MUNICIPAL

DRINKING WATER & WASTEWATER

EXPERTS IN UV DISINFECTION

atg evoqua

ABOUT US

UK'S MARKET LEADING UV EQUIPMENT PROVIDER FOR THE MUNICIPAL DRINKING WATER INDUSTRY, SUPPLYING OVER 90 UV PLANTS IN AMP 5 & AMP 6

SPECIALIST MANUFACTURER OF MEDIUM PRESSURE & AMALGAM LOW PRESSURE UV SYSTEMS, MOBILE UV RIGS & CONTAINERISED UV PLANTS

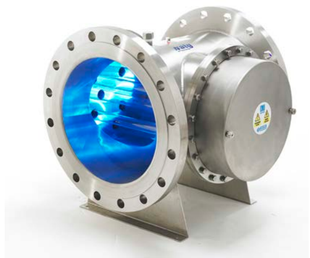
MUNICIPAL DRINKING WATER & WASTEWATER

Established in 1981, atg Evoqua have developed to be a world market leader in the design and manufacturer of medium pressure and low pressure amalgam UV systems, deployable mobile skid packages and containerised UV plants. As a specialist supplier to the municipal drinking water and wastewater industry, atg Evoqua have become known worldwide for innovative engineering solutions, high quality manufacturing and for having an unrivalled passion for collaborative research and development.

With over 35 years of expertise in municipal drinking water and wastewater applications, atg Evoqua have delivered 100's of UV plants worldwide, including many of the UK's largest potable drinking water plants treating over 240 MLD (10,000 m3/hr) each and every day.

Operating from a modern, purpose built UK based manufacturing facility, atg Evoqua serves the UK municipal sector directly from our head quarters in Lancashire, North West England with a team of experienced Engineers, Project Mangers, Technical Advisors and National Water Hygiene Scheme (Blue Card) trained Service Technicians and Commissioning Engineers.

As a global business, atg Evoqua have an established and experienced global distributor, service and after sales network who work closely with atg Evoqua's clients and end users to provide innovative and cost effective UV Disinfection solutions worldwide and award winning customer service and after sales support.



TECHNICAL OVERVIEW

Benefits of UV Disinfection

- Highly effective disinfection technology
- Proven solution for cryptosporidium & giardia
- Chemical-free with no disinfection by-products
- Safe, low risk technology and easy to operate
- Easy to install and retrofit into existing plants
- Can significantly reduce CAPEX, OPEX & TOTEX
- Low maintenance technology
- Independent 3rd party validated performance to US EPA UVDGM (2006)

Municipal Applications

- Drinking water - primary disinfection
- Drinking water - cryptosporidium barrier
- High dose virus removal
- Taste and odour Solutions (AOP)
- Effluent wastewater discharges
- Wastewater reuse (NWRI) - irrigation and industrial
- Wastewater reuse (NWRI) - potable drinking water
- Priority substances directive discharges (AOP)
- Dechlorination of backwash water / run-to-waste

Equipment Options

- Medium pressure UV systems
- Low pressure amalgam UV systems
- Site PLC solutions
- DFMA off site design & manufacture
- 10ft , 20ft, 30ft & 40ft containerised UV plants
- Mobile UV plants / emergency response equipment
- DWI & WIMES compliant designs
- ATEX / IE CEX hazardous areas zones 1 & 2
- Design & manufacture to client specifications

POTABLE DRINKING WATER

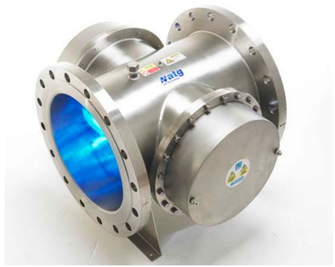
MUNICIPAL DRINKING WATER

Traditionally, chlorine has been used as the primary disinfection barrier for municipal drinking water. However, due to concerns regarding disinfection by-products and the rise of chlorine resistant microorganisms (17 known species), UV disinfection has been widely implemented around the world for both primary disinfection, eliminating the need for chlorination and contact tanks, and as secondary barrier disinfection, installed post chlorination specifically to target chlorine resistent microorganisms such as Cryptosporidium and Giardia.

UV disinfection is a physical process that does not involve the use of chemicals and does not create any disinfection by-products. In some locations / regions, UV is used as the only disinfection barrier, providing the full inactivation of bacteria, protozoan and viruses without the need for any chemicals.

In other locations, UV is used as part of a multi-barrier approach, utilising it as the primary disinfectant followed by the addition of residual chlorine to protect the treated water as it travels through the distribution network.

Specialising in ultra-compact, medium pressure (polychromatic) UV systems and ultra-high output, low pressure amalgam (monochromatic) UV systems, atg Evqoua have designed and manufactured UV disinfection systems, integrated UV plants and mobile, turn-key UV packages for some of the worlds' largest municipal water treatment works, treating over 240 MLD (10,000 m3/hr) daily. With independent 3rd party validation to the US EPA UVDGM, atg Evoqua UV Systems are guaranteed to perform and meet the strict requirements of regulators around the world such as DWI (UK) and NiPH (Norway).



INSTALLATION OPTIONS

Primary Disinfection

- Installed as primary disinfection barrier
- Removes requirement for chlorine contact tanks
- Operates at 40 mJ/cm2 RED
- Provide 4 Log reduction (99.99%) of microorganisms
- Proven Cryptosporidium & Giardia Barrier
- Reduces overall plant OPEX & CAPEX
- Suitable for bore holes & surface water
- 3rd party validation to US EPA UVDGM (2006)
- Can be used in conjunction with residual chlorination (typically dosed at 0.2ppm)

Secondary Barrier Disinfection

- Installed as secondary disinfection barrier
- Located after chlorination stage (contact tank)
- Specifically targets Cryptosporidium & Giardia
- Sized in relation to site UVT% using RED Bias
- Operates at 16.56 - 30.06 mJ/cm2 RED
- Options for 2,3,3.5 & 4 Log reductions
- Suitable for bore holes & surface water
- 3rd party validation to US EPA UVDGM (2006)
- Significantly reduces equipment size & operating power compared to primary UV disinfection

US EPA UVDGM VALIDATION

WORLD'S LEADING INDEPENDENT VALIDATION PERFORMANCE STANDARD

In order to meet the strict requirements of municipal drinking regulations worldwide, atg Evoqua offer UV solutions that feature independent 3rd party validation based on bioassay testing with live surrogate micro-organisms (B. Subtilis, MS2 phage T1 & MS2) at a large range of water qualities. This allows the disinfection performance of atg Evoqua's UV systems to be guaranteed against a range of micro-organisms such as Cryptosporidium, Giardia and Adenovirus.

Validation testing is based on the US EPA Ultraviolet Disinfection Guidance Manual (Long Term 2 Enhanced Surface Water Treatment Rule). In comparison to other available validation protocols, such as DVGW or ONORM, which only test to a single UV dose set point of 40 mJ/cm2, the US EPA UVDGM validation method allows for the selection of a wide range of UV dose set points.

The result is a highly flexible validation report that allows for guaranteed performance of a UV system at UV doses between 10 mJ/cm2 RED and 190 mJ/cm2 RED. For drinking water operators, this is of particular importance when implementing secondary barrier disinfection, aiming for log reductions of micro-organisms e.g. 3.0 Log (99.9%) reduction of Cryptosporidium.

Shown in table 1 (right) by adopting the US EPA UVDGM Validation, UV systems can be sized to provide the optimum UV dose in direct relation to the specified UVT% and target micro-organism. In the case of UVT% values higher than 90% T10, the operational power savings are typically 50% less when using the US EPA UVDGM compared to the required operating power of DVWG and ÖNORM solutions, which can only offer 40 mJ/cm2 in any circumstance.

HIGHLY FLEXIBLE VALIDATION STANDARD THAT GUARANTEES DISINFECTION PERFORMANCE AT UV DOSES OF 10 MJ/CM2 RED TO 190 MJ/CM2 RED

US EPA UVDGM BENEFITS

US EPA UVDGM (2006)

- Operate at a large range of UV doses (10 - 190 mJ/cm2)
- Primary disinfection at 40 mJ/cm2
- Cryptosporidium barrier at 16.56 - 30.06 mJ/cm2
- Adenovirus reduction - 120 mJ/cm2 / 186 mJ/cm2
- Sized directly in relation to the on site UVT%
- Includes validation safety factors & RED Bias
- Offers significant CAPEX & OPEX savings
- Install 5 x pipe diameters or CFD analysis of installation
- Accommodates for minor design changes (+/- 10%)
- Modern standard adopted worldwide

UVT %	US EPA UVDGM		DVGW		ONORM	
	Primary Disinfection	Cryptosporidium Barrier*	Primary Disinfection	Cryptosporidium Barrier	Primary Disinfection	Cryptosporidium Barrier
95% UVT	40 mJ/cm2	16.56 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
90% UVT	40 mJ/cm2	20.76 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
85% UVT	40 mJ/cm2	24.12 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
80% UVT	40 mJ/cm2	26.64 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
75% UVT	40 mJ/cm2	28.32 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
70% UVT	40 mJ/cm2	30.06 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2	40 mJ/cm2
65% UVT	40 mJ/cm2	41.85 mJ/cm2	40 mJ/cm2	N/A	40 mJ/cm2	N/A
60% UVT	40 mJ/cm2	43.716 mJ/cm2	40 mJ/cm2	N/A	40 mJ/cm2	N/A

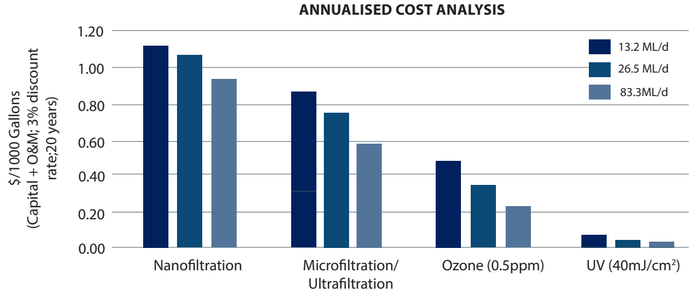
* For Cryptosporidium, the US EPA UVDGM uses the actual dose response rate of the microorganism (12 mJ/cm2 RED) x the RED Bias to achieve the required 3.0 Log reduction (99.9%). As the UVT% decreases, the RED Bias changes to reflect the increased difficulty in achieving even dose distribution, increasing the UV Dose to guarantee log reduction performance. By delivering the optimum UV Dose in relation to the microorganism, the US EPA UVDGM avoids over sizing (blanket 40 mJ/cm2 RED) saving on CAPEX and OPEX.

OPEX ADVANTAGES

A Cost Effective Treatment Solution

As operators drive to improve efficiency, many organisations are basing their investment decisions regarding the selection of water treatment equipment on whole-life costing models. This takes into account the capital cost of equipment (CAPEX), and the predicted operational life costs (OPEX) for up to 20 years.

UV disinfection is a cost-effective solution compared to alternative technologies on the market. An annualised cost analysis (graph to right) illustrates how UV disinfection is the most cost-effective technology available when compared to nano-filtration, micro-filtration/ultra-filtration and ozone.



TASTE & ODOUR SOLUTIONS

ADVANCED OXIDATION (AOP)

Taste and odour challenges in municipal drinking water are created as a result of Cynobacteria (Blue-Green Algae) blooms that occur during late summer and early autumn when weather is warm. When Cynobacteria die and decay, chemical compounds such as geosmin and 2-methylisoborneol (MIB) are released into the environment. These organic compounds can change the organoleptic properties of water, creating earthy or musty tastes and smells. In humans, concentrations levels of only 5ppt to 10ppt (parts per trillion) are detectable.

Whilst MIB and geosmin are not dangerous or toxic to humans, the taste and smell can be very unpleasant causing complaints and damage to reputation for municipal drinking water suppliers and manufacturers of products such as food and beverages.

The atg Evoqua taste and odour solution utilises standard medium pressure UV systems (SX & WF Range) in conjunction with hydrogen peroxide (H^2O^2) dosing to create an Advanced Oxidation Process (AOP) solution that effectively breaks down & removes micro pollutants through oxidation.

Advanced Oxidation creates hydroxyl radicals (-OH) a highly reactive compound species that is highly effective at attacking and breaking down trace organic compounds such as MTBE, Atrazine, NDMA, Pheonals and Nitrobenzene. Critically, Advanced Oxidation is a widely used, proven and cost effective solution for the treatment of seasonal taste and odour compounds (geosmin and 2-methylisoborneol (MIB) and other algal toxins.

TASTE & ODOUR COMPOUNDS SUCH AS MIB & GEOSMIN ARE NATURALLY CAUSED BY BLUE-GREEN ALGAE (CYNOBACTERIA)

DUAL MODE UV TREATMENT

The atg Evoqua solution consists of a UV system designed specifically to treat the inlet contaminant levels of geosmin and 2-methylisoborneol (MIB) together with a H^2O^2 dosing package and storage solution for the AOP chemicals (H^2O^2). The system is designed to provide a solution for both standard disinfection and also respond to the seasonal nature of algae blooms by operating in 2 selectable treatment modes: -

Mode A: Disinfection - all year-round disinfection at 40 mJ/cm2 for a 99.99% reduction in microorganisms and Cryptosporidium).

Mode B: Disinfection + AOP - activated when required in response to seasonal taste and odour outbreaks by increasing the UV dose (600 mJ/cm2 - 1,500 mJ/cm2) plus H2O2 (2ppm - 10 ppm depending on the inlet contaminant concentration).

When the system is changed from Mode A: Standard Disinfection to Mode B: Disinfection + AOP for Taste and Odour control, the UV system increases in operational power / additional UV lamps or reactors are energized to increase the UV dose in order to achieve the require photocatalytic reaction with the H^2O^2 .

The H^2O^2 is dosed into the water upstream of the UV chambers and reacts with UV photons to generate -OH radicals, destroying geosmin and MIB through oxidation.

- Both A and B modes achieve full disinfection.
- Seasonal use of mode B reduces operational costs
- Typically up to 20% cost reduction compared to Ozone & PAC
- Removes need for additional treatment steps e.g. absorption media (PAC / GAC)

WASTEWATER

EFFLUENT WASTEWATER

UV disinfection is now a standard final treatment stage in wastewater treatment plants worldwide and is widely favoured due to its environmentally friendly, chemical free ability to provide high log reductions of all known micro-organisms including Faecal coliforms and E. coli.

As stricter regulations and testing regimes drive effluent discharge standards and water re-use initiatives to achieve greater performance, UV disinfection is fast becoming the "must have" treatment for many wastewater applications worldwide. atg Evoqua's wastewater solutions are guaranteed by independent 3rd party validation based on bioassay testing with live surrogate micro-organisms to guarantee performance against micro-organisms such as E.coli, Faecal coliforms and chlorine resistant protozoa such as Cryptosporidium & Giardia.

Traditionally, wastewater has been treated by open channel UV systems that use large concrete trenches to direct water towards suspended UV lamps. However, due to problems with poor hydraulics, short circuiting of flow streams and treatment dead zones and large required footprints, operators have been looking for alternative designs for wastewater UV plants.

A more efficient approach is to contain the wastewater stream within the pipeline and disinfect the wastewater in a closed vessel UV chamber in the same way municipal drinking water is treated. This ensures optimised hydraulics, improved disinfection performance and keeps the operators from exposure to open wastewater sources. The reduced number of lamps, quartz and smaller footprint of the closed vessel design, will considerably reduce the CAPEX (capital expenditure) costs of a project.

ADVANTAGES

CAPEX Advantages

- ✓ UV chambers install directly into the pipe
- ✓ No requirement for concrete trenches
- ✓ No requirement for large civil structures
- ✓ No requirement for penstocks
- ✓ No requirement for level control
- ✓ Improved hydraulic performance
- ✓ Simple to install indoors or outdoors
- ✓ 100% duty & 100% standby operation easily achieved
- ✓ Designed for retrofitting into redundant open channels
- ✓ Significantly reduced installation footprint

OPEX Advantages

- ✓ Reduced power consumption
- ✓ Significantly less lamps and quartz & ballasts
- ✓ Increased disinfection efficiency
- ✓ Validated performance
- ✓ Accurate UV dose monitoring
- ✓ Individual lamp monitoring
- ✓ Significantly reduced maintenance time
- ✓ Automatic self cleaning reduces maintenance cycles
- ✓ Significant reduction in corrosion and structural damage
- ✓ Improved health & safety - no open water sources

NWRI WATER REUSE

EFFLUENT WASTEWATER REUSE

Traditionally final wastewater is treated using conventional UV systems to meet standards such as the EU Shell Fish Directive and Bathing Water Directive before discharge into the environment e.g. river or coastal waters. However, due to water losses that occur when discharging into the environment, reusing final effluent wastewater for applications such as irrigation of crops, process water and more recently, potable drinking water is now becoming a necessity for many water-stressed locations around the world.

Using the independent testing and performance validation protocols of the NWRI (National Water Research Institute) 3rd Edition 2012 for Wastewater & Water Reuse (also known as California Title 22 standard), wastewater can now follow the requirements of modern drinking water plants with guaranteed disinfection performance based on biometric testing.

Unlike standard wastewater disinfection that operates at 10 mJ/cm2 to 30 mJ/cm2, wastewater reuse (also known as New Water or Water Reclamation) operates at significantly higher UV doses of 50 - 100 mJ/cm2. In addition to performance based on log reduction testing with live surrogate microorganisms (MS2), validation safety factors, fouling factors and lamp efficiency factors are added to the performance calculations to guarantee disinfection performance.

In some applications such as reusing final effluent for potable drinking water without an environmental barrier, atg Evoqua provide Advanced Oxidation (AOP) systems that use Hydroxyl Radicals (OH-) to breakdown and remove organic and chemical contaminants / micro pollutants in addition to providing high-level disinfection.

APPLICATION OF NWRI

Water Reuse (California Title 22)

The NWRI provides a world leading standard for water reuse, and offers a validated minimum performance standard that guarantees filtered and UV treated reclaimed water is pathogen-free (i.e., 5-$\log_{10}$ poliovirus inactivation and a 7-day median total coliform of 2.2 most probable number [MPN]/100ml. Once treated, reclaimed water is classed as suitable for the irrigation of food crops (including all edible root crops), parks, playgrounds, school yards, residential landscaping, golf course irrigation, cooling towers, flushing toilets, industrial process water, water features and fountains, commercial car washes as well as for the for the recharging of aquifers / feed water to potable drinking water plants (head of works).

NWRI GUIDELINES FOR APPLYING UV DISINFECTION IN WATER REUSE APPLICATIONS

Pre-treatment	Design UVT %	Turbidity	Applied UV Dose	Log Reduction
Media Filtration	55% UVT	3 ntu	100 mJ/cm2 RED	5 Log
Membrane Filtration	65% UVT	0.5 ntu	80 mj/cm2 RED	5 Log
RO Membranes	90% UVT	0.2 ntu	50 mJ/cm2 RED	5 Log

PRIORITY SUBSTANCES

ADVANCED OXIDATION (AOP) OF MICRO POLLUTANTS

The pending EU Priority Substances Directive (2013/39) a new 'daughter directive' of the widely established Water Framework Directive (2000/60/EC) and other associated watch lists for chemicals of priority concern (EQS / OSPAR) will require approximately 41 micro-pollutants such as Polycyclic Aromatic Hydrocarbons (PAH's), Endocrine Distruptor Compounds (EDC's), BTEX compounds trace pesticides, trace pharmaceuticals and other contaminants produced by industrial processes to be removed from effluent wastewater streams before discharge in order to protect the aquatic environment.

In addition, some municipal drinking water suppliers are also looking at implementing technology solutions to remove possible contaminants from potable drinking water before it enters their municipal water networks.

Advanced Oxidation is an established treatment technology for both municipal drinking water and final wastewater treatment. By forming Hydroxyl Radicals (OH-) through reactions with an appropriate agent (H^2O^2) Advanced Oxidation (AOP) can be used to effectively break down organic and chemical contaminants into their base components of CO^2 and H20 or in some cases convert non-biodegradable compounds into biodegradable e.g. Benzyne.

atg Evoqua are currently performing pilot studies using AOP solutions for both municipal drinking water and wastewater, as part of the CIP phase 2 initiative that is currently being undertaken by water companies across the UK and EU to establish micro pollutant reduction performance and Best Available Techniques (BAT) to meet the priority Substances Directive which will come into effect in 2027.

As part of the Water Framework Directive, a EU 'priority list' of substances posing a threat to the aquatic environment was established, with the aim of reducing / eliminating pollution

TARGET CONTAMINANTS

Changes to the WFD & EQDS

- 15 additional priority substances
- 6 of them designated as priority hazardous substances
- Stricter EQS for certain (7) existing priority substances
- Certain substances designated as priority hazardous
- Introduction of biota standards for several substances
- Provision for a EU wide watch-list for priority substances
- Provision to improve the efficiency of monitoring and the clarity of reporting with regard to certain substances behaving as ubiquitous, persistent, bio-accumulative and toxic (PBT) substance

Example Target Micro Pollutants

- Poly-aromatic Hydrocarbons (PAHs)
- BTEX Compounds (Benzene, Toluene, Ethylbenzene, Xylene)
- Tri-tert-butylphenol
- Poly-chlorinated Biphenyls (PCBs)
- Endocrine Distruptor Compounds
- Alkylphenol (Octylphenols & Nonylphenol)
- Pentachlorophenol (PCP)
- Methoxychlor
- MTBE (Methyl tert-butyl)
- Trace Industrial Chemicals, Pesticides & Pharmaceuticals

UV SOLUTIONS

MEDIUM PRESSURE UV TECHNOLOGY

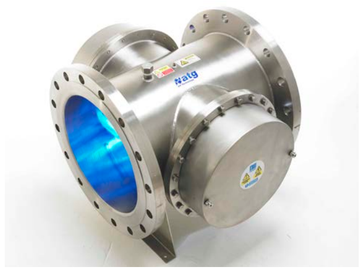
Overview

In-line Polychromatic (Medium Pressure) UV Disinfection Systems provide the very latest in medium pressure UV lamp technology, flow efficient in-line UV chamber design and independent 3rd party validation that offer a high treatment capacity in a small foot print.

Featuring both single lamp and multi-lamp configurations and using a range of medium pressure UV lamp powers, the specially designed in-line UV reactors provide optimum flow distribution and hydraulic performance treating capacities from 1.0 m3/hr to more than 6,000 m3/hr in a single, high output, low footprint UV system.

Technology Advantages

- ✓ Reduced CAPEX UV Solution
- ✓ 9,000 Hour Lamp Life
- ✓ 100% to 40% power (dose pacing)
- ✓ 1.0, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 7.3 & 8.0 kW
- ✓ Ultra compact, in-line chamber designs
- ✓ Installs directly into pipe (similar to a butterfly valve)
- ✓ Significantly reduced maintenance area
- ✓ Reduced number of lamps & quartz
- ✓ Horizontal or vertical installation
- ✓ US EPA UVDGM Validated



LOW PRESSURE AMALGAM TECHNOLOGY

Overview

Traditional axial and end feed Monochromatic (Low Pressure) UV Disinfection Systems provide the very latest in amalgam UV lamp technology, hydraulically optimised flow efficient chamber design, extended lamp life, low power consumption and independent 3rd party validation.

Featuring multi-lamp configurations using a range of amalgam UV lamp powers, Low Pressure UV technology provides a low OPEX (operational costs) solution treating capacities from 1.0 m3/hr to more than 3,700 m3/hr in a single, high output, closed vessel UV system.

Technology Advantages

- ✓ Reduced OPEX UV Solution
- ✓ 16,000 Hour Lamp Life
- ✓ 100% to 30% power (dose pacing)
- ✓ 200 Watt, 340 Watt & 800 Watt lamp options
- ✓ Single ended maintenance
- ✓ Horizontal or vertical installation
- ✓ Instant on / off technology (suits batch processes)
- ✓ US EPA UVDGM Validated
- ✓ NWRI Validated

SX RANGE

ULTRA COMPACT, VALIDATED DRINKING WATER SOLUTIONS

Performance Advantages

- ✓ 2 to 18 multi-lamp configurations
- ✓ 2.5 kW, 3.5 kW, 5.0 kW and 7.3 kW UV lamps
- ✓ 9,000 hour lamp life and 5 year quartz life
- ✓ Automatic power stepping 100% - 50% power
- ✓ Chemical free, green disinfection solution
- ✓ High capacity treatment up to 5,000 m3/hr
- ✓ High disinfection efficiency - 1 to 5 log
- ✓ Hydraulically optimised low head loss design
- ✓ Independent 3rd party validated performance

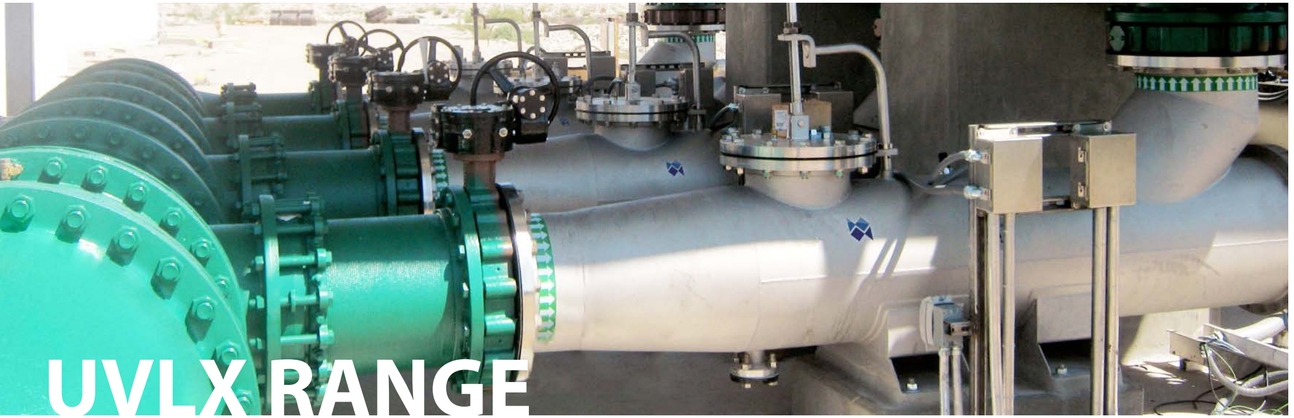
Operational Benefits

- ✓ Dry UV monitors and temperature probes
- ✓ Flange mounted slider bars for easy internal access
- ✓ Lamp changes without removing wiper monitor
- ✓ Quick release enhanced safety 'Twistlok™' lamps
- ✓ Robust, chemical free automatic wiper system
- ✓ Significantly reduced maintenance requirements
- ✓ Single sided maintenance / access
- ✓ Wiper rings can be replaced without removing wiping carriages from chamber

Installation Advantages

- ✓ Can be installed directly against walls / structures
- ✓ Closed system design installs directly into pipe work
- ✓ Horizontal and vertical installation options
- ✓ Modbus / Profibus / ICSS / BMS integration available
- ✓ Multiple flange size, type and mounting options
- ✓ Suitable for both new builds and retrofits
- ✓ Significantly reduced footprint requirement
- ✓ Ultra compact and easy to install
- ✓ Up to 50 meter cable distance from LCP to UV chamber

UV System	SX-225-8	SX-425-10	SX-635-16	SX-850-20	SX-1250-20	SX-1873-30
3rd Party Validation	USEPA Ultraviolet Disinfection Guidance Manual (UVDGM) 2006					
Validated UVT% Window	>58%	>70%	>70%	>70%	>43%	>70%
Certification	CE Marked					
UV Lamps and Monitoring						
Lamp Power	2.5 kW	2.5 kW	3.5 kW	5.0 kW	5.0kW	7.3 kW
Lamp Number	2	4	6	8	12	18
Lamp Life	9,000 Hours					
Lamp Design	TWISTLOK™ Quick Release, Enhanced Safety - Medium Pressure					
UV Monitoring	Validated ÖNORM UV Monitor - AT-900 (calibrated) - IP66					
Variable Power	100% Power to 50% Power (variable automatic dose pacing)					
UV Chamber						
Connection Size (mm/inch)	DN200/8"	DN250/10"	DN400/16"	DN500/20"	DN500/20"	DN800/32"
Connection Type	BS4504 PN10 RF Flange					
Design Pressure	10 Barg Design (15 Barg Test)					
Material Construction	316L Stainless Steel					
Internal / External Finish	0.8 µm Ra / 1.6 µm Ra					
Lamp and Wiper Access	Single Sided Access					
Quartz Type	High Purity Quartz Thimble					
Mounting	Feet (optional)					
Wiper System	Automatic Wiper System (optional)					
Temperature Probe	AT-487 (PT-100) - IP66					
Vent & Drain Ports	Yes					
Ingress Protection	IP66					
Installation	Horizontal or Vertical (Lamps must be horizontal)					
Chamber Options	0.4 µm Ra Internal Polish Upgrade / Electropolish Upgrade / Super Duplex 25% Chrome Steel / Connection Types					
Spectra II / Spectra II Touch - Local Control Cabinet						
Control Type	Microprocessor					
Interface	Soft Touch Push Button with 4 Line Text Display / 7" Touch Screen HMI - Full Colour Display (optional)					
Communication	Modbus RTU / Data Stream (other fieldbus options available)					
Lamp Power Supply	Choke		Electronic Ballast			
Power Consumption	5,500 W	11,000 W	23,100 W	44,000 W	66,000 W	144,540 W
Protection	Door locked isolator , MCB & Earth Leakage Protection					
Operating Temperature	Standard Max Working Ambient +45 °C					



UVLX RANGE

ULTRA HIGH OUTPUT AMALGAM, VALIDATED DRINKING WATER SOLUTIONS

Performance Advantages

- ✓ Automatic power stepping 100% - 30% power
- ✓ Automatic self-cleaning for quartz thimbles
- ✓ Effective at water qualities as low as 20% UVT
- ✓ Extended lamp life of 16,000 hours
- ✓ High capacity treatment up to 3,500 m3/hr
- ✓ High disinfection efficiency - 1 to 5 log
- ✓ Hydraulically optimised low head-loss design
- ✓ Independent 3rd party validated performance
- ✓ Validated performance from 50% UVT+

Operational Benefits

- ✓ Access hatches for easy and quick access
- ✓ Lamp changes without removing wiper motor
- ✓ Quick release enhanced safety 'Twistlok™' lamps
- ✓ Robust, chemical free automatic wiper system
- ✓ Simple to install and easy to operate
- ✓ Single sided maintenance / access
- ✓ Significantly reduced maintenance requirements
- ✓ Wiper rings can be replaced without removing wiping carriage from chamber

Installation Advantages

- ✓ Asymmetric lamp design removes need for baffles
- ✓ Closed system design, installs directly into pipe work
- ✓ Horizontal and vertical installation options
- ✓ Multiple flange size, type and mounting options
- ✓ No requirement for concrete trenches, pen stocks, level control or flow modifiers
- ✓ Significantly reduced footprint requirements
- ✓ Smaller, quicker and easier installation

UV System	UVLX-1800-6	UVLX-3800-10	UVLX-6800-14	UVLX-16800-20	UVLX-30800-30
Performance	3rd Party Validation - US EPA UVDGM (United States Environmental Protection Agency Ultraviolet Disinfection Guidance Manual) 2006				
Certification	CE Marked				
UV lamps and monitoring					
Lamp power	800 W	800 W	800 W	800 W	800 W
Lamp number	1	3	6	16	30
Lamp life	16,000 hours				
Lamp design	TWISTLOK™ quick release, enhanced safety - 800 Watt ultra high output amalgam low pressure				
Validated UV monitoring	Validated ÖNORM UV monitor - AT-900 (calibrated) - IP66				
Variable power	100% power to 30% power (variable automatic dose pacing)				
UV Chamber					
Connection size (mm)	DN100/4"	DN200 / 8"	DN250 / 10"	DN400 / 16"	DN600 / 24"
Connection type	BS4504 PN10 RF Flange				
Design pressure	10 Barg design (15 Barg test)				
Material construction	316L stainless steel				
Internal / External Finish	.8 µm Ra Internal / Bead Blasted (UVLX-1800-6 1.6 µm Ra)				
Lamp and wiper access	Single ended access (UVLX-1800-6 Is An Open Access Chamber)				
Quartz type	High purity quartz thimble				
Mounting	Legs (UVLX-1800-6 - adjustable PVC Clips)				
Wiper system	Automatic wiper system (optional)				
Temperature probe	AT-487 (PT-100) - IP66				
Vent & drain ports	Yes				
Access hatch	Yes				
Ingress protection	IP66				
Installation	Vertical or horizontal				
Chamber Options	0.8 µm Ra Internal Polish Upgrade / Electropolish Upgrade / Super Duplex 25% Chrome Steel / Connection Types				
Spectra II / Spectra II Touch - Local Control Cabinet					
Control Type	Microprocessor				
Interface	Soft Touch Push Button with 4 Line Text Display / 7" Touch Screen HMI - Full Colour Display (optional)				
Communication	Modbus RTU / Data Stream (other fieldbus options available)				
Lamp Power Supply	800 Watt Electronic Ballast				
Power Consumption	880 W	2,600 W	5,200 W	14,080 W	26,400 W
Protection	Door locked isolator , MCB & Earth Leakage Protection				
Operating Temperature	Standard Max Working Ambient +45 °C				

SW RANGE

ULTRA COMPACT, CLOSED VESSEL WASTEWATER TREATMENT SYSTEMS

Performance Advantages

- ✓ 2 to 18 multi-lamp configurations
- ✓ 2.5 kW, 3.5 kW and 5.0 kW UV lamps
- ✓ 9,000 hour lamp life and 5 year quartz life
- ✓ Automatic power stepping 100% - 50% power
- ✓ Chemical free, green disinfection solution
- ✓ High capacity treatment up to 2,500 m3/hr
- ✓ High disinfection efficiency - 1 to 5 log
- ✓ Hydraulically optimised low head loss design
- ✓ Independent 3rd party validated performance

Operational Benefits

- ✓ Dry UV monitors and temperature probes
- ✓ Flange mounted slider bars for easy internal access
- ✓ Lamp changes without removing wiper monitor
- ✓ Quick release enhanced safety 'Twistlok™' lamps
- ✓ Robust, chemical free automatic wiper system
- ✓ Significantly reduced maintenance requirements
- ✓ Single sided maintenance / access
- ✓ Wiper rings can be replaced without removing wiping carriages from chamber

Installation Advantages

- ✓ Can be installed directly against walls / structures
- ✓ Closed system design installs directly into pipe work
- ✓ Horizontal and vertical installation options
- ✓ No requirement for concrete trenches, pen stocks, level control and flow modifiers
- ✓ Significantly reduced footprint requirements
- ✓ Smaller, quicker and easier installation
- ✓ Suitable for both new builds and retrofits
- ✓ Significantly reduced footprint requirement
- ✓ Up to 50 meter cable distance from LCP to UV chamber

UV System	SW-213-4	SW-225-6	SW-425-6	SW-625-8	SW-635-14	SW-835-14	SW-1235-14	SW-1850-20
Performance								
Certification	CE Marked							
UV Lamps and Monitoring								
Lamp Power	1.3 kW	2.5 kW	2.5 kW	2.5 kW	3.5 kW	3.5 kW	3.5 kW	5.0 kW
Lamp Number	2	2	4	6	6	8	12	18
Lamp Life	9,000 Hours							
Lamp Design	TWISTLOK™ Quick Release, Enhanced Safety - Medium Pressure							
UV Monitoring	AT-463 (4-20 mA) IP66							
Variable Power	100% Power To 50% Power (Variable Automatic Dose Pacing)							
UV Chamber								
Connection Size (mm/inch)	DN100/4"	DN150/6"	DN150/6"	DN200/8"	DN350/14"	DN350/14"	DN350/14"	DN500/20"
Connection Type	BS4504 PN10 RF Flange							
Design Pressure	10 Barg Design (15 Barg Test)							
Material Construction	316L Stainless Steel							
Internal / External Finish	1.6 µm Ra / 1.6 µm Ra							
Lamp and Wiper Access	Single Sided Access							
Quartz Type	High Purity Quartz Thimble							
Mounting	Feet (optional)							
Wiper System	Automatic Wiper System (optional)							
Temperature Probe	AT-487 (PT-100) - IP66							
Vent & Drain Ports	Yes							
Ingress Protection	IP66							
Installation	Horizontal or Vertical (Lamps must be horizontal)							
Chamber Options	0.4 µm Ra Internal Polish Upgrade / Electropolish Upgrade / Super Duplex 25% Chrome Steel / Connection Types							
Spectra II / Spectra II Touch - Local Control Cabinet								
Control Type	Microprocessor							
Interface	Soft Touch Push Button with 4 Line Text Display / 7" Touch Screen HMI - Full Colour Display (optional)							
Communication	Modbus RTU / Data Stream (other fieldbus options available)							
Lamp Power Supply	Choke				Electronic Ballast			
Power Consumption	2,860 W	5,500 W	11,000 W	16,500 W	23,100 W	30,800 W	46,200 W	99,000 W
Protection	Door locked isolator , MCB & Earth Leakage Protection							
Operating Temperature	Standard Max Working Ambient +45 °C							

UVLW RANGE

CLOSED VESSEL, WASTEWATER DISINFECTION SOLUTIONS

Performance Advantages

- ✓ Automatic power stepping 100% - 30% power
- ✓ Automatic self-cleaning for quartz thimbles
- ✓ Effective at water qualities as low as 20% UVT
- ✓ Extended lamp life of 16,000 hours
- ✓ High capacity treatment up to 3,500 m3/hr
- ✓ High disinfection efficiency - 1 to 5 log
- ✓ Hydraulically optimised low head-loss design
- ✓ Independent 3rd party validated performance
- ✓ Validated performance from 50% UVT+

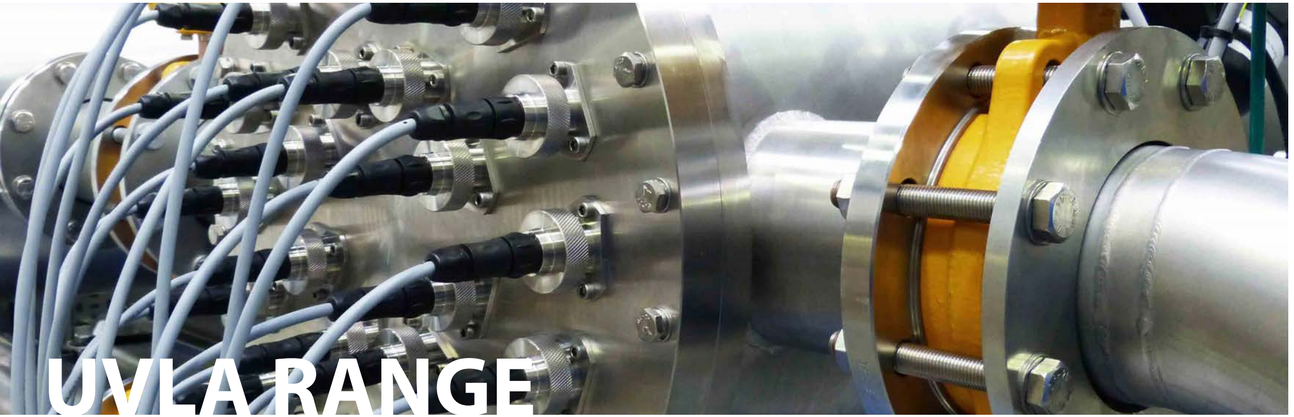
Operational Benefits

- ✓ Access hatches for easy and quick access
- ✓ Lamp changes without removing wiper motor
- ✓ Quick release enhanced safety 'Twistlok' lamps
- ✓ Robust, chemical free automatic wiper system
- ✓ Simple to install and easy to operate
- ✓ Single sided maintenance / access
- ✓ Significantly reduced maintenance requirements
- ✓ Wiper rings can be replaced without removing wiping carriage from chamber

Installation Advantages

- ✓ Asymmetric lamp design removes need for baffles
- ✓ Closed system design, installs directly into pipe work
- ✓ Horizontal and vertical installation options
- ✓ Multiple flange size, type and mounting options
- ✓ No requirement for concrete trenches, pen stocks, level control and flow modifiers
- ✓ Significantly reduced footprint requirements
- ✓ Smaller, quicker and easier installation

UV System	UVLW 6800-10	UVLW 6800-14	UVLW 8800-14	UVLW 16800-20	UVLW 20800-20	UVLW 22800-24	UVLW 30800-24	UVLW 30800-30	UVLW 45800-30
Performance									
3rd Party Validation	USEPA UVDGM (2006) & NWRI 3rd Edition (2012)			NWRI 3rd Edition (2012)					
Certification	CE Marked								
UV lamps and monitoring									
Lamp Power	800 W	800 W	800 W	800 W	800 W	800 W	800 W	800 W	800 W
Lamp Number	6	6	8	16	20	22	30	30	45
Lamp Life	16,000 Hours								
Lamp Design	TWISTLOK™ PLUS quick Release, Enhanced Safety - 800 Watt High Output Amalgam Low Pressure								
UV Monitoring	AT-463 - 4-20 mA - IP66 / AT-900 (Optional, but needed if USEPA validation is required)								
Variable Power	100% Power to 30% Power (Variable Automatic Dose Pacing)								
UV Chamber									
Connection Size (mm/inch)	DN200/8"	DN250/10"	DN250/10"	DN400/16"	DN400/16"	DN500/20"	DN500/20"	DN500/20"	DN500/20"
Connection Type	BS4504 PN10 RF Flange								
Design Pressure	7 Barg Design (10.5 Barg Test)								
Material Construction	316L Stainless Steel								
Internal / External Finish	1.6 µm Ra Internal / Bead Blasted								
Lamp and Wiper Access	Single Ended Access								
Quartz Type	High Purity Quartz Thimble								
Mounting	Legs								
Wiper System	Automatic Wiper System (Optional)								
Temperature Probe	AT-487 (PT-100) - IP66								
Vent & Drain Ports	Yes								
Access Hatch	Yes								
Ingress Protection	IP66								
Installation	Horizontal								
Chamber Options	0.8 µm Ra Internal Polish Upgrade / Electropolish Upgrade / Super Duplex 25% Chrome Steel / Connection Types								
Spectra II / Spectra II Touch - Local Control Cabinet									
Control Type	Microprocessor								
Interface	Soft Touch Push Button with 4 Line Text Display / 7" Touch Screen HMI - Full Colour Display (optional)								
Communication	Modbus RTU / Data Stream (other fieldbus options available)								
Lamp Power Supply	800 Watt Electronic Ballast								
Power Consumption	5,280 W	5,280 W	7,040 W	14,080 W	17,600 W	19,360 W	26,400 W	26,400 W	39,600 W
Protection	Door locked isolator , MCB & Earth Leakage Protection								
Operating Temperature	Standard Max Working Ambient +45 °C								



UVLA RANGE

FLEXIBLE & ROBUST WASTEWATER TREATMENT SOLUTIONS

Performance Advantages

- ✓ 120 Watt, 200 Watt, 325 Watt UV lamps
- ✓ 12,000 hour lamp life
- ✓ ATEX hazardous area versions available
- ✓ Capacities from 0.1 m^3/hr - 2,000 m^3/hr
- ✓ Effective for a large range of applications
- ✓ Single and multi-lamp configurations
- ✓ Traditional U and S shaped UV chamber designs
- ✓ WRAS Approval and CE Marked

Operational Benefits

- ✓ Dry UV monitors and temperature probes
- ✓ Easy to operate with no specialist training required
- ✓ Lamp changes without removing wiper monitor
- ✓ Quick release enhanced safety 'Twistlok™' lamps
- ✓ Reduced power consumption with high efficiency amalgam UV lamps
- ✓ Robust, chemical free automatic wiper system
- ✓ Robust, chemical free manual wiper system
- ✓ Simple and cost effective to run and maintain

Installation Advantages

- ✓ Closed system design installs directly into pipe work
- ✓ Compact and easy to install
- ✓ Horizontal and vertical installation options
- ✓ Large range of custom options available
- ✓ Multiple flange size, type and mounting options
- ✓ Robust and durable design with 5 year warranty
- ✓ Single sided maintenance / access
- ✓ Suitable for both new builds and retrofits

UV System	UVLA 2200-6	UVLA 3200-8	UVLA 4200-8	UVLA 3340-8	UVLA 4340-8	UVLA 6340-8	UVLA 6340-10	UVLA 8340-10	UVLA 8340-12
Performance									
Certification	WRAS Approved, CE Marked								
UV Dose Range	Minimum Wall Dose / Average UV Dose								
UV lamps and monitoring									
Lamp Power	200 W	200 W	200 W	325 W	325 W	325 W	325 W	325 W	325 W
Lamp Number	2	3	4	3	4	6	6	8	8
Lamp Life	Greater Than 12,000 Hours								
Lamp Design	TWISTLOK PLUS™ Quick Release, Enhanced Safety - Low Pressure High Output Amalgam								
UV Chamber									
Connection Size (mm/inch)	DN100/4"	DN150/6"	DN150/6"	DN150/6"	DN150/6"	DN150/6"	DN200/8"	DN200/8"	DN250/10"
Connection Type	BS4504 PN10 RF Flange								
Design Pressure	10 Barg Design (15 Barg Test)								
Material Construction	316L Stainless Steel								
Internal / External Finish	1.6 µm Ra / 1.6 µm Ra								
Standard Body Design	Open Access Chamber								
Mounting	Adjustable PVC Pipe Clips						Feet		
Lamp and Wiper Access	Single Ended Access								
Quartz Type	High Purity Quartz Sleeve								
Wiper System	Automatic Wiper System (optional)								
High Temperature Adapter	Adapter needed if fluid temperature is over 60 °C								
Vent & Drain Port	Yes								
Ingress Protection	IP66								
Installation	Horizontal or Vertical			Horizontal					
Chamber Options	0.4 µm and 0.8 µm Ra Internal Polish Upgrade / Electropolish Upgrade / Super Duplex 25% Chrome Steel / Tri-Clamp Connections								
Spectra II / Spectra II Touch - Local Control Cabinet									
Control Type	Microprocessor								
Interface	Soft Touch Push Button with 4 Line Text Display / 7" Touch Screen HMI - Full Colour Display (optional)								
Communication	Modbus RTU / Data Stream (other fieldbus options available)								
Lamp Power Supply	Electronic ballast								
Power Consumption	440 W	660 W	880 W	1,072 W	1,430 W	2,145 W	2,145 W	2,860 W	2,860 W
Protection	Door locked isolator , MCB & Earth Leakage Protection								
Operating Temperature	Standard Max Working Ambient +45 °C								

DEMA & PACKAGE DESIGNS

TAILORED SOLUTION & DESIGN

1.
Work with our team of water treatment experts & design engineers to tailor the right solution for your installation, choose skid packages, containerised plant or kiosk designs

MANUFACTURED IN A CONTROLLED FACTORY ENVIRONMENT

2.
Benefit from project execution carried out in a controlled factory Environment with lower costs, higher quality & significantly reduced delivery times vs on-site work.

REDUCED TRANSPORT

3.
Building project inhouse reduces site visits, truck movements and deliveries whilst promoting sustainability & lowering the environmental impact of your project

SIMPLIFIED ON-SITE INSTALLATION

4.
Significantly reduced construction time, limit workers on site & improve Health & Safety with an easy to install, turn-key design that is delivered straight to site

WORLD CLASS TECHNICAL SUPPORT ON YOUR DOOR STEP

5.
Hassle-free start-up, operation & maintenance with local 24/7 support & technical expertise from our UK headquarters, nationwide service network & next day spares promise

INNOVATIVE SOLUTIONS FOR THE MUNICIPAL INDUSTRY

The need for more efficient and innovative installation options is becoming a priority for both operators and M&E contractors throughout the UK. In response to industry requirements for reducing the necessary time spent on site for installation, and a drive for greater efficiency and simplicity, atg Evoqua offer a range of prefabricated, turn-key, skid mounted UV plants that offer a quick and easy installation solution for drinking water applications.

Designed to meet the requirements of the UK DWI (Drinking Water Inspectorate) Guidelines on UV Disinfection for Potable Water Supplies, the atg Evoqua design provides a range of self-contained, mobile and fully equipped drinking water plants that are suitable for both temporary use, and long term installations.

The leading atg Evoqua package design includes all of the necessary equipment and design features required to operate a modern UV drinking water facility.

A typical prefabricated UV skid package includes: -

- 100% Duty & 100% UV systems
- 316L stainless steel pipe work
- Automatic + battery pack isolation valves) post UV)
- Hygienic sampling points
- Flow meters
- UVT monitors & instrumentation back board
- Local control panels
- Junction boxes (at package edge)
- Containerised / trailer mounted / kiosk designs available.

OFF SITE FABRICATION & ASSEMBLY

- **Reduced Time On-site**
- **Reduced Costs**
- **Reduced Waste**
- **Improved H+S**
- **Improved Quality**

EMERGENCY RESPONSE

RAPID RESPONSE TO WATER QUALITY INCIDENTS

Designed to meet the requirements of the DWI (Drinking Water Inspectorate) Guidelines on the use of UV Disinfection for Potable Water Supplies, atg Evoqua's range of turn-key, mobile UV drinking water plants and deployable UV Rigs are fully equipped and suitable for both temporary use during emergency water quality incidents such as Cryptosporidium outbreaks or as medium to long term installations to cover plant down time during planned maintenance / upgrade work.

atg Evoqua can provide both deployable UV Rigs kept in storage for deployment to site in <24 hours (for flow rates of 10 m3/hr to 1,500 m3/hr) and the rapid manufacture of specialist, bespoke containerised UV plants in order to accommodate flow rates above 1,500 m3/hr (upto 6,000 m3/hr).

As a leader in the municipal drinking water sector, atg Evoqua package designs fully comply with the requirements of the US EPA UVDG, WIMES 801.B and the DWI 2010 UV Disinfection Guidelines. For ease of installation and integration, emergency solutions include all of the necessary equipment and design features required to operate a modern UV drinking water facility. Typical solutions include:-

- Duty / Standby or Assist UV Chambers & Control Panels
- 316L Stainless steel pipe work & manifolds
- Manual isolation valves (Pre UV)
- Automatic isolation valves (Post UV)
- Hygienic Sampling points
- Flow meters (optional)
- UVT Monitors & Instrumentation

Rapid Manufacturing Capability & Deployable UV Rigs make atg Evoqua the UK's Leading Provider of Emergency Response UV Solutions

EMERGENCY RESPONSE OPTIONS

Deployable UV Rigs

- 1.0 m3/hr to 1,500 m3/hr Capacity
- Deployable UV Disinfection Rigs
- On site in less than 24 hours
- US EPA UVDGM Validated
- DWI & WIMES 801.B Compliant
- Skid Mounted for rapid deployment & installation
- Containerised plants for long term deployment
- Valves, UVT meters, sample points & instrumentation
- Indoor / outdoor installations
- Custom Inlet / outlet connections

Rapid Design & Manufacturing

- Solutions for >1,500 m3/hr to 6,000 m3/hr
- Off-the-shelf designs ready for rapid manufacture
- Optimised, reactive supply chain in place
- Stock of key components
- Rapid manufacture & assembly strategy
- UV Chambers & control panels: 2-3 week lead time
- Containerised UV plants: 4 - 6 week lead time
- Valves, UVT meters, sample points & instrumentation
- US EPA UVDGM Validated
- DWI & WIMES 801.B Compliant

CONTACT US

Scan me

+44(0)1942 216161 | www.atguv.com | info@atguv.com
Genesis House, Richmond Hill, Wigan, WN5 8AA

EXPERTS IN
ULTRAVIOLET
DISINFECTION

atg
evoqua