pollution at the Source

- **Terminal Daily Drinking Water:** Install small UVC disinfection modules at ward water dispenser outlets and public area direct drinking machine faucets, forming a "disinfect upon output" closed loop. Built-in water flow sensors enable "automatic start when water is taken, shut off when stopped" to avoid unnecessary energy consumption.
- **Terminal Medical Care:** Integrate disinfection modules at shower heads and washbasin faucets; provide sterile daily water for patients.

Value Embodiment

- **Strengthen Infection Defense, Reduce Fatal Risks:** Terminal output water colony count stably controlled below 1CFU/100mL, cutting off water-borne infection paths at the source.
- **Residue-Free Safety:** Pure physical sterilization without adding any chemicals, avoiding damage from disinfection byproducts, especially suitable for populations on long-term immunosuppressive therapy.
- **Optimize Nursing Processes:** Disinfection synchronizes with water use, requiring no additional operations from medical staff.

Pilot Cases:

北京大学人民医院
PEKING UNIVERSITY PEOPLE'S HOSPITAL

Peking University People's Hospital Bone Marrow Transplant Center

MASSPHOTON

Medical Application Scenario:

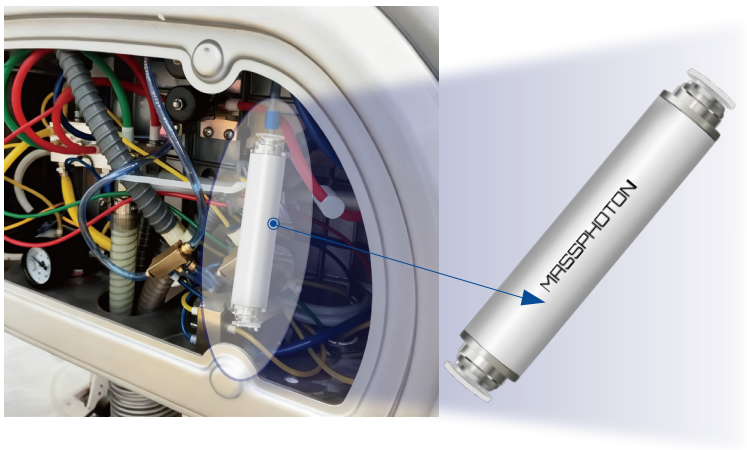
Providing Sterile Water for Dental Treatment

Key Challenges

1. **Dental Chair Waterline System:** A "Disaster Area" for Biofilm Growth. Dental Unit Waterlines (DUWLs) consist of complex small pipelines and valves; humid environments and water flow fluctuations easily promote bacterial attachment and biofilm formation. Studies show untreated dental chair waterline output can reach colony counts up to 10^5-10^6 CFU/mL.
2. **Inherent Defects of Traditional Disinfection:** Using chlorine-containing disinfectants or quaternary ammonium salts temporarily kills planktonic bacteria but cannot penetrate biofilms to remove deep pathogens, and easily produces irritating byproducts like chloramines. These residues contact patient mucous membranes via water mist, potentially causing allergic reactions; long-term use corrodes dental chair pipelines and precision components, shortening equipment life.
3. **Limitations of Flushing Disinfection:** Daily pre-treatment clear water flushing only replaces surface stagnant water in pipelines, unable to remove inner wall biofilms; disinfection effect lasts less than 2 hours, insufficient for full-day multiple treatments.

Solution

- **Inlet End:** Pre-treat municipal water or storage tank before connecting to dental chair to reduce subsequent pipeline contamination risks.
- **Return Water Pipeline:** Combine with waterline circulation system for secondary disinfection of used water to prevent biofilm growth.
- **Independent Module Integration:** Build ultraviolet disinfection modules into the water supply system, forming a sealed disinfection space via metal cavities to ensure sufficient UV irradiation.



Value Embodiment

- **Zero Microbial Pollution:** Post-disinfection dental chair waterline output colony count stably controlled below 10CFU/mL, or below 1CFU/mL in special scenarios, completely eliminating pathogen contamination risks.
- **Significant Cost Reduction and Efficiency Improvement:** No need to purchase chemical disinfectants or replace corroded pipeline components, annual consumables cost reduced by over 50%; disinfection requires no downtime, adding 2-3 daily treatment slots per chair, boosting revenue.

Pilot Cases:

首都医科大学 附属北京口腔医院 口腔医学院

中国科学院大学 杭州口腔医院 HANGZHOU STOMATOLOGY HOSPITAL

Beijing Stomatological Hospital, Hangzhou Stomatological Hospital

MASSPHOTON

Commercial Application Scenario:

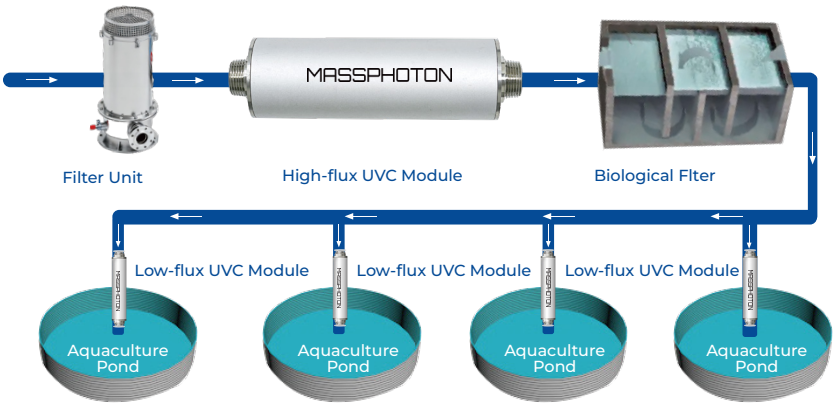
Aquaculture Balancing "Safety, Efficiency, and Cost

Key Challenges

1. **Pathogen Breeding and Outbreak Diseases:** Untimely water exchange easily leads to excessive ammonia nitrogen and nitrite, providing breeding grounds for bacteria (Vibrio, Edwardsiella), viruses (IPN virus), parasites (myxobolus). Data shows Vibrio detection rate over 60% in untreated aquaculture water, causing shrimp "stealth death disease" and fish septicemia.
2. **Biofilm Pollution in Recirculating Systems:** Pipelines and filtration units in recirculating aquaculture systems easily form biofilms, blocking equipment and affecting flow while continuously releasing pathogens. Conventional chemical disinfection struggles to penetrate membrane structures, causing fluctuating effects.
3. **Residue Risks of Chemical Disinfection:** Traditional agents like chlorine disinfectants provide short-term bacteriostasis but disrupt water microecology, killing beneficial algae; drug residues enter the food chain via aquatic products.

Solution

- Install medium-pressure UVC units at farm inlets (post-water intake pumps) to treat external sources like rivers, lakes, seas.
- Deploy UV modules after filtration units and before biofilter ponds in recirculating systems, ensuring disinfected circulating water enters breeding pools to avoid secondary pathogen pollution.



Value Embodiment

- **Ensure Biosafety, Reduce Disease Losses:** Post-disinfection pathogen kill rate reaches 99.99%, bacterial infection rates drop sharply, fry survival rates increase significantly, fish mortality reduced by 30%, boosting production and income.
- **Reduce Chemical Dependency, Enhance Product Competitiveness:** Fully replace chlorine disinfectants and some antibiotics, drug costs reduced 50%-70%, aquatic products free of chemical residues.
- **Optimize Resource Utilization, Lower Operating Costs:** Circulating water utilization rate from 30% to over 80%, water-saving costs as proportion of total revenue from 15% to 5%; equipment maintenance frequency reduced 60% due to less biofilm, lifespan extended over 2 years, significantly cutting replacement and repair expenses.

Commercial Application Scenario:

MASSPHOTON

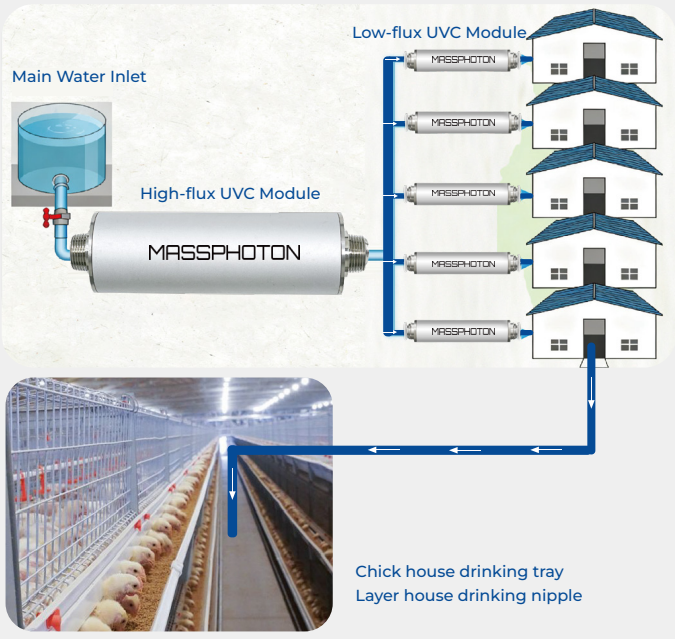
Solving Drinking Water Safety Dilemmas in Poultry Farming

Key Challenges

1. **Biofilm Pollution in Drinking Water Pipelines:** Narrow, bendy poultry drinking lines, plus feed residues and poultry feces entering water, easily form biofilms. Biofilms breed E. coli, Salmonella, Campylobacter, causing chick pullorum, laying hen salpingitis, egg production drop 15%-20%, mortality up to 10%-15%.
2. **Conflict Between Disinfectants and Gut Health:** To control drinking water pollution, some farms add antibiotics or acidifiers long-term. Antibiotic abuse disrupts poultry gut flora balance, reduces immunity, leads to resistant bacteria, increasing disease control difficulty; acidifiers temporarily lower pH but have limited biofilm removal, irritating chick digestive mucosa and affecting feed intake.
3. **Management Challenges in Large-Scale Farming:** Large farms have dozens of sheds, dispersed drinking systems; traditional manual cleaning requires dismantling pipelines per shed, time-consuming (2-3 hours per shed), hard to thoroughly remove inner biofilms; manual water quality testing lags, unable to monitor disinfection in real-time, epidemics spread easily once outbreak.

Solution

- **Water Source Pre-Treatment and Main Pipeline Disinfection:** Install medium UVC units at total farm inlets (e.g., reservoir outlets, municipal interfaces) for initial disinfection; deploy small UVC modules at each shed's main drinking pipeline entrance, forming "total-branch" two-level system, ensuring all water entering sheds is sterilized.
- **Terminal Nipple/Trough Disinfection:** Add micro UVC components at chick shed drinking trays and laying hen nipple fronts, ensuring terminal output ≤50CFU/mL, avoiding pathogen contact during drinking. Some high-end models use LED UVC sources, compact (2cm diameter), directly embeddable without system modification.



Value Embodiment

- **Ensure Poultry Health, Reduce Disease Losses:** Post-disinfection drinking water colony count stably below 50CFU/mL, E. coli and Salmonella detection rates below 5%.
- **Reduce Chemical Dependency, Improve Product Quality:** Fully replace drinking water antibiotics and some acidifiers, drug costs reduced 50%-70%, poultry products free of chemical residues, meeting EU, Japan, Korea market standards.
- **Optimize Management Processes, Lower Operating Costs:** No manual pipeline dismantling, per shed disinfection management from 2 hours weekly to 10 minutes daily, labor costs reduced 60%; UVC LED equipment annual power consumption 1/5 of traditional UV, energy costs drop significantly; biofilm reduction lowers pipeline blockage 80%, nipple replacement 70%, maintenance costs over 50%.

Commercial Application Scenario:

MASSPHOTON

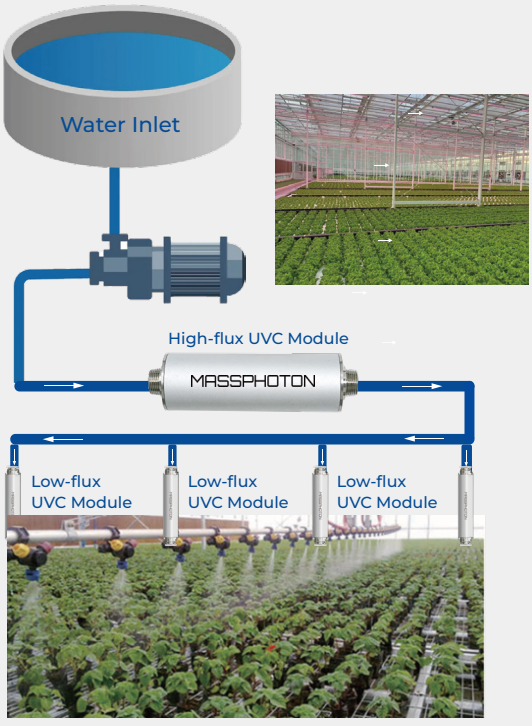
Breaking Water Safety Bottlenecks in Modern Agricultural Planting

Key Challenges

1. **Microbial Pollution in Irrigation Water Causing Disease Outbreaks:** Vertical planting often uses recirculating irrigation, repeated water use breeds plant pathogens (e.g., tomato late blight, strawberry gray mold) and fecal microbes (e.g., E. coli O157:H7); in fruit planting, rainwater/river irrigation spreads pathogens to fruit surfaces or roots, causing widespread diseases.
2. **Residues and Ecological Costs of Chemical Disinfection:** To control diseases, some growers use copper/chlorine agents for irrigation water, accumulating residues in soil causing compaction and beneficial microbe reduction, polluting fruit surfaces and affecting produce safety.
3. **Management Challenges in Efficient Planting Modes:** Dense pipelines and branches in vertical planting irrigation hard for manual cleaning to cover, forming "dead corner pollution"; large-scale fruit planting blocks have vast irrigation areas, low efficiency in manual water testing, unable to monitor disinfection real-time, diseases spread rapidly park-wide upon outbreak.

Solution

- **Vertical Planting Scenario:** Form "three-level disinfection network" at reservoir outlets, circulating main lines, and branch inlets per cultivation rack layer in vertical greenhouses. Install medium-large UVC units at reservoir outlets for makeup water; deploy medium-flow UVC modules in main circulating lines for per-cycle disinfection; add small components at branch inlets to prevent local pollution.
- **Fruit Planting Scenario:** ① Field Irrigation Disinfection: Install large UVC units (flow 20-50m³/h) at orchard irrigation pump stations, with variable frequency control to auto-adjust based on area; install micro UVC at each drip branch inlet for sterile dripper output, preventing root infections. In strawberry planting, add modules before spray heads to avoid pathogen spread in atomization. ② Post-Harvest Cleaning Disinfection: After picking, deploy UVC disinfectors at cleaning line water supplies, ensuring wash water ≤10CFU/mL to avoid cross-contamination during cleaning.



Value Embodiment

- **Disease Control for Stable Yield:** Post-disinfection irrigation pathogen detection <0.5%, hydroponic lettuce root rot from 80% to 5%, vertical strawberry gray mold from 35% to 4%.
- **Zero Residues Boost Competitiveness:** Replace chemical disinfectants and fumigants, pesticide use down 50%-70%, produce "zero pesticide detection.
- **Water Saving, Cost Reduction, Efficiency Boost:** Hydroponic water utilization from 40% to 95%, vertical irrigation from 60% to 85%; pipeline blockage down 90%, maintenance from 2 days weekly to 30 min daily, labor costs down 50%; energy consumption 1/10 of original UV.

Commercial Application Scenario:

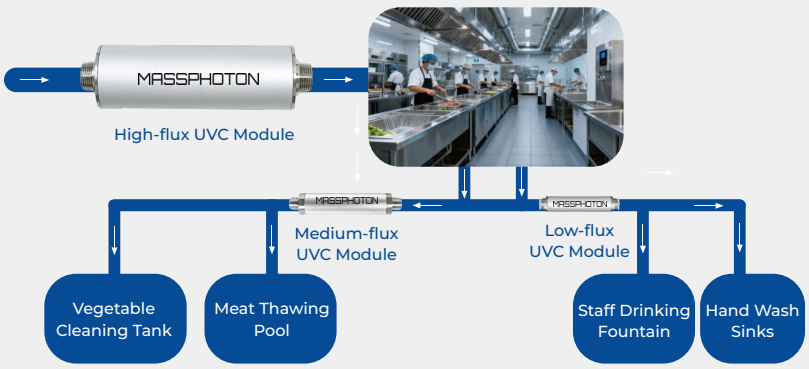
Central Kitchens and Food Processing,
Multi-Dimensional Enhancement from Safety to Efficiency

Key Challenges

1. **Microbial Pollution Causing Foodborne Disease Risks:** Raw material wash water and equipment rinse water containing Salmonella, Listeria, E. coli O157:H7 easily cause poisoning via fruits/veg, meat, dairy carriers.
2. **Residues and Quality Impact of Chemical Disinfection:** Traditional chlorine (e.g., sodium hypochlorite) for water treatment provides short-term kill but forms chlorine residues on food surfaces, affecting taste (chlorine in drinking water, off-flavors in juice); reactions with organics produce trihalomethanes, increasing failed safety inspections.
3. **Production Efficiency and Compliance Pressure:** High water use in central kitchens/food plants (dozens to thousands tons daily), frequent residue testing time-consuming; biofilms on pipelines/tanks require 3-4 hour shutdowns for manual cleaning, affecting assembly line progress.

Solution

- Central Kitchen: Install large UVC units (flow 50-200m³/h) at inlet pipelines for source pre-treatment; add medium modules (10-30m³/h) at vegetable wash tanks, meat thaw pools; embed small components at staff drinkers, hand basins, forming "total-branch-terminal" three-level protection.
- Beverage/Juice Processing: Install long UVC systems in raw water pre-treatment, add UVC modules before filling pipelines to prevent secondary pollution, meeting aseptic filling requirements.
- Food Processing Water: E.g., dough mixing water for bread, tempering water for chocolate, install small UVC modules before use points to meet product-specific standards.



Value Embodiment

- **Block Foodborne Risks:** Post-disinfection water pathogen kill rate 99.999%.
- **Zero Residues Improve Quality, Boost Competitiveness:** Replace chemicals, no chlorine on food surfaces, enhanced taste in juices/drinking water.
- **Cost Reduction, Efficiency, Output Boost:** Water recycling rate up 50%-70%, annual savings over 200,000 yuan; biofilm reduction lowers cleaning from 3x to 1x weekly, cleaners down 60%; auto data logging generates compliance reports, manual testing costs down 70%.

Commercial Application Scenario:

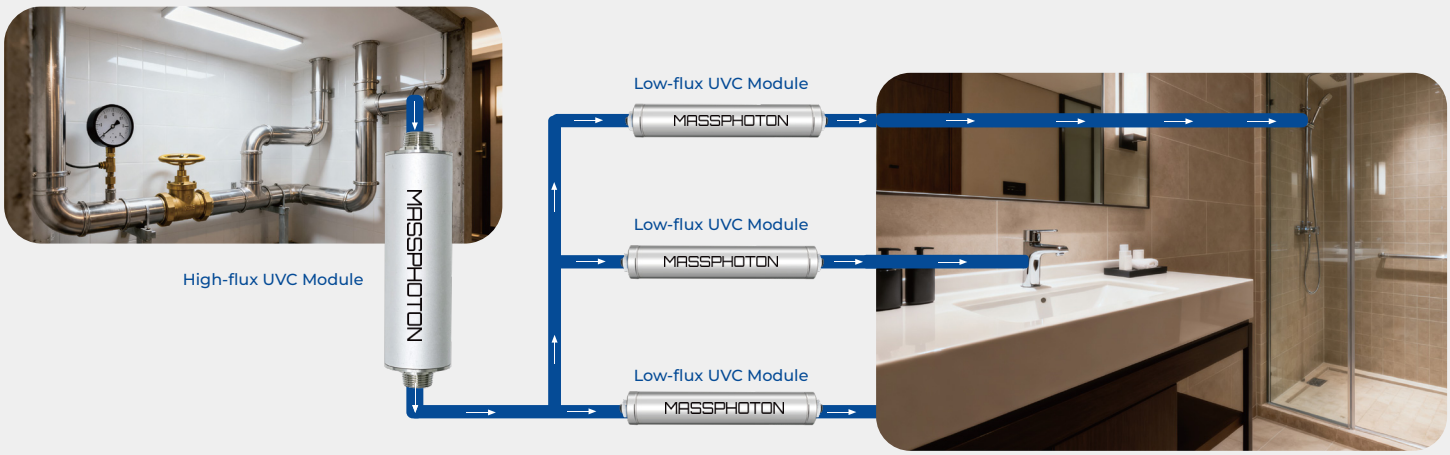
Hotel Water Safety Management Shifting from "Basic Assurance" to "Experience Value-Add"

Key Challenges

1. **Pipeline Biofilms Causing Health Risks:** Hotel supply pipelines stagnant long-term (e.g., vacant rooms), suitable temperatures breed Legionella, Pseudomonas aeruginosa and biofilms. Guests inhale bacteria-laden shower mist, risking Legionnaires' disease (mortality 10%-30%); faucet water microbial exceedance causes skin allergies, digestive discomfort.
2. **Chemical Disinfection Affects Experience and Equipment Life:** Traditional chlorine for tanks/pipelines leaves odors, causing irritating smells in room drinking/shower water, impacting guest experience; chlorine corrodes pipeline walls and water equipment (heaters, coffee machines), shortening lifespan.

Solution

- Install medium UVC modules (flow 5-10m³/h) at floor supply branch inlets; embed micro components at each room basin/shower faucets, forming "area-terminal" dual protection;



Value Embodiment

- **Block Health Risks, Protect Brand Reputation:** Post-disinfection pathogen kill 99.999%, room Legionella detection 0.
- **Enhance Experience Quality, Boost Competitiveness:** Chlorine-free drinking water, non-irritating showers, improved guest satisfaction.
- **Cost-Effective Operations:** Water recycling up 40%-60%, annual savings over 150,000 yuan; biofilm reduction lowers water equipment maintenance 50%, hot water energy down 12%.

Commercial Application Scenario:

Commercial Water Dispenser Safety Management from "Passive Inspection Response" to "Proactive Defense Building"

Key Challenges

1. **Secondary Pollution Causing Microbial Exceedance Risks:** Barrel water dispenser reservoirs and faucet gaps breed E. coli, Pseudomonas; summer heat can exceed colonies 10x; direct drinker/vending machine post-RO tanks form biofilms if not disinfected timely, output "visually clear but microbiologically exceeding".
2. **Maintenance Pressure:** Dispersed commercial dispensers require heavy manual cleaning, annual per-unit cost over 1000 yuan; GB 5749-2022 strict on terminal microbial indicators, operators face quarterly inspections and fines for exceedance.

Solution

- **Barrel Water Dispenser:** Embed static UVC LED antibacterial modules in reservoirs for real-time sterilization; add micro UVC flow sterilizers before cold/hot faucets, forming "storage + output" dual barriers to eliminate terminal pollution.
- **Direct Drinker/Vending Machine:** Integrate UVC modules post-RO membrane, in tanks, main lines, and outlets for "purification-storage-output" full-process dead-angle-free disinfection.
- **Smart Maintenance:** Connect to IoT platform for real-time upload of disinfection duration, water parameters, lifespan; support remote "pipeline flush + enhanced disinfection + smart cutoff" programs.

Value Embodiment

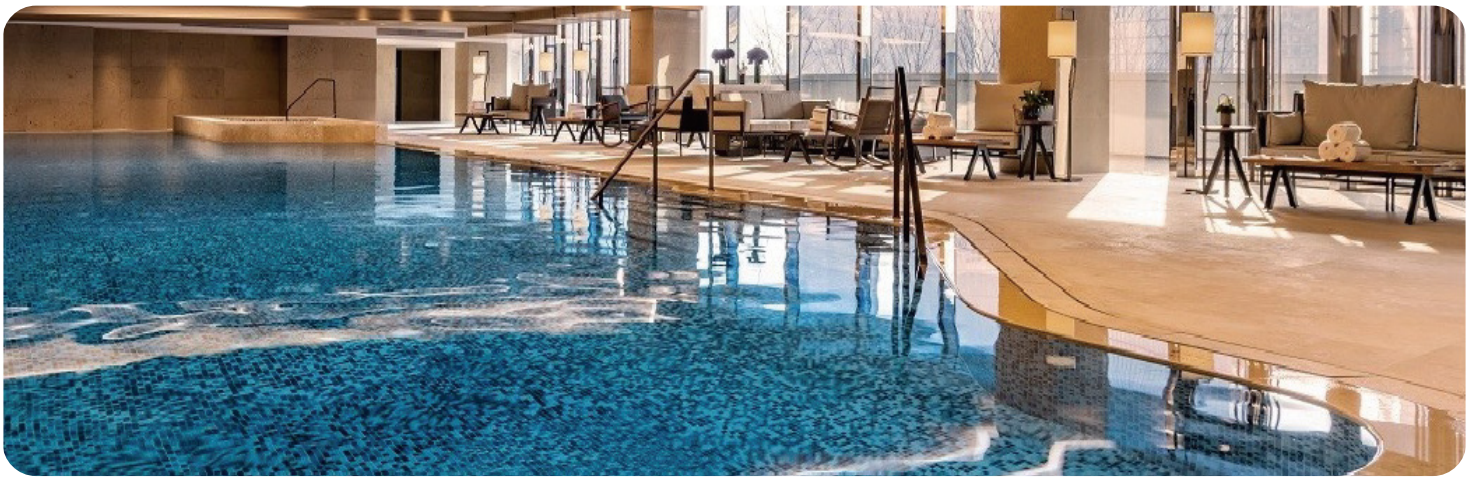
- **Strengthen Health Defense, Reduce Risk Costs:** Post-output colonies ≤5CFU/mL, pathogen detection 0.
- **Cost Reduction, Maintenance Efficiency, Market Boost:** Auto disinfection reduces manual cleaning, per-unit annual cost from 600 to 180 yuan; smart monitoring boosts efficiency 300%.

Commercial Application Scenario:

Swimming Pool Water Purification Solution, Reducing Chemical Disinfectant Use

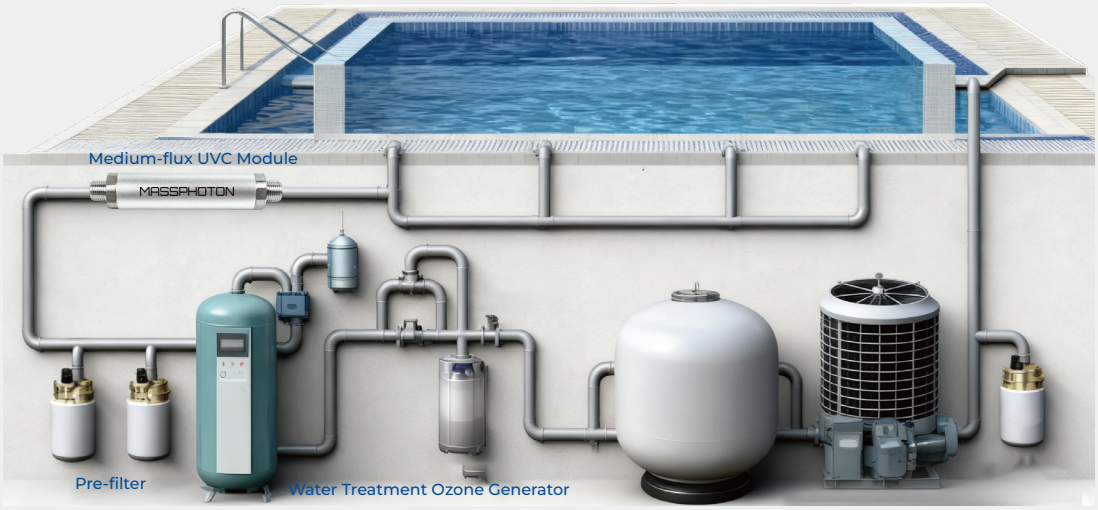
Key Challenges

1. **Traditional pool chlorine disinfection reacts with sweat/urine to form "trichloramine",** causing "pungent chlorine smell", irritating skin/eyes, reducing experience. High trichloramine may cause eye swelling, throat pain, skin allergies.



Solution

- Add MASSPHOTON medium-flux UVC LED water disinfector to pool circulation systems (with filtration, ozone), reducing chlorine use 50-70%, UVC LED kills stubborn viruses ozone can't (e.g., norovirus).



Value Embodiment

- Reduce pool chlorine odor, extend water change frequency (traditional weekly to 2-3 weeks with UVC), lowering water costs.

MASSPHOTON

Public Application Scenario:

Public Direct Drinking Water Assurance,
Achieving Sterile-Level Direct Drinking and Efficient Maintenance

Key Challenges

1. **Secondary Pollution Risks Under High-Frequency Use:** Campus direct drinker faucets/tanks breed E. coli, Staphylococcus from student hand contact/splashes; municipal points (parks, subways) exposed outdoors, dust/insects enter, summer exceedance up to 35%.
2. **Experience-Safety Conflict in Traditional Disinfection:** Manual dismantling pauses use (1-2 hours per unit), affecting supply; chlorine soaking kills but leaves taste; ozone requires 30+ min wait before drinking.
3. **Large-Scale Maintenance and Regulatory Pressure:** Large campuses (universities) have hundreds of units, city-wide municipal points require heavy manual inspections, high annual per-unit costs.

Solution

- Integrate UVC modules post-RO membrane, in tanks, main lines, outlets for "purification-storage-output" full dead-angle-free disinfection.
- Data Monitoring and Alerts: All devices connect to IoT platform, real-time upload UV intensity, running status; auto alert or cutoff if intensity drops to 70% or water abnormal. Support remote "enhanced disinfection", campus/municipal staff manage 300+ units per person via PC, greatly reducing labor.

Value Embodiment

- Strengthen Health Defense, Reduce Risks: Post-output colonies ≤5CFU/mL, pathogens 0.
- Cost Savings, Maintenance Boost, Competitiveness: Auto reduces cleaning, per-unit cost from 600 to 180 yuan; smart system boosts efficiency 300%.

Pilot Cases: —— Beijing Universal Resort

UNIVERSAL BEIJING RESORT

MASSPHOTON

Public Application Scenario:

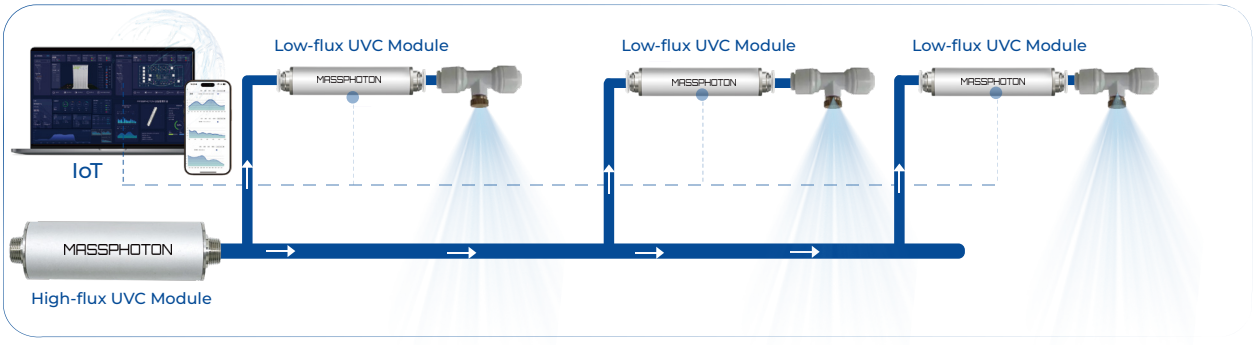
Suitable for Outdoor Atomization Cooling Systems

Key Challenges

1. **Microbial Exceedance and Health Risks:** Full chain from municipal supply to atomizing nozzles has breeding risks: Reservoirs prone to dust/insects, humid environments breed Legionella, E. coli, colonies exceed 20x in summer heat; pipeline walls form biofilms, water visually clear but hidden exceedance; nozzle apertures 0.1-0.5mm easily blocked by microbes breeding bacteria, spreading via aerosols causing respiratory infections, skin allergies in vulnerable groups like elderly/children.
2. **Equipment Blockage and High Maintenance Costs:** Systems dispersed outdoors, manual periodic dismantling of reservoirs, pipelines, nozzles for cleaning, annual per-system cost over 800 yuan; nozzles frequently replaced due to microbial blockage (1-2x monthly), consumables over 300 yuan/year, blockage causes uneven atomization, cooling efficiency down over 50%.

Solution

- **Source End:** Add pre-treatment UVC modules at reservoir inlets, embed static UVC antibacterial inside for "inlet - storage" dual sterilization;
- **Transport End:** Install pipeline UVC flow modules every 5-10m in main/branch pipes for real-time microbial kill;
- **Atomization End:** Add micro UVC before nozzle inlets for anti-blockage + final disinfection;
- **Smart Maintenance:** Connect all UVC LED modules to "Outdoor Atomization System IoT Platform" for real-time monitoring, remote control, alert reminders.



Value Embodiment

- **Strengthen Public Health Defense, Zero-Risk Operations:** Post-disinfection water microbes ≤10CFU/mL, aerosols pathogens 0, fully compliant, eliminating respiratory/skin risks; shift from "passive inspections" to "proactive monitoring", no fine worries, avoid service losses from pauses.
- **Cost Savings, Ease Burden:** Auto reduces 90% manual cleaning (monthly to quarterly), per-system cost from 800 to 200 yuan; reduced wear, nozzle blockage down 95%, replacement from 300 to under 30 yuan/year, stable atomization keeps cooling at 90%+.
- **Enhance Public Service Experience, Strengthen Competitiveness:** Clean odor-free aerosols avoid "fishy post-atomization", improve comfort; failure rate down 80%, less downtime, ensure continuous cooling in parks/squares, help build "healthy, comfortable" image.