Triangular Wave Technologies, Inc
Installation & Technical Guidelines

Triangular Wave 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 Triangular Wave 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.

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

- 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 lifecycle
- 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

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TWT Deposit Control Systems enhance other treatment technologies as well, including chemicals, 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 fluid treatment systems as a complementary technology. For further details on how you can leverage the TWT Deposit Control benefits, please contact us.

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.

Review section 13 as a means of obtaining system design guidance.

In order to ensure the greatest level of performance and satisfaction in your work with the TWT Deposit Control 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.

Thank You

TRIANGULAR WAVE TECHNOLOGIES, INC.
FLUID MANAGEMENT SOLUTIONS

FLUID MANAGEMENT SOLUTIONS

State-of-the-Art Versatile Fluid Management Systems
To Effectively Meet The Needs Of Any Application

Residential • Commercial • Industrial Treatment

Specializing in:

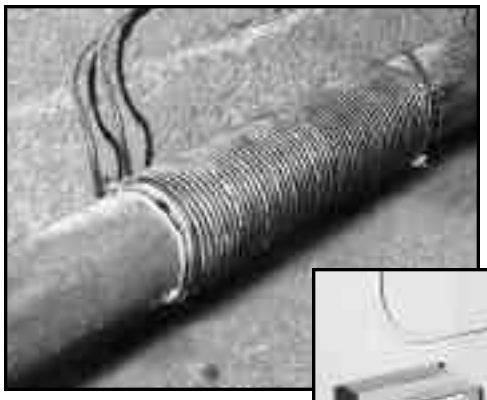
- **Chemical-Free Deposit Control Systems**
- **Eliminating Scale Deposits and Bio-Film in Pipes, Fixtures and Equipment**
- **Ultraviolet Disinfection Systems**
- **Ionization Purification Systems**
- **Custom Systems Design & Integration**
- **Residential Water Filtration Products**
- **Economical & Cost Effective**
- **For All Fluid-Based Industries**

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**

TUBE & PIPE APPLICATION & INSTALLATION GUIDELINES

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

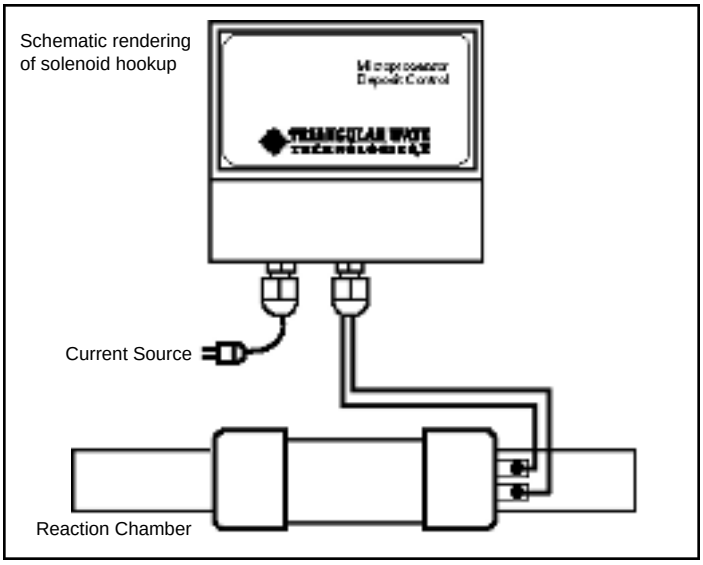


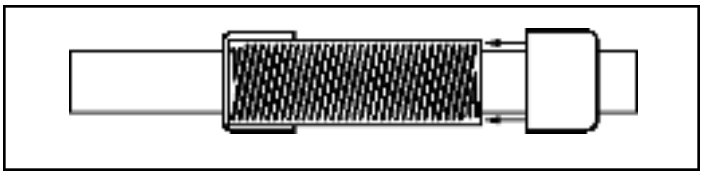
Solenoid wrapped pipe

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

TRIANGULAR WAVE TECHNOLOGIES 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 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.





Schematic drawing of Reaction Chamber showing Solenoid Coil

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

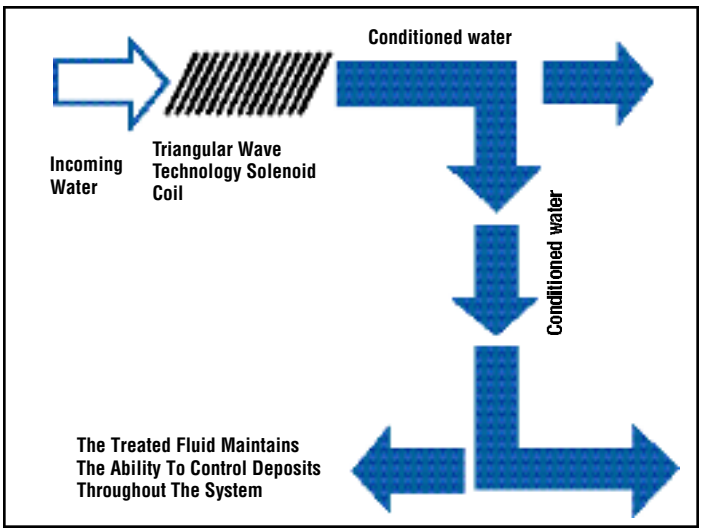
Schematic rendering of the
TWT-CSE-0227 hookup

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

Triangular Wave 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.

WHEN TWT SYSTEMS ARE PROPERLY INSTALLED, THE EFFECTS OF THE TRIANGULAR WAVE TREATMENT LAST DOWNSTREAM



In effect, 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.

Water The Way Nature Intended it!

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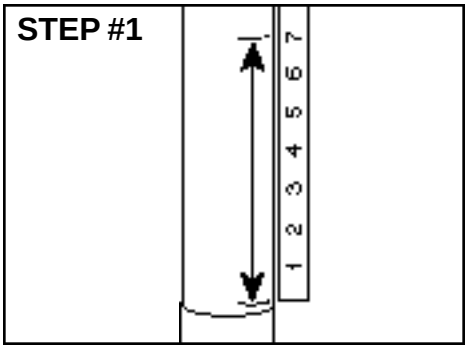
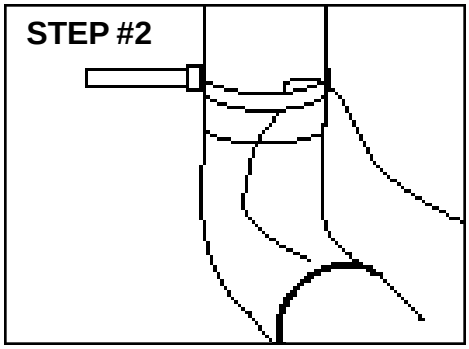
TUBE & PIPE APPLICATION & INSTALLATION GUIDELINES

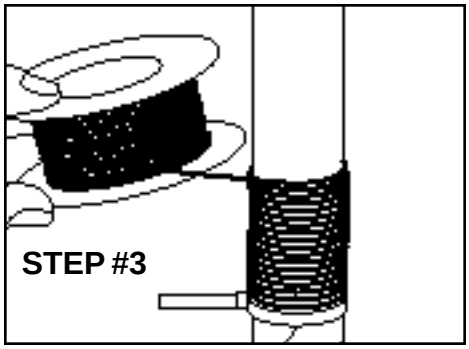
Step by step installation Instructions for onsite solenoid Coil Wrap for Model #TWT-5C8-402



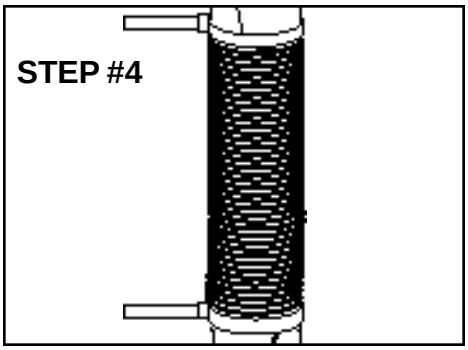
Measure and mark a 7" section in the middle of a straight pipe segment.



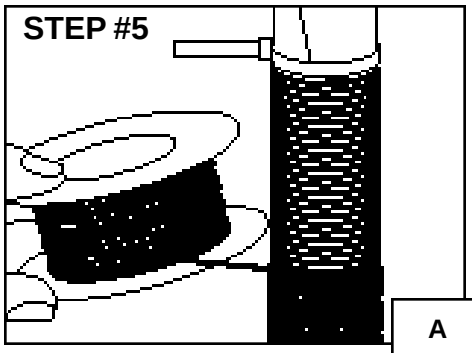
Fasten the signal wire to the pipe with a cable tie (provided) at one end of the 7" section.



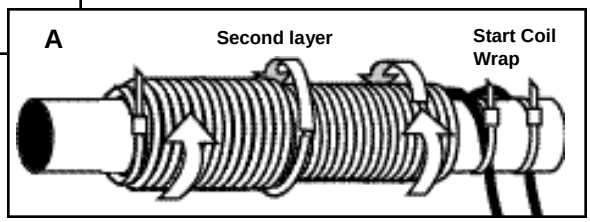
Wrap the signal wire around the pipe in a tight coil, in a clockwise manner, so that the adjacent wires are touching each other.

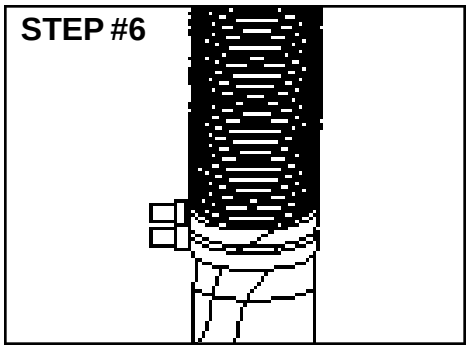


Continue to wrap until the 7" section of pipe is completely covered. Fasten down the end of the coil with the second cable tie (provided). You can hold the first layer in place with cloth tape or electrician's tape.

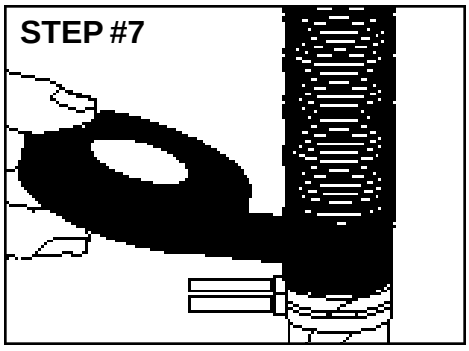


Add a second layer to the coil by continuing to wind in a clockwise manner starting where you completed the first layer and wind ***back in the direction of the starting point. (see Diagram A) Do Not Twist or Cut Wire or the System WILL NOT Function.*** Place the second layer directly on top of the first 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.***

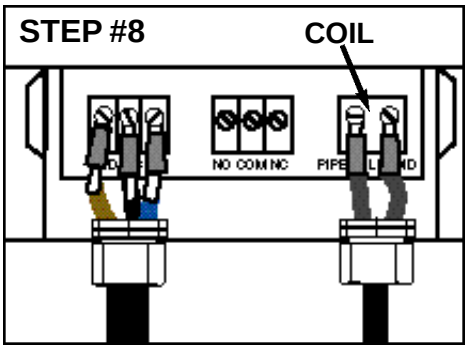




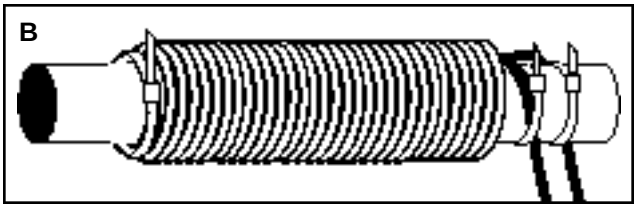
Complete the second layer by clamping the wire with third cable tie (provided). ***(See Diagram B Below)***



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



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



On site solenoid wrap sizes vary according to pipe material & size. For further instructions regarding the completion of the installation, please refer to your Deposit Control System Owner/ Installation Manual.

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 pipesize, 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.

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ON-SITE SOLENOID INSTALLATION

Deposit Controller	Pipe Size	Wrap Length Along Pipe	Wire Kit	Solenoid
TWT-5C8-470	**3/4 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 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 #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.

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

TWT-5C8-470	**3/4 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 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 180º F and above, you should request a Teflon Wire Kit. We will provide a spool of Teflon Insulated Wire to form the pipe solenoid at our factory cost. 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 #20awg.

Teflon Insulated Wire Kit is provided at factory upon request.The wire ties supplied with the unit are satisfactory for use with the Teflon Wire.

For further information about custom installations for 8", 10", 12", 14" and larger pipe sizes,please contact us at Triangular Wave Technologies,Inc.

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.

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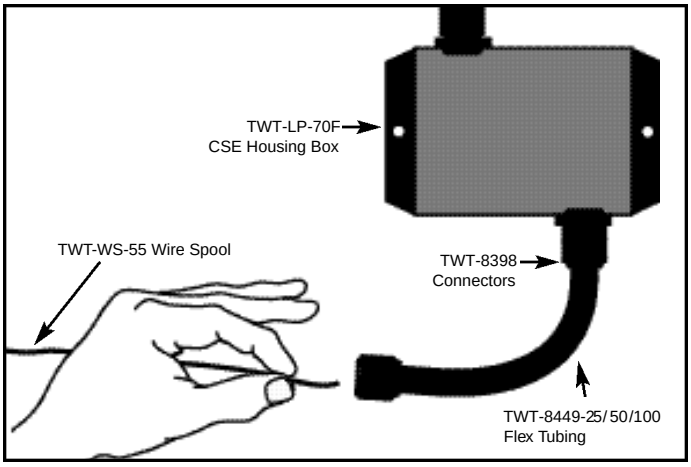
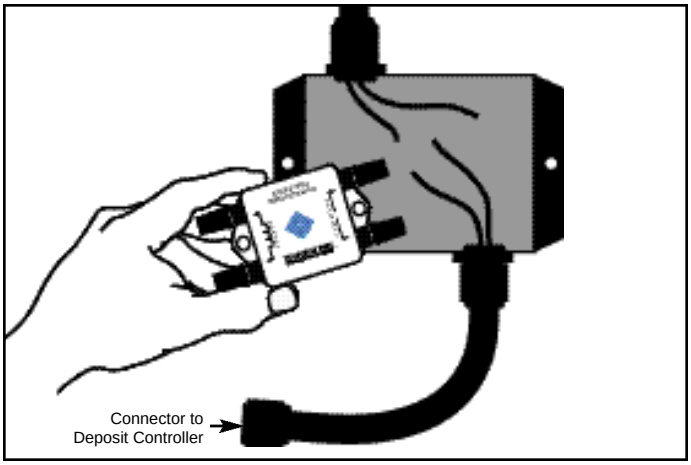
COPPER PIPE (CSE) TUBE & PIPE APPLICATION & INSTALLATION GUIDELINES

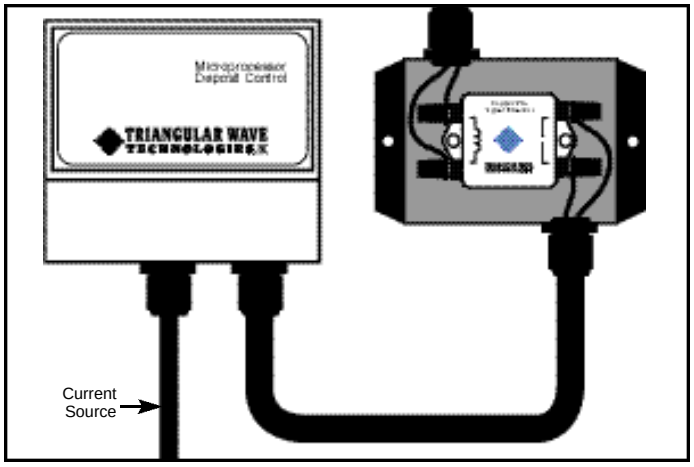
On Site Professional Installation Assembly When Using Copper Signal Enhancer (for Copper Pipes Only)



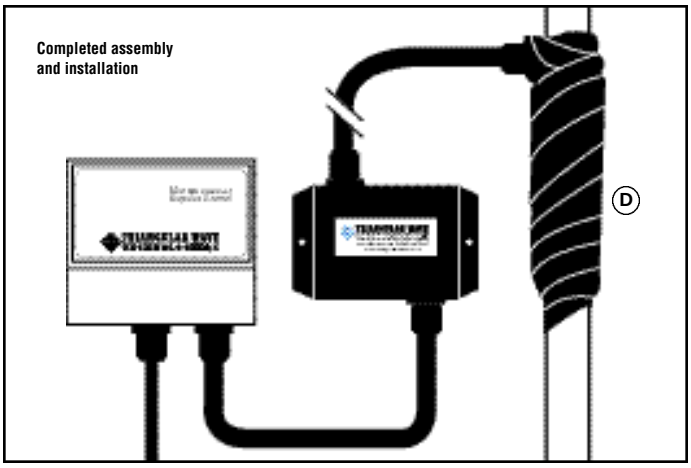
Insert wire through black flex tubing and into mounted CSE housing box, leave enough wire for CSE Unit connection

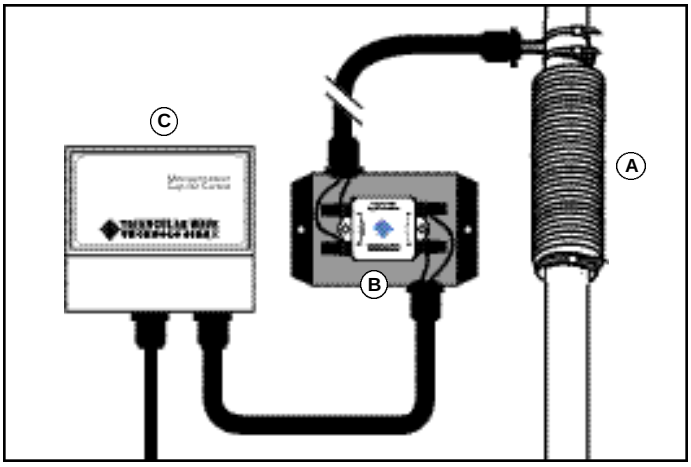


Secure CSE Unit to housing and connect wires to unit



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 websitefor additional information.

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

Flex Tubing:

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

CSE Black Housing Box: TWT-LP-70F
(To mount and enclose CSE Unit)

Connectors: TWT-8398
(For Flex Tubing and CSE Black Box)

Copper Signal Enhancer Installation:
Conduit, CSE housing box plus 2 sets of connectors required for each CSE unit installed

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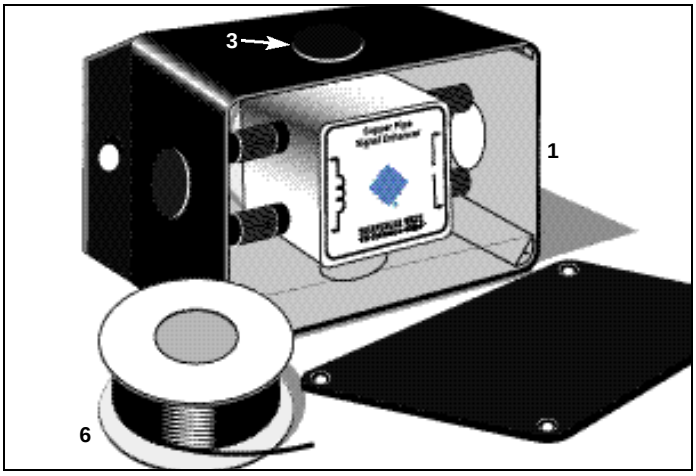
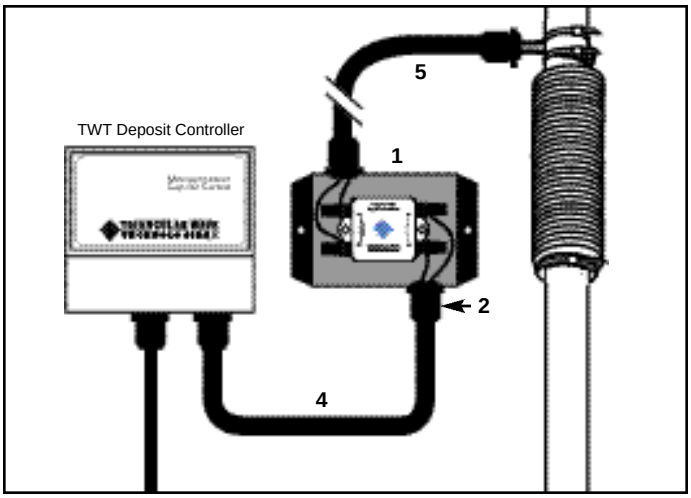
INDUSTRIAL COPPER PIPE SIGNAL ENHANCER KITS

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

Schematic renderings for illustrative purposes only





ITEM #	KIT DESCRIPTION & COMPONENTS
TWT-CSE-0227K	***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 remining 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 #	KIT DESCRIPTION & COMPONENTS
TWT-CSE-0229K	***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 remining holes)

4- 1-15' length of flex tubing for housing box to deposit controller connection

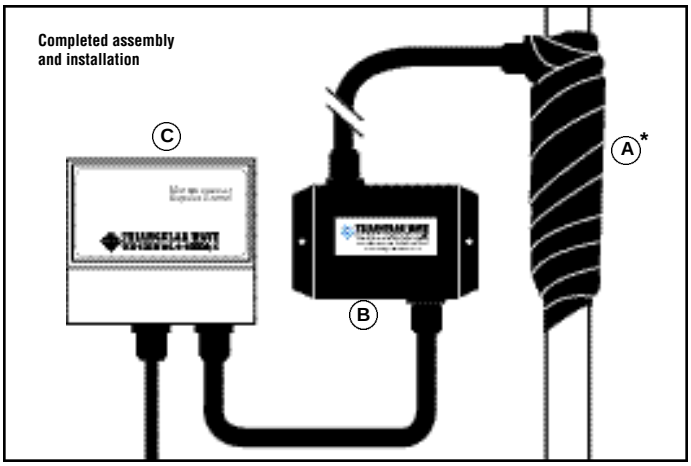
5- 1-10' length for hosing box to onsite solenoid connection

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.

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FLUID MANAGEMENT SOLUTIONS
www.triangularwave.com

MADE IN U.S.A.

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TWT Deposit Control Installation & Configuration Guide

Water Chemistry / TDS / Grain Count / Process & Reaction Zones

TWT is the world's leading manufacturer and supplier of chemical- free fluid management products based on its patented TWT triangular waveform 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.

To understand how to solve water-related problems, it is necessary to understand what causes these problems. Although water is basically H_20 (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.***
- ***Triangular Wave Technologies, Inc. Versatile Fluid Management Products & Systems Are TheSolution!***

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 Triangular Wave 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.***

Continued ➤

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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 patter (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 costs 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 microprocessor 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 (provided on CD) 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.

NOTE:

Triangular Wave 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.

Thank you
Triangular Wave Technologies, Inc.

Visit Triangular Wave Technologies, Inc.’s comprehensive website, the valuable technical resource for all involved in water and fluid management...

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

Upgrade Deposit Controllers if extreme hard water conditions exist

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 on-site wrap coil dimensions must continue to match the actual pipe size, not the controller upgrade.

For Recirculating Systems:

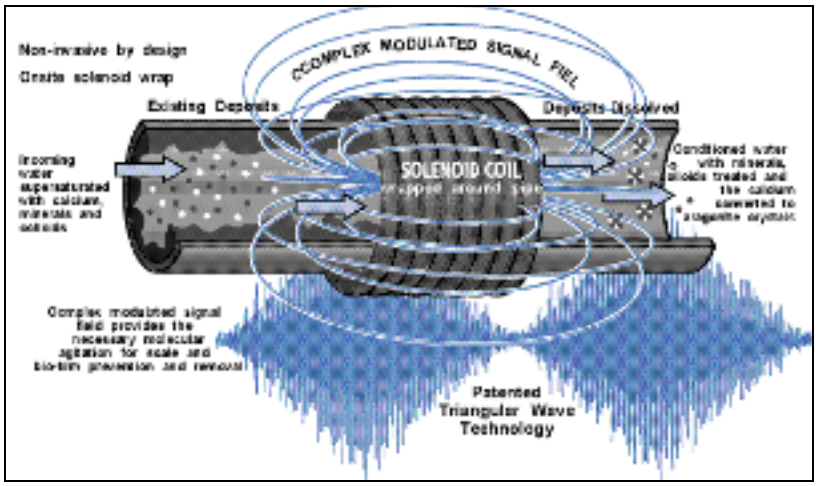
Guide to Choosing Your Products by Volume of Water

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

Assuming a Concentration Ration 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.



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.

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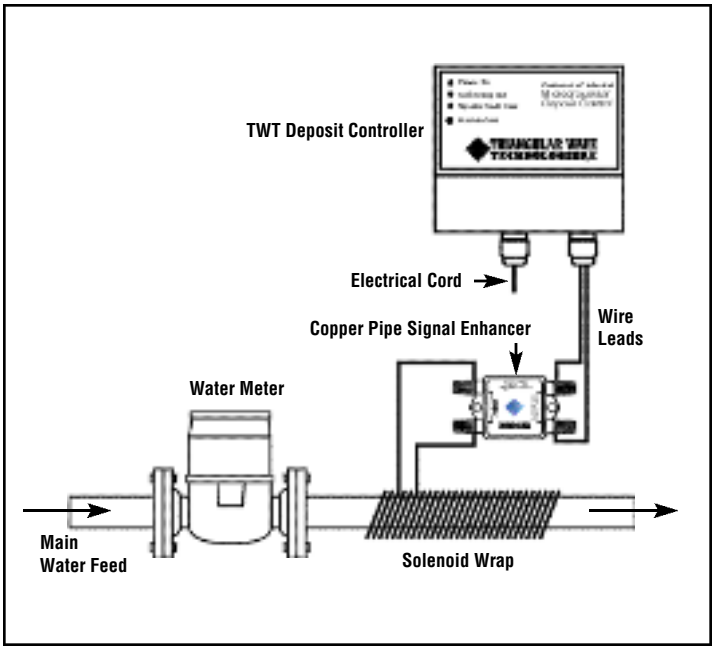
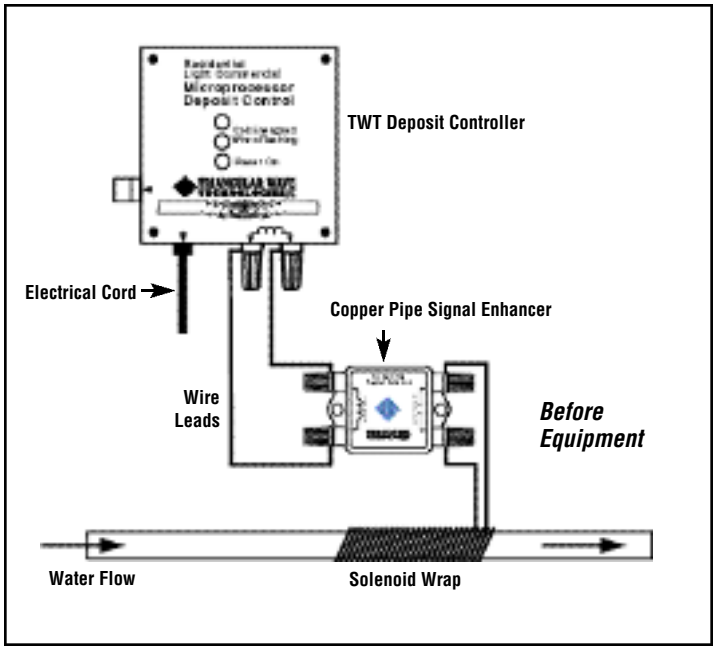
Points of Treatment

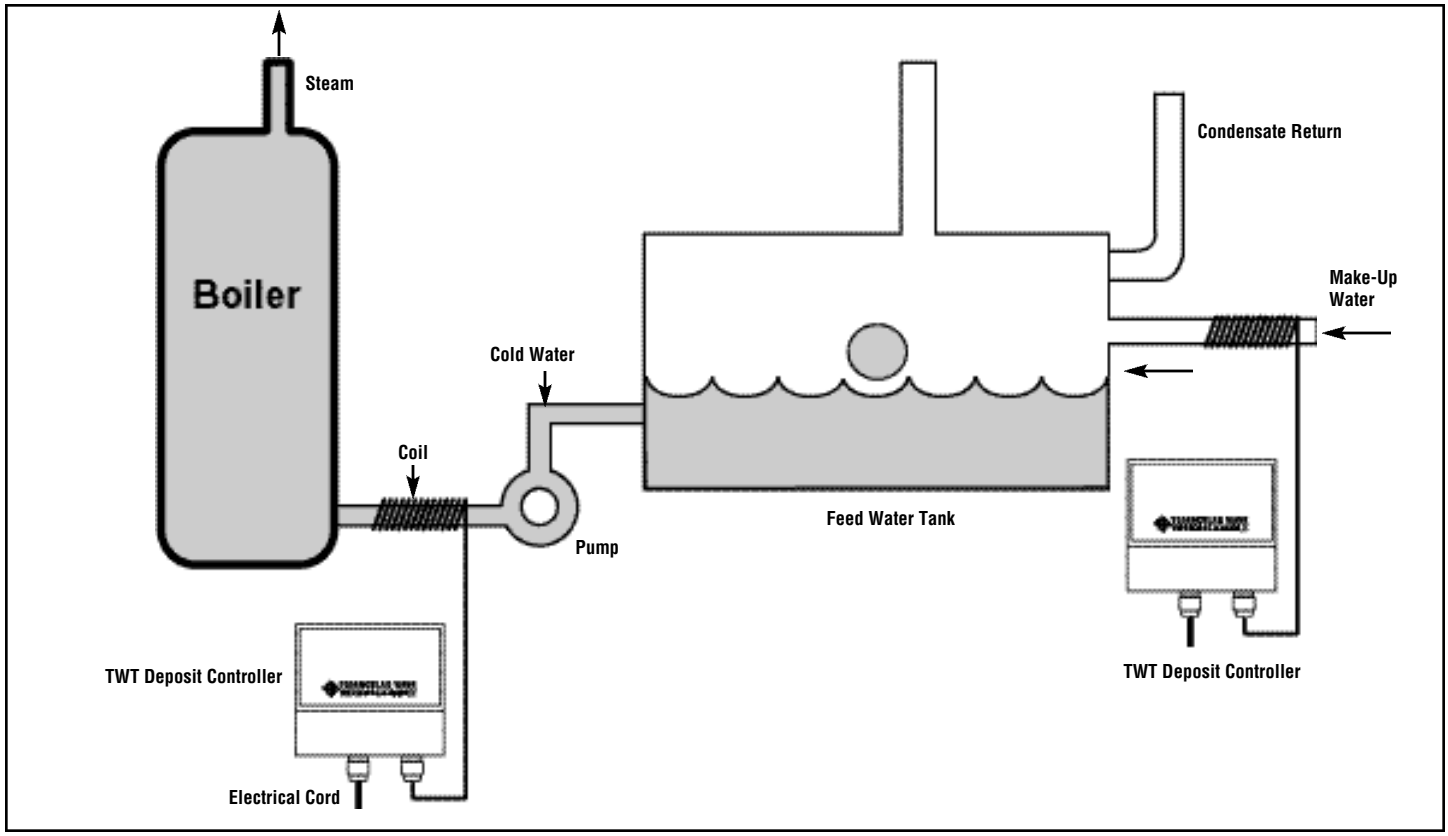
Main Water Feed Line (after water meter) to Facility



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

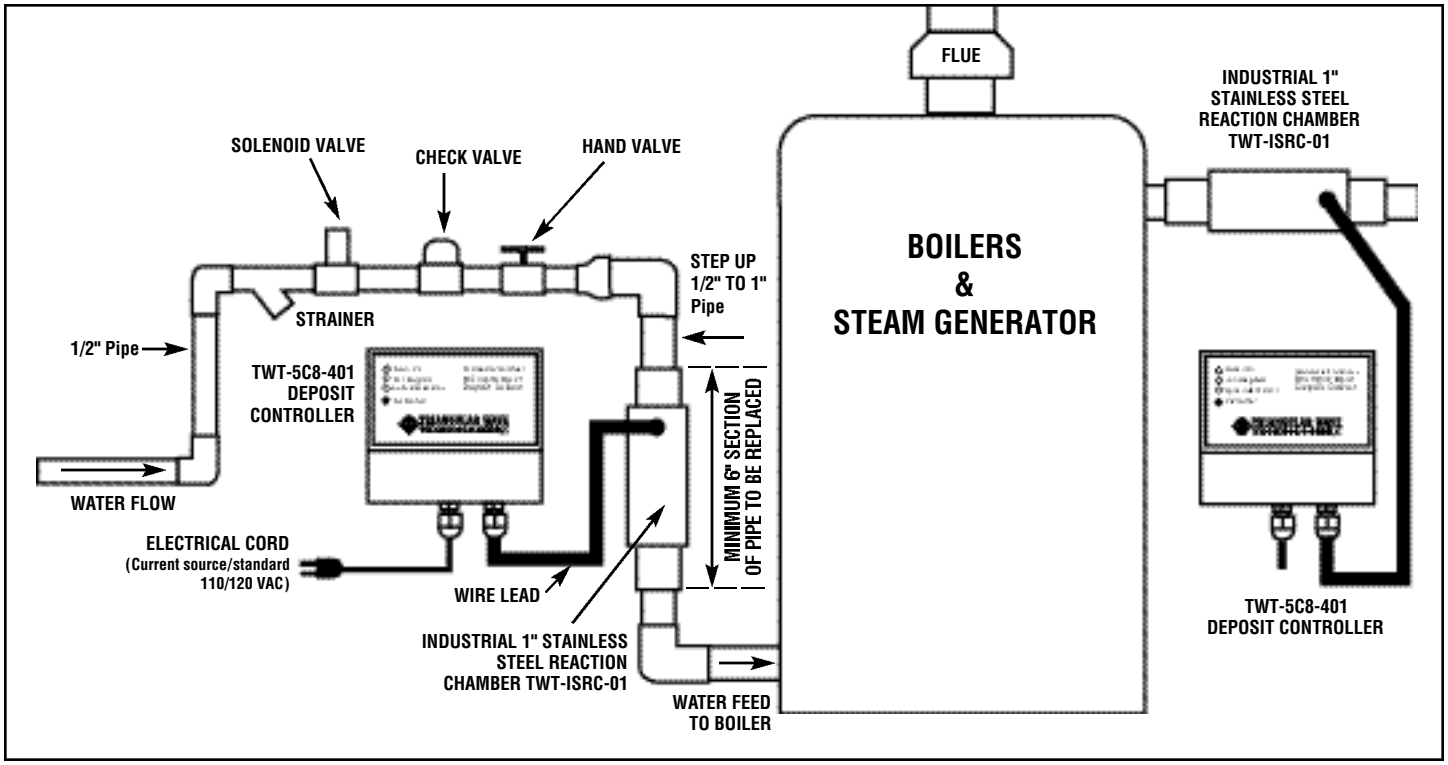


Boiler Application / Installation

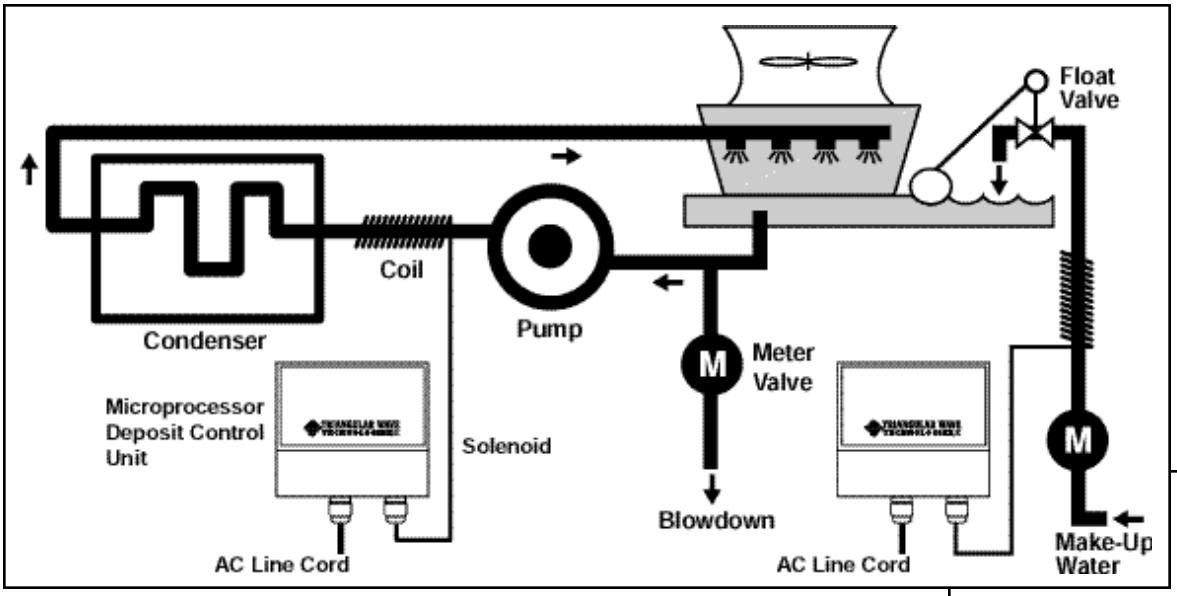


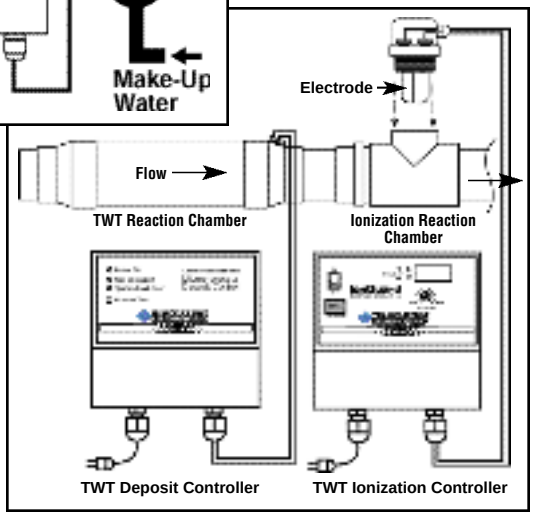
Points of Treatment

Hot Water Heater/Boiler and/or Steam Generator



Cooling Tower / Condenser Application

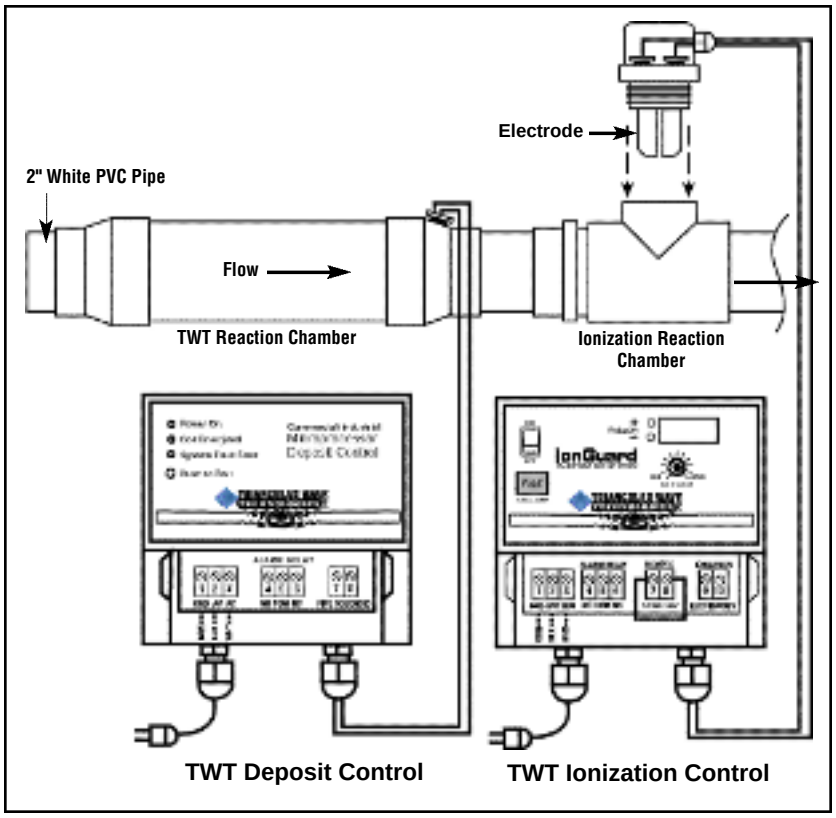


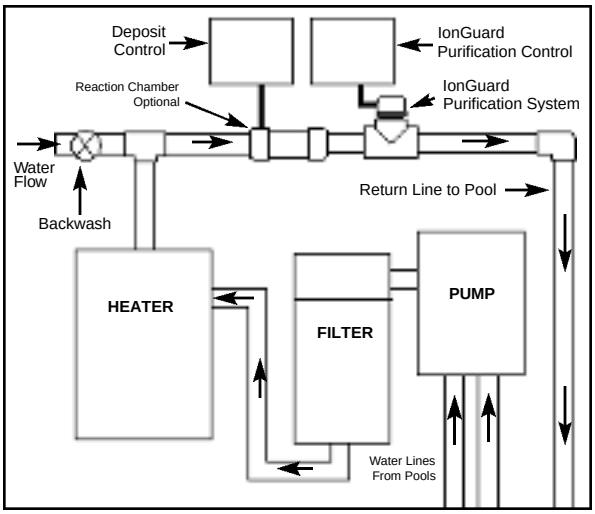


For **Algae and Bacteria** problems use TWT Deposit Controller & Ionization Purification System as illustrated above

Points of Treatment

Swimming Pool And Spa





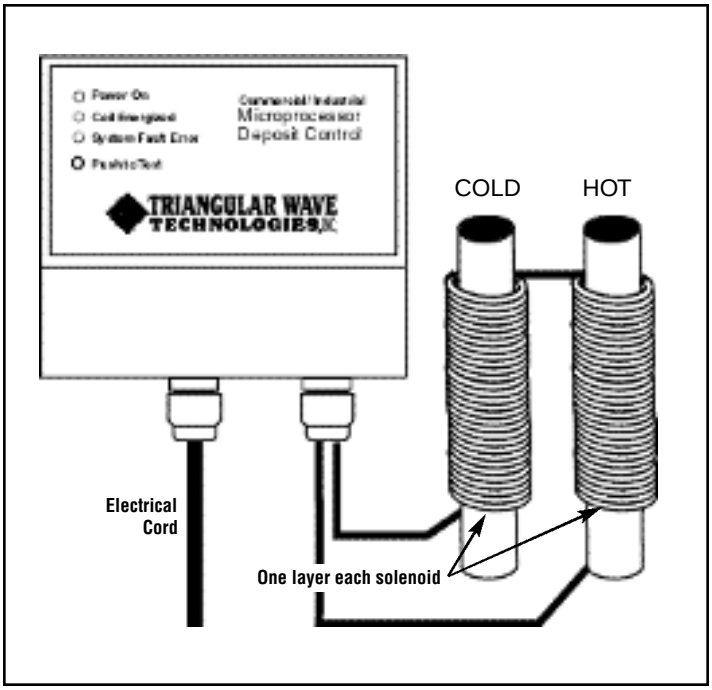
Typical installation overview of equipment room

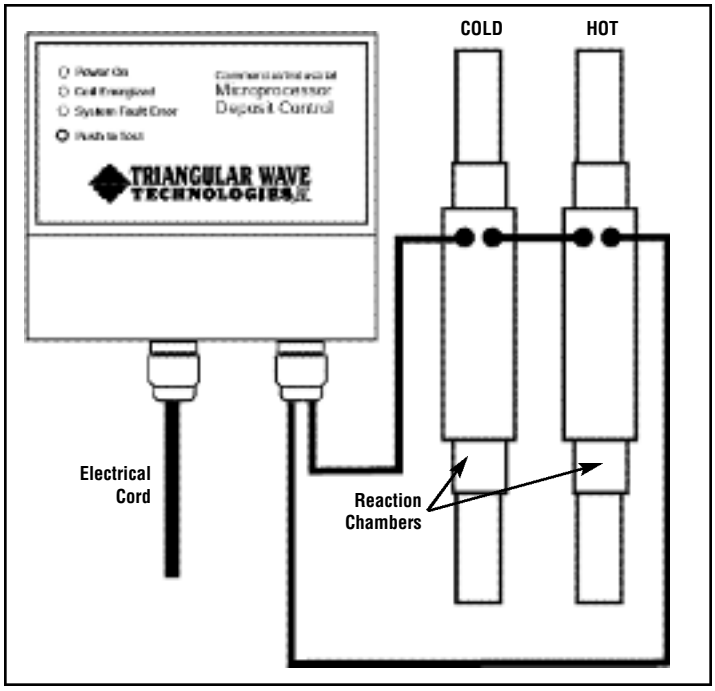
TWT Microprocessor Deposit Controllers, Copper Pipe Signal Enhancers and/or Reaction Chambers are combined to provide a start-to-finish answer to simplified treatment and management. TWT systems are scalable to your industry-specific needs

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 solenoids coils or two Reaction Chambers so long as the total impedance of the load is within the unit's 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 solenoids 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/solenoids 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.

On Site Outdoor Solenoid Installation

The versatility of the Triangular Wave Deposit Control System allows for exterior installation when interior installation is impossible

Triangular Wave Technologies, Inc.Microprocessor TWT-5C8-404 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.

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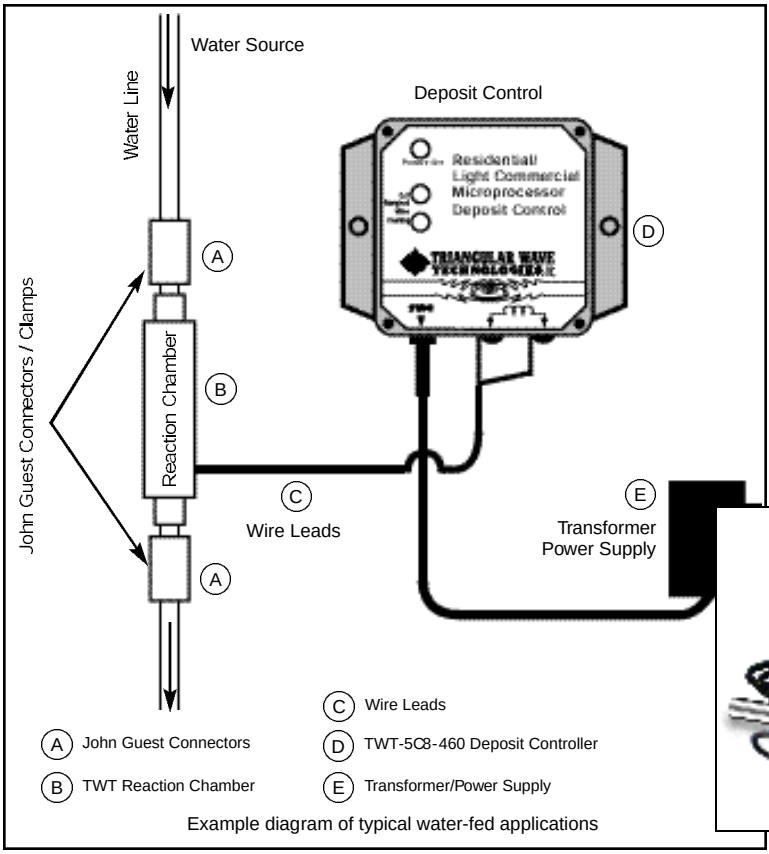
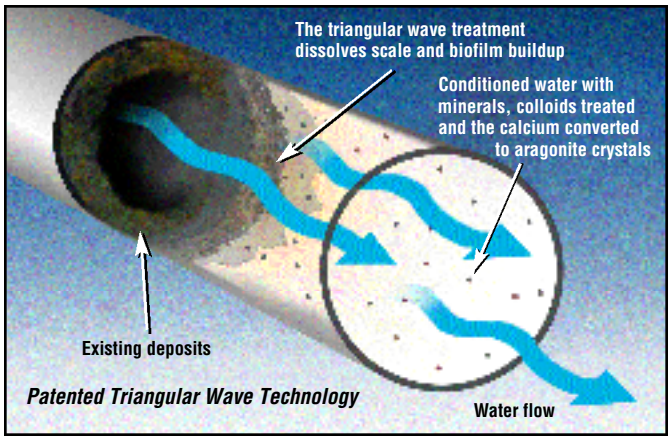
TWT Deposit Control System
Installation for Water-Fed Appliances
Control Scale and Bio-fouling in Beverage Dispensing Equipment



Example diagram of typical water-fed applications



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.

Triangular Wave Deposit Control System Controls Scale Buildup In Reverse Osmosis Water Treatment System

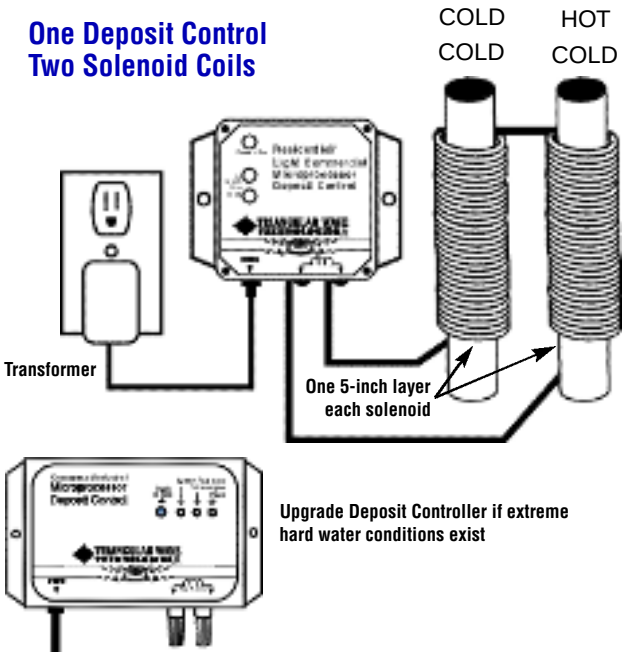
- **No scaling of the flanges or locking rings.**
  Prior to the Triangular wave System wrenches were needed to disassemble the assemblies; now the disassembly can be accomplished by hand
- **Reverse Osmosis filters capacity and life cycle extended**
- **Filters were not scaled on the surface. The filter 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.

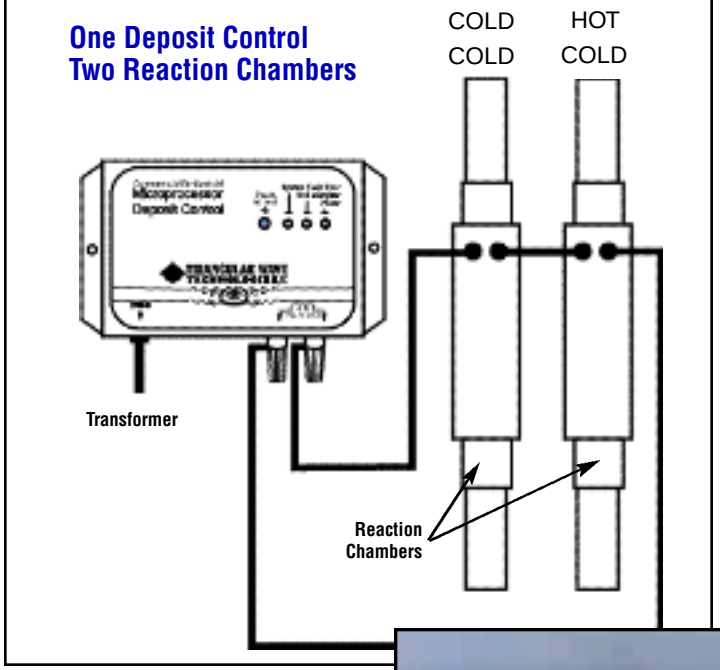
MADE IN U.S.A.

Alternate Application *Alternate acceptable applications*

One Deposit Control Two Solenoid Coils



One Deposit Control Two Reaction Chambers

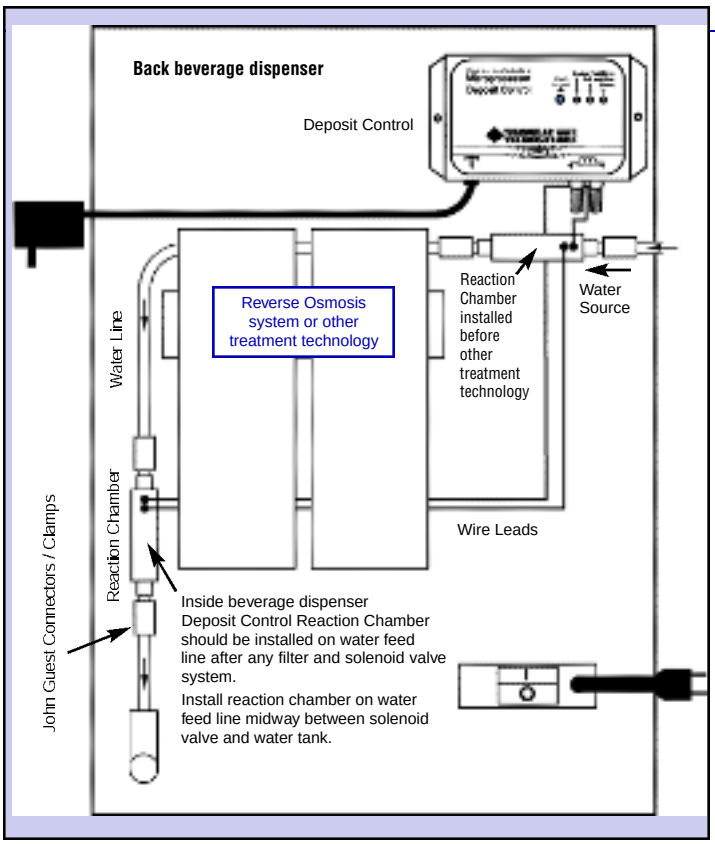


Situation:
One Deposit Controller with two solenoid coils and/or Reaction Chambers for before and after system installation, or before other treatment technologies and were recommended by TWT.

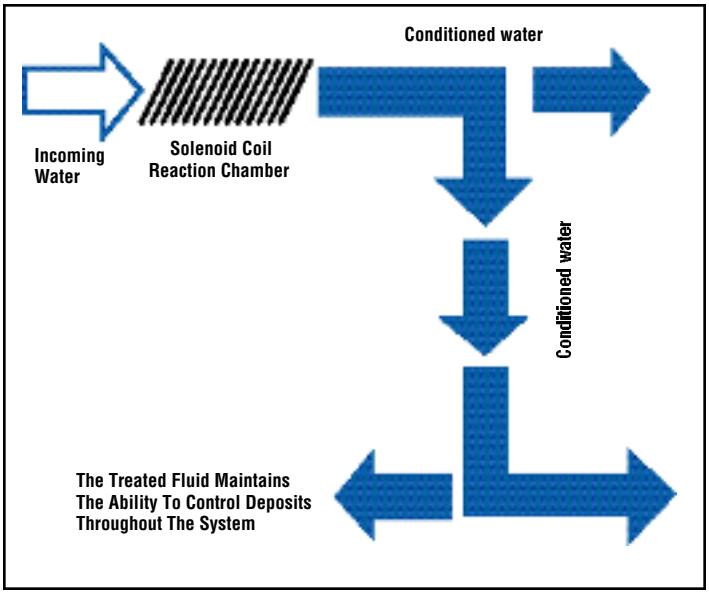
Solution:
The Deposit Control unit will accept two solenoids coils or two Reaction Chambers so long as the total impedance of the load is within the unit's design (consult TWT or its distributors for verification).Upgrading of the Controller is necessary when using reaction chambers and/or if extreme hard water conditions exist. Install two solenoids or reaction chambers (as shown).One on the cold water feed and one on the hot water feed or before other treatment technologies and were recommended by TWT. Wire the two in series as shown.The distance between the reaction Chambers/ solenoids 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.

ModelTWT-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"



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



One Deposit Control / Two Reaction Chambers

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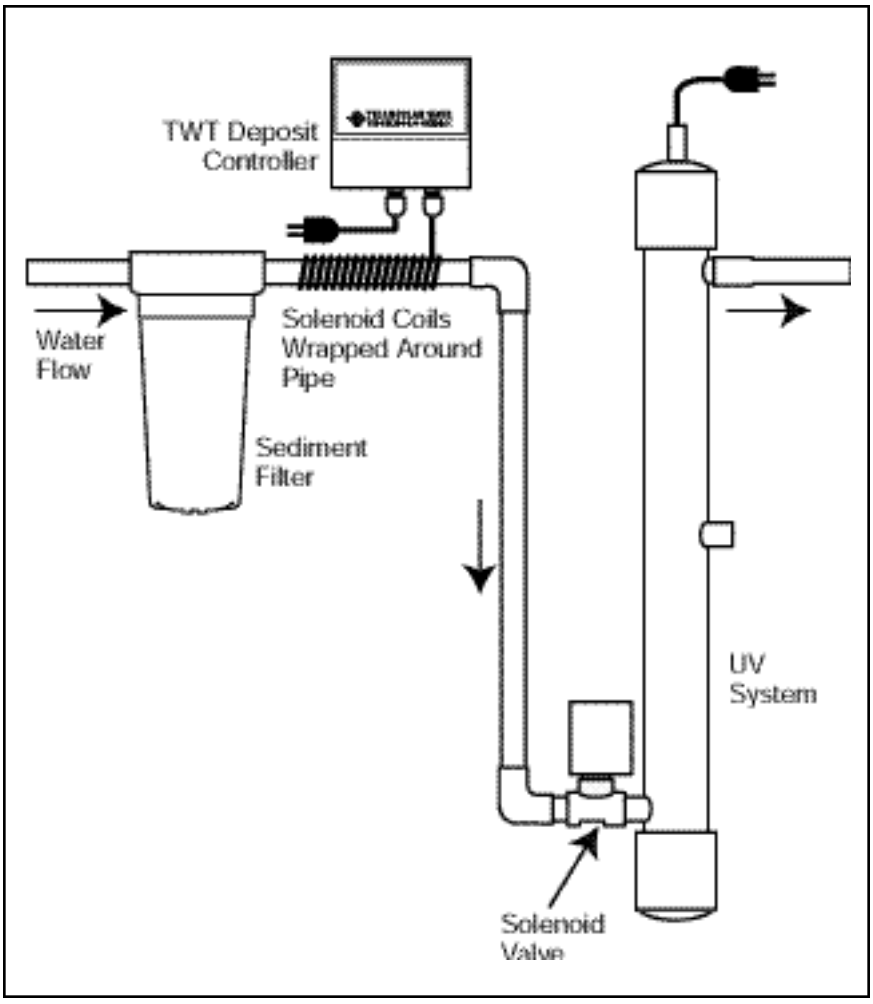
Email:info@triangularwave.com

TRIANGULAR WAVE TECHNOLOGIES SYSTEM INTEGRATION
ULTRAVIOLET DISINFECTION SYSTEM WITH DEPOSIT CONTROL

Eliminate the biofilm, that serves as a breeding ground for disease-causing bacteria, collecting in your pipes, tubing and equipment.



The patented Triangular Wave Deposit Control System conditions the water before it enters the water lines for the equipment and ultraviolet System. The bacteria and scale particles in the water are conditioned so that they remain suspended and unable to attach to the water line walls or the ultraviolet system. In addition, the conditioned water will attack the biofilm on the walls of the water lines and cause the biofilm to detach from the walls and remain suspended in the water. By eliminating the habitat provided by the biofilm, the bacteria will ultimately die off.

Recommended configuration for combined use of TWT Ultraviolet Disinfection and Deposit Control Systems

All the needed elements for maximum fluid protection, management, and peace of mind in one simple packaged solution. State-of-the-art Microprocessor Deposit Controller, Solenoid Coil and/or 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 solutions are scalable to fit the volume you need - ask us to specify the system that works best for you!

Have An Industry Specific Fluid Problem?

Have An Industry Specific Tube and/or Pipe Configuration Problem?

Contact Our Engineering Staff, Who Will Be Pleased To Work Closely With You To Determine The Optimal Solution To Meet Your Industry Specific Needs

To find out even more about us,
and how we can help you, contact us at:
Email: info@triangularwave.com

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