MASSPHOTON



Industry Solution

# Water Treatment for Villas

UVC LED Disinfection Solution

MASSPHOTON


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MASSPHOTON

A Leader in Semiconductor Ultraviolet Technology and Application



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# Core Pain Points

The Middle East faces acute water scarcity. Residential water supply relies primarily on desalinated seawater, groundwater, and truck-delivered water, with fluctuating source quality and extended supply chains that pose ongoing challenges to end-use water safety.

High-end villas represent more than mere living spaces; they embody a lifestyle and safety standard. As end-users increasingly demand healthier, eco-friendly, and smarter living environments, conventional water treatment methods can no longer fully satisfy affluent households' comprehensive requirements for safe drinking water, comfortable living, and low-maintenance experience.



### Stagnant Water Contamination

Elevated temperature of stored water accelerates the growth of bacteria, algae and biofilms. Infrequent tank cleaning easily causes sediment buildup and peculiar odors.

### Pipeline Secondary Pollution

Extended domestic water pipelines greatly increase the risk of secondary water contamination.

### Unstable Source Water Quality

Variable water quality from desalinated seawater, groundwater and truck-supplied water brings uncertain water safety risks.

### Higher Hygiene Requirements

Modern users raise stricter standards for the hygienic safety of drinking, bathing and landscape water.

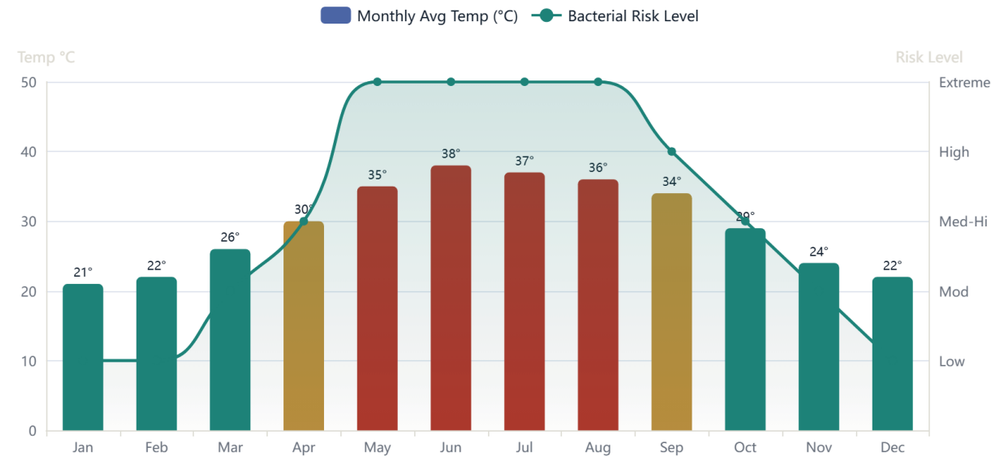
### Defects of Traditional Disinfection

Conventional chemical disinfection causes residual chlorine, peculiar odors, pipeline corrosion and high maintenance costs.

## Legionella Risk

Legionella bacteria multiply rapidly in stagnant water at 20-45°C. In Oman, water temperatures inside domestic water storage tanks frequently fall within this range during summer. Infection may cause Legionnaires' disease with a fatality rate of 10-15%. Conventional chlorine disinfection delivers limited efficacy against Legionella embedded inside biofilms. UV-C ultraviolet radiation is a highly effective inactivation method recommended by the WHO and CDC.

**Figure 1: Muscat Monthly Average Temperature & Bacterial Risk Level**



# Solution Overview

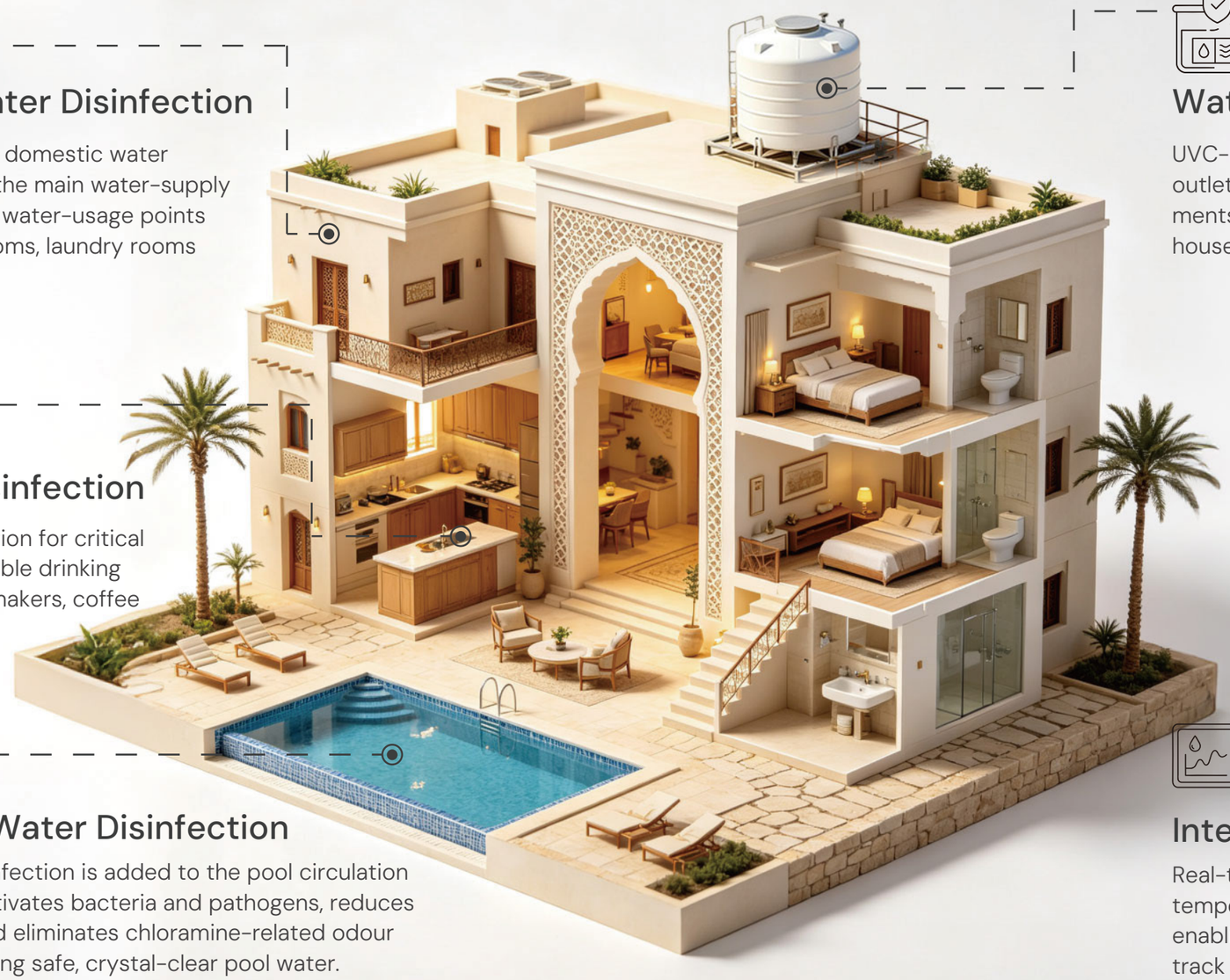
Centered on UVC-LED disinfection technology, this solution follows the technical route of "Whole-house Water Purification + Point-of-use Disinfection + Intelligent Monitoring" to build a full-chain water-safety protection system covering water storage, distribution and end-point water consumption for villa residents.

## Whole-house Water Disinfection

Centralized disinfection of domestic water entering the residence at the main water-supply pipeline, covering multiple water-usage points including kitchens, bathrooms, laundry rooms and guest rooms.

## Point-of-use Disinfection

Provides targeted protection for critical water points such as potable drinking water, kitchen water, ice makers, coffee machines and showers.

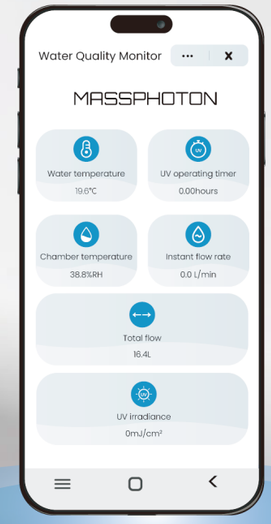


## Swimming Pool Water Disinfection

Integrated UVC-LED disinfection is added to the pool circulation system. It efficiently inactivates bacteria and pathogens, reduces chlorine consumption and eliminates chloramine-related odour and skin irritation, delivering safe, crystal-clear pool water.

## Water Storage Tank Protection

UVC-LED disinfection units can be installed at the outlet of the water storage tank per project requirements, lowering the risk of microorganisms entering household water pipelines.




## Intelligent Operation & Monitoring

Real-time monitoring of equipment operating status, flow, temperature, UV output and maintenance reminders, enabling property owners and facility managers to keep track of system performance.

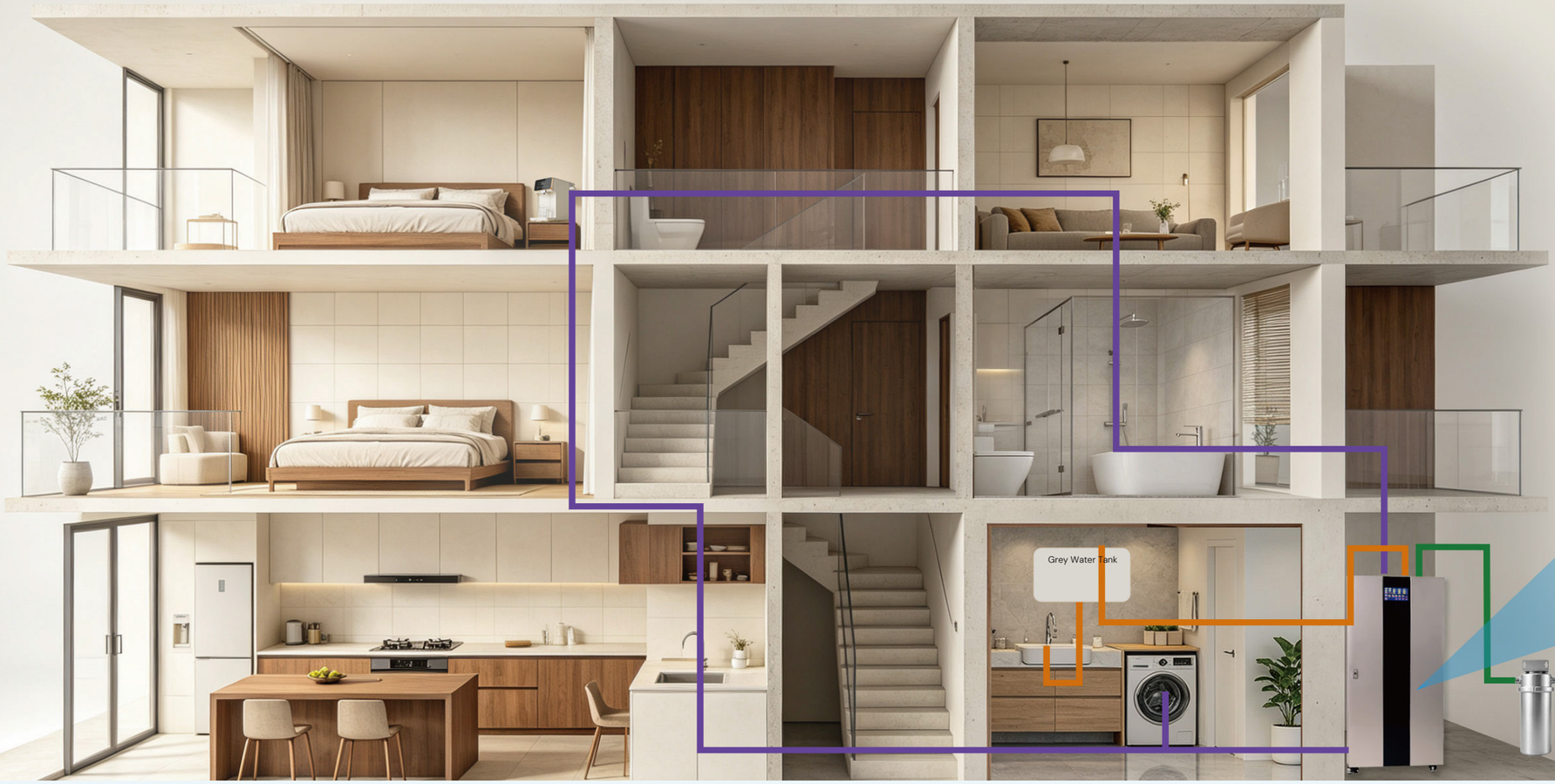
## Advantages of UVC-LED Technology

- High-efficiency Microbial Inactivation
- Long Service Life & Easy Maintenance
- Instant On-off, No Warm-up Required
- No added-chemical residues for Pure Water Quality
- Mercury-free & Eco--friendly, Safe to Use
- Low-power Consumption & Cost-saving Operation

Premium

# Intelligent Whole-house Water Safety System

Centered on a whole-house water softener equipped with a UVC-LED disinfection module, this solution integrates water quality softening and ultraviolet disinfection. Installed at the main water inlet of the villa, one system covers whole-house water supply, eliminates stagnant water, achieves zero-emission operation, and completes full-chain purification of all domestic water from the source.




## One system covers your entire villa.

The native built-in UVC-LED disinfection module of the whole-house water softener. It integrates water softening and ultraviolet disinfection functions.



Raw Water  Grey Water  Pure Water



## Whole-house Water Purification System

### Intelligent Online Monitoring

Large color touch-LCD shows real-time pressure, flow and water quality, and auto-logs filter through-put and UV run hours.

### High Efficiency & Water Saving

Premium filters and membranes with tail-water recycling achieve >95% recovery for maximum water and energy savings.

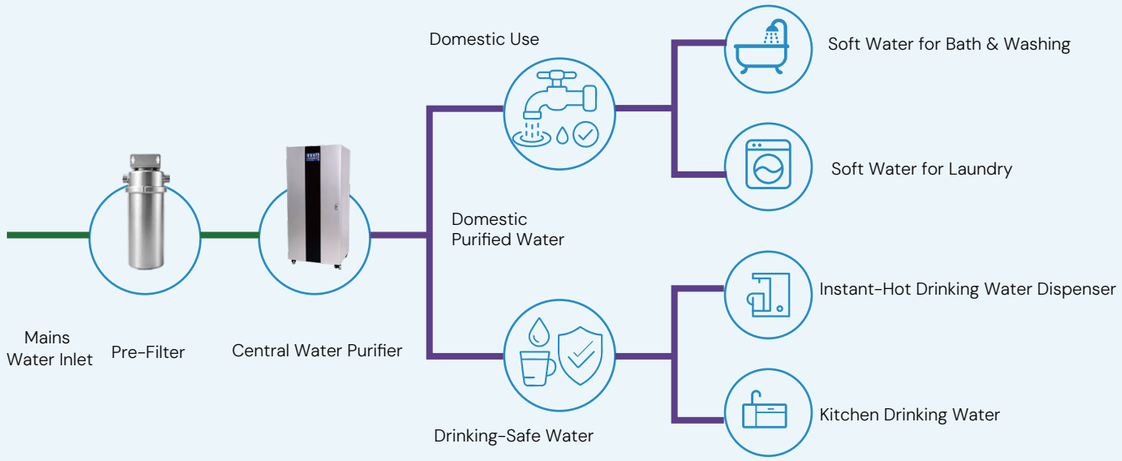
### Cost & Maintenance Friendly

Direct main-inlet connection standardizes whole--house water quality, cuts piping costs and simplifies O&M.

### Emergency Water Supply

Optional 200–500L tank provides 300L+ standby water; built-in booster ensures stable flow and pressure.

| | | |
|---|---|---|
| Dimension(LDH)mm<br>880*570*1935 | Source-Water Condition<br>Municipal tap water, pressure 0.15~0.35MPa | |
| Max Power<br>220V/1.85kW (0.5~1.85kW) | Rated flow rate<br>5m³/h | Water production capacity<br>1585 GPD(6m³/d) |



Economy

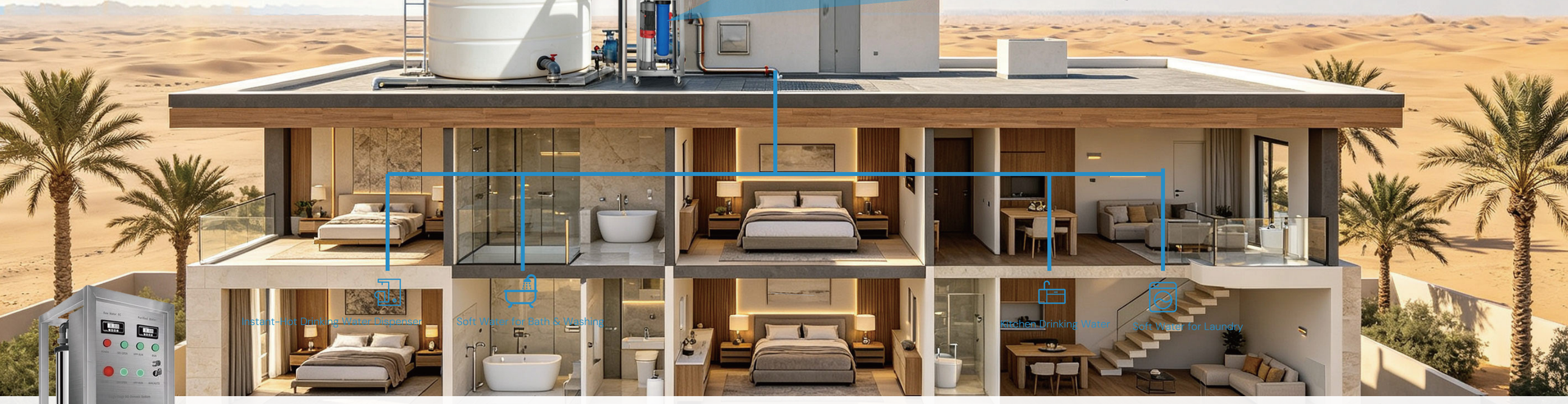
# Whole-house Basic Antibacterial Solution

Designed for rooftop storage-tank supply in villas installed at the tank outlet, the system draws water from the tank and delivers multi-stage treatment-sediment filtration, RO deep purification and UVC-LED disinfection-providing safe domestic water to all points: bathrooms, kitchen, laundry and direct drinking.



Integrated built-in module, UV disinfection at RO membrane pure water outlet.

Ultrafiltration filter traps sediment, suspended solids, colloids and large-molecule contaminants to elimi-nate unwanted color and odor. Built-in UVC-LED module performs secondary disinfection on residual microbes, delivering dual-purification protection for safe household wate






## Ultrafiltration Purifier System

The complete system combines multi-stage filtration with a UVC LED water disinfection module. It draws water from the storage tank, performs sediment filtration, RO deep purification and UV disinfection, and delivers safe domestic water to all points—bathrooms, kitchen, laundry and direct drinking.

| | | |
|---|---|---|
| Flow Rate<br>250 L/H | Voltage<br>220V/50Hz (customizable) | Control Mode<br>Fully automatic control |
| Power<br>1.1 KW | Flow Monitoring<br>Pure water / Wastewater | Flushing Method<br>Solenoid valve + Manual valve |

### RO Deep Purification

RO membrane module, effectively removes heavy metals, bacteria, viruses and dissolved solids for superior output water quality.

### Low Maintenance

Modular cartridge design, easy replace-ment, stable operation, long maintenance intervals.

### Integrated UVC Disinfection

UVC LED module built into purifier body, RO and UV disinfection completed simulta-neously, no additional equipment

### Fully Automatic Control

Fully automatic control mode, solenoid + manual valve flushing, pure/wastewater dual flow and inlet/working dual pressure monitoring.

Economy

# Whole-house Basic Antibacterial Solution

This whole-house antibacterial solution takes raw water from the storage tank. Treated by sediment filtration, softening and chemical-free UVC-LED disinfection, it supplies clean water to all villa outlets including bathroom, laundry and kitchen with cost-effective safety protection.




- Bathroom
- Kitchen
- Laundry
- Drinking Water (with RO system)

Raw Water
From Storage Tank

**1 Sediment Filter**

Removes sand, rust, suspended solids and particles

**2 Soft Water Treatment**

Softens water, reduces scale, protects pipes and equipment

**3 UVC Water Disinfection**

Inactivates 99.9999% of bacteria, viruses and pathogens without chemicals

**4 Clean & Safe Water**

Disinfected water flows to every tap in your villa—covering washing, laundry, kitchen, and cleaning




## MASSPHOTON UVC LED Water Disinfection System

**MP-UVC-48LC**

Effective Disinfection · Low Maintenance · 100% Efficacy Test · Intelligent · Easy to Install · Eco-Friendly & Energy-Efficient

## Key Features

- Safe: Mercury-Free UV-C LED Technology-Environmentally friendly, non-toxic, and compliant with global regulations.
- Effective: Achieves up to 99.999% Pathogen Reduction (5.0 log) against bacteria, viruses, and microbes.
- Efficient: Up to 90% energy savings with low power operation, reducing costs.

# Point-of-use Disinfection Solution

This Point-of-use Disinfection Solution deploys a compact UVC-LED module post whole-house filtration. Choose between under-sink or faucet-terminal installation for end-point protection against stagnant-water contamination.




Option 1:
Under-Sink Pipeline Installation

Option 2:
Faucet-Terminal Installation

## Option 1: Under-Sink Pipeline Installation

The UVC-LED disinfection module is connected to the water-supply pipe under the kitchen sink. After whole-house filtration, water flows through the UVC-LED module for UV disinfection before reaching the faucet.

## Option 2: Faucet-Terminal Installation

The UVC-LED disinfection module is fitted directly beneath the faucet spout, acting as the final disinfection barrier before water flows out.




### MASSPHOTON UVC LED Water Disinfection System

**MP-UVC-4LC**

Effective Disinfection · Low Maintenance · 100% Efficacy Test · Intelligent · Easy to Install · Eco-Friendly & Energy-Efficient

### Key Features

- Safe: Mercury-Free UV-C LED Technology–Environmentally friendly, non-toxic, and compliant with global regulations.
- Effective: Achieves up to 99.999% Pathogen Reduction (5.0 log) against bacteria, viruses, and microbes.
- Efficient: Up to 90% energy savings with low power operation, reducing costs.

# Pool Circulation Water Disinfection Solution

The UVC LED disinfection module is built into the all-in-one unit, located downstream of the quartz sand filter and upstream of the water outlet.
All circulating pool water, every drop passes through UVC LED irradiation within each circulation cycle.



## Buried Filtration & Disinfection System

Sand filtration + pump circulation + UVC LED disinfection 3-in-1 buried integrated unit, with built-in UVC LED water disinfection module, completing pool water filtration, circulation and disinfection in one device.
A sand filter removes suspended solids and impurities, while built-in UVC LED technology rapidly inactivates bacteria, viruses, Cryptosporidium, and algae spores. A low dose of chlorine provides lasting protection. This delivers clear, odor-free, skin-friendly pool.

- **3-in-1 Integration**
  Sand filter, circulation pump, and UVC LED disinfection module integrated in one unit, completing filtration, circulation and disinfection in a single device without separate component installation.
- **Chlorine Reduction**
  UVC LED reduces chlorine usage by 50%-80%, effectively photodegrading chloramines, eliminating pool odor and eye irritation.
- **Buried Installation**
  Entire system buried underground with only control panel above ground, preserving pool landscape space, quiet
- **Easy & Quick Installation**
  Durable, ready-to-install housing connects directly to pre-installed piping. No plant room needed—eliminates traditional concrete rooms and saves installation labor and time.



# Expected Benefits

Compared with traditional methods that rely on manual cleaning and chemical disinfection, this solution offers clear advantages in microbial control, operational efficiency, and lifecycle cost reduction.

### Improved water safety

Continuously suppresses the growth of bacteria, viruses, and biofilms in storage tanks and pipelines, reducing the risk of secondary contamination and ensuring safer water at the point of use.

### Reduced cleaning frequency

Reduce reliance on traditional cleaning, disinfection, and inspection, improve maintenance efficiency, and lower labor input as well as service interruption impacts.

### Lower long-term operating costs

Reduces the use of disinfection chemicals, labor costs, and emergency maintenance expenses, helping to decrease the total lifecycle cost of the system.

### Enhanced system stability and responsiveness

Enables real-time monitoring and alerting for water quality, UV intensity, flow rate, and equipment status, improving the system's visibility and controllability.

### Stronger smart and green positioning

Chemical-free, mercury-free, and built for long-term stable operation, the solution aligns with green building, smart water management, and sustainability trends.

# Product Parameters



| Module | MP-UVC-R1-0.5T/H |
|---|---|
| Overall Dimensions (LWH) mm | 880*570*1935 |
| Water Source Conditions | Municipal Tap Water, Pressure Range 0.15~0.35MPa |
| Max Power (Power Range) | 220V/2.4kW (0.8~2.4kW) |
| Water Production | 3171 GPD (12m³/d) (Temp 25°C)(0.8~2.4kW) |
| Recovery Rate | Temp 25°C, Tap Water |
| 304 Stainless Steel Water Tank | 260L |
| Greywater Recovery Tank | Optional |
| Permanent Magnet Variable Frequency Water Supply | Rated Flow: 5m³/h, Rated |
| Control System | PLC IoT Control System + 10-inch Touch Screen + Digital/Analog Gauges |
| Disinfection Method | UVC LED |
| UV-C LED Wavelength | 270-280 nm |
| UV-C LED Lifetime | L70 ≥ 15,000 Hours |



| Module | MP-UVC-T1-0.25T |
|---|---|
| Flow Rate | 250L/H |
| Net Weight | 47.64Kg |
| Gross Weight (with wooden case) | 65Kg |
| Product Size (LWH) mm | 370*370*1300 |
| Voltage | 220V/50HZ(customizable) |
| Pre-filter | 20" PP *1 |
| RO Membrane Quantity | 4040 *1 |
| Power | 1.1KW |
| Flow Monitoring | Pure water / Wastewater |
| Pressure Monitoring | Inlet pressure / Working |
| Control Mode | Fully automatic control |
| Flushing Method | Solenoid valve + Manual valve |
| Disinfection Method | UVC LED |
| UV-C LED Wavelength | 270-280 nm |
| UV-C LED Lifetime | L70 ≥ 15,000 Hours |



| Module | MP-UVC-D1 |
|---|---|
| Hair Collector | Yes |
| Casing Material | Acrylic |
| Tank Material | Fiberglass (FRP) |
| Filtration Precision | 5 |
| Voltage | 220V/50HZ(customizable) |
| Filter Media Type | Quartz Sand |
| Max Operating Temperature | 40°C |
| Disinfection Method | UVC LED |
| UV-C LED Wavelength | 270-280 nm |
| UV-C LED Lifetime | L70 ≥ 15,000 Hours |







| Module | MP-UVC-4LC | MP-UVC-48LC |
|---|---|---|
| MASSPHOTON STANDARD CONFIGURATION (30 mJ/cm² at 95% UVT) | 4 lpm (1.1 gpm) (0.25 m³/hr) | 48 lpm (12.7 gpm) (2.9 m³/hr) |
| ALTERNATE CONFIGURATION (16 mJ/cm² at 95% UVT) | 7.5 lpm (2.1 gpm) (0.4 m³/hr) | 90 lpm (23.8 gpm) (5.5 m³/hr) |
| ALTERNATE CONFIGURATION (40 mJ/cm² at 95% UVT) | 3 lpm (0.8 gpm) (0.2 m³/hr) | 36 lpm (10 gpm) (2.1 m³/hr) |
| Power Adapter Input | 100-240 V 50/60 Hz | 100-240 V 50/60 Hz |
| Total Power | 8 W | 15 W |
| Power Supply Method | Adapter | Adapter |
| UV-C LED Wavelength | 270-280 nm | 270-280 nm |
| UV-C LED Lifetime | ≥ 15,000 Hours | ≥ 15,000 Hours |
| Connection Size | 1/4" Quick Connect | 1" MNPT |
| Maximum Inlet Pressure | 0.4 MPa (60 psi) | 0.48 MPa (60 psi) |
| Operating Temperature Range | 5℃ to 40℃ (41℉ to 104℉) | 5℃ to 40℃ (41℉ to 104℉) |
| Product Dimensions | φ1.7*10 in (φ142*252 mm) | φ2.8*13.3 in (φ70*338.5 mm) |
| Exterior Material | 304 Stainless Steel (316 Available Upon Request) | Anodized Aluminum |

*Note: Parameters for reference only; subject to change per project requirements.

# MASSPHOTON

We focus on technological innovation and application to build healthier, safer living environments.
Liyu Semiconductor specializes in UV-C LED disinfection systems to protect human health from bacteria and viruses. This mission remains unchanged through continuous innovation.

# ABOUT US

## UV-C LED Technology

Founded by experienced engineers, we focus on UV- C LED chip and product R&D. We deliver high-performance disinfection systems to protect public health.

## Digital Disinfection Technology

We have rich experience in air, surface and water disinfection. Our self-developed NitroSteriX™ leads the industry.

## Industry Solutions

Combining IoT and AI, we provide tailored solutions for various sectors via continuous innovation.

