

TRIANGULARWAVE TECHNOLOGIES, INC. (TWT®) PRODUCT SUMMARY

Sorted by Technology

P.O.E. Point-of-Entry • P.O.U. Point-of-Use
Residential • Commercial • Industrial

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TWT, Inc. offers a full range of products & systems designed to address fluid problems wherever fluid flows. From patented deposit control technology to pre and post filtration needs, ionization, iron removal, disinfection, and ultraviolet purification treatment and conditioning, TWT has the versatile, efficient, cost-effective methods to solve your fluid management problems end to end.

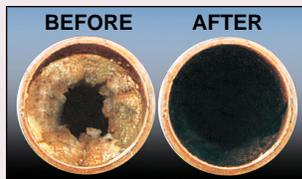
- Versatile fluid management systems to effectively meet the needs of any industry and application
- Controls scale, bio-film & corrosion
- Enhance operating efficiency & life cycle of equipment
- Saves water & energy
- Protection for new equipment: TWT provides new equipment with the ability to enhance it's features and benefit
- Treatment for existing equipment: Retrofit existing equipment to improve its operating efficiency and lifecycle
- Value added technology
- System integration
- Retrofit programs
- Industry-specific custom design
- Consulting, training and service before, during and after sales.
- Enter new markets and broaden customer satisfaction

TWT® Patented Deposit Control—Technologically Advanced Method for Water & Fluid Management Providing Comprehensive End-To-End Treatment & Conditioning (chemical-free)

TWT Patented Deposit Control System:



Hard water problems solved easily. Control scale deposits, bacteria, corrosion, algae, colloids in all fluid based systems. Providing comprehensive end-to-end treatment & conditioning **(chemical-free)**.



The basic component in the TWT systems is the deposit controller. It is comprised of a microprocessor, solenoid coil wrap and/or a reaction chamber. The microprocessor is a patented controller that functions like a small computer to relay a continuous electrical power supply to the solenoid coil and/or reaction chamber. The reaction chamber is plumbed into the main water in-take line and/or just before each piece of vital processing equipment, and provides a factory-wrapped wire coil forming a solenoid. The solenoid conveys the Triangularwave signal at the appropriate power level (as allowed by the model chosen) to the water passing through the chamber. This signal constantly changes the polarity, frequency, and amplitude of the current entering the water. This Triangularwave treatment produces several benefits. It increases the capability of the water to hydrate scale ions and other colloidal particles. In effect, the surface charge of the hydrogen molecules is enhanced and the water is made “wetter”. This “hydrated” water can dissolve

unwanted particles, suspend them in solution, and allow them to be easily filtered out or flushed from the system. Accordingly, the mineral and biological particles that cause scale, deposits, and corrosion are dissolved and washed away. This means that the breeding environments for bacteria, such as bio-film and corrosion, are eliminated. The agitation created in the reaction chamber also disrupts the conditions essential for the normal reproduction of bacteria and they die, thus allowing them to be harmlessly flushed out of the system.

TWT Reaction Chamber:

The TWT Reaction Chamber is part of the patented TWT Deposit Control Technology, the function of which is to control scale and bio-film in the plumbing infrastructure, fixtures, and water-fed appliances found in the facility being treated. The Reaction Chamber provides a chamber through which the water flows and is exposed to the Triangularwave signal that lies at the heart of the deposit control technology. As the fluid passes through, it is treated and then carries that treatment downstream, to condition the rest of the plumbing system, non-chemically and reliably.



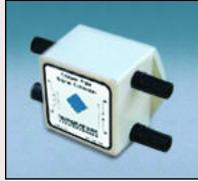
To use in conjunction with the TWT Deposit Control Systems when required, Triangularwave Technologies, Inc. has developed a line of factory-wrapped wire Reaction Chambers to address magnetic pipe environments. — *Typically, wire coil cannot be installed on any magnetic pipe, such as steel, galvanized steel, ductile iron, or cast iron.* If a coil is applied to such a pipe, the pipe becomes a shield and prevents the wave energy from entering the fluid path. The TWT Reaction Chambers solve this problem by providing an easily installed section of non-magnetic pipe to provide the proper pipe material for the Deposit Control System to work as designed. The TWT Reaction Chambers are fully sealed, protecting their two layers of factory-wrapped coil. The PVC, Stainless Steel and the Industrial Reaction Chamber systems are designed and manufactured to meet the highest quality specifications.

Copper Pipe Signal Enhancer:

Copper pipes, although acceptable, are one of the more difficult of materials to work with. To overcome this...

TWT has developed its Copper Pipe Signal Enhancer. This unit is placed between the Deposit Controller and the solenoid coil on the copper pipe. The function of the signal enhancer is to provide a proper impedance match and to ensure maximum energy transfer between the controller and the solenoid, which, in turn, ensures enhanced treatment of the fluid.

Magnetic pipe materials such as steel, galvanized steel, iron, ductile iron or cast iron become shields and prevent the proper energy transfer to the fluid path. For magnetic pipe applications we offer a full line of factory wrapped wire coil Reaction Chambers. TWT products are designed to provide comprehensive solutions to water and fluid management problems. The Copper Pipe Signal Enhancer and its equivalent for the magnetic pipe environment, TWT Reaction Chambers, offer the answer to limited signal penetration, ensuring optimal results. *The copper signal enhancer is a passive signal / impedance matching circuit. This device provides a power boost to the conditioning signal in copper pipes.*



Special Note: Copper pipe signal enhancers are to be used on copper pipes only.

Ionization—for bacteria, algae, fungus control in Pools, Spas, HVAC



IonGuard Purification System- All-In-One package solution, TWT Ionization, Purification, Disinfection, Deposit Control Technology:

The IonGuard Purification System is an electrolytic copper /silver ion generator. The system units contain specially cast copper/silver alloy electrodes.

These electrodes are mounted in a housing designed for easy access (HVAC & Pool Environments). The IonGuard Purification System purifies water through a process called ionization. This process utilizes a low voltage direct current (DC) to place precise and minute amounts of copper and silver ions into water systems. Copper ions kill algae and silver ions kill bacteria (integrate with TWT deposit control technology for enhanced results).

Ultraviolet Disinfection /Purification

High intensity bacteria control for potable water, waste water, food service, sanitary, pharmaceutical applications and anywhere the need for safe water required.

Ultraviolet Disinfection/ Purification Systems:

The UV disinfection technology used in the system to provide



safe, potable drinking water, free of disease-causing pathogens. As water passes through the UV chamber, UV light will attack and render harmless any bacterial, viral or spore contamination present in the treated water. “High intensity UV light destroys these contaminants with a 99.9% or greater kill rate”. The output water is thus disinfected and offers exceptionally high quality for human consumption.

Ultraviolet Sterilization Technology

Ultraviolet disinfection systems are mysterious to many people – how can “light” kill bacteria? But the truth is it can. Ultraviolet (UV) technology has been around for over 50 years, and its effectiveness has been well documented both scientifically and commercially. It is nature’s own disinfection/purification method. With consumers becoming more concerned about chlorine and other chemical contamination of drinking water, more dealers are prescribing the ultraviolet solution suitable for both small flow residential applications as well as large flow commercial projects.

Ultraviolet is a means of killing or rendering harmless microorganisms in a dedicated environment. These microorganisms can range from bacteria and viruses to algae and protozoa. UV disinfection is used in air and water purification, sewage treatment protection of food and beverages, and many other disinfection and sterilization applications. A major advantage of UV treatment is that it is capable of disinfecting water faster than chlorine without cumbersome retention tanks and harmful chemicals. UV treatment systems are also extremely cost efficient!

What is UV and how does it work?

Ultraviolet is one energy region of the electromagnetic spectrum, which lies between the x-ray region and the visible region. UV itself lies in the ranges of 200 nanometers (nm) to 390 nanometers (nm). Optimum UV germicidal action occurs at 260 nm.

Since natural germicidal UV from the sun is screened out by the earth’s atmosphere, we must look to alternative means of producing UV light. This is accomplished through the conversion of electrical energy in a low-pressure mercury vapor “hard glass” quartz lamp. Electrons flow through the ionized mercury vapor between the electrodes of the lamp, which then creates UV light.

As UV light penetrates through the cell wall and cytoplasmic membrane, it causes a molecular rearrangement of the microorganisms DNA, which prevents it from reproducing. If the cell cannot reproduce, it is considered dead.



Design and Dosage

The design of an ultraviolet sterilizer has an extremely important bearing on how the UV Dose is delivered and Dosage is the most critical function of UV disinfection. As individual UV lamps emit a set amount of ultraviolet energy, it is important that a system be sized correctly. Flow rates are the determining factor and must not be overstated. Contact time, which is the time the water is within the sterilization chamber, is directly proportional to Dosage, which is the amount of energy per unit area (calculated by dividing the output in watts by the surface area of the lamp), and thus the overall effectiveness of microbial destruction in the system. This product of intensity and time is known as the Dose and is expressed in microwatt seconds per centimeter squared (uWsec/cm2). **Divide by 1000 to express the dose in mJ/cm2, the preferred notation.**

$$\text{DOSE} = \frac{\text{time (sec)} \times \text{output (watts)}}{\text{area (cm}^2\text{)}}$$

For maximum UV transmission a “hard glass” quartz sleeve is recommended for two main reasons. It isolates the lamp from the water to offer more uniform operating temperatures and allows for higher UV output into the water.

A variety of optional features may be added on to the UV sterilizers. They include UV monitoring devices that measure the actual UV output, solenoid shutoff devices that will stop the water flow in the event of a system failure, flow control devices to properly limit the water flow in the units, audible and visual alarms (both local and remote) to warn of lamp failures, high temperature sensors to monitor excessive temperatures in the reactor chamber or control panel, and hour meters to monitor the running time of the UV lamps.

Advantages of UV Sterilization

Following are the advantages of UV sterilization:

- Environmentally friendly, no dangerous chemicals to handle or store, no problem of overdosing (it's impossible).
- Low initial capital cost as well as reduced operating expenses when compared with similar technologies such as ozone, chlorine, etc.
- Immediate treatment process, no need for holding tanks, long retention times, etc.
- Extremely economical, hundreds of gallons may be treated for each penny of operating cost.
- No chemicals added to the water supply – no by-products (i.e. chlorine + organics = trihalomethanes).
- No change in taste, odor, pH or conductivity or the general chemistry of the water.
- Automatic operation without special attention or measurement, operator friendly.
- Simplicity and ease of maintenance, periodic cleaning (if applicable) and annual lamp replacement, no moving parts to wear out.
- No handling of toxic chemicals, no need for specialized storage requirements, no WHMIS requirements.

- Easy installation, only two water connections and a power connection.
- Compatible with all other water processes (i.e., RO, filtration, ion exchange, etc.)



Test proves Triangularwave Technologies, Inc. (TWT®) Deposit Control System reduces the fouling effects caused by "hard water" on the quartz sleeve and UV lamp inside the disinfection/purification unit while maintaining the residual effects downstream chemically free.

Ozone Disinfection

The Ozonator is a natural, safe way to purify water in many different applications. It eliminates the need for chemicals which can be irritating to people and costly to budget. The Ozonator converts Oxygen (O₂) into (O₃) by the action of the corona discharge system. Ozone is then injected into the water where it destroys viruses, bacteria and many other micro-organisms. taste, odor and color disappear and iron oxide, hydrogen sulphide, lignite and tannin are precipitated out, leaving your water pure and clean.



Filtration Systems—Commercial • Industrial • Residential

- **Regardless of the type of water filtration required, basic filtration, separation or reverse osmosis. TWT has the filtration system and media suitable for your application. Filters are available in various micronic sizes providing flexibility & adaptability to meet the needs of all fluid conditions & applications.**

Filters are designed to trap various kinds of debris, dirt and organic particles that will otherwise enter your equipment and/or plumbing system, restrict your water flow and create a breeding ground for bacteria. Filtration is the first line of defense for residential, commercial, industrial facilities, where the source of water may be ponds, wells, streams or other water sources that have high exposure to contamination from airborne pollutants, surface runoff, agricultural or industrial waste or similar dangers.

The first step in achieving clean water is to install a filtration device that effectively removes particulate matter and similar debris.

Filtration is an important step in water treatment, especially for water intended for human consumption. Filtration systems provide a bacteriostatic environment and are designed to remove, volatile organic chemicals, hydrogen sulfide and sulfur, herbicides, pesticides, chemical fertilizer residues, trihalomethanes and many other pollutants. Regardless of the type of water filtration required, basic filtration, separation or reverse osmosis. TWT has the filtration system and media suitable for your application. Filters are available in various micronic sizes providing flexibility & adaptability to meet the needs of all fluid conditions & applications.



Chemical-Free Iron Removal Systems for 12 to 50 ppm iron.

The Rust-Erase iron filter system is designed to effectively eliminate rust from your water supply economically and thoroughly. No more unsightly rust stains in the toilet, tub and sink., the laundry will be cleaner, too! The Rust-Erase Iron Filter works automatically. Every drop of water coming through the line is filtered to remove rust and other particles. The pre-set timer periodically activates the back-wash mechanism which keeps the filter medium fresh and effective for many years. Media is good for approximately 3 - 5 years or more depending on water conditions.

Effects of iron and manganese in water – When exposed to air, dissolved iron or manganese reacts with oxygen and is converted by oxidation to a colored, solid material that settles out of the water. Iron changes to white, then yellow and finally to a reddish-brown color. Manganese forms a black residue. High concentrations of these sediments cause reddish-brown or black stains on laundry and facility fixtures. Another result of iron and manganese in water is the presence of harmless bacteria in soil, shallow groundwater supplies and some surface water that secrete large amounts of red-brown (iron) or black-brown (manganese) slime that stain toilet tanks.



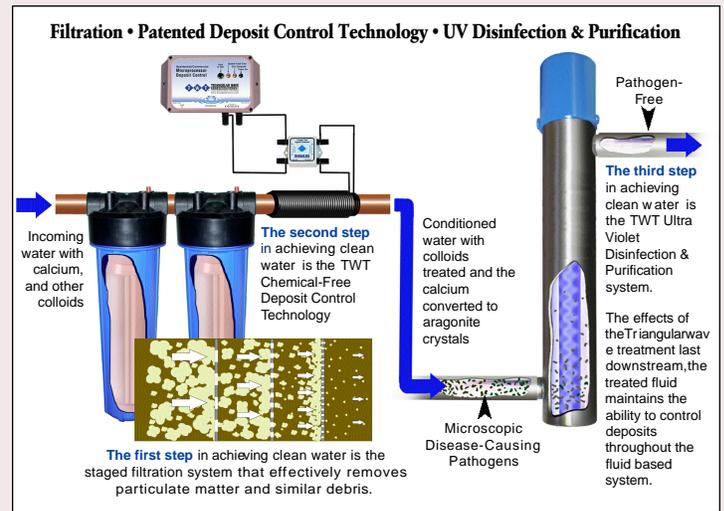
TWT® Multi-Process Modular Treatment System All-In-One Unit :

TWT® Filtration, Micro-processor Deposit Controller, Reaction Chamber, and UV Disinfection units are combined to provide a start-to-finish answer to simplified prevention, treatment and management of water line contamination dangers.

“The Competitive Edge”

- The TWT All-In-One fluid management water filtration, disinfection and purification systems are unique, compact, self-contained units (easy installation & operation).
- In effect, a clean, corrosion-free delivery system is restored and maintained in an environmentally safe and chemical-free manner.

Flow Diagram



Integrated Water: Treatment & Conditioning Systems:

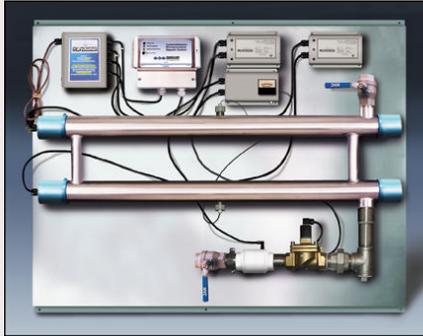
MD Series Integrated Water Treatment Systems

TWT® technologically advanced method for water management. Triangularwave Technologies, Inc. All-In-One fluid management systems, the ultimate in water treatment & conditioning TWT® systems are factory engineered and assembled, applying all of the needed elements for maximum fluid protection, management, and peace of mind in one simple packaged solution. TWT® Filtration, Micro-processor Deposit Controller, Reaction Chamber, and UV Disinfection units are combined to provide a start-to-finish answer to simplified prevention, treatment and management of water line contamination dangers. *The TWT All-In-One Fluid management water disinfection/ purification systems are unique, compact, self-contained units for the treatment of water. (well and ground water application)*



DP Series Integrated Water Treatment Systems

Technologically advanced method for water management. Triangularwave Technologies, Inc. TWT Patented Deposit Control/Ultraviolet Disinfection / Purification systems, TWT® systems are factory engineered and assembled, applying the needed elements for maximum fluid protection, in one simple packaged solution. TWT Microprocessor Deposit Controller, Reaction Chamber, and UV Disinfection units are combined to provide a simplified prevention, treatment and management of water line contamination dangers. The TWT water disinfection/ purification systems are unique, compact, self-contained units for the treatment of water. *(municipal water application)*



Bacterial Reduction Systems

Technologically Advanced Fluid Treatment Methods for the Meat, Poultry and Other Related Processing Industries.



- Filtration • Deposit Control Technology
- Ozone and/or UV Disinfection / Purification Combined for maximum effectiveness. *(bacteria reduction guaranteed)*



Total Water Control Systems

For large cooling system applications - TWCS controlled system featuring Deposit Controller, Ultra-violet Disinfection or Ionguard and Filtration. Low pressure systems to 6,000 gpm, high pressure systems to 36,000 gpm for cooling tower, process water and other industrial applications.



Transportable Water Treatment Systems

The most economical and efficient way to produce safe drinking water in temporary situations

The TWT Transportable Water Treatment System is an integrated system of exactly selected components customized to remedy specific water treatment problems in temporary installations, remote areas or crisis situations. First developed for use in military camps related to the 1996 UN peace-keeping mission in Bosnia, the TWT treatment systems are well suited to a wide range of applications. TWT systems are designed to produce safe drinking water, dependably and economically, from a wide range of problem input sources. The self-contained, transportable system filters out contaminants such as heavy metals, pesticides and parasites from any non-salt water source and kills all micro-organisms including virulent bacteria and viruses.



Mobile Solar Powered...Renewable Energy On Wheels:

Explore new innovative ideas using mobile solar power with TWT® chemical-free water treatment technology. The most economical and effective way to produce safe drinking water anywhere... any time! Sensing and solving environmental needs with intelligent solutions. conserves energy, clean, quite and transportable All-In-One Systems.

Mobile solar powered units are system integrated, engineered and designed to produce safe drinking water dependably and economically from a wide range of problem input sources. The systems are well suited for various applications in areas with no power and poor water quality.



Mobile solar powered, water treatment systems are portable and well suited for various applications. Disaster Relief, Emergency Preparedness, remote Construction Sites, Small Villages, Areas With No power And Poor Water Quality.





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Custom Engineered Systems To Your Exacting Specifications:

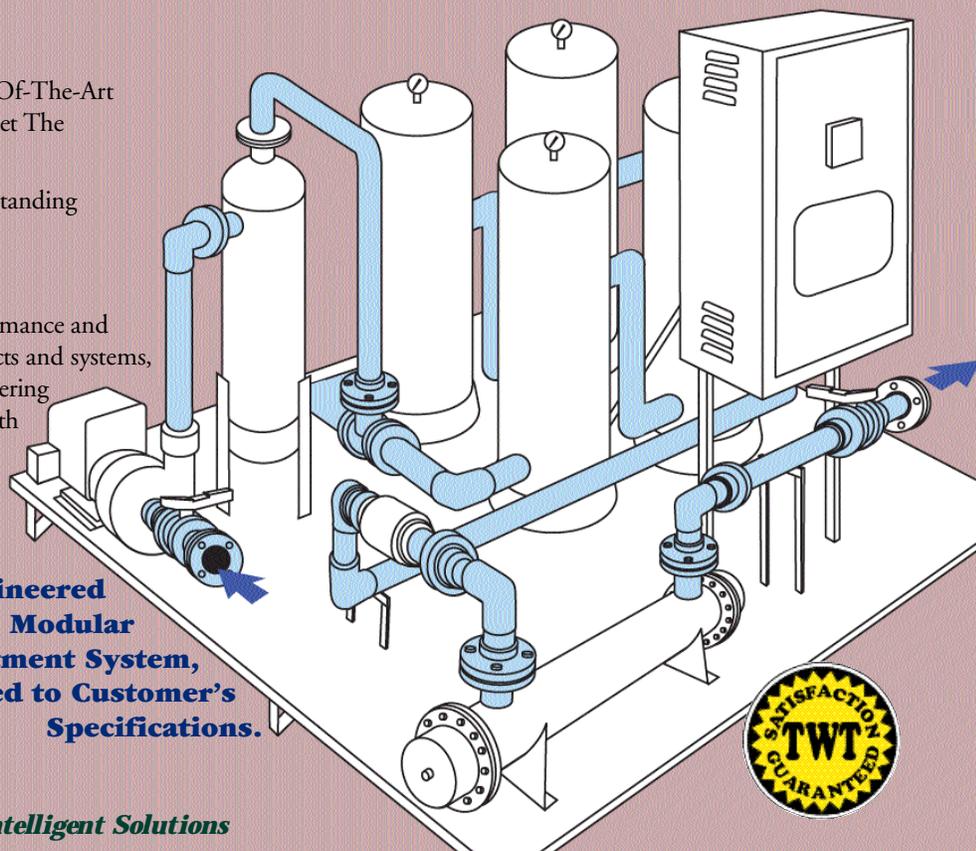
TWT has extensive design, engineering, manufacturing, consulting and training ability to work with customers worldwide, and to use its products and/or systems in whole or component form, as a component assembly, or as an accessory to their primary product. Take advantage of our outstanding manufacturing and marketing expertise — let TWT custom design a product and/or system to meet your specific application, system integration, and/or retro-fit program needs.

Our unique capabilities and custom design expertise have and continue to successfully solve a wide variety of problems for a wide variety of customers (Commercial • Industrial • Residential).



- From Ideas to Final Production
- Efficient Engineering Design Team State -Of-The-Art Production Equipment And Facility To Meet The Ever Challenging Production Requirements
- Technical And Test Department With Outstanding Quality Control Guaranteed
- Cost effective and delivered on time
- In order to ensure the greatest level of performance and satisfaction in your work with TWT products and systems, we recommend that you contact our engineering staff, who will be pleased to work closely with you to determine the optimal installation for your industry specific needs.

**Custom Engineered
Multi-Process Modular
Water Treatment System,
Designed to Customer's
Specifications.**



Thank you for your time, interest in our products, systems and technology. We at TWT, Inc. look forward to being a valued part of your operation.

Notes:

- Systems and/or subsystems of larger sizes/capacities or alternate materials available by special order.
- Accessories, spare parts and consumables for all products and systems available upon request
- Worldwide distribution

To learn more about TWT® products, systems and technologies visit Triangularwave Technologies, Inc. comprehensive websites. The valuable technical resource for all involved in water and fluid management.

• www.Triangularwave.com • www.twtwatertreatment.com

Sensing Environmental Needs with Intelligent Solutions

TWT® The Ultimate in Water Treatment & Conditioning

Go Green - Save Green!

