

## UV Disinfection Systems TAK Series

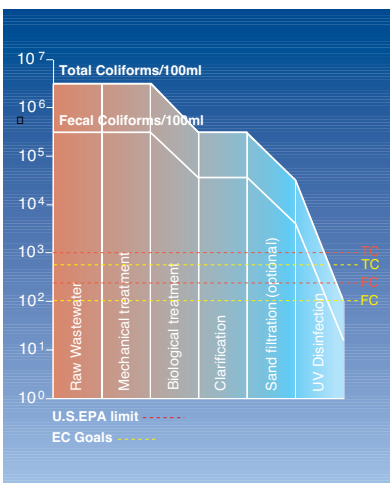
Main Application:  
Disinfection of Waste Water

# TAK – The ultimate solution for waste water disinfection

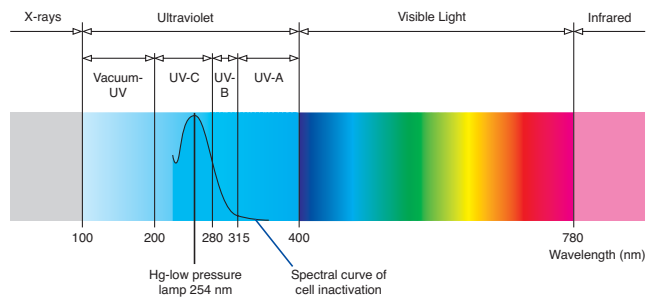
To effectively protect rivers, lakes, coastal waters and ultimately the public health, municipal waste water must be disinfected before release to the environment. Biological treatment, even when combined with clarification and filtration, does not provide adequate removal or inactivation of dangerous bacteria and viruses. Where waste water can enter bathing or drinking water resources, the risk of human infection makes disinfection prior to discharge an absolute necessity. Waste water reuse for irrigation and other purposes is increasingly required to meet the needs of rapidly expanding population sizes, especially in arid climates. Provided there is a disinfection system in place to safeguard water quality, reuse represents a positive, safe method of water conservation that is set to increase dramatically in the future.



Worldwide largest UV system for waste water in Manukau, New Zealand. (Capacity: 14 m3/s)



Typical total (TC) and fecal (FC) coliform reduction through a domestic waste water treatment plant



UV light inactivates harmful bacteria and viruses within seconds



Fully equipped UV module with UV sensor and wiper system

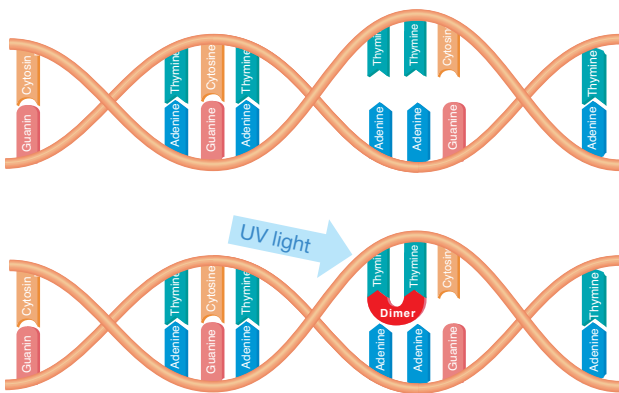
UV produces no harmful by-products. It also eliminates the risk for operators associated with handling dangerous chemicals. Two major advantages of UV disinfection versus chemical methods are increased disinfection effectiveness (especially against viruses) as well as space-savings due to shorter reaction times. Since no chemicals are introduced into the water, no "post-treatment" is required to remove these chemicals before discharge to the environment.

### Natural disinfection without chemicals

Ultraviolet technology provides a proven, accepted and environmentally friendly method of disinfecting waste water. When exposed to UV-C light, microorganisms are inactivated within seconds through a physical reaction with the organisms' DNA. In contrast to chemical disinfection,

### Effective and economic ultraviolet systems

WEDECO has more than 20 years of experience in the development and application of UV technology. The TAK series was specifically engineered for the disinfection of municipal waste water. Several different TAK design configurations are available to meet worldwide regulatory requirements (e.g. European bathing water guidelines, WHO guidelines for irrigation, California's Title 22 for waste water reclamation, etc.) and cope with varying degrees of water quality depending on the level of pretreatment (e.g. primary, secondary or tertiary). Installed in final effluent channels, the modular design of the TAK allows for practically unlimited flow capacities.



Ultraviolet light destroys microorganisms by changing their genetic information (DNA)

## WEDECO's specialty: Providing the most effective solution

Throughout the world, WEDECO TAK systems demonstrate their effectiveness and reliability every day of the year.

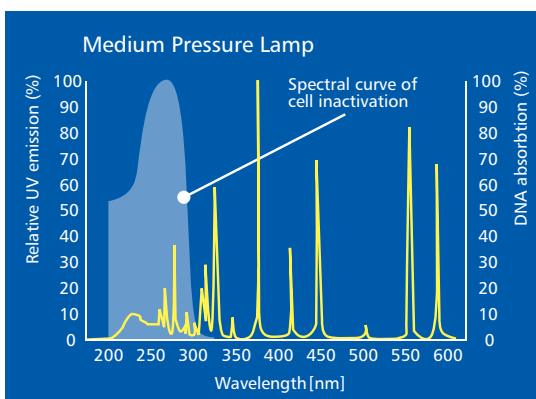
The design of any UV system starts with the selection of the right lamp technology. The lamp in turn is only as good as the ballast that powers it. This lamp/ballast combination and the available control philosophy will determine the performance, operating costs and reliability of the UV system. Since UV light can only disinfect properly when it can enter the medium unhindered, the overall performance of a UV system is also dependent on the effectiveness and reliability of its automatic cleaning (i.e. wiping) system. TAK series disinfection systems utilize the most advanced technology available in all four of these critical areas.

TAK ADVANTAGES
• Safe, chemical-free operation
• Excellent disinfection results
• Drastically reduced design/ construction costs
• Easy installation of compact, modular components in open channels
• Low operation and maintenance costs
• Fully automatic operation
• Design flexibility to meet customer requirements

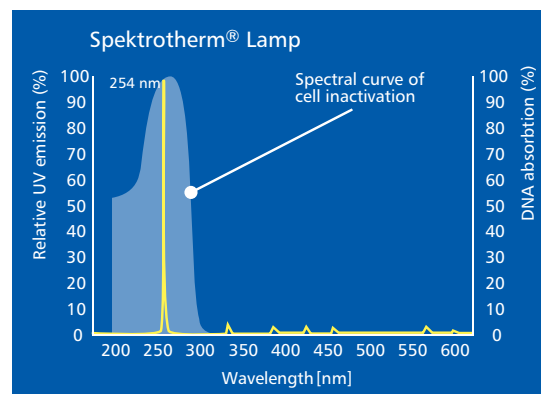
High performance variable output Spektrotherm® UV lamp

At the heart of every TAK system are WEDECO high performance Spektrotherm® lamps. These high intensity, low pressure amalgam lamps combine the advantages of conventional mercury lamp technologies while eliminating their disadvantages.

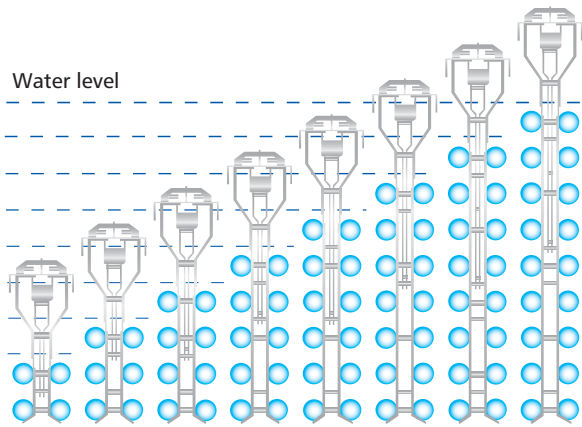
WEDECO's extensive research and development program has delivered maximum UV-C output and superior energy efficiency from Spektrotherm® lamps. A single Spektrotherm® lamp will deliver four to five times more UV-C energy than a typical low pressure mercury lamp while maintaining the same electrical efficiency.



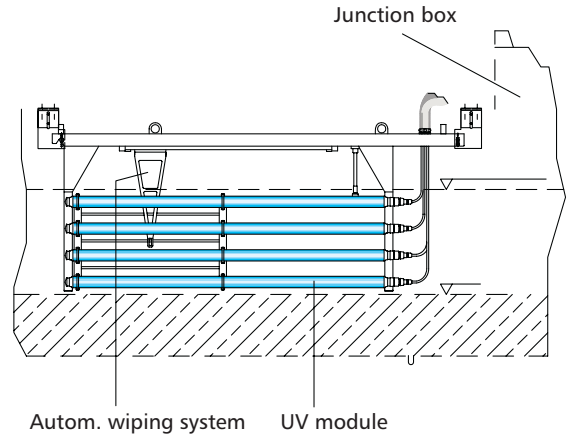
Spectrum of a medium pressure UV lamp



Spectrum of a Spektrotherm® UV lamp



WEDECO's modular waste water disinfection system TAK



This results in:

- Fewer lamps required
- Reduced design/construction costs
- Savings in operating and maintenance costs
- Lower installation costs

Like Spektrotherm® lamps, medium pressure mercury lamps ("multi-wavelength" lamps) also emit a very high UV output. However, a significant portion of their energy output consists of wavelengths outside the effective disinfection region of the electromagnetic spectrum. This non-productive energy leads to higher electrical operating costs and installation of a larger electrical service to the system.

WEDECO Spektrotherm® lamps and ballasts also feature variable output control to precisely match changes in flow rate and/or water quality. This technology truly provides "The Best of Both Worlds".

WEDECO continues to set the pace in UV technology development. No other company can match WEDECO's 15 plus years of "Low Pressure High Intensity" (Spektrotherm®) ultraviolet lamp experience.



“Connect and disinfect” - electronic ballast for the ideal operation of the Spektrotherm® UV lamp



Continuous UV intensity measurement for active UV dosing control



Reliable operation even under severe conditions

## Smart Ballast Operation

TAK systems employ WEDECO’s advanced variable output electronic ballast, developed specifically to operate Spektrotherm® lamps. It offers a multitude of unique features for maximum system performance and reliability.

These include:

- Very low power losses for increased efficiency
- Infinite adjustment of UV lamp output
- “Smart” automatic lamp restart on ignition failure
- High output stability for long lamp life
- Lamp failure detection
- Very high power factor (>0.98)
- Ease of maintenance

## Chemical-free Wiping System

One of the most important features in state-of-the-art UV systems for waste water is automatic cleaning to keep the equipment performing well day-in and day-out. The TAK series’ automatic wiping system performs this function like no other. Employing specially designed wiper rings, it prevents organic and inorganic deposits from accumulating on the lamp protective quartz sleeves. This ensures that the UV light actually reaches the water.

The TAK series’ wiping systems are designed to operate continuously without disrupting the disinfection process. Wiping frequency and “wipes per cycle” are fully field adjustable to match specific waste water characteristics. Even when lamp banks are in “stand-by” mode, their quartz sleeves are automatically kept clean and ready for operation.

The smooth, reliable operation of the TAK wiping system is due largely to its use of a high performance pneumatic drive and “torsion-free” floating wiper array.

The result is perfectly clean quartz sleeves, completely without chemicals.

ADVANTAGES
• Most efficient UV lamp technology
• Longer guaranteed lamp life
• Smart variable power ballasts
• Reliable and trouble-free operation
• Completely chemical free
• Operator-friendly operation and maintenance

The degree of micro-organism inactivation in a UV system is a function of the UV dose received by the organisms:

$$\text{UV dose} = \text{UV intensity} \times \text{Retention}$$

$$[\text{J/m}^2] \quad [\text{W/m}^2] \quad [\text{s}]$$



Maintenance without tools: easy replacement of lamps, quartz sleeves and wiper rings due to clip mechanism

## Reliable and intelligent disinfection control

The UV intensity to which an organism is exposed is dependent on the lamp output, quartz sleeve cleanliness and effluent UV transmittance. By using dedicated UV intensity sensors mounted within the lamp arrays, each of these variables is automatically incorporated into the measured intensity value. Exposure time is derived from the ratio of the UV system "reactor" volume to the effluent flow rate. The resulting UV dose can be calculated by the control system as a product of the measured UV intensity and exposure time.

## Calibrated UV intensity monitoring system

To ensure reliable monitoring of the UV intensity, TAK systems utilize automatically cleaned, calibrated intensity sensors developed by WEDECO. The sensor features include excellent UV selectivity, operational stability and a long operating life.



Arrangement of electronic ballasts inside an electrical cabinet

## Custom engineered solution

### True dose pacing

The TAK series is unique in its ability to provide true "dose-paced" system control. This intensity-based control technology actively monitors and controls the UV dose delivered to micro-organisms by measuring the ultraviolet intensity within the UV system itself. The system adjusts lamp power automatically (up or down) to compensate for intensity fluctuations caused by changes in water quality, lamp ageing or quartz sleeve cleanliness.

Control systems that utilize a flow signal alone ("flow pacing") or in combination with water transmittance cannot provide accurate "dose-pacing" due to their ignorance of critical variables including actual quartz sleeve transmittance and UV lamp output.

The TAK systems are able to employ true "dose-pacing" as a result of their exclusive use of accurate,

reliable and automatically cleaned WEDECO intensity sensors.

TAK systems' electronic ballast and system control enclosures offer maximum flexibility to design engineers while presenting an intrinsically operator friendly design approach. Available in a variety of NEMA or IP ratings, they provide convenient front access and a neat, logical component layout for routine maintenance in a clean, dry and safe environment. To ensure long-term, reliable operation of the system electronics, WEDECO is pleased to engineer a cooling solution to meet any installation location and local climatic requirements.

WEDECO is also able to provide pre-fabricated stainless steel channels to house the UV lamp modules, including integrated inlet and outlet transition chambers and fixed weir level controls. This option is generally selected for smaller TAK systems where the provision of a concrete channel is not desirable.

With most TAK systems, WEDECO provides precise level control technology engineered to meet project specific hydraulic and performance criteria. Weir designs include fixed "finger" or pipe weirs, downward opening gate weirs and variable orifice plate weirs, among others.

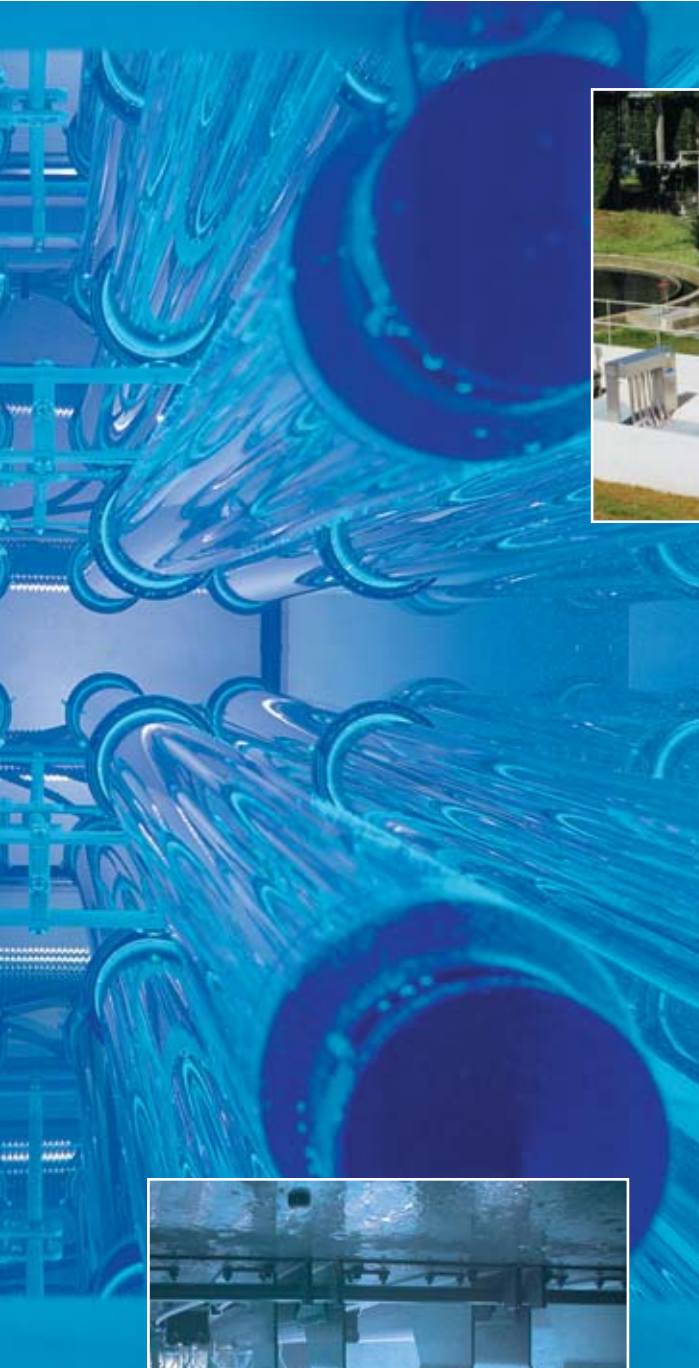
### Additional TAK Advantages

- True "intensity based" dose pacing control
- No overdosing or underdosing concerns
- Automatically cleaned intensity sensor



WEDECO TAK 55 UV modules in the water



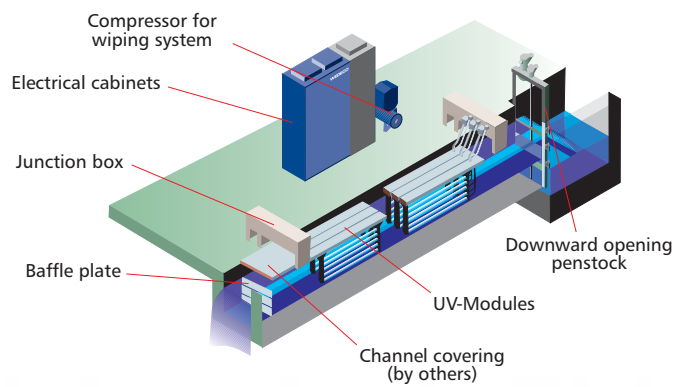


WEDECO TAK system at Christchurch, UK



WEDECO TAK system at Bad Tölz, Germany

### Example installation TAK 55



WEDECO System TAK 55: Waste water disinfection in Cassano Spinola / Italy.



UV modules in maintenance position



Supervision and maintenance via modem connection

Water treatment with UV in Manukau, New Zealand

## Monitoring and control systems

WEDECO offers design engineers maximum flexibility regarding System Control & Data Acquisition (SCADA) and telemetry systems. All TAK systems are equipped with integrated PLC systems and intuitive local operator controls. System monitoring can be accomplished either locally or remotely depending on project specific requirements.

## Ease of maintenance

In the development of WEDECO products, special attention is always devoted to maintenance considerations. The successful operation of any UV system is dependent upon the frequency as well as the ease of maintenance. In TAK systems WEDECO has succeeded in minimizing maintenance requirements through the use of advanced technology, quality engineering and construction. The long life of Spektrotherm® lamps, exceptional ballast reliability, superior lamp module construction and an extremely effective wiping system all serve to minimize the time and costs to maintain a TAK system. WEDECO accomplished much of the timesavings simply by designing the TAK system to provide easy access to all system components.

## Worldwide service

The WEDECO Group has delivered and supports more than 100,000 UV systems throughout the world. Regardless of your location, WEDECO strives to provide every customer with world-class service, before and after the sale. Company trained WEDECO staff and partners are stationed in almost every region of the world to provide responsive and professional support.

## WEDECO support and service capabilities:

- Customized long-term service contracts
- Certified operator training courses
- Defined service call-outs
- Holding of consignment stock
- Free return/recycling of used WEDECO lamps



WEDECO Global Customer Service:  
Professional and fast local support for our customers

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