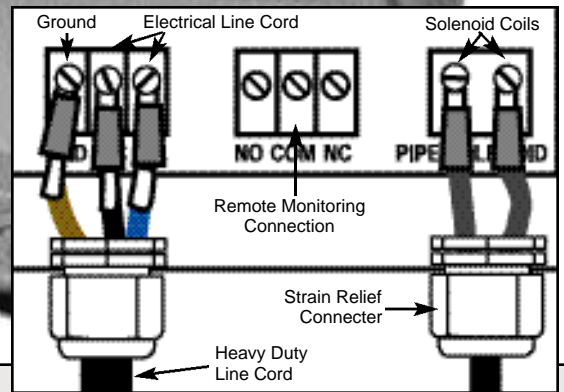
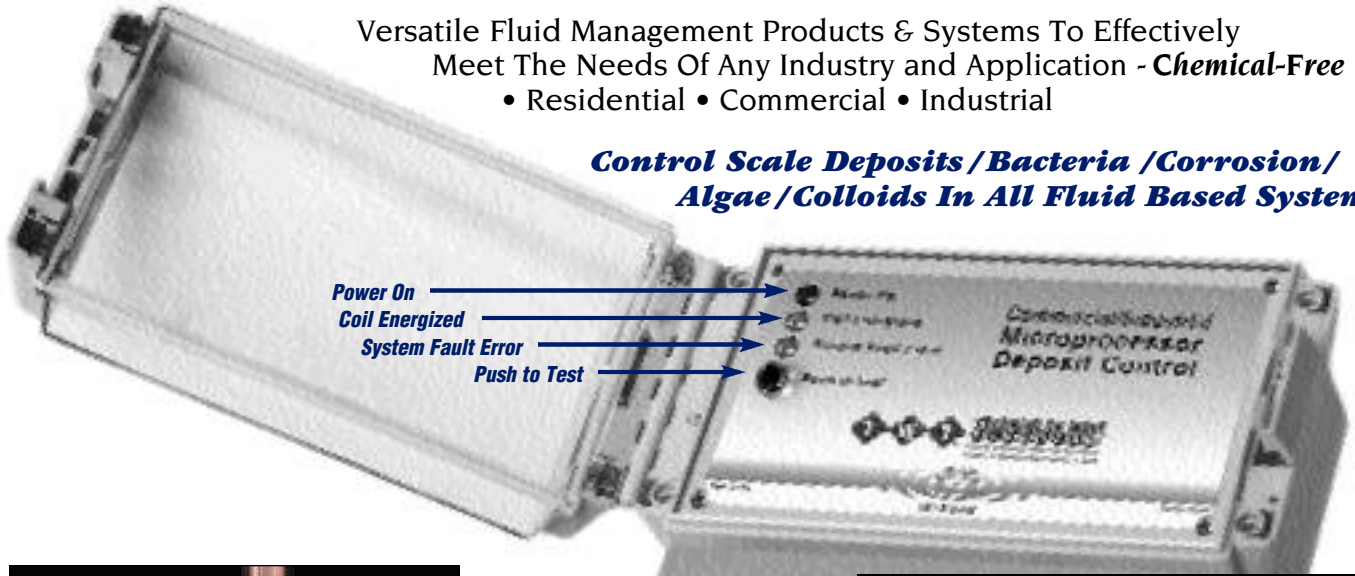


Triangularwave Technologies, Inc. (TWT®)

WATER AND FLUID MANAGEMENT SOLUTIONS

Versatile Fluid Management 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



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

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 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.

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

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

TS59



TWT® PATENTED DEPOSIT CONTROL TECHNOLOGY

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

- Control Scale Deposits/ Bacteria Corrosion / Algae/ Colloids In All Fluid Based Systems
- Improve Operating Efficiency And Life Cycle Of Equipment

The TWT Deposit Control System is an advanced method for controlling scale and bio-fouling. It is applicable with once through and recirculating HVAC, Cooling Towers, Heat Exchangers, Boilers, Chillers, Spray Systems, Pumps, Induction Furnaces, and Process Cooling Systems, as well as agricultural, industrial processing, wastewater, and other fluid based systems.

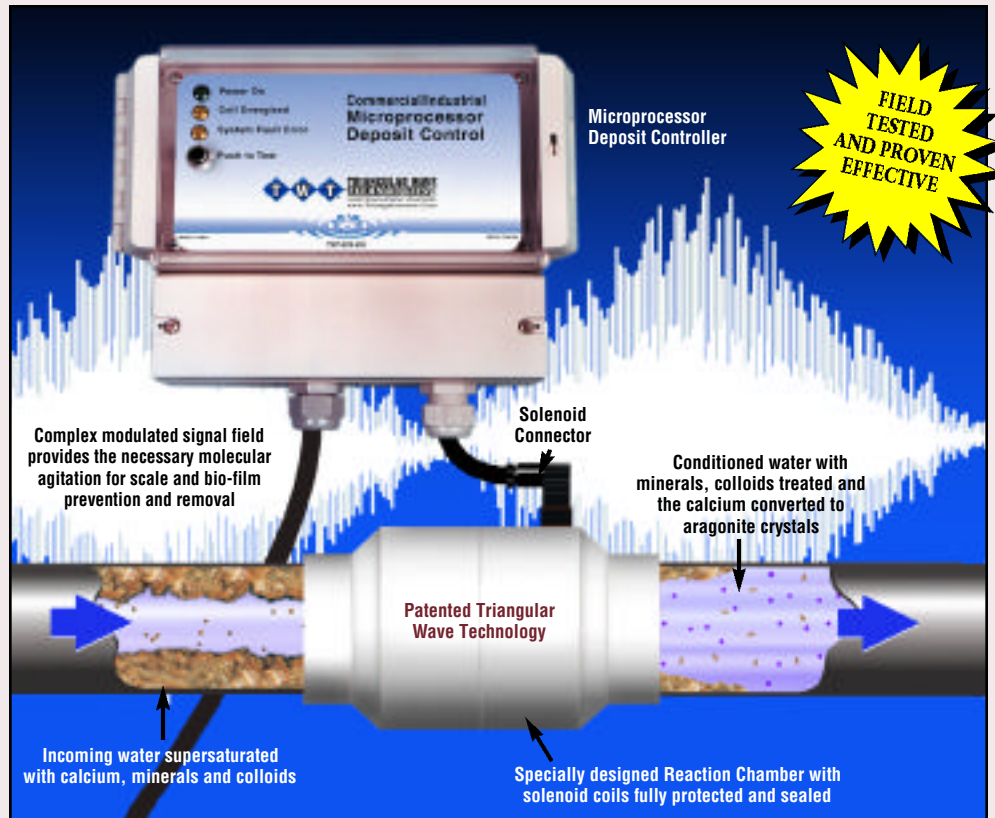
The electronic deposit control technology uses a signal coil that is wrapped around a pipe in the plumbing system being treated. The signal coil produces an extremely small time-varying magnetic field inside the pipe. The resulting induced, oscillating electric field provides the necessary molecular agitation for chemical-free scale prevention and removal.

- *Polarity changes from positive to negative many thousands of times per second.*
- *Frequency varies, the range of frequencies is wide enough to affect the water and the materials in the water.*
- *Amplitude varies, this means that the water molecules and the materials in the water are being subjected to a wide range of field forces.*

The entire Triangular Wave Signal is repeated 30 times each second. When the current reaches the solenoid, a constantly changing electro-magnetic field is formed. That field induces a constantly changing voltage in the fluid. This process ensures proper fluid treatment results and increased operational efficiency. The Triangular Wave Deposit Control System uses a Current Source as the drive circuit to the pipe solenoid. A Current Source is the most reliable and strongest conditioning signal over a wide frequency range. Most waters have qualities that vary over time. Higher total dissolved solid concentration will cause greater impedance in the system. The TWT system, with a Current Source generator is able to sense the increased impedance and maintain the strong conditioning.

- *One time cost vs. recurring monthly chemicals= better profit margin*
- *Labor costs for maintaining the systems will be reduced*
- *Costs to replace corroded parts like heat exchanger tube bundles, etc. will be reduced.*
- *Less downtime for equipment repairs and maintenance=increased production*
- *Increased heat transfer from non-scaled tube surfaces=significant energy savings*

When the TWT systems are properly installed the effects of the Triangularwave Technology treatment last downstream enhancing water quality, and improve operating efficiency and life cycle of equipment. Triangularwave Technologies systems



How TWT Deposit Controller and Reaction Chamber System Work:

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.

use technologically advanced methods to restore and maintain a clean, corrosion-free delivery system in an environmentally safe and chemical-free manner. The result is clean pipes, tubing and equipment with no bio-film and reduced bacterial contamination.

The build up of scale deposits is a common and costly industrial problem. The higher costs of maintaining and cleaning fluid-fed equipment can be attributed to the continuous cleaning of scaled surfaces or to the increased energy and operating costs due to the poor conductivity of the fluid pipe. For example, with every 1/4" of scale, 40% more energy will be needed to heat the water. Moreover, scale deposits narrow the inner diameter of piping, increasing the amount of energy required to pump the water through the system.

Why does scale occur?

The source of scaling problems lies in hard water which contains excess ions such as calcium and magnesium. Because of the inverse solubility laws, these mineral ions precipitate as hard water is heated, resulting in the deposition of scales on heat transfer surfaces.

TWT Operating Principles:

The TWT System utilizes a principal of molecular agitation to neutralize the dissolved calcium that

causes hardness and lime scaling. Molecular agitation uses resonant energy forces, which develop on charged particles moving through an electrical impulse induction field, to change the molecular surface energy states of dissolved minerals. Dissolved mineral surface energy states, a quantum function, determine the subsequent precipitated crystalline structures created. In this case, the doubly positive ionic calcium is treated so that neutral aragonite crystal instead of lime scale crystal precipitation results.

The signal from the TWT system circuitry flows to a solenoid coil (reaction chamber) wound around the pipe being treated. This coil develops the frequency modulated electrical impulse induction field that immediately neutralizes the hardness, or functionally "softens" the water. The field penetrates the piping to its center, with the modulation component acting on the passing water and dissolved mineral molecules.

TWT® THE COMPETITIVE EDGE!

To find additional technical information about TWT® Deposit Control Technology, go on the home page of the TWT web site and click on "About the Technology" there you will find additional Installation & Technical Guidelines.

TWT® Effective Water Treatment Systems

Available for the building industry, modular, residential, restaurant, finance, education, childcare, corrections, aviation, convenience store, telecommunications markets and commercial/industrial facilities worldwide.

Chemical-Free water treatment, conditioning, products and systems.

Building A Better Way!

VALUE ADDED TECHNOLOGY • SYSTEM INTEGRATION • RETROFIT PROGRAMS
• INDUSTRY-SPECIFIC CUSTOM DESIGN

NO MATTER HOW TOUGH THE JOB...TWT® IS THE SOLUTION!

**HARD WATER PROBLEMS SOLVED EASILY!
Your Simple and Safe Solution!**

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® 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.



On-Site Solenoid Wrapped Pipe

Made in USA

Email: info@triangularwave.com • triwaveinc.com • Website: www.Triangularwave.com



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 coffee makers, shower drains, pipes and plumbing equipment.
- Consumers may notice a film build-up on shower tiles, bathtubs, or even themselves, which can cause dry skin and dull, limp hair.
- 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 triangular wave 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.

The electronic deposit control technology uses a signal coil wrapped around a pipe in the plumbing system being treated. The signal coil produces an extremely small time-varying magnetic field inside the pipe, the resulting induced, oscillating electric field provides the necessary molecular agitation for chemical-free scale prevention and removal.

This state-of-the art electronic deposit controller provides continual scale and bio-film control in fluid systems resulting in reduced maintenance and more efficient operation. The Triangular Wave System utilizes unique and proprietary treatment and design processes.

- The patented Triangularwave System assures effective treatment.
- Highest quality parts and engineering design assures long-term performance.
- Chemical-Free Technology
- Simple installation and application maximize field success.
- Full product line to meet all field situations;flexible and cost effective.

Microprocessor Based Technology for all Commercial / Industrial Applications

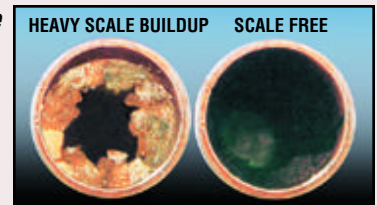
- Cooling Towers
- Heat Exchangers
- Condensers and Chillers
- Commercial Irrigation
- Swimming Pools
- Public/Private Display Water Fountains
- Boilers
- Water Heaters
- Food Processing Equipment
- All Fluid Based Applications
- Controls Algae and Bacteria
Without bio-film to house and protect it, biological growth can not feed or reproduce, resulting in greatly reduced biological activity
- Reduces Corrosion
- Reduces or Eliminates the use of Dangerous Toxic Chemicals
- Improve Operating efficiency And Life Cycle Of Equipment

Highly Cost Effective:

- Savings in maintenance include reduced cleaning, monitoring, and chemical costs.
- 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.

When TWT systems are properly installed, the effects of the Triangularwave treatment last downstream. The treated fluid maintains the ability to control deposits throughout the system

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.



Eliminates deposits in pipes, fixtures and equipment.

On Site Outdoor Solenoid Installation

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



TriangularwaveTechnologies, Inc. Microprocessor installed in a weatherproof electrical box on the outside wall of the building.



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

Triangular Wave Technologies, Inc. TWT® Patented Deposit Control Systems

Technologically Advanced Method for Water & Fluid Management Providing Comprehensive End-To-End Solutions



Model TWT-5C8-470
Residential Deposit Control
 Designed for pipes 1/2 inches 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.
 Coil length: 4"



Model TWT-5C8-473
Residential/Commercial
 Designed for pipes 1 inch or less in diameter.
 Size: 5.25"W x 5.25"H x 2.5"D
 Amperage: Draws less than 1 Amp.
 Coil length: 4"
Universal Power Supply



Model TWT-5C8-472
Residential/Commercial
 Designed for pipes 3/4" / 1" inch in diameter.
 Size: 6.5"W x 3.75"H x 1.3"D
 Voltage: 9 vdc
 Amperage: Draws less than 1 Amp.
 Coil length: 4"



Model TWT-5C8-401
Commercial/Industrial
 Designed for pipes 1-1/2 inches or less in diameter.
 Size: 6.5"W x 7.75"H x 4.75"D
 Voltage: 120 vac
 Amperage: Draws less than 1 Amp.
 Coil length: 4"
Industrial Reaction Chamber Recommended



Model TWT-5C8-402
Commercial/Industrial
 Designed for pipes 2 inches or less in diameter.
 Size: 7.75"W x 6.25"H x 3.75"D
 Voltage: 120 VAC
 Amperage: Draws less than 2 Amp.
 Coil length: 7"
Industrial Reaction Chamber Recommended



Model TWT-5C8-403
Commercial/Industrial
 Designed for pipes 3 inches or less in diameter.
 Size: 10"W x 7.25"H x 4.5"D
 Voltage: 120 VAC
 Amperage: Draws less than 2 Amps.
 Coil length: 7"
Industrial Reaction Chamber Recommended



Model TWT-5C8-404
Commercial/Industrial
 Designed for pipes 4 inches or less in diameter.
 Size: 10"W x 7.25"H x 4.5"D
 Voltage: 120 VAC
 Amperage: Draws less than 2 Amps.
 Coil length: 7"
Industrial Reaction Chamber Recommended



Model TWT-5C8-406
Commercial/Industrial
 Designed for pipes 6 inches or less in diameter.
 Size: 11.5"W x 8.5"H x 6"D
 Voltage: 120 VAC
 Amperage: Draws less than 3 Amps.
 Coil length: 4.5"
Industrial Reaction Chamber Recommended



Model TWT-5C8-408
Commercial/Industrial
 Designed for pipes 8 inches or less in diameter.
 Size: 10"W x 8.25"H x 5.25"D
 Voltage: 120 VAC
 Amperage: Draws less than 3 Amps.
 Coil length: Contact TWT directly for solenoid winding instructions
Industrial Reaction Chamber Recommended



Model TWT-5C8-410
Commercial/Industrial
 Designed for pipes 10 inches or less in diameter.
 Size: 12"W x 10"H x 7"D
 Voltage: 120 VAC
 Amperage: Draws less than 3 Amps.
 Coil length: Contact TWT directly for solenoid winding instructions
Industrial Reaction Chamber Recommended

Note: Custom orders—12", 14" and larger sizes deposit controllers are available upon request.
 Other voltage source available upon request (overseas installations, must specify with PO).
 Solenoid winding coil wire supplied with systems is 18-20 AWG (UL Approved).
 Teflon wire available upon request (UL Approved), must specify with PO.
 System housings ABS construction.
 All TWT systems are shipped with easy to follow application, installation and maintenance manuals.

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. 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 • 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.

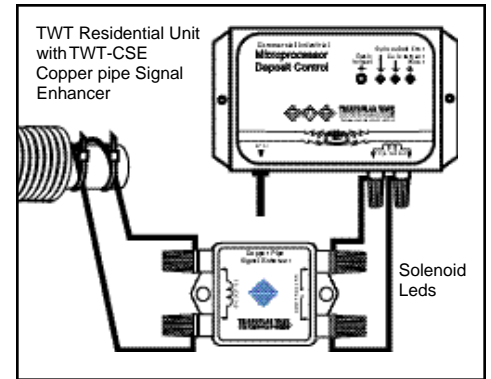
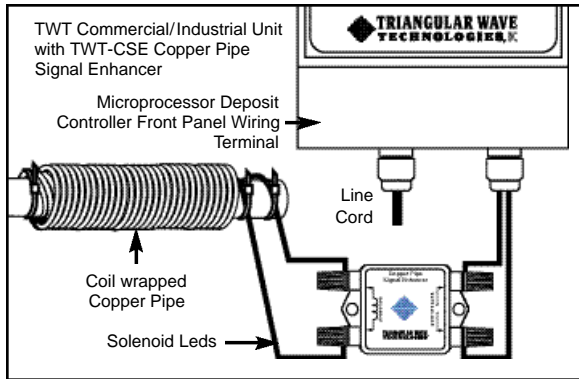
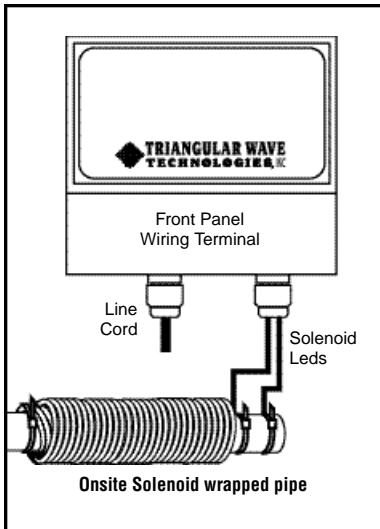
Based on point-of-use, water quality and conditions and to ensure proper use, application and installation of the TWT 8", 10", 12" and higher deposit control systems, contact your dealer or TWT, Inc. for additional information and winding instructions.

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.

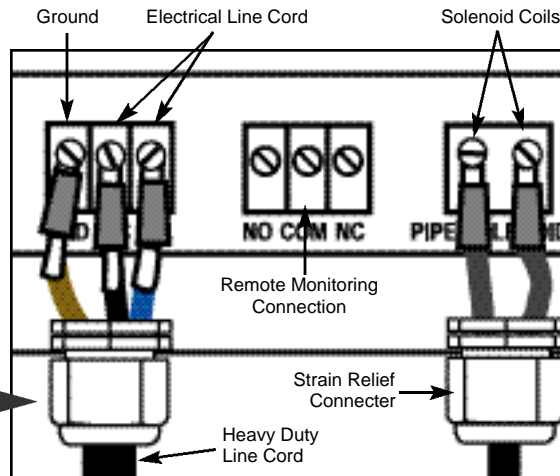
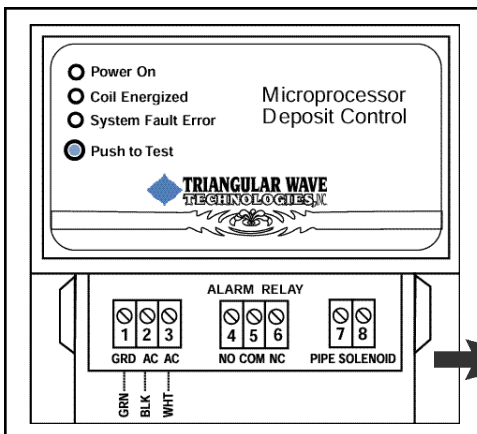
Special Note: Copper pipe signal enhancers are to be used on copper pipes only.



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 Deposit Controller terminal Hookup



TWT Deposit Control Unit

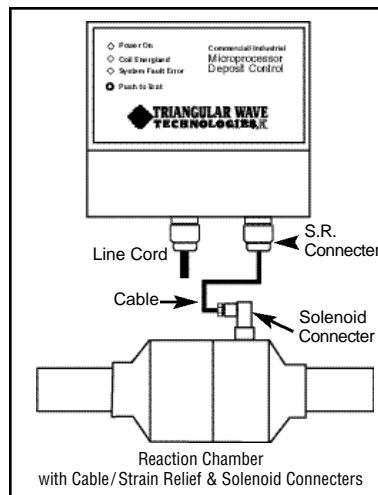
The controller is supplied with a wiring kit and a strain relief connector for the solenoid coil wires. This strain relief will provide a water resistant seal for the two coil wires. You should rotate the compression ring counter clockwise to release pressure on the seal. Feed the two wires through the 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

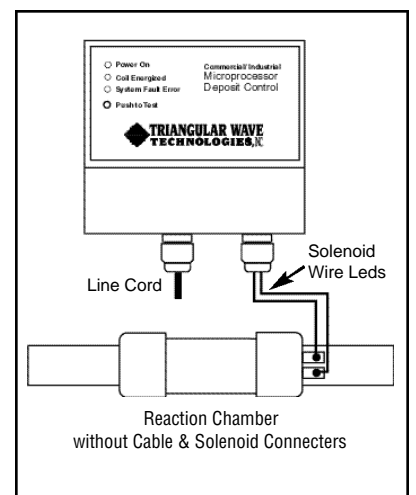
- To address magnetic pipe applications
- When a protected environment (code) is needed
- When on-site solenoid wrap is not applicable

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 triangular wave 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

TWT® Technologically Advanced Methods for Water & Fluid Management “The Competitive Edge”

TWT® 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 GPM requirements and 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, waste water and other fluid based systems.

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

All TWT® Products And Systems Come With Easy To Follow Care,
Maintenance And Operational Manuals.

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.

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. For further details on how you can leverage the TWT Deposit Control benefits, please contact us.

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

Visit Triangular Wave Technologies, Inc. Comprehensive Website.
The Valuable Technical Resource For All Involved In
Water And Fluid Management. www.Triangularwave.com

Sensing Environmental Needs with Intelligent Solutions

TWT® The Ultimate in Water Treatment & Conditioning

The green way

