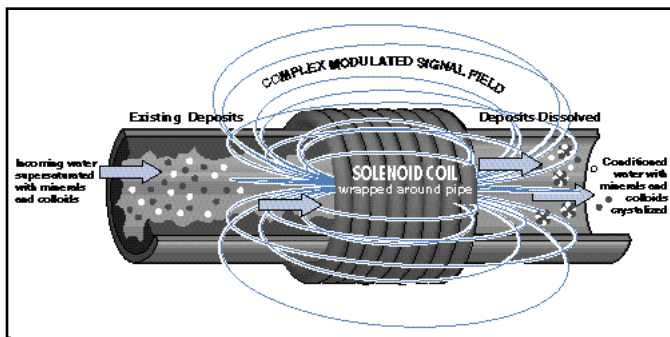


TRIANGULAR WAVE Fact Sheet

The Patented Triangular Wave System

The **Triangular Wave System** is an advanced method for controlling scale and bio-fouling. It is applicable with once-through and recirculating HVAC, heating, process cooling, agricultural, industrial processing, wastewater, and other fluid based systems.



The **Triangular Wave System** is a wire coil that forms a solenoid around the fluid pipe. The solenoid is energized by a power supply that **constantly changes the polarity, frequency and amplitude** of the current being sent to the solenoid. When the current reaches the solenoid, a constantly changing electromagnetic field is formed. That field induces a constantly changing voltage in the fluid.

When the Triangular Wave System treats water or other fluids, several things happen.

1. The hydrogen bonds between water molecules are broken and more water molecules are freed to hydrate scale ions and colloidal particles.
2. The scale ions dissolved in the water are agitated, they collide, and form scale molecules that join together to form crystals.
3. The colloidal particles in the water receive an enhanced surface charge, possibly from the freed water molecules. The enhanced surface charge is great enough for the colloidal particles to repel each other and the sides of the equipment, and stay suspended in the fluid.

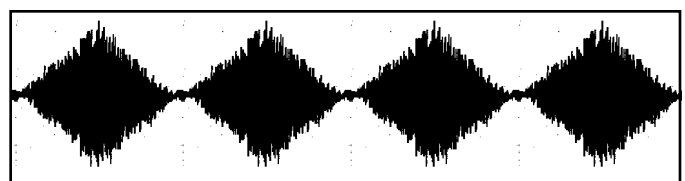
Calcium carbonate (CaCO_3) is the primary constituent of scale in water systems. Calcium and carbonate

ions enter the water as parts of other molecules that dissolve in the water. The ions join to form calcium carbonate when they precipitate out of solution at a surface of the equipment. **The calcium and carbonate ions are "hydrated"** when they are dissolved in the water. This means the ions are surrounded by water molecules that are attracted to the ions by the electrical charge. The main culprit in most scale problems is the super-saturated solution. There is so much scale causing mineral in the solution that ions are only partially hydrated. The scale causing minerals such as calcium and magnesium ions are unstable and **"barely hanging in water"** in a super saturated solution.

The **induced molecular agitation** in the Triangular Wave electronic deposit control system causes the unstable mineral ions to collide with each other and precipitate. Impurities in the water such as alumina or silica provide initial nucleation sites for further precipitation of adjacent mineral ions. A **snow ball effect** starts, resulting in the growth of many crystals, each consisting of numerous mineral ions. This enables crystal salts to become large in size and float with water; thus they do not stick to the metal services, because the crystals do not have the charges at the surface anymore.

As the byproduct of the above mentioned precipitation and snowball effect of mineral particles, **freed water molecules** become available to dissolve existing scales.

The **Triangular Wave System** represents a significant breakthrough in electromagnetic technology. The triangular wave has made possible use of electromagnetic technology in all size applications from residential to large commercial and industrial systems.



Triangular Wave form as shown on the oscilloscope