

Product(s) Versatile Application, Installation & Technical Guidelines

P.O.E Point-Of-Entry • Point-Of-Use • Chemical-Free

Specializing in:

- **Chemical-Free Deposit Control Systems (hard water conditioning & treatment). Eliminating Scale Deposits and Bio-Film in Pipes, Fixtures and Equipment**
- **Ultraviolet / Ozone / Disinfection & Purification Systems**
- **Ionization Purification Systems**
- **Custom Systems Design & Integration**
- **Water Filtration Products**
- **Bacterial Reduction Systems**
- **Economical & Cost Effective**
- **For All Fluid-Based Industries**

Triangularwave Technologies, Inc. products and systems provide technologically advanced methods for water and fluid management that are both efficient and cost-effective. Components and subsystems chosen from across the range of treatment methods can be combined in different configurations to provide custom solutions specific to any industry, site or application.

TWT systems work to consistently deliver high quality water, reduce scale and bio-fouling in plumbing systems, and to increase efficiency of both once-through and re-circulating HVAC, process cooling, agriculture, industrial processing, wastewater and other fluid based systems. Each product line offers a variety of both standalone and comprehensive treatment solutions for end-to-end fluid management, for all types of applications.

The patented Triangularwave Deposit Control Systems use advanced integrated circuitry and signal processing to create a complex frequency and amplitude modulated wave form. A complex and changing electrical field is induced in the pipe, which increases the solubility of the minerals and changes the shape and size of the calcium carbonate crystals. By this reaction, the crystals lose their adhesive properties, remain in sub-micron suspension, and pass harmlessly through the pipe. Existing scale deposits are taken into solution and also pass harmlessly through the pipe.

Triangularwave Deposit Control Systems offer all the positive effects of soft water, and clean up existing deposits, without the use of traditional salts and chemical.

Their full treatment benefits are realized, with reduced maintenance requirements.

Consider using TWT deposit control systems in conjunction with any fluid treatment systems as a complementary technology. For further details on how you can leverage the TWT deposit control benefits, please contact us.

TWT® Technologically Advanced Methods for Water & Fluid Management Potable Water, Process and Waste Water Treatment & Conditioning

- Provides the effects of softened water, neutralizes calcium hardness effects in the water
- Removes and prevents scale buildup
- Uses no salts or other chemicals
- Service and maintenance-free
- Improves efficiency of all water-fed equipment and extends its life cycle
- Quickly pays for itself and continues saving
- Descales the entire plumbing system over time
- Designed for safety—the output is safe to both personnel and equipment. There is no electrical contact with the pipe

TWT chemical-free deposit control (hard water conditioning & treatment) systems enhance other treatment technologies as well, including chemicals, ozone, ultraviolet, separators and other filtration systems, keeping them clean and enhancing their operation. In this way, their full treatment benefits are realized, with reduced maintenance requirements.

Simply Said... a clean, corrosion-free delivery system is restored and maintained in an environmentally safe and chemical-free manner.

The result is clean pipes and tubing with no biofilm and reduced bacterial contamination.

Thank You



Versatile Fluid Management Systems To Effectively Meet The Needs Of Any Application

Residential • Commercial • Industrial Treatment

TWT® Filtration

Filters are designed to trap various kinds of debris and organic particles that will otherwise enter your equipment and/or plumbing system; restrict flow and create a breeding ground for bacteria.

TWT® Deposit Control

Deposit Control technology works by producing a complex frequency-modulated waveform. This creates a de-ionizing effect, induced by physical means, which increases the solubility of the minerals and colloids in the liquid and changes the shape, size, and texture of the calcium carbonate crystals. Hard water conditioning & treatment technology.

TWT® UV Purifiers

As water passes through the UV chamber the UV light attacks and renders harmless bacterial, viral or spore contamination present in the treated water. The out put water is thus disinfected and offers exceptionally high quality for processing, human consumption and use.

TWT® All-In-One Multi-Process Treatment

TWT Filtration, Microprocessor Deposit Control Technology, 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.

TWT® Chem-Free Pool & Spa Treatment

Through IonGuard disinfection, purification and deposit control technology, the system controls scale deposits, algae, bacteria and corrosion without the need for chemicals. Eliminate the bio-film that serves as a breeding ground for disease-causing bacteria, collecting in your pool, piping, tubing and equipment.

TWT® ChemFree HVAC Cooling Treatment

Through ionization, disinfection, purification and deposit control technology control scale deposits, algae, bacteria and corrosion without the need for chemicals. Eliminate the bio-film that serves as a breeding ground for disease-causing bacteria, collecting in your piping, tubing, heating and other related equipment.

Applications:

- Cooling Towers • Heat Exchangers
- Biofilm & Bacteria Control for Medical/Dental Environments
- Commercial Irrigation • Condensers & Chillers
- Food Processing Equipment
- Manufacturing Processing Equipment
 - Boilers/Water Heaters
 - Spray Systems
 - Private & Commercial Swimming Pools & Spas
 - Residential/Office Plumbing
- Coffee & Tea Dispensers
- Bottleless Water Coolers
- Washing Machines
- Humidifiers
- Small Water-Fed Appliances
- Lawn & Sprinkler Systems • Mobile Homes
- Marine Industry / House Boats • Steamers Systems
- Breweries • Aquariums
- All other Water and Fluid-Based Applications

Versatile Fluid Management Products & Systems To Effectively Meet The Needs Of Any Industry & Application

- Control Scale Deposits
- Bacteria
- Corrosion
- Algae
- Colloids

In All Fluid Based Systems

Potable Water, Process and Waste Water Treatment & Conditioning

PROTECTION FOR NEW EQUIPMENT

TWT provides new equipment with the ability to enhance the product features and benefits

TREATMENT FOR EXISTING EQUIPMENT

Retrofit existing equipment to improve its operating efficiency and life cycle

ENHANCE PRODUCT LINE

Enter new markets and broaden customer satisfaction

CUSTOM DESIGN

Let TWT, Inc. custom design a fluid management system to meet any industry specific application

- Residential
- Commercial
- Industrial



TWT is the world's leading manufacturer and supplier of chemical-free fluid management products based on its patented TWT Triangularwave form technology. TWT's chemical-free fluid treatment and management methods have been accepted for use around the world by governments, industry, and individuals, who all enjoy the increased safety, extended equipment life cycle, and decreased operating costs that the TWT systems deliver.

Triangularwave Technologies, Inc. products and systems provide technologically advanced methods for water and fluid management that are both efficient and cost-effective. Components and subsystems chosen from across the range of treatment methods can be combined in different configurations to provide custom solutions specific to any industry, site or application.

TWT systems work to consistently deliver high quality water, reduce scale and bio-fouling in plumbing systems, and to increase efficiency of both once-through and re-circulating

**TWT® Saves:
Chemicals, Water,
Energy, Labor,
Time and Materials.**

**Protection for
New Equipment**

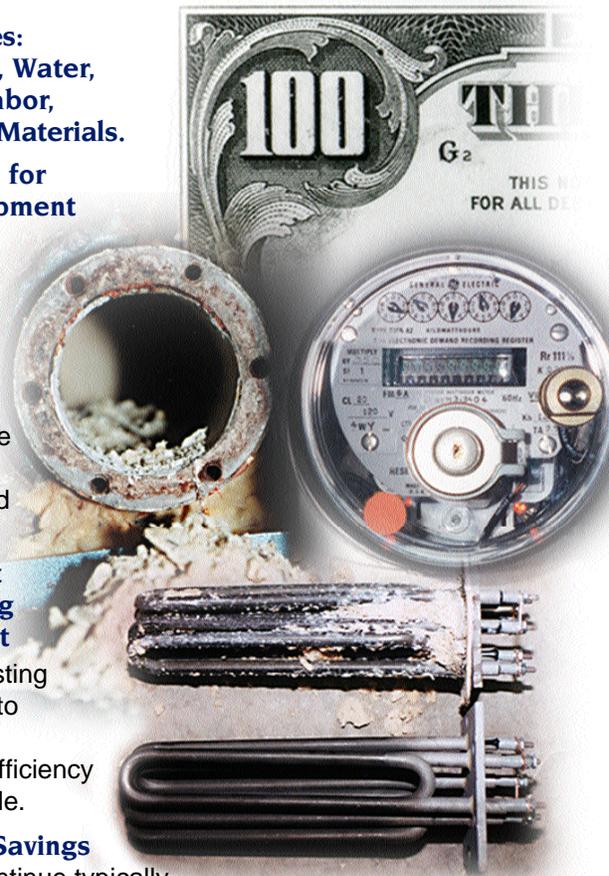
TWT provides new equipment with the ability to enhance the product benefits and features.

**Treatment
for Existing
Equipment**

Retrofit existing equipment to improve its operating efficiency and life cycle.

Lifecycle Savings

Savings continue typically for 10 years or more from date of installation. Savings accelerate after the payback period and continue for the life of the system. Lifecycle savings are thus typically many times the cost of the TWT System.



HVAC, process cooling, agriculture, industrial processing, wastewater and other fluid based systems. Each product line offers a variety of both standalone and comprehensive treatment solutions for end-to-end fluid management, for all types of applications. The patented Triangularwave Deposit Control Systems use advanced integrated circuitry and signal processing to create a complex frequency and amplitude modulated wave form. A complex and changing electrical field is induced in the pipe, which increases the solubility of the minerals and changes the shape and size of the calcium carbonate crystals. By this reaction, the crystals lose their adhesive properties, remain in sub-micron suspension, and pass harmlessly through the pipe. Existing scale deposits are taken into solution and also pass through.

Triangularwave Deposit Control Systems offer all the positive effects of soft water, and clean up existing deposits, without the use of traditional salts and chemicals.

**TWT® Advanced Methods for Water & Fluid Management
Potable Water, Process and Waste Water Treatment
& Conditioning**

- Residential • Commercial • Industrial
- Provides the effects of softened water, neutralizes calcium hardness effects in the water
- Removes and prevents scale buildup
- Uses no salts or other chemicals
- Service and maintenance-free
- Improves efficiency of all water-fed equipment and extends its life cycle
- Quickly pays for itself and continues saving
- Descales the entire plumbing system over time
- Designed for safety– the output is safe to both personnel and equipment
- There is no electrical contact with the pipe

TWT Deposit Control Systems enhance other treatment technologies as well, including chemicals, ozone, ultraviolet, separators and other filtration systems, keeping them clean and enhancing their operation. In this way, their full treatment benefits are realized, with reduced maintenance requirements. Consider using TWT Deposit Control Systems in conjunction with any fluid treatment systems as a complementary technology. Visit our websites for further details on how you can leverage the TWT Deposit Control benefits.

Triangularwave Technologies, Inc.(TWT)

**Sensing Environmental Needs
with Intelligent Solutions**

Be Smart, Buy Once! Go Green Save Green

Conserve Water, Save Energy...Non-Chemical, Safe, Cost-Effective Treatment System:

TWT® The Ultimate in Alternative Energy, Water Treatment & Conditioning

The Green Way

CHEMICAL-FREE

Choosing the right system depends on several things...

Triangularwave Technologies, Inc. products and systems provide technologically advanced methods for water and fluid management that are both efficient and cost-effective. Components and subsystems chosen from across the range of treatment methods can be combined in different configurations to provide custom solutions specific to any site or application. Each product line offers a variety of both standalone and comprehensive treatment solutions for end-to-end fluid management, for all types of applications.

At TWT, Inc. we feel the simplest way to choose a system depends on your personal situation. Home/office and facility owners with well water have different water treatment requirements than users who own / rent an apartment in a city. People with municipal water may choose to rely on a scaled down system that meets their current needs, while people drinking untreated ground or surface water need to fully account for all aspects of water treatment in order to guarantee the purity of their water.

To ensure the greatest level of satisfaction in your work with the TWT Water Treatment Products & Systems:

Know the performance capabilities and technical limitations of all products and systems to guarantee the proper installation application and treatment solutions.

Manage Expectations: Verify the purchase order product/system application, installation and performance needs.

Take these steps before placing your purchase order:

TWT, Inc. Deposit Control Systems:

1. Verify the pipes/tubes to be treated in your systems, i.e., diameter of pipe or Tube (1", 2", 3", etc.) pipe material – copper, PVC, steel, ductile iron, glass, rubber, etc.
2. Verify that you have chosen the correct location and application method, i.e., determine reaction zones, (reaction zone is a place in the water system where the water goes through a physical or chemical change, and the deposit ion of scale or biofilm occurs), onsite solenoid wrap, Copper Pipe Signal Enhancer, Reaction Chamber, etc.
3. Verify that you have determined the appropriate Deposit Controller based on water quality review, system to be treated (process review); check your installation & technical guidelines on TWT website for additional information.
4. If any upgrades/ changes are requested, it must be noted on your purchase order, e.g., voltage source changes (110/240 etc.), Deposit Controller upgrades and reason for upgrade additional wire & type of wire (Teflon, etc.), Reaction Chamber construction material e.g., Schedule 40/80 PVC, etc.
5. When using TWT Deposit Control Systems in conjunction with or integrated within other TWT or non TWT treatment technologies and systems, be certain to verify the performance capabilities and technical limitations of all system components

Additional Process Uses of Triangularwave Patented Deposit Control Technology

Triangularwave Technologies, Inc. patented Deposit Control Technology has other potential applications in a wide range of industrial processes including transport, mixing and blending, size separation, dewatering, flotation, leaching, solvent extraction, ion exchange, electrolytic processes, chemical synthesis (compounds/ structures), water reclamation and extraction of oil or sulfur from geological formations.

When installed in a process pipeline the Triangularwave Deposit Controller will:

- Reduce viscosity
- Control fine particles (slime)
- Enhance mixing/blending
- Keep reactants or products in solution or suspension; reduce agglomeration and clogging of pipes, valves, fittings etc.
- Enhance transport limited liquid-solid reactions
- Provide a new chemical synthesis regime
- Enhance water reclamation processes
- Enhance performance of filtration equipment
- Enhance performance of size separation equipment
- Enhance dewatering process

Partial List of Applications:

RESIDENTIAL & LIGHT COMMERCIAL OFFICES

Medical/Dental Offices
Lawn & Sprinkler Systems
Mobile Homes
Humidifiers
Boilers
Aquariums
Car Wash
Steamers Systems
Marine Industry-Houseboats
Laundry & Cleaning Industry

WATER SUPPLY

Water Treatment
Waste Water Treatment
Emergency Water Systems

COMMERCIAL

Cooling Towers
Filtration Equipment
Heat Exchangers
Condensers & Chillers
Evaporators
Boilers/Water Heaters
Power Generation
Condensers Irrigation
Public Swimming Pools
Public Display Fountains
Steam Cleaning Systems
Food Processing Equipment
Maritime Cargo
Medical/Dental

INDUSTRIAL PROCESS

Petro Chemical
Aluminum
Chemical Plastics
Glass Molding

Dye Manufacturing
Fabric Manufacturing
Food Processing
Metal / Mills Finishing
Paint Manufacturing
Pulp & Paper Industry
Pharmaceuticals
Rubber
Slurry Process Lines
Steel
Sugar Mills
Textile Manufacturing
Mining & Ore processing
Breweries
Pasteurization
Plastic Injection Molding
Polymer Production

HEAVY INDUSTRY & ELECTRIC GENERATION

Steel Making
Surface Condenser Cooling Tower
Refining
Petro-Chemical
Surface Condensers
Steam Electricity Generation

AGRICULTURAL APPLICATIONS

Dairy Products
Irrigation Systems
Poultry
Farming

To find out more about prospective markets and technical information.

Check TWT's websites:

www.triangularwave.com click on Industrial Applications.

www.twtwatertreatment.com click on Industry Specific.

Triangularwave Technologies, Inc. (TWT®)

WATER AND FLUID MANAGEMENT SOLUTIONS

Versatile Deposit Control Products & Systems To Effectively Meet The Needs Of Any Industry and Application - **Chemical-Free**
• Residential • Commercial • Industrial

Control Scale Deposits / Bacteria / Corrosion / Algae / Colloids In All Fluid Based Systems

HARD WATER PROBLEMS SOLVED EASILY
Efficient, Cost Effective & Reliable



Power On
Coil Energized
System Fault Error
Push to Test

TWT® Patented Deposit Control systems use advanced technology to restore and maintain a clean, corrosion-free delivery system in an environmentally safe and chemical-free manner... The result is clean pipes and tubing with no biofilm and reduced bacterial contamination.



TWT® Patented “Chemical-Free” Triangularwave Deposit Control Technology:

Electro-magnetic microprocessors sized to meet the needs of all applications. Technologically advanced method for water & fluid management providing comprehensive end-to-end treatment & conditioning.



TWT® Copper Pipe Signal Enhancer

The copper pipe signal enhancer is a passive signal/ impedance matching circuit. This device provides a power boost to the conditioning signal in copper pipes (for copper pipe applications only).



TWT® Reaction Chambers

To use in conjunction with the TWT Deposit Control Systems when required, Triangular Wave 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.

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 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.

TWT, Inc. offers a full range of products & systems designed to address fluid problems wherever fluid flows. TWT has the versatile, efficient, cost-effective methods to solve your fluid management problems end to end.

- Controls scale, bio-film & corrosion
- Enhance operating efficiency & life cycle of equipment
- The only products & systems that pay for themselves
- Review application and installation guidelines (owners manual) of all products and systems to ensure proper use and treatment.



ISO Certified Facility

MADE IN U.S.A.

TWT is the world's leading manufacturer and supplier of chemical-free fluid management products based on its patented TWT Triangularwave form technology. TWT's chemical-free fluid treatment and management methods have been accepted for use around the world by governments, industry, and individuals, who all enjoy the increased safety, extended equipment life cycle, and decreased operating costs that the TWT systems deliver.

**HEAVY SCALE BUILDUP**

To understand how to solve water-related problems, it is necessary to understand what causes these problems. Although water is basically H₂O (a simple combination of hydrogen and oxygen), by its nature it is highly receptive to many

other substances that complicate and contaminate this simple mixture.

Encrusted Tube Bundles

THERE ARE THREE BASIC CAUSES OF WATER/FLUID RELATED PROBLEMS

Scale

- Problems:
- *Loss of heat transfer efficiency*
 - *Flow restriction in pipes and frozen valves*
 - *Back pressure increases energy needed to pump*
 - *Reduced reaction vessel capacity*
 - *Localized corrosion*
 - *Visible surface scale objectionable*

Adverse Water Chemistry

- Problem:
- *General corrosion*

Biofilm

- Problems:
- *Loss of heat transfer efficiency*
 - *Biocorrosion (both general and local)*
 - *Sludge*
 - *Disease and odors*
 - *Bacteria, Algae, Fungus, etc.*

The End Results of Water Problems

- *Wasted water*
- *Ruined equipment*
- *High energy costs*
- *Productivity losses*
- *Product contamination or quality problems*
- *Disease and odor in the water environment*

Materials That Deposit on Equipment and Cause Water/Fluid Problems

Materials may be animal, vegetable, mineral, or corrosive water chemistry. The sources of the materials include: pollution; wind borne dirt, bacteria, and algae; chemical additives; and process components themselves. Some of the materials can grow; such as bacteria, algae, fungus, etc.

Treatment

Scale, Adverse Water Chemistry & Biofilm Can Cost You Money!

Untreated fluid used in boilers, hot water systems, cooling towers and other fluid related equipment contains dissolved salts, gases and traces of many minerals and metals. These elements are the direct cause of scale buildup in pipes and equipment. If left untreated, scale buildup can increase fuel costs, repair and ongoing cleaning costs, downtime and may eventually result in significant equipment replacement.

The bottom line is that if the problem-causing materials are controlled, then 85% to 90% of the problems are eliminated. Treatment options include removal and control.

- *Removal involves physical or chemical cleaning, filtration, ion exchange, softening, demineralization, reverse osmosis.*
- *Control involves adding chemicals or ozone, or electro-magnetically conditioning the water.*
- *Triangularwave Technologies, Inc. Versatile Fluid Management Products & Systems Are The Solution!*

TWT Deposit Control Installation for Fluid-Fed Equipment - Determining Points of Treatment and Optimum Treatment Configurations for Commercial and Industrial Facilities and Systems

A complete TWT treatment system may use all or only some of the components of a comprehensive water treatment plan, including deposit control, filtration, purification, and disinfection. This configuration guide deals with factors to consider when selecting TWT **deposit control** models for use in a commercial or industrial environment.

Site conditions may indicate that a combination of deposit control products of varying sizes and models is most appropriate for an optimal installation. Among the factors to consider are water chemistry (hardness/grain count) process, "reaction zones", and pipe layout.

We have established that certain configurations are preferred for certain uses, and that if correctly installed in these configurations, the TWT Deposit Control Systems will deliver even greater performance than may have been previously experienced, providing the best end-to-end fluid management and treatment solutions available.

The ability of the Triangularwave Technologies Deposit Control Systems to inhibit scale and biofilm deposits and to remove pre-existing deposits is dependent upon the proper application and installation of the products purchased from TWT Inc. ***Water chemistry must be taken into consideration.***

Every application has areas called reaction zones. These areas represent locations in a system where the fluid is exposed to different types of changes that affect its behavior.

Mechanical: change in pressure, velocity, direction, flow pattern (pumps, aerators, agitators, etc.)

Thermodynamic: changes in temperature (heat exchangers, evaporators, boilers, spray nozzles, etc.)

Physiochemical: change in concentration, state (membranes, cooling towers, filters, main/makeup water inlets, etc.)

It is in the reaction zones where the particles in the fluid, due to the changes to which they are exposed, are more likely to form scale or biofouling. There are many systems, which, due to their nature, will have multiple reaction zones. In general, it is the reaction zone(s) where the TWT Deposit Control treatment should be focused. In these cases, the size and conditions of the system will play an important role in determining the need for one or multiple units, likely of varying sizes/models. (based on pipe size and material)

Our suggested considerations for optimal installation of the TWT Deposit Control System:

The Deposit Control System will provide the means to keep deposits (calcium, lime, etc.) in solution for extended periods, if not disturbed. The ability of the fluid to retain the deposits in solution is decreased (but not eliminated) by fluid disturbances (e.g., pressure changes) high temperature conditions (flashing, boiling, etc.) and changes in concentration (fluid conditions).

In Automatic Fill Systems, a Fill Solenoid Valve/Float Valve will be used to control the fluid level in the fill system. Where a large pressure change takes place immediately downstream of the valve, TWT recommends that the Reaction Chamber and/or the on-site wrap be located downstream from the valve to avoid this pressure change point. When water boils and/or is evaporated, the calcium and other dissolved solids remain and form deposits. As a result of the TWT fluid conditioning, these deposits will be softer and more easily removed when treated by the TWT deposit control system. In most cases the heating system process and self cleaning ability will wash away any potential build up, allowing for a significant reduction in maintenance procedures.

If a heating system can be operated without boiling/flashing on the surface of the heating element, a significant reduction in deposits will be obtained. As the fluid temperature is lowered from boiling, the ability of the TWT-treated water to hold the deposits in solution increases. TWT recommends that a reaction chamber and/or onsite wrap be located upstream of (before) any heating system, and where possible downstream (after) the heating system, to further ensure the ability of the fluid to retain the deposits in solution.

When fluid is heavily saturated with deposits (TDS, grain count, change in concentration/ fluid condition), the ability of the TWT Deposit Control System to treat fluids and hold deposits in solution is decreased but not eliminated. The ability of the TWT Deposit Control Treatment System effectiveness decreases proportionately with the increase in TDS. i.e., grain count, change in concentrations, evaporation and/or other fluid exposures as referred in the above "reaction Zones". That is why a TWT representative must examine the water (fluid) to be

treated and all of the obvious influences surrounding it to ensure proper installation & application. **Under these conditions TWT recommends that you upsize (increase the oscillating electrical field) the Deposit Control System to meet and ensure the highest level of performance for these conditions.**

For these and other special requirements and installations, TWT will work directly with you to custom design fluid management solutions and system configurations for your industry-specific needs in an operational and cost effective manner. Examples of custom design for these products include designation of the appropriate deposit control system in the appropriate reaction zones to enhance and guarantee balanced treatment throughout the system, custom reaction chambers to meet size restraints and/or to allow for longer dwell time, as well as upgraded micro-processor design to meet the challenges of unusual circumstances.

In order to ensure the greatest level of performance and satisfaction in your work with the TWT Deposit Control Systems and our other fluid management products, we recommend that you use the systems analysis worksheets and contact our engineering staff, who will be pleased to work closely with you to determine the optimal installation for your needs and provide the best range of fluid management solutions.

TWT products make sense from operational, economic, and safety points of view. Ownership of the TWT System will afford you and your customers significant savings over a short period of time and even greater savings over the life cycle of the equipment.



TWT Deposit Control Technology/system:

On site testing after application and installation completed according to manufactures guidelines. Owner application & installation manual, sent with systems.

All TWT Deposit Controllers are engineered and designed to be self-testing. Read all information in manual carefully for this information before installing the systems

NOTE:

Triangularwave Technologies Patented Deposit Control Systems enhance the life cycle and operating efficiency of all filtration, disinfection, and purification systems.

Properly installed, a clean, corrosion-free delivery system is restored and maintained in an environmentally safe and chemical-free manner. The result is clean pipes and tubing, with no biofilm, and reduced bacterial contamination.

Versatile Fluid Management Systems To Effectively Meet The Needs Of Any Application

Optional, Unique, Scalable Systems For Every Need TWT Deposit Control Systems can be deployed in different modular configurations, scaling to fit your specific needs.

Configuring for extreme hard water conditions (TDS)

Example:

An industrial plant with 2" piping and a moderate to high Total Dissolved Solids (TDS) level could be treated with the expected TWT 402 (2") Deposit Controller and the appropriate 2" Reaction Chamber, Copper Pipe Signal Enhancer or on-site solenoid wrap.

If that site, however, had a very high TDS level, the 2" pipe would best be treated by a 3", 4", or even 6" TWT Deposit Controller combined with the appropriate 2" Reaction Chamber, Copper Pipe Signal Enhancer or on-site solenoid wrap, depending upon the severity of the TDS level. In other words, for unusual situations, application of TWT products can be scaled up to meet those needs.

Note:

When upgrading controller, the reaction chamber, copper pipe signal enhancer or on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

For Recirculating Systems: Guide to Choosing Your Products by Volume of Water

The proper use of a TWT Deposit Control System will generally allow standard water system operation at concentration ratios of between 6 and 8, conserving a great deal of water and energy. Average untreated systems typically run at concentration ratios of 3 to 4.

The chart below is provided as a guide and approximation only - the choice of products to be used at any given site will depend upon the water quality and other specifics of that site.



Upgrade Deposit Controllers if extreme hard water conditions exist

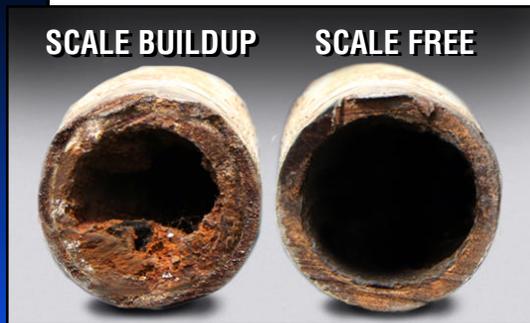
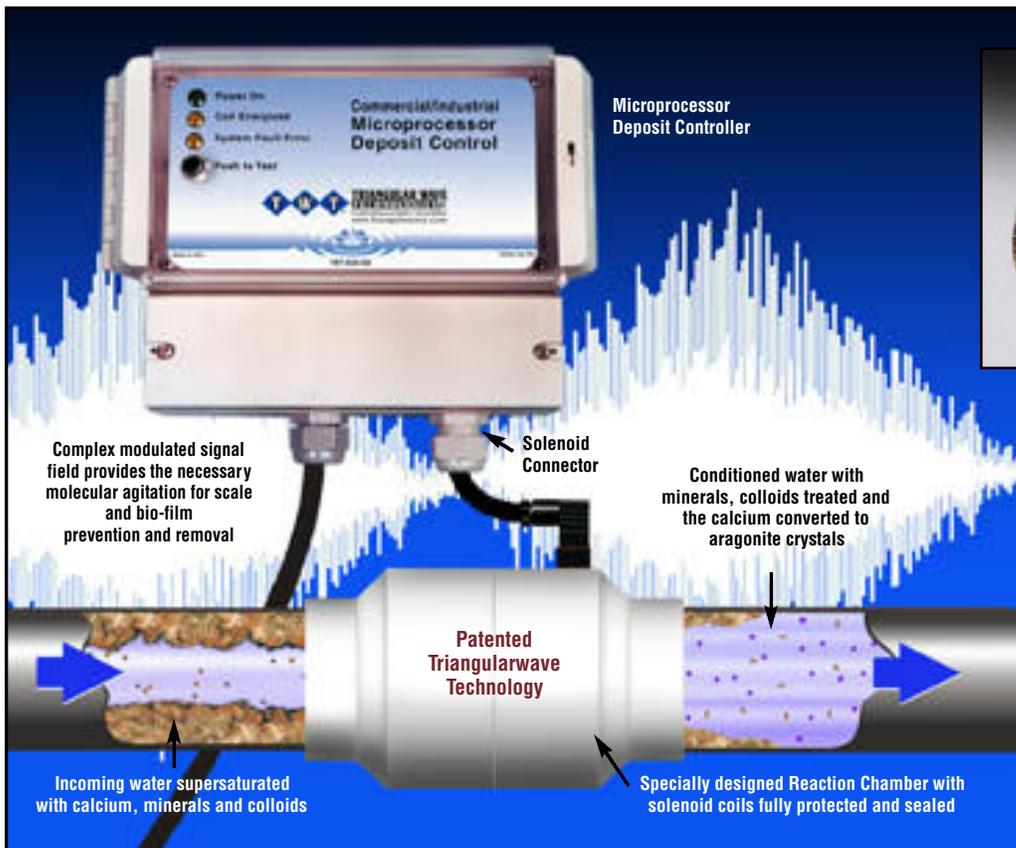
Assuming a Concentration Ratio of 6 to 8:

A 2" TWT Deposit Control System can generally treat a recirculating volume of water up to 6,000 gallons.

A 4" TWT Deposit Control System can generally treat a recirculating volume of water up to 19,000 gallons.

A 6" TWT Deposit Control System can generally treat a recirculating volume of water up to 43,000 gallons.

An 8" TWT Deposit Control System can generally treat a recirculating volume of water up to 77,000 gallons.



How TWT Deposit Control Technology Works:

Using modern integrated circuitry and signal processing techniques, the patented TWT Deposit Control Technology works by producing a complex frequency-modulated waveform. This creates a deionizing effect, induced by physical means, which increases the solubility of the minerals, and colloids in the liquid and changes the shape, size and texture of the calcium carbonate crystals. By this reaction, the minerals, colloids and crystals lose their adhesive properties and remain in suspension in the liquid. Pre-existing scale is taken back into solution and removed in the same way. The effects are immediate and long lasting down stream.

WATER & FLUID MANAGEMENT SOLUTIONS

Provide Your Customers With Technologically Advanced Water Treatment Systems

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)**.



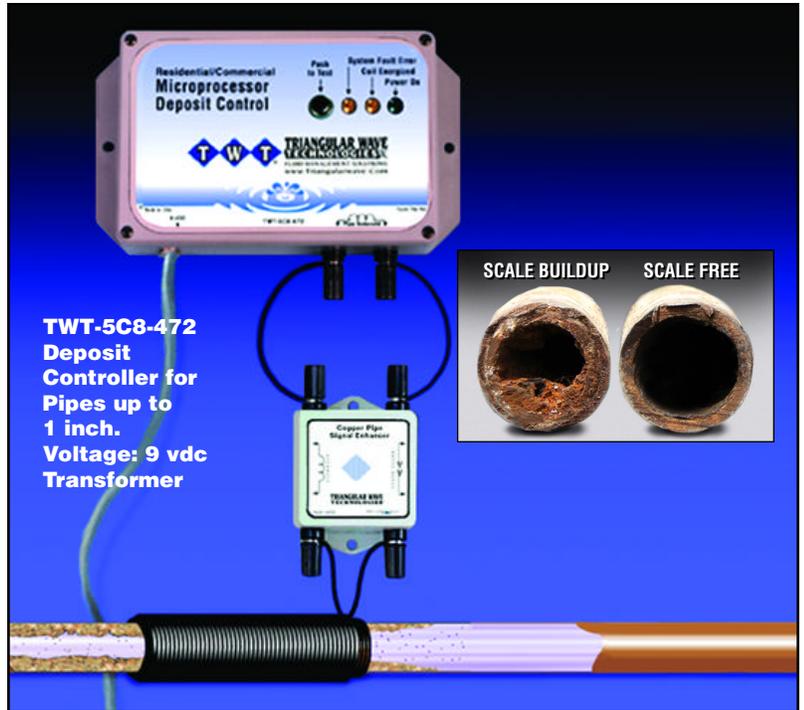
TWT® Deposit Control units sized to meet the applications (pipe size & material) required for point-of-entry and/or point-of-use water treatment and conditioning. Used in residential, commercial & industrial facilities worldwide.

FIELD TESTED AND PROVEN EFFECTIVE

**CHEMICAL-FREE
HARD WATER CONDITIONING
& TREATMENT SYSTEMS**



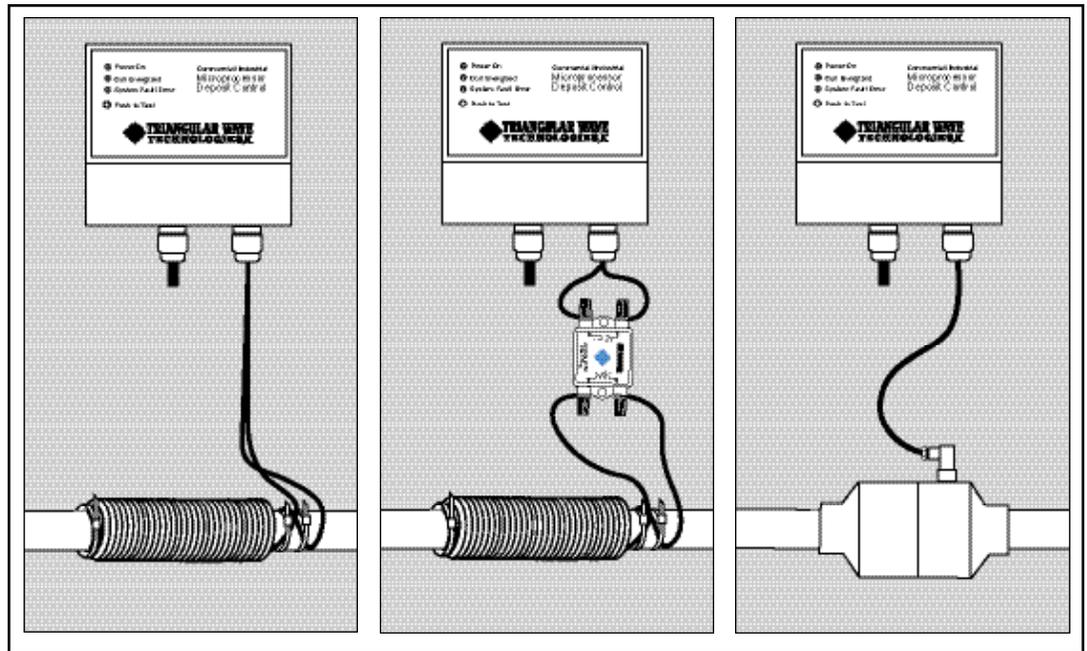
TWT-5C8-402/2" controller with TWT-CSE-0227 copper pipe signal enhancer. Onsite solenoid application, on 2" copper pipe.



**TWT-5C8-472
Deposit
Controller for
Pipes up to
1 inch.
Voltage: 9 vdc
Transformer**

Residential Deposit Control Unit

For Maximum Effectiveness Follow These Simple Guidelines



**TWT-Deposit Control Solenoid
Coil Wrap on PVC Pipe
Application:**

PVC/Plastic pipes require **NO** copper pipe signal enhancer or reaction chamber

**TWT-Deposit Control Solenoid
Coil Wrap with a CSE Copper
Pipe Signal Enhancer
Application:**

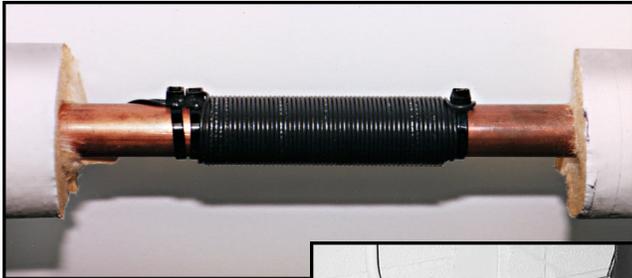
Copper pipe signal enhancer is required for copper pipe applications only

**TWT-Deposit Control with
Stainless Steel or PVC
Reaction Chamber
Application:**

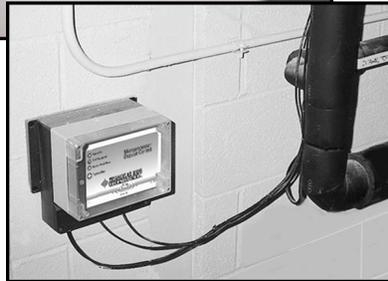
Magnetic pipes (steel/iron) require a reaction chamber

Owner application, installation, and maintenance manuals sent with units:
Read all instructions carefully before installing the systems.

TO ENSURE THE MAXIMUM EFFECT AND RESULTS OF OUR DEPOSIT CONTROL SYSTEMS PLEASE FOLLOW THESE GUIDELINES:



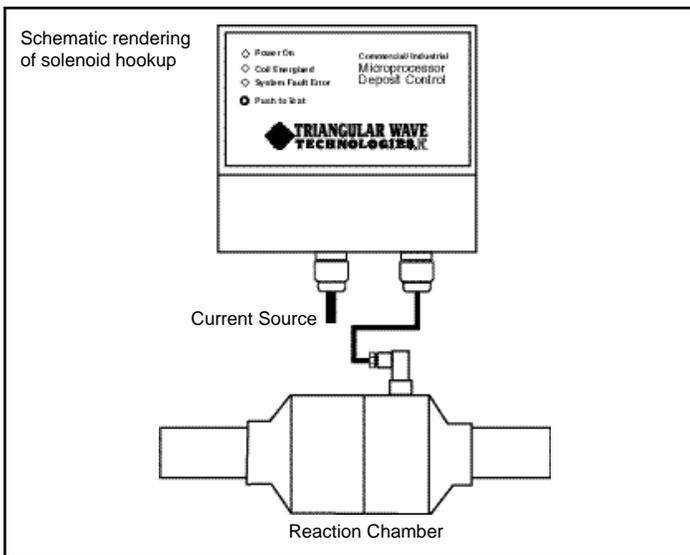
Solenoid wrapped pipe



Solenoid wrapped pipe
(Coil hidden by insulation)
with deposit controller

TRIANGULARWAVE TECHNOLOGIES REACTION CHAMBERS

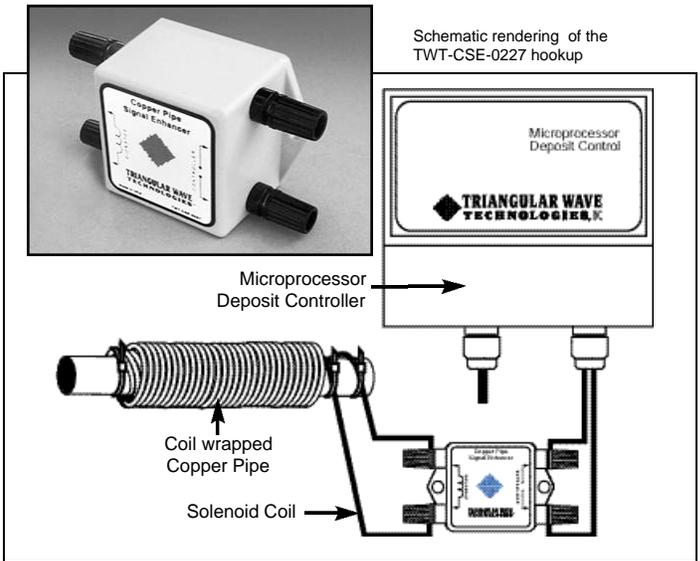
To use in conjunction with the TWT Deposit Control Systems when required, Triangularwave Technologies, Inc. has developed a line of factory-wrapped wire coil Reaction Chambers to address magnetic pipe environments. **Typically, wire coil cannot be installed on any magnetic pipe, such as steel, galvanized 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.



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. When properly installed 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.

Water The Way Nature Intended it!

TWT-CSE COPPER PIPE SIGNAL ENHANCER (For copper pipes only)



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

Triangularwave Technologies has designed its Copper Pipe Signal Enhancer. This unit is placed between the controller and the copper pipe solenoid. 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 ensures enhanced treatment of the fluid. The Copper Pipe Signal Enhancer must be used in all copper pipe applications to maximize the performance, and provide a boost to your application.

The copper signal enhancer is a passive signal / impedance matching circuit. This device provides a power boost to the conditioning signal in copper pipes.

THE VERSATILITY OF THE TRIANGULARWAVE DEPOSIT CONTROL SYSTEM ALLOWS FOR EXTERIOR INSTALLATION WHEN INTERIOR INSTALLATION IS IMPOSSIBLE



Triangularwave Technologies, Inc. Microprocessor TWT-5C8-402 installed in a weatherproof electrical box on the outside wall of the building.



The coil is wrapped around a 2" water pipe and protected from dirt, disturbance and moisture with weatherproof tape.

Triangularwave Technologies (TWT®) Deposit Control Systems: Pipe Measurement Guidelines

Triangularwave Technologies, Inc. products and systems provide technologically advanced methods for water and fluid management that are both efficient and cost-effective. Components and subsystems chosen from across the range of treatment methods can be combined in different configurations to provide custom solutions specific to any industry, site or application.

Each product line offers a variety of both standalone and comprehensive treatment solutions for end-to-end fluid management, for all types of applications.

To ensure the greatest level of satisfaction in your work with the TWT®, Fluid Management Products & Systems

- **Know the performance capabilities and technical limitations of all products and systems to guarantee the proper installation application and treatment solutions.**
- **Manage Customer Expectation: Verify the purchase order product/system application, installation and performance needs, customer perceptions and manage customer expectations.**

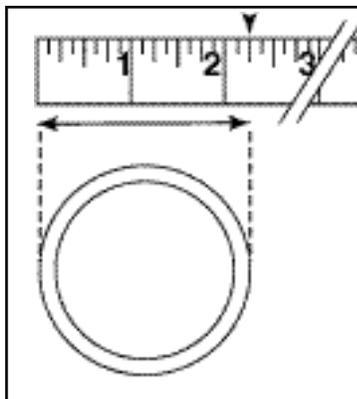
Follow these simple procedures to verify pipe sizes (application) prior to submitting a purchase order. Conversion chart of field measurements to determine pipe size (same for any material, to nearest 1/4" inch).

Measuring with non-flexible ruler

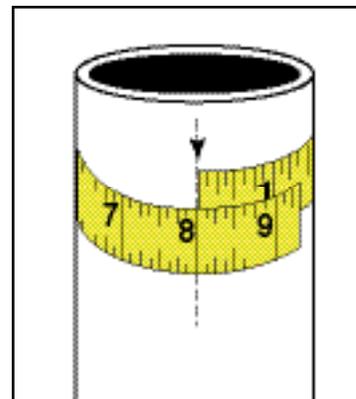
Outside Pipe Diameter (inches)	TWT Pipe Application (inches)
3/4"	1/2"
1"	3/4"
1 1/4"	1"
1 3/4"	1 1/2"
2 1/2"	2"
3 1/2"	3"
4 1/2"	4"
6 1/2"	6"
8 1/2"	8"
10 3/4"	10"

Using tape measure or flexible ruler

Pipe Circumference (inches)	TWT Pipe Application (inches)
2 1/2"	1/2"
3 1/4"	3/4"
4 1/4"	1"
6"	1 1/2"
7 3/4"	2"
11"	3"
14 1/4"	4"
20 3/4"	6"
27"	8"
33 3/4"	10"



Example:
Outside diameter of pipe measuring 2 1/4" = 2"
TWT pipe application



Example:
Circumference of pipe measures 7 3/4" = 2"
TWT pipe application



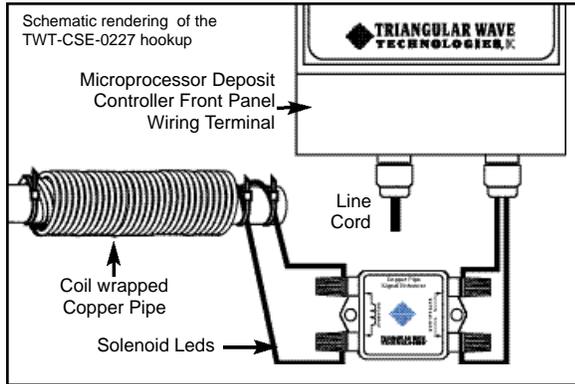
TWT® DEPOSIT CONTROLLER TERMINAL HOOKUP & APPLICATION GUIDELINES



The TWT® Deposit Control System will give many years of service if installed properly. Please read all instructions carefully (owners installation manual) before assembling the system.

The unit is provided with a line cord. The cord should remain unplugged until the installation is complete. Mount the unit to a supporting structure using the base mounting flange, and case mounting kit supplied. Install two mounting feet to the top rear of controller case with screws supplied. Place one of the mounting brackets on the top corner over the locating tab on each side of the unit, attach the brackets with screws provided. The two bottom mounting holes are located inside the controller in the terminal hookup area. You need to remove the front panel to locate the mounting holes at the bottom corners of the case. With the brackets in place you have a method to fasten all four corners of the controller to an appropriate surface.

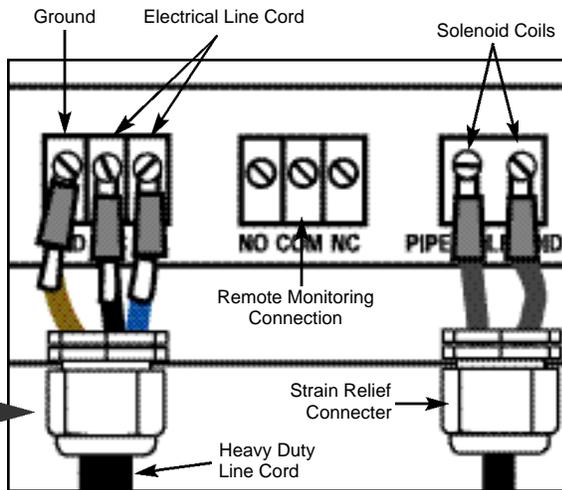
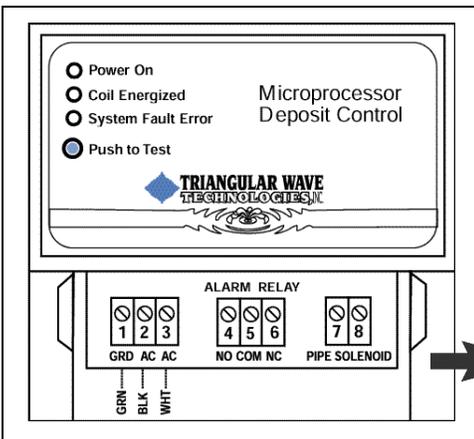
TWT-CSE Copper Pipe Signal Enhancer Application



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 as illustrated. 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.

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

TWT Deposit Controller terminal Hookup



TWT Deposit Control Unit

The controller is supplied with a wiring kit and a strain relief connector for the solenoid coil wires. This strain relief will provide a water resistant seal for the two coil wires. You should rotate the compression ring counter clockwise to release pressure on the seal. Feed the two wires through the provided holes and tighten the compression ring. Connect the two wires to the coil terminals in the controller housing as illustrated (refer to winding instructions in owners installation manual).

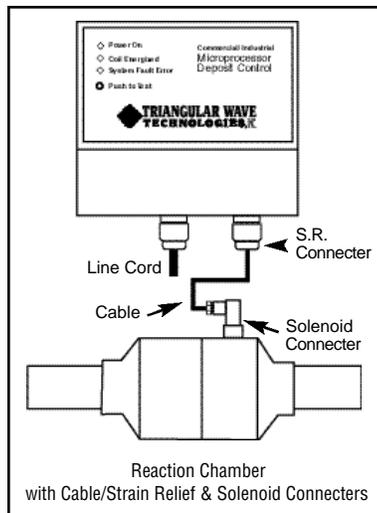
A standard installation will not require access to the main control circuit board, because all connections are available in the wiring terminal. The control circuit is accessed by removing the front panel of the TWT unit.

Factory Wrapped Wire Coil Reaction Chambers Application

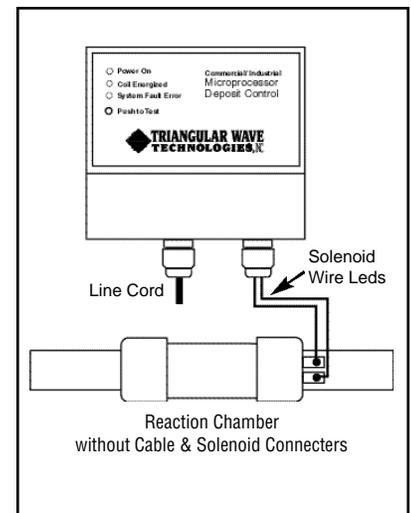
- To address magnetic pipe applications
- When a protected environment (code) is needed
- When on-site solenoid wrap is not applicable

The TWT Reaction Chamber is part of the patented TWT Deposit Control Technology. 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.

When you have purchased a reaction chamber with cable and connectors with your controller unit, the correct strain relief connector for the controller is furnished with the cable for the reaction chamber. The strain relief connector on the controller (pipe solenoid) should be removed and replaced with the strain relief connector provided with the reaction chamber cable. The two wires should be connected to the coil terminals in the controller housing as illustrated above.

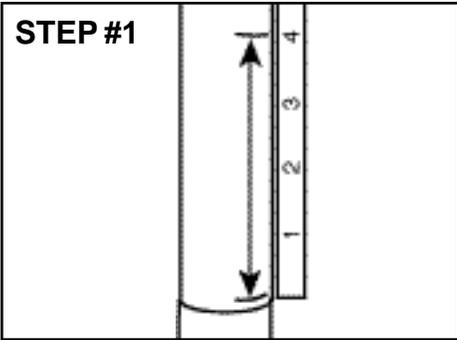


Schematic rendering of industrial reaction chamber hookup



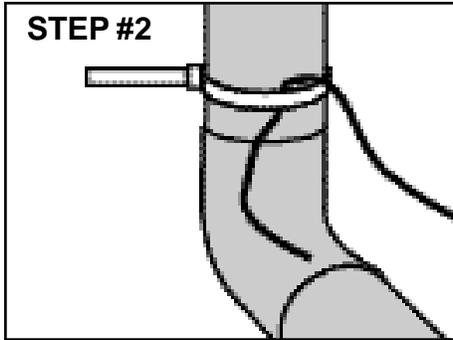
Schematic rendering of reaction chamber hookup using wiring kit provided

Step by step installation Instructions for onsite solenoid Coil Wrap for Model #TWT-5C8-402 (other sized controllers see owners manuals)



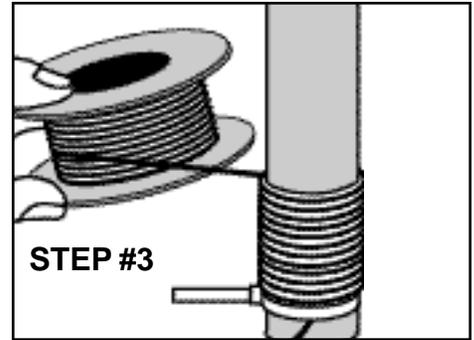
STEP #1

Measure and mark a 7" section in the middle of a straight pipe segment.



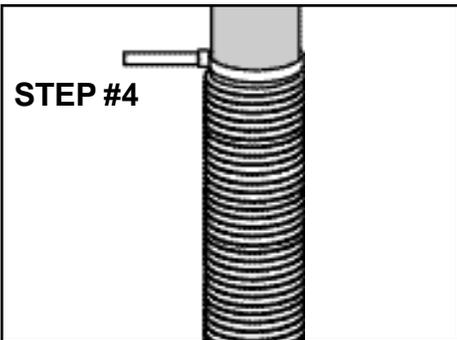
STEP #2

Fasten the signal wire to the pipe with a cable tie (provided) at one end of the 7" section.



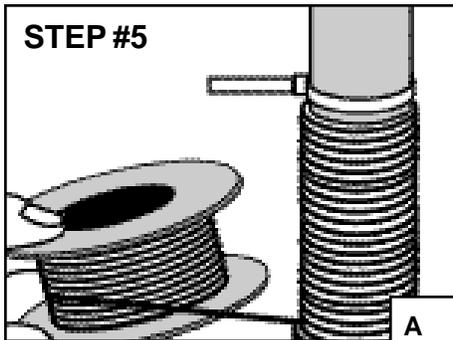
STEP #3

Wrap the signal wire around the pipe in a tight coil, in a clockwise manner, so that the adjacent wires are touching each other.



STEP #4

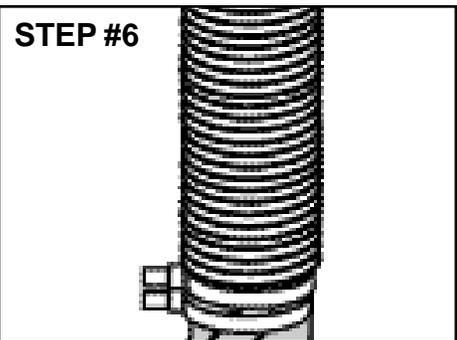
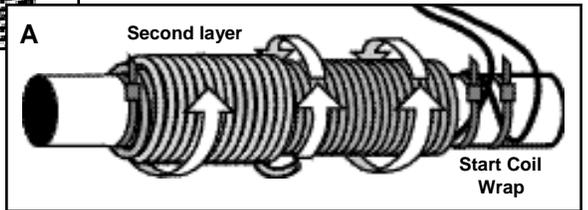
Continue to wrap until the 7" section of pipe is completely covered. Fasten down the end of the coil with the second cable tie (provided). You can hold the first layer in place with cloth tape or electrician's tape.



STEP #5

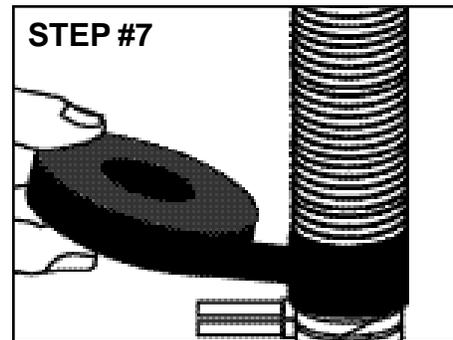
Add a second layer to the coil by continuing to wind in a clockwise manner starting where you completed the first layer and wind **back in the direction of the starting**

point. (see Diagram A) Do Not Twist or Cut Wire or the System WILL NOT Function. Place the second layer directly on top of the first layer. Be careful to wind the second layer tightly **in the same clockwise manner** as the first layer **back in the direction of the starting point.**



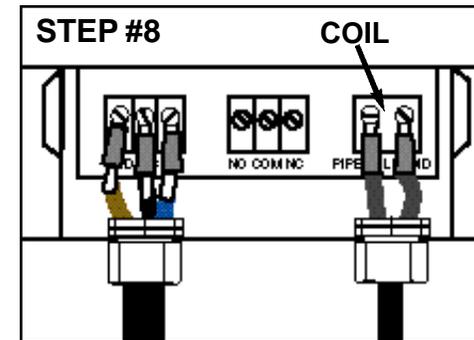
STEP #6

Complete the second layer by clamping the wire with third cable tie (provided). **(See Diagram B Below)**



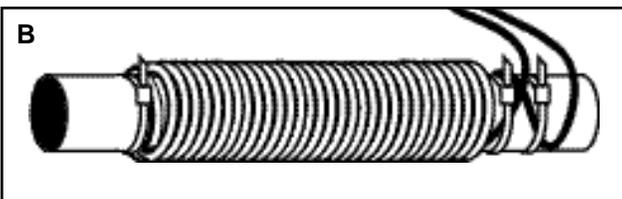
STEP #7

Wrap the coil with vinyl industrial tape to help maintain a tight coil and protect the coil from loosening.



STEP #8

Guide both wires to the Triangularwave Unit and leave about 2" of extra wire.



B

On site solenoid wrap sizes vary according to pipe material, size and model chosen. For further instructions regarding the completion of the installation, please refer to your owners installation manual shipped with system.

For high temperature applications of 176°F and above, request and use teflon wire. Teflon wire solenoid wrap sizes vary according to pipe material and pipe size, refer to the technical guidelines on the TWT website for additional information.

TWT recommends that installers should use vinyl self-sealing industrial electrical tape for maximum protection and support of the solenoid coil wrap.

Deposit Controller	Pipe Size	Wrap Length Along Pipe	Wire Kit	Solenoid
TWT-5C8-470	1/2 inch	4 inch wrap	75 ft.	The solenoid is wound in two overlapping layers, approx..60 turns per layer
TWT-5C8-471	1 inch	4 inch wrap	75 ft.	The solenoid is wound in two overlapping layers, approx..60 turns per layer
TWT-5C8-472	1/2 / 1 inch	4 inch wrap	75 ft.	The solenoid is wound in two overlapping layers, approx..60 turns per layer
TWT-5C8-401	1 1/2 inch	4 inch wrap	100 ft.	The solenoid is wound in two overlapping layers, approx..60 turns per layer
TWT-5C8-402	2 inch	7 inch wrap	150 ft.	The solenoid is wound in two overlapping layers, approx..90 turns per layer
TWT-5C8-403	3 inch	7 inch wrap	200 ft.	The solenoid is wound in two overlapping layers, approx..90 turns per layer
TWT-5C8-404	4 inch	7 inch wrap	225 ft.	The solenoid is wound in two overlapping layers, approx..90 turns per layer
TWT-5C8-406	6 inch	4.5 inch wrap	275 ft.	The solenoid is wound in two overlapping layers, approx..65 turns per layer

Please see the installation manual for instructions to correctly wind the coil.

Coil Kit provided will contain UL 1007 • UL 1015 #18/20 awg wire with the assumption that the controller will be located within 10 to 15 ft. of solenoid. All installations may splice additional wire to remotely locate the Controller up to 100 ft. away from the solenoid coil. Refer to Owner's/ Installation Manual for further information..

Note: When upgrading controller for extreme hard water conditions (TDS), the on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

High Temperature Applications for Triangular Wave Technologies™ Deposit Control Systems 176° F and Above (Teflon Wire)

TWT-5C8-470	1/2 inch	3.5 inch wrap	55 ft.	The solenoid is wound in two overlapping layers, approx...60 turns per layer
TWT-5C8-471	1 inch	3.5 inch wrap	55 ft.	The solenoid is wound in two overlapping layers, approx...60 turns per layer
TWT-5C8-472	1/2 / 1 inch	3.5 inch wrap	55 ft.	The solenoid is wound in two overlapping layers, approx... 60 turns per layer
TWT-5C8-401	1 1/2 inch	4 inch wrap	75 ft.	The solenoid is wound in two overlapping layers, approx...60 turns per layer
TWT-5C8-402	2 inch	5 inch wrap	125 ft.	The solenoid is wound in two overlapping layers, approx... 90 turns per layer
TWT-5C8-403	3 inch	5 inch wrap	175 ft.	The solenoid is wound in two overlapping layers, approx...90 turns per layer
TWT-5C8-404	4 inch	5 inch wrap	200 ft.	The solenoid is wound in two overlapping layers, approx...90 turns per layer
TWT-5C8-406	6 inch	3.75 inch wrap	250 ft.	The solenoid is wound in two overlapping layers, approx...65 turns per layer

In applications where the pipe surface temperature is 180° F and above, you should request a Teflon Wire Kit. To provide a spool of Teflon Insulated Wire to form the pipe solenoid. The wire ties supplied with the unit are satisfactory for use with the Teflon Wire.

Please see the installation manual for instructions to correctly wind the coil. The Teflon Wire will be slightly smaller in diameter and the solenoid should be formed as described above:

The wire used to form the pipe solenoid provided with enclosed Microprocessor is: UL1007 • UL 1015 #18/20awg.

Teflon Insulated Wire Kit is provided at factory upon request.

Note: When upgrading controller for extreme hard water conditions (TDS), the on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

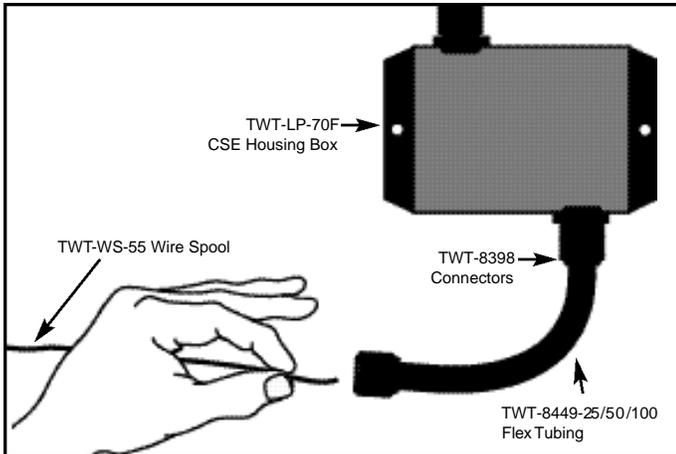
TWT, Inc. always recommends that an additional protective covering (high temperature out side rated electrical tape) be put over the solenoid coil after completion. This will hold correctly wound solenoid in place to ensure that the coil stays tight and does not loosen.

Important Reminder: Do not install the wire coil on any magnetic pipe; such as STEEL, GALVANIZED STEEL, IRON, DUCTILE IRON OR CAST IRON. When the coil is applied to a magnetic material the pipe then becomes a shield, and prevents the energy from entering the fluid path. The Triangular Wave Deposit Control System creates an electromagnetic field which is used to address the fluids in the pipe. If the fluid pipe is magnetic, it is necessary to insert a section of nonmagnetic pipe to provide the proper pipe material for the unit to work as designed.

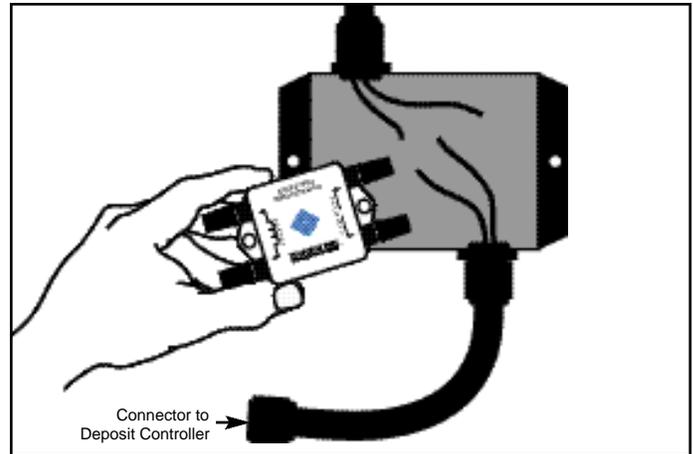
Based on point-of-use, water quality and conditions and to ensure proper use, application and installation of the TWT 8", 10", 12" and higher deposit control systems, contact your dealer or TWT, Inc. for additional information and winding instructions.

COPPER PIPE (CSE) TUBE & PIPE APPLICATION & INSTALLATION GUIDELINES

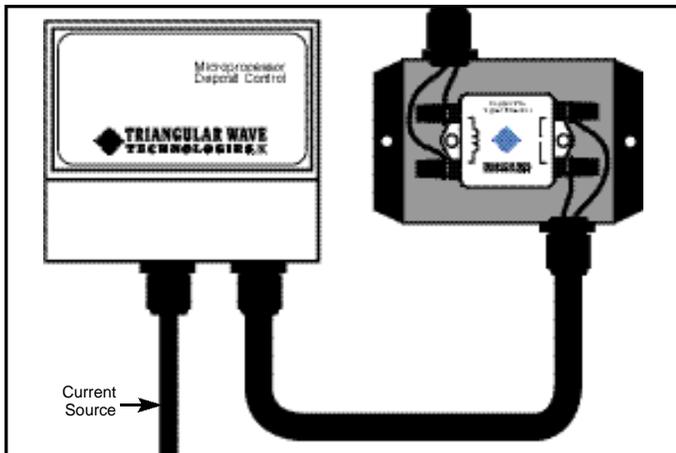
On Site Professional Installation Assembly When Using Copper Signal Enhancer (for Copper Pipes Only)



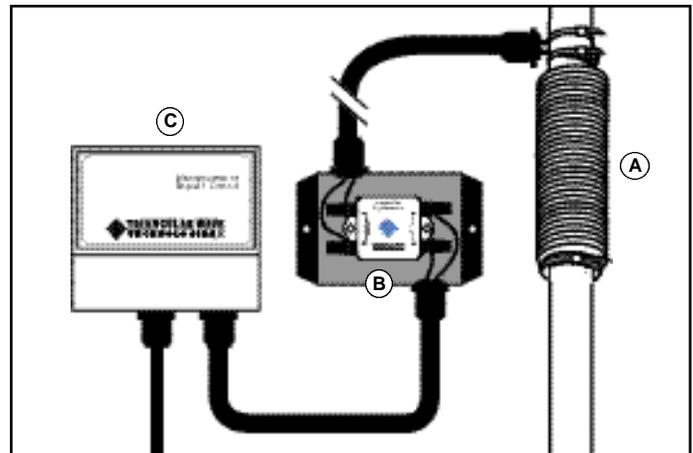
Insert wire through black flex tubing and into mounted CSE housing box, leave enough wire for CSE Unit connection



Secure CSE Unit to housing and connect wires to unit



Copper pipe signal enhancer correctly wired and installed



Completed System Installation Must Reflect:

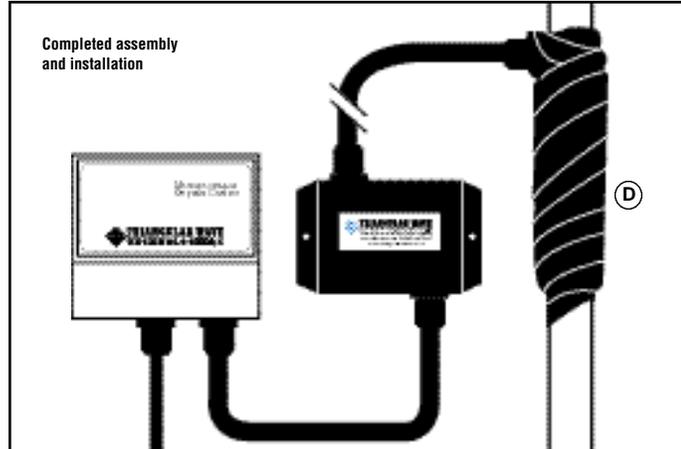
- A. Solenoid coil correctly field wrapped
- B. CSE (copper pipe signal enhancer) securely mounted in CSE Housing
- C. Visual placement for deposit controller suitable for periodic visual inspection of LED'S
- D. Solenoid coils should be covered with vinyl self-sealing industrial electrical tape to protect the coil from loosening (see illustration on left)

All wires must be securely fastened and/or taped to connections

All associated wiring/conduit/line cords must be fastened with plastic wire ties and out of harms way

CSE housing unit should be installed not more than 10 feet from onsite solenoid wrap installation for best results

For high temperature applications of 176°F and above, request and use teflon wire. Teflon wire solenoid wrap sizes vary according to pipe material and pipe size, refer to the technical guidelines on the TWT website for additional information.



Accessories: Note: Complete factory packaged CSE kits available upon request

Optional: Flex Tubing:

TWT-8449-25 – 25 ft. • TWT-8449-50 – 50 ft. • TWT-8449-100– 100 ft.

Optional: CSE Black Housing Box: TWT-LP-70F

(To mount and enclose CSE Unit)

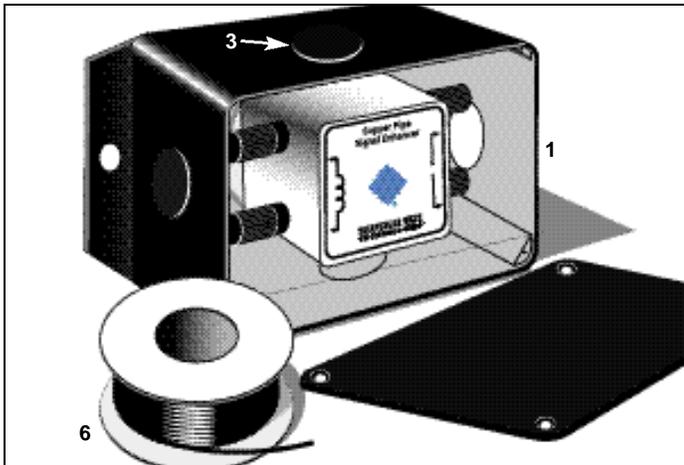
Optional: Connectors: TWT-8398

(For Flex Tubing and CSE Black Box)

INDUSTRIAL COPPER PIPE SIGNAL ENHANCER KITS

On Site Professional Installation Assembly When Using Copper Signal Enhancer (for Copper Pipes Only)

Schematic renderings for illustrative purposes only



ITEM

TWT-CSE-0227K

KIT DESCRIPTION & COMPONENTS

For installation of copper pipes up to 2" only

- 1- 1 CSE black housing box with pre-mounted CSE unit, and 4 pre-drilled 1/2" holes for easy assembly and installation. CSE kit may be mounted vertically or horizontally. Box dimensions: 5.5"W x 4.25"H x 1.75"D
- 2- 4 connectors for CSE housing box, controller and solenoid connections
- 3- 2 plastic hole plugs (cover remaining holes)
- 4- 1-15' length of flex tubing for housing box to deposit controller connection
- 5- 1-10' length for hosing box to onsite solenoid connection
- 6- One 55' extra wire spool

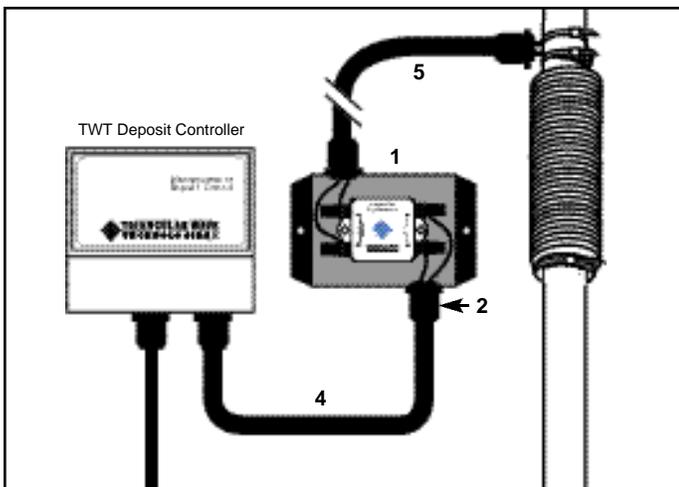
ITEM

TWT-CSE-0229K

KIT DESCRIPTION & COMPONENTS

For installation of copper pipes up to 4" only

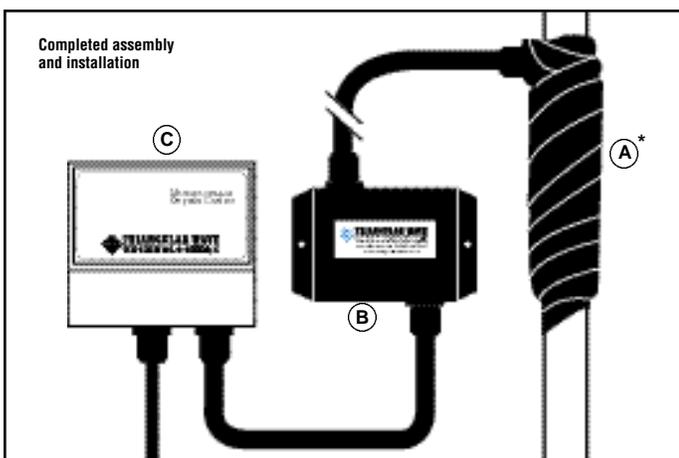
- 1- 1 CSE black housing box with pre-mounted CSE unit, and 4 pre-drilled 1/2" holes for easy assembly and installation. CSE kit may be mounted vertically or horizontally. Box dimensions: 6.1"W x 4.6"H x 2.4"D
- 2- 4 connectors for CSE housing box, controller and solenoid connections
- 3- 2 plastic hole plugs (cover remaining holes)
- 4- 1-15' length of flex tubing for housing box to deposit controller connection
- 5- 1-10' length for hosing box to onsite solenoid connection
- 6- One 55' extra wire spool



Kits for larger copper pipe diameters available upon request

#18/20 awg wire for onsite solenoid installation packaged and shipped with all TWT deposit controllers

For high temperature applications of 176°F and above request from your distributor or TWT teflon wire.



Completed System Installation Must Reflect:

- A. Solenoid coil correctly field wrapped
- B. CSE (copper pipe signal enhancer) securely mounted inside CSE Housing
- C. Visual placement of deposit controller suitable for periodic visual inspection of LED's

All wires must be securely fastened and/or taped to connections

All associated wiring/conduit/line cords must be fastened with plastic wire ties and out of harms way

CSE housing unit should be installed not more than 10 feet from onsite solenoid wrap installation for best results

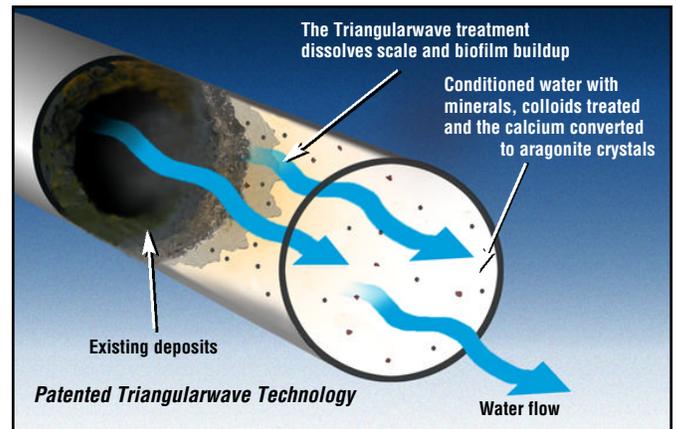
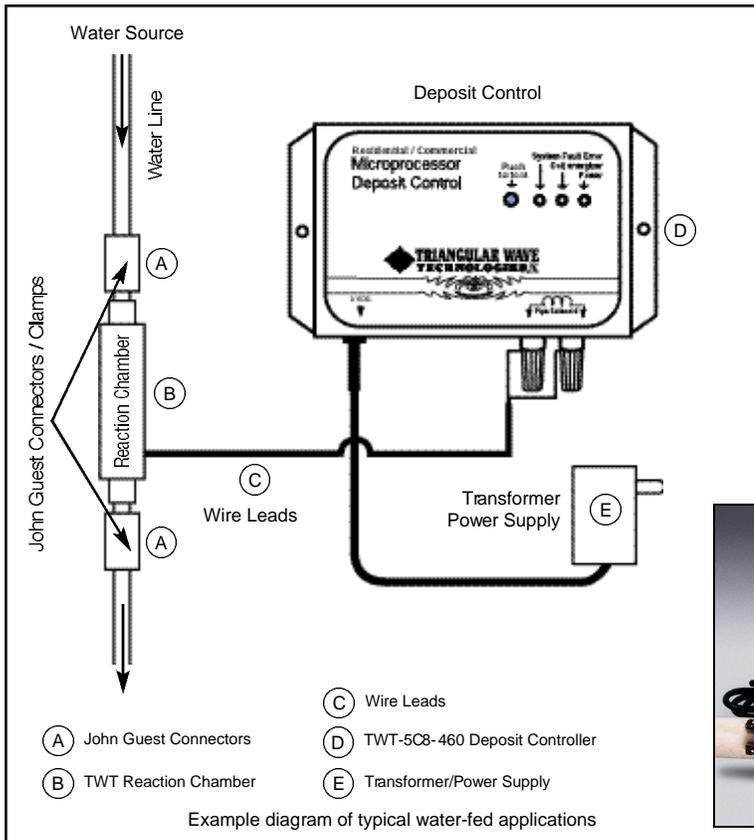
*** Solenoid coils should be covered with vinyl self-sealing industrial electrical tape to protect the coil from loosening (see illustration on left)**

For high temperature applications of 176°F and above, request from your distributor or TWT teflon wire. Teflon wire solenoid wrap sizes vary according to pipe material and pipe size, refer to the technical guidelines on the TWT website for additional information.



TWT Deposit Control System Installation for Water-Fed Appliances

Control Scale and Bio-fouling in Beverage Dispensing Equipment



Dissolving scales in fluid pipe.



Model TWT-5C8-460
Residential/Light Commercial
Deposit Control
System with Reaction Chamber
Designed for pipes 1/2 inch or
less in diameter.
Size: 3.3"W x 3.3"H x 1.3"D
Voltage: 9 vdc
Amperage: Draws less than 1 Amp.

Optimal installation of the TWT Deposit Control System:

1. Cut water line and insert Reaction Chamber using John Guest connectors/ Clamp as illustrated.
2. Attach power supply to back of machine or adjacent to water-fed appliance in a safe location.
3. Attach wire leads from Reaction Chamber to terminals on Deposit Controller.
4. Plug transformer/power supply into a standard 110 VAC outlet.

Note:

Deposit Control Reaction Chamber should be installed on water feed line after a any filter and solenoid valve system.

Install reaction chamber on water feed line midway between solenoid valve and water tank.

The Deposit Control System will provide the means to keep deposits (calcium, lime, etc.) in solution for extended periods, if not disturbed. The ability of the fluid to retain the deposits in solution is reduced by fluid disturbances (e.g., pressure changes) and high temperature conditions (flashing, boiling, etc.).

In Automatic Fill Systems, a Fill Solenoid Valve will be used to control the fluid level in the fill system. Where a large pressure change takes place immediately downstream of the solenoid valve, TWT recommends that the Reaction Chamber be located downstream from the solenoid valve to avoid this pressure change (fluid disturbance).

When water boils and is evaporated, the calcium and other dissolved solids remain and form deposits. These deposits will be softer and more easily removed when treated. If a heating system can be operated without boiling/flashing on the surface of the heating element, a significant reduction in deposits will be obtained. As the fluid temperature is lowered from boiling, the ability of the TWT treated water to hold the minerals in solution increases.

In order to ensure the greatest level of operation, performance and satisfaction in your work with TWT's water-fed beverage/coffee dispensers, we recommend that you contact our engineering staff, who will be pleased to work closely with you to determine the optimal installation to meet your needs and provide the best results for you and your customers.

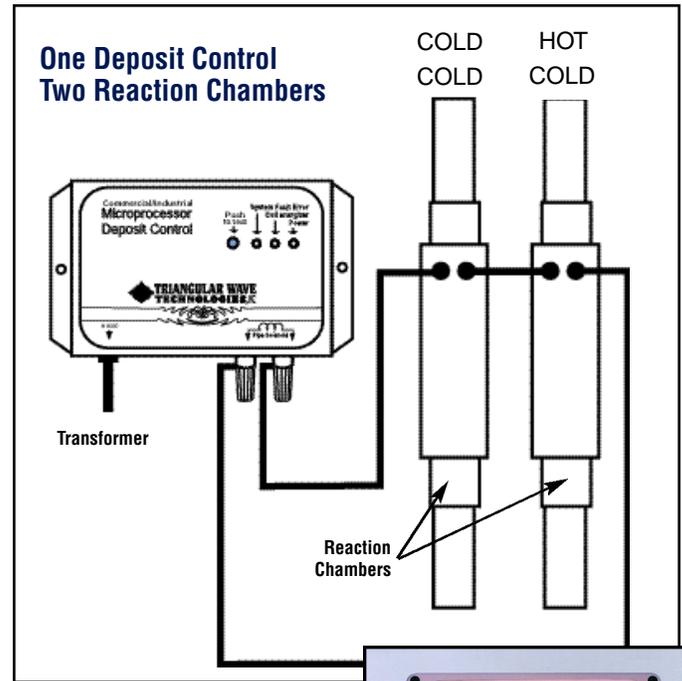
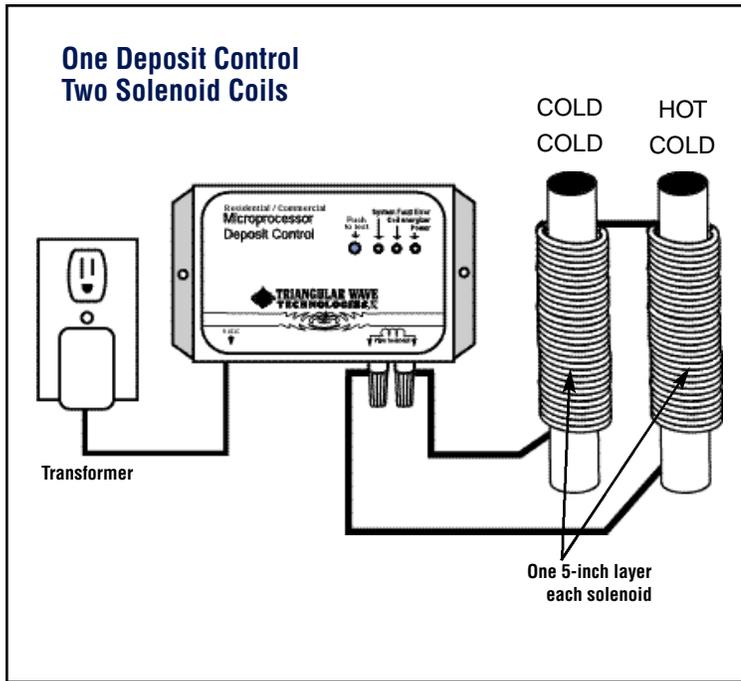
Triangularwave Deposit Control System Controls Scale Buildup In Reverse Osmosis Water Treatment System

- No scaling of the flanges or locking rings.
Prior to the Triangularwave System wrenches were needed to disassemble the assemblies; now the disassembly can be accomplished by hand
- Reverse Osmosis filters capacity and life cycle extended
- Filters were not scaled on the surface. The filter membranes were filled with dirt and particulate matter; as would be expected. The extended life of the membranes is due to the lack of scale accumulation on the surface.
- No scale formed around the edges of the filter assemblies, and no short circuiting of the filters was found
- Reaction Chamber and/or coil installed before other fluid treatment technologies
- TWT Deposit Control Systems work to protect other treatment technologies as well, including ozone, ultraviolet, and other filtration systems, keeping them clean and enhancing their operation. In this way, their full treatment benefits are realized, with reduced maintenance requirements.

Consider using TWT Deposit Control Systems in conjunction with any existing or potential fluid treatment systems as a complementary technology. For further details on how you can leverage TWT Deposit Control benefits, please contact us.



Alternate Application *Alternate acceptable applications*

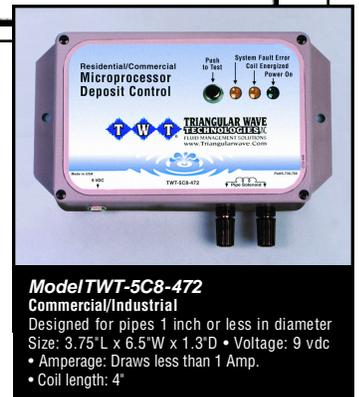


Situation:
One Deposit Controller with two solenoid coils and/or Reaction Chambers for before and after system installation, or before other treatment technologies and where recommended by TWT.

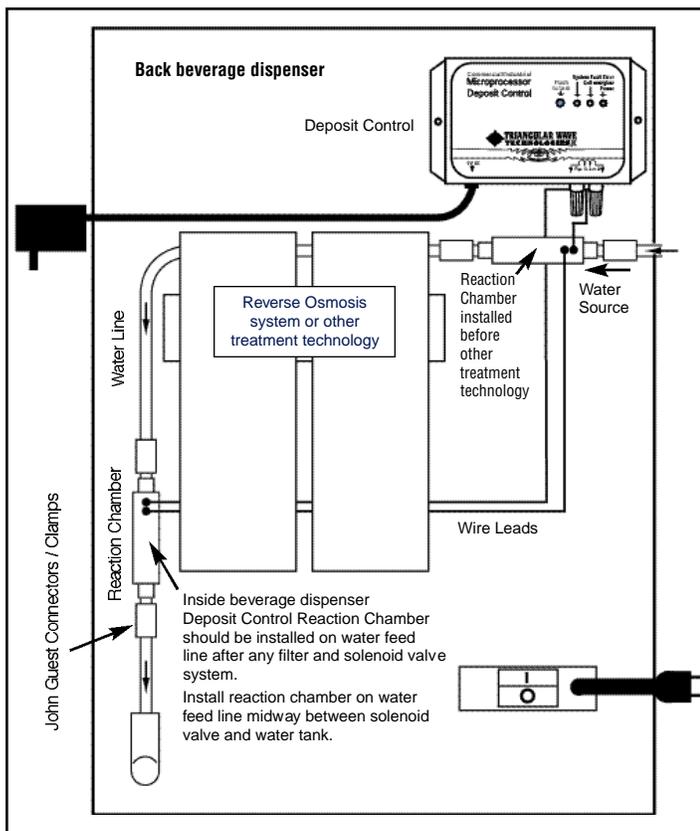
Solution:
The Deposit Control unit will accept two solenoid coils or two Reaction Chambers so long as the total impedance of the load is within the units design (consult TWT or its distributors for verification). Upgrading of the Controller is necessary when using reaction chambers

and/or if extreme hard water conditions exist. Install two solenoid or reaction chambers (as shown). One on the cold water feed and one on the hot water feed or before other treatment technologies and where recommended by TWT. Wire the two in series as shown. The distance between the reaction Chambers/ solenoid to the Controller may be a total of not more than 100 feet without loss of output power. (closer distances are recommended)

Note: When upgrading controller for extreme hard water conditions (TDS), the on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

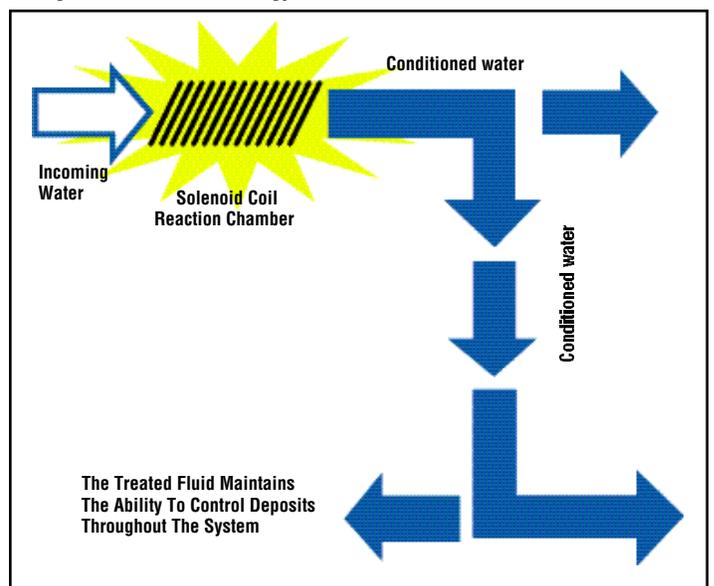


Model TWT-5C8-472
Commercial/Industrial
Designed for pipes 1 inch or less in diameter
Size: 3.75" L x 6.5" W x 1.3" D • Voltage: 9 vdc
• Amperage: Draws less than 1 Amp.
• Coil length: 4'



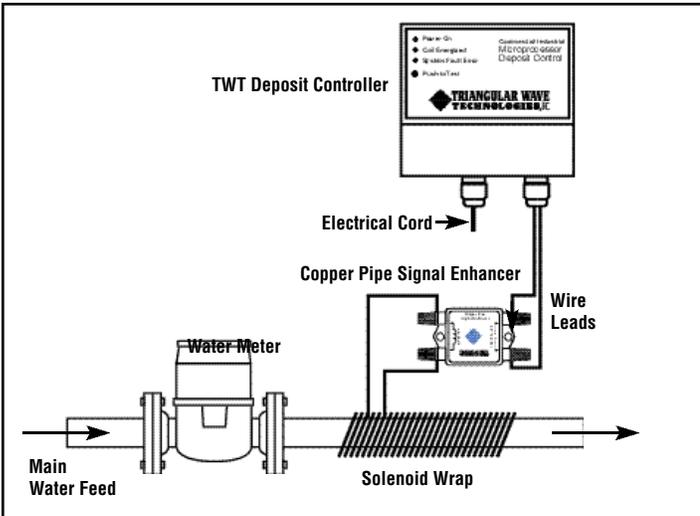
One Deposit Control / Two Reaction Chambers

When the TWT system is properly installed the effects of the Triangularwave form technology treatment last downstream

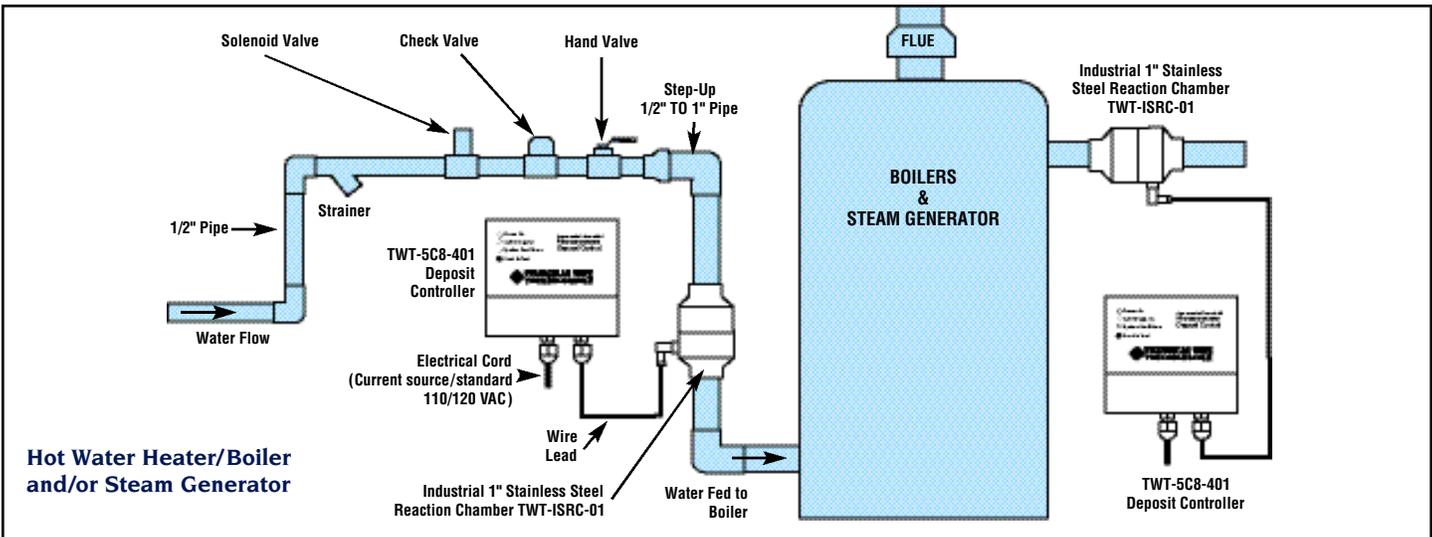
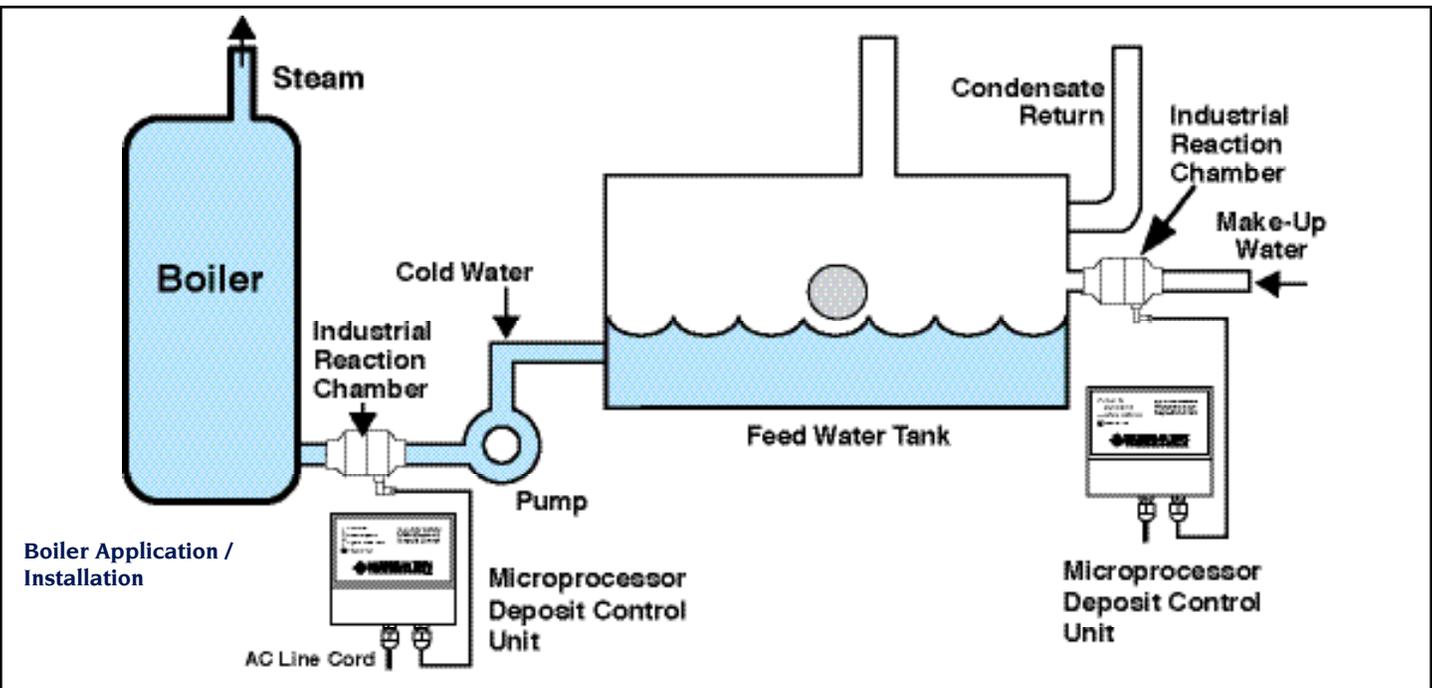
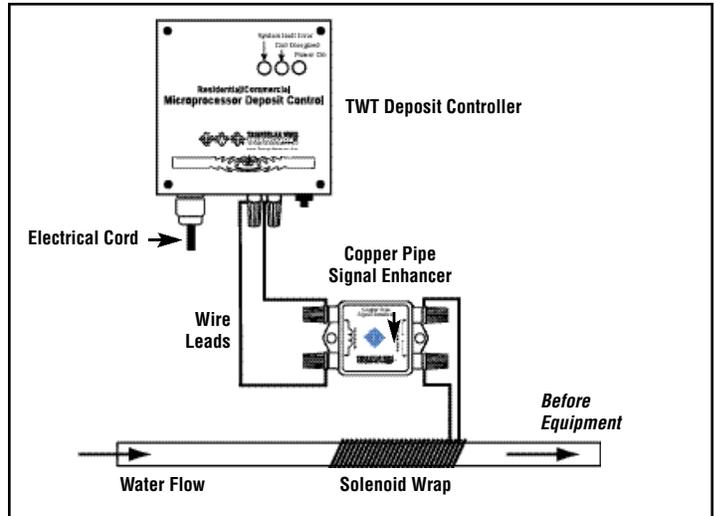


TWT Products Versatile, Application Guidelines P.O.E. / P.O.U.

Main Water Feed Line (after water meter) to Facility Well Water Application (after pressure tank) to Facility

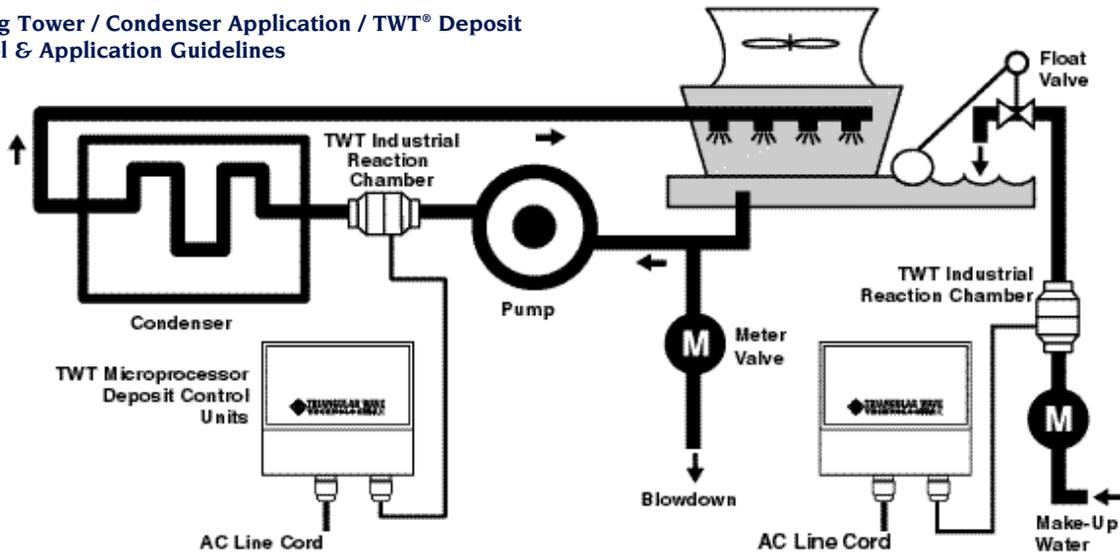


Ice Machine, Misters, Steamers and other Water Fed-Appliances in Facility

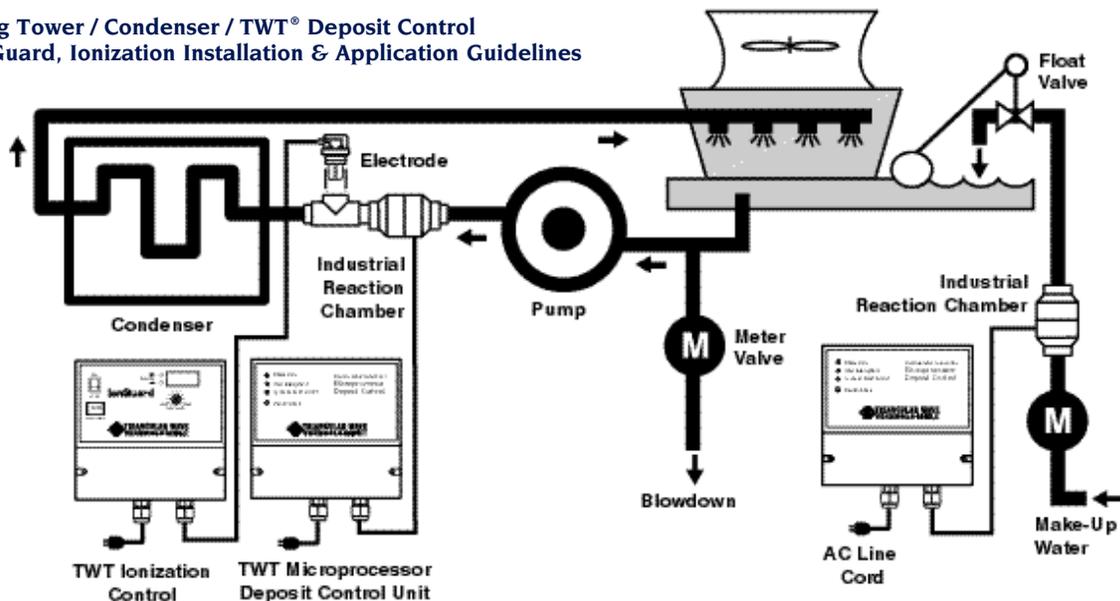


HVAC Application Guidelines

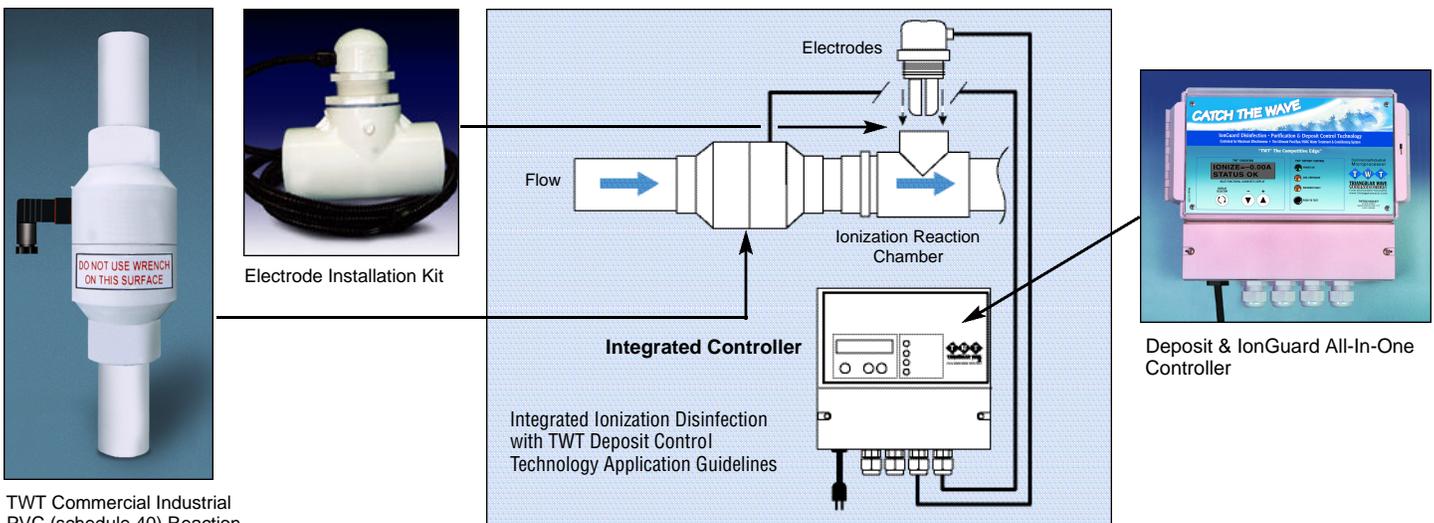
Cooling Tower / Condenser Application / TWT® Deposit Control & Application Guidelines



Cooling Tower / Condenser / TWT® Deposit Control & IonGuard, Ionization Installation & Application Guidelines



Sidestream Application: TWT IonGuard Disinfection, Purification with TWT Deposit Control Technology

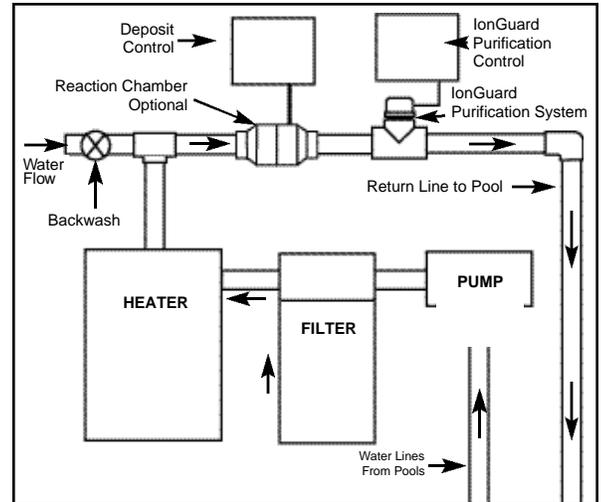
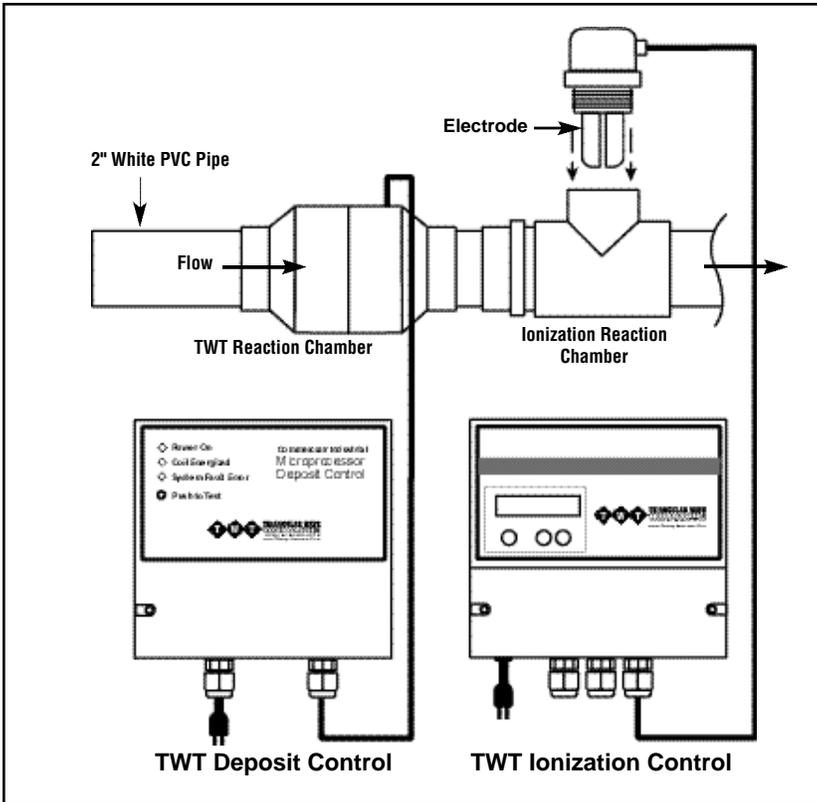


TWT Commercial Industrial PVC (schedule 40) Reaction Chamber For All-In-One Controllers

Three (3) Unit Application & Installation

Points of Treatment

Swimming Pool And Spa

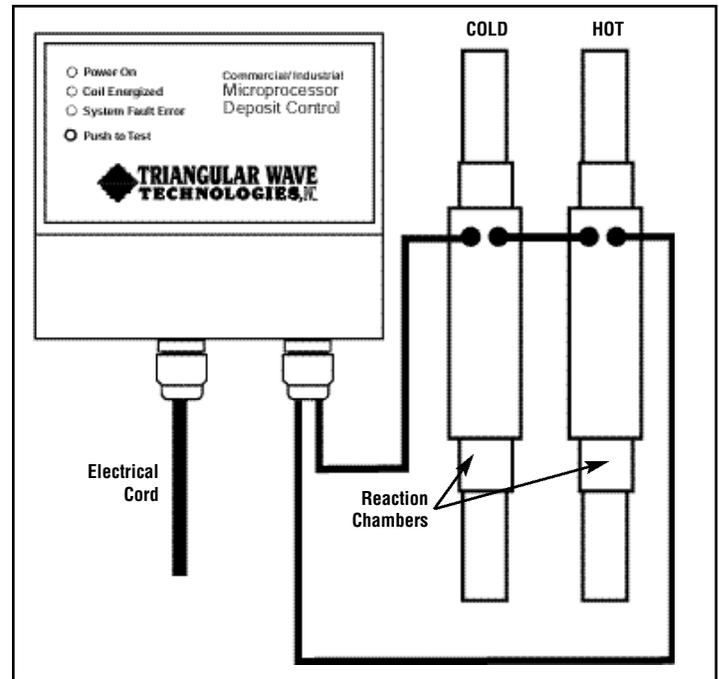
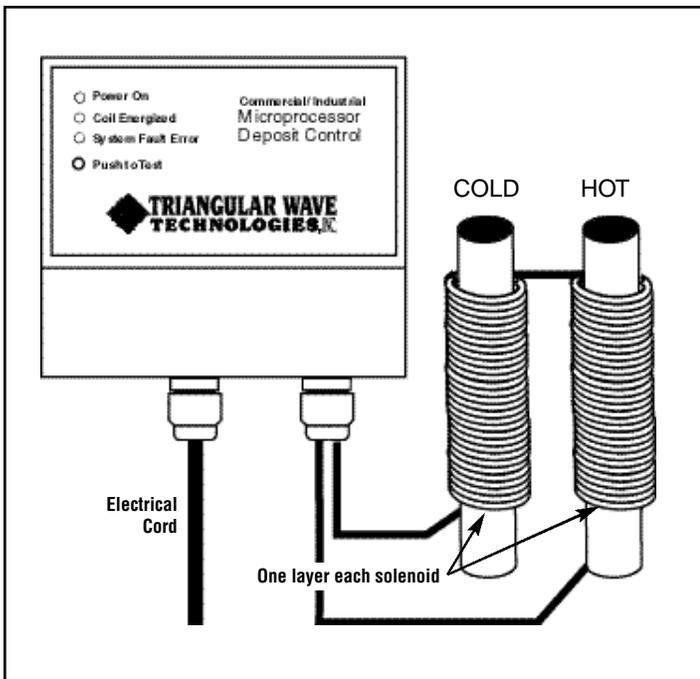


Typical installation overview of equipment room

TWT Microprocessor Deposit Controllers, Copper Pipe Signal Enhancers and/or Reaction Chambers are combined to provide a start-to-finish answer to simplified treatment and management. TWT systems are scalable to your industry-specific needs

Contact TWT Inc. to determine your industries specific application

Alternate Application Alternate acceptable applications for systems with good water quality (low grain count)



Situation:
One Deposit Controller with two solenoid coils and/or Reaction Chambers for before and after system installation, or when entrance of water line to facility prevents preferred installation.

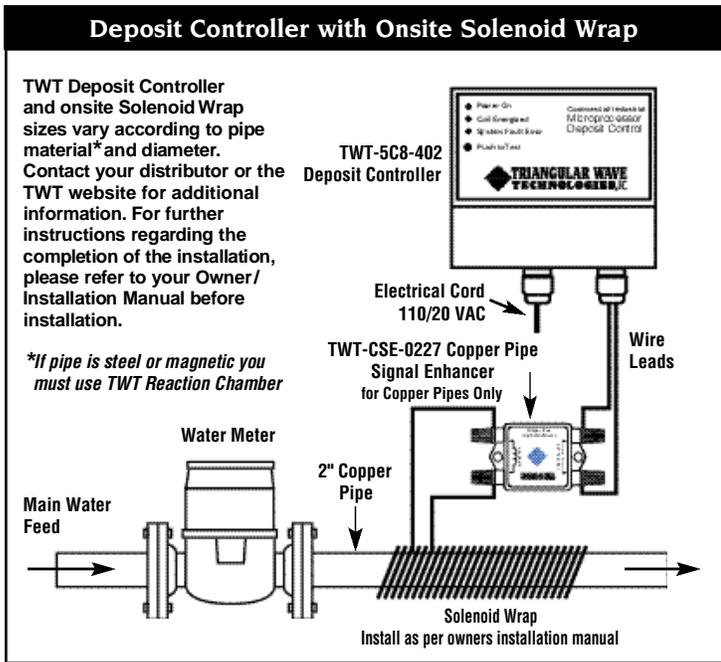
Solution:
The Deposit Control unit will accept two solenoid coils or two Reaction Chambers so long as the total impedance of the load is within the units design (consult TWT or its distributors for verification). Upgrading of the Controller is necessary when using reaction chambers and/or if extreme

hard water conditions exist. Install two solenoid or reaction chambers (as shown). One on the cold water feed and one on the hot water feed. Wire the two in series as shown. The distance between the reaction Chambers/solenoid to the Controller may be a total of not more than 100 feet without loss of output power (closer distances are recommended).

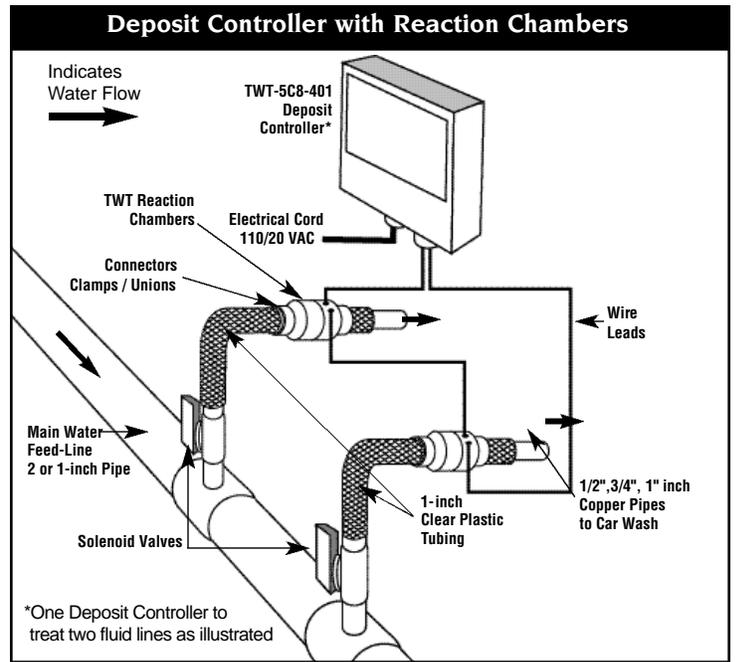
Note: When upgrading controller for extreme hard water conditions (TDS), the on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

OPTIONAL: UNIQUE, SCALABLE SYSTEMS FOR EVERY NEED!

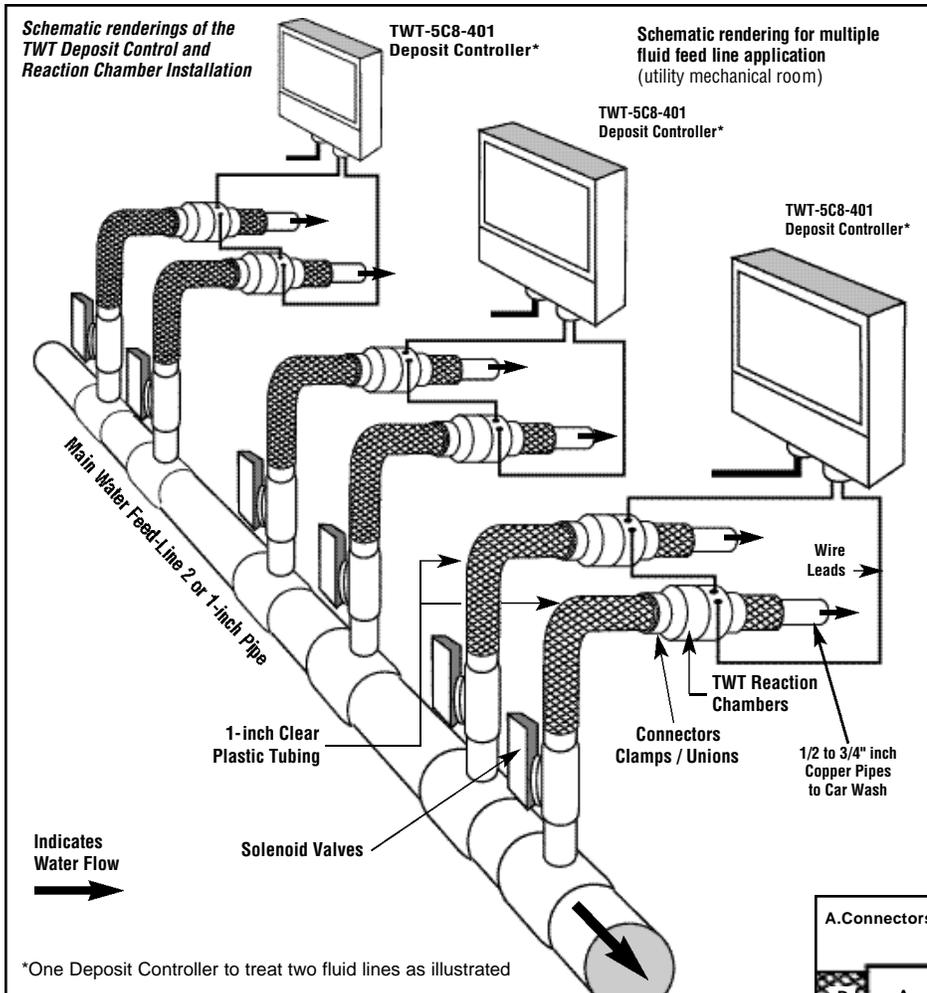
Configuring TWT technology to meet the water volume and conditioning required for all applications



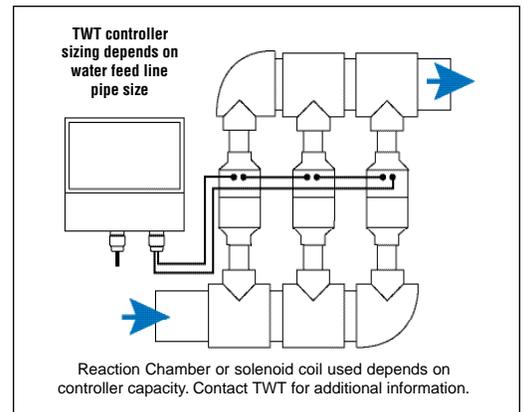
1. Treatment Area: main water feed line (after water meter/ pressure tank) at facility (when P.O.E.TWT-SMD1007-4M multi-process treatment system is not required)



2. Treatment Area: Fluid feed lines for water processing. Note: Review owners manual before installation



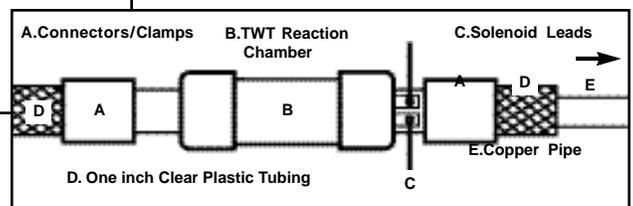
3. Treatment Area: feed lines, pipe material and size vary in number according to system needs: Other current source available for TWT systems, must specify.



Not to scale, for reference only.

Optimal installation of the TWT Deposit Control System:

1. Cut clear plastic tubing and insert Reaction Chamber with connectors as illustrated
2. Attach Deposit Controller to wall or adjacent to water-fed lines in a safe location.
3. Attach wire leads from pipe lines to terminals on Deposit Controller.
4. Plug power supply into a standard 110 VAC protected outlet.



The Return On Investment of a TWT System is Undeniably Significant From Operational, Economical, and Safety Points-Of-View.

Hard water is the most commonly reported water quality problem by consumers in the U.S., found in over 85 percent of the country. Over 60% of the earth's water is groundwater, which picks up minerals, rocks and soil, including calcium and magnesium contaminants that make water hard.

Some telltale signs that water may be hard:

- Clogged pipes and/or appliances may be due to hard water.
- Mineral deposits can form in pipes and plumbing equipment.
- Heating bills are increased, because the hard water forms an insulated shell between the heating element and the water to be heated. Heated hard water causes scale.

The Triangularwave System represents a significant breakthrough in electromagnetic technology. The triangularwave has made possible the use of electromagnetic technology in applications of all sizes, from residential to large commercial and industrial applications.

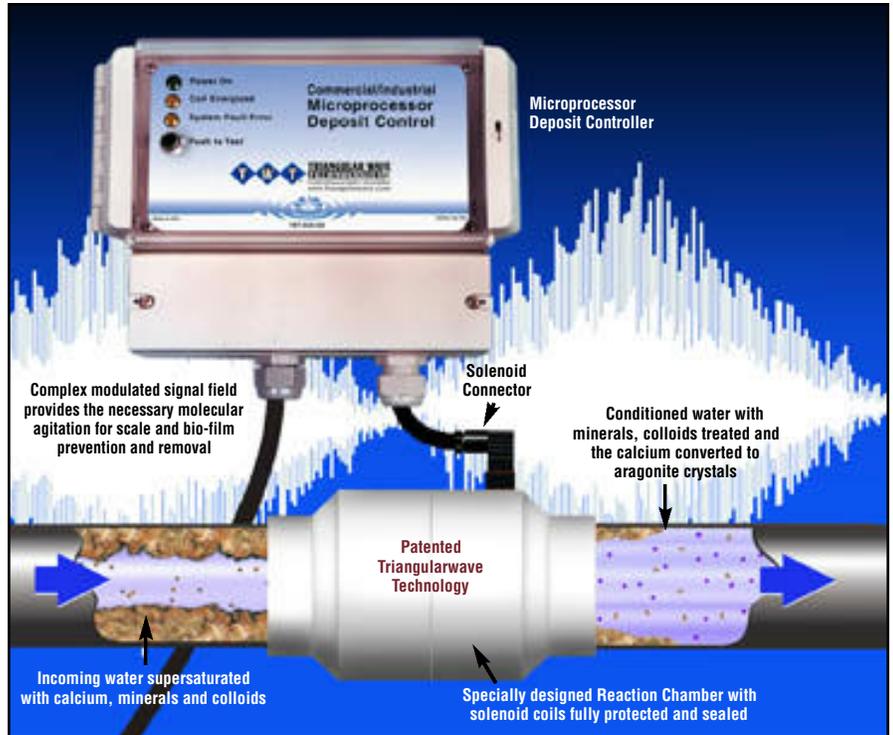
An advanced system for controlling scale and bio-fouling, it is applicable with once-through and recirculating HVAC, heating and process cooling systems, as well as agricultural, industrial processing, wastewater, and other fluid-based systems.

TWT Patented Microprocessor Deposit Control Systems. Technologically Advanced Method for Water & Fluid Management Providing Comprehensive End-To-End Solutions. Water The way Nature Intended It! Chemical Free.

- **Eliminates Deposits in Pipes, Fixtures and Equipment (Softens and removes hard scale build-up around plumbing fixtures)**
- **Controls Algae and Bacteria (Prevents the formation biofilm, the breeding ground for algae and bacteria)**
- **Removes Existing Scale on Heat Exchangers Over Time Which Improves Heat Transfer for Greater Efficiency**
- **Salt and Chemical -FREE Water Conditioning**
- **Controls Algae and Bacteria**
- **Controls Scale and Bio-fouling in Water Fed Appliances**
- **Performance and Durability Guaranteed**
- **No Moving Parts**

Highly Cost Effective:

- Savings in maintenance such as cleaning, monitoring and adding chemicals are greatly reduced.
- Savings in electrical expenses, due to cleaner system components and better heat transfer, can also be significant.
- Protects expensive capital equipment; cleaner systems, with less chemicals added, will operate more efficiently, and will have a longer working life.
- Operating costs of Triangularwave Systems are very small and the systems require no maintenance.
- Non-hazardous blowdown means no treatment and no discharge permits required.
- Ownership of the TWT System will afford you and your customers significant savings over a short period of time and even greater savings over the life cycle of the equipment.



How TWT Deposit Control Technology Works:

Using modern integrated circuitry and signal processing techniques, the patented TWT Deposit Control Technology works by producing a complex frequency-modulated waveform. This creates a deionizing effect, induced by physical means, which increases the solubility of the minerals, and colloids in the liquid and changes the shape, size and texture of the calcium carbonate crystals. By this reaction, the minerals, colloids and crystals lose their adhesive properties and remain in suspension in the liquid. Pre-existing scale is taken back into solution and removed in the same way. The effects are immediate and long lasting down stream.



TWT® System Packaging Contents

- TWT Microprocessor Deposit Control Unit
- Wire for onsite wiring & solenoid coil hookup
- Hardware kit: Screws, wire ties
- Controller mounting kit: Mounting brackets & wire ties
- System registration card
- Owners Manual

Not included, sold separately:

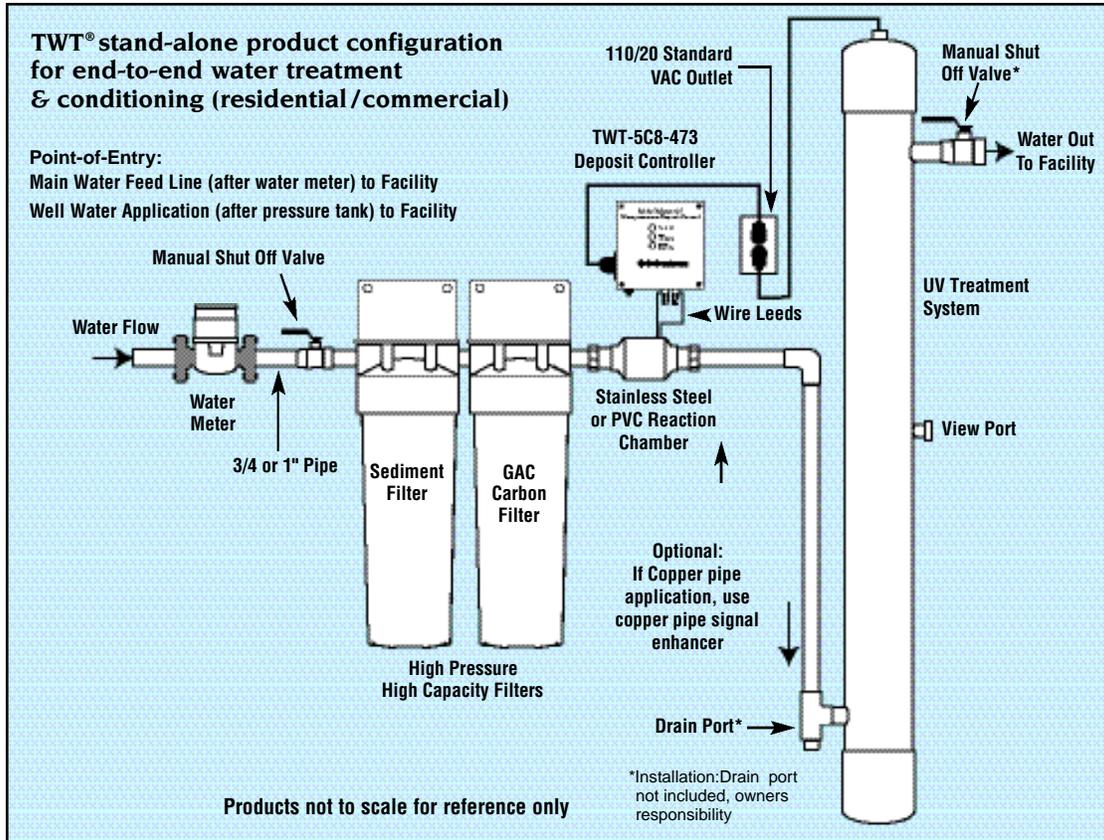
- Contact your dealer and/or TWT, Inc. before installation of system if application requires a–
- TWT Copper Pipe Signal Enhancer
 - TWT factory wrapped Reaction Chamber Teflon coated wire

Triangularwave Technologies, Inc.(TWT)

Sensing Environmental Needs with Intelligent Solutions

Be Smart, Buy Once! Go Green Save Green

Triangularwave Technologies, Inc. (TWT®)
Filtration • Deposit Control • UV Disinfection & Purification



Chemical-Free Fluid Management Products & Systems To Enhance Water Quality, and Improve Operating Efficiency and Equipment Life Cycle



Filtration • Deposit Control • Disinfection • Purification

Potable Water, Process and Waste Water Treatment & Conditioning

All-In-One Integrated Water Treatment Systems P.O.E. / P.O.U. Applications

Chemical-Free • Multi-Stage Filtration • Electro-Magnetic Fluid Conditioning • UV Disinfection/Purification

Triangular Wave Technologies, Inc. (TWT®) Technologically advanced method for water/fluid management & control. All-In-One Water Filtration, Disinfection & Purification Systems Available Upon Request.

ALL TWT® PRODUCTS AND SYSTEMS COME WITH EASY TO FOLLOW CARE, MAINTENANCE AND OPERATIONAL MANUALS. READ ALL INFORMATION CAREFULLY BEFORE INSTALLING THE SYSTEM

ALL PRODUCTS & SYSTEMS ARE RUGGEDLY CONSTRUCTED FOR EXCEPTIONAL PERFORMANCE.

THE RUGGED DESIGN OF THE PRODUCTS & SYSTEMS ENSURE THAT THEY WILL ENJOY A LONG AND RELIABLE LIFE CYCLE WHEN PROPERLY CARED FOR.

HAVE AN INDUSTRY SPECIFIC FLUID PROBLEM?

HAVE AN INDUSTRY SPECIFIC TUBE AND/OR PIPE CONFIGURATION PROBLEM?

In order to ensure the greatest level of performance and satisfaction in your work with the TWT products & systems, we recommend that you contact our engineering staff, who will be pleased to work closely with you to determine the optimal application and installation for your industry specific needs.

TWT products make sense from operational, economic, and safety point of view. Ownership of the TWT System will afford you and our customers significant savings over a short period of time and even greater savings over the life of the equipment.

Contact your Distributor or TWT today (info@Triangularwave.com) for information on what TWT system will meet your specific application needs and/or visit [Triangularwave Technologies, Inc. Comprehensive Websites](http://Triangularwave.com).
The Valuable Technical Resource For All Involved In Water And Fluid Management. www.Triangularwave.com • twatreatment.com

We sincerely thank you for your time and interest in our products, and look forward to being a valued part of your operation.

TWT® has the versatile, efficient, cost-effective methods to solve your water/fluid management problems end to end.

TWT® The Ultimate in Water Treatment & Conditioning

TWT® “The Competitive Edge”

Go Green-Save Green

