

EZ-DOSE

**BOILER COMPOUND DOSING SYSTEM WITH
ELECTRONIC RETURN TANK LEVEL CONTROL**



PREFACE**EZ-DOSE BOILER COMPOUND AND LEVEL MANAGER****WHY THE EZ-DOSE?**

Most boiler damage is caused by improper treatment of new make-up water flowing into the return tank. In order to ensure the longevity and proper steam generation, chemicals must be added in the form of boiler compound to control corrosion and scale. The two main causes of corrosion and scale is excessive oxygen content and a high level of dissolved solids present in the untreated make-up water added to the condensate return tank.

The villains in this scenario, which inspired me to develop the EZ-DOSE, are the **BALL FLOAT VALVE** and **MAINTENANCE OF THE PROPER CONCENTRATION OF BOILER COMPOUND**.

Let's take the ball float valve first. These valves use a ball shaped float, similar in operation to the valve in your toilet tank, to control the addition of new water to return tank. When these valves leak (almost all of them do) untreated water, rich in both oxygen and dissolved solids bleeds into the return tank. This creates four undesirable effects:

1. Cools the make-up water requiring greater boiler heating capacity to boil once inside the boiler and greater quantities of boiler compound to control the water impurities. This increases fuel consumption and extends boiler recovery time which is costly in terms of production. This will be critical on steam systems operating at the margin of their steam production capacity.
2. The higher oxygen content dissolved in the cool incoming water reacts with carbon dioxide to form carbonic acid which corrodes the internals of your boiler as well as the steam system piping, steam traps and machinery.
3. High levels of dissolved solids in the make-up water form scale leading to the clogging of pipes, valves, boiler tubes, steam traps and machinery.
4. Adding new water without a corresponding addition of boiler compounds dilutes the concentration of boiler compound in the water pumped into the boiler, thereby reducing the compounds effectiveness.

The EZ-DOSE uses an electronic level control module, immune to return tank turbulence and surging to open and close a 24 VAC solenoid, positively controlling the return tank water level thereby eliminating the undesirable effects listed above.

The second culprit of the boiler destruction duo is improper control of the chemistry inside the boiler. Boiler chemistry is maintained by adding boiler compound to the water being pumped into the boiler which both scavenges the oxygen in the make-up water, preventing acid formation as well as controlling the level of solids dissolved in the make-up water called "total dissolved solids". These are also known as TDS. TDS are the major contributor to scale formation in steam and water systems. Adding the right quantity of boiler compound at the correct time to the make-up water is the second challenge the EZ-DOSE overcomes. Just adding the compound once or twice a day or using a fixed timer or a return pump relay to time the addition of boiler compound simply cannot compensate for the effects the variation in the demand for steam has upon the addition of new, untreated water to the return tank. The EZ-DOSE solves this problem by electronically metering the volume of new water added then having a micro-computer calculate the proper dose of compound to be added to the return tank using a metering pump. This combination of measuring the volume of incoming water and adding the precise amount of compound required can be easily adjusted and precisely controlled by settings on the EZ-DOSE control panel, tailoring the compound addition to any boiler operation.

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DISCLAIMER

Installation and operation of your unit must comply with any pertinent federal, state or local codes, ordinances of other applicable governing data.

Instructions contained in this publication are intended only as a guide to assist your and assure the safe reliable operation of your machine

WARRANTY

EZtimers Manufacturing will supply new or remanufactured parts at no cost based upon the following time period after the shipping date.

- 90 days on peristaltic pump and associated parts

- 2 years-plastic parts

- 1 year-metal or electronic parts

This warranty extends only to the original purchaser. A receipt of other proof of purchase is required before any warranty action can be taken. This warranty covers only failures due to defects in materials and workmanship. It does not cover damage which is the result of accident, misuse, abuse, neglect, mishandling, misapplication alteration or damage attributed to acts of God. EZtimers Manufacturing assumes no responsibility for any special, incidental or consequential damages.

EZ- DOSE

INSTALLATION

REQUIRED TOOL AND MATERIALS

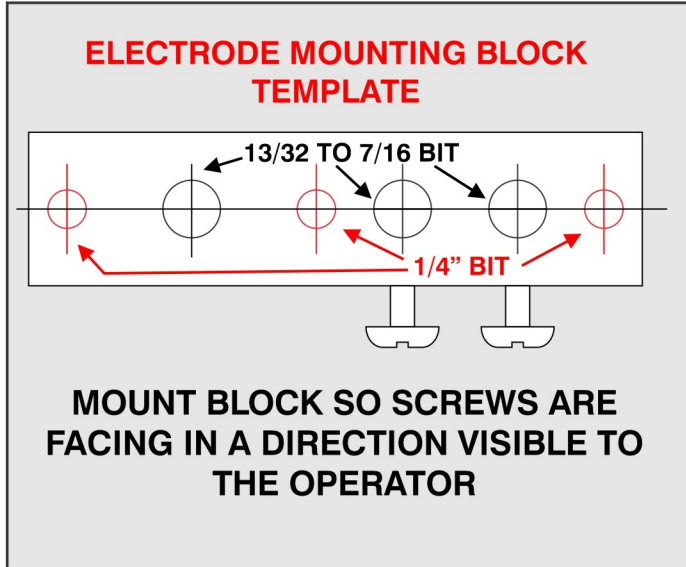
1. 1/2" ELECTRIC DRILL AND DRILL BITS - A 13/32" **OR** 7/16" as well as a 1/4" drill bit will be required. It is advisable to use thread tapping or pipe threading lubricant when drilling
2. A #2 PHILLIPS HEAD SCREW DRIVER
3. CHANNEL LOCK PLIERS
4. PIPE FITTING TOOLS– Because of the variations of plumbing used to install the make up water supply to the Return Tank it not possible to list the required pipe wrenches and other pipe fitting tools required.
5. PIN PUNCH OR CENTER PUNCH
6. TEFLON TAPE– We all know what this tape is used for.

WARNING!

**NEVER PERFORM ANY MAINTENANCE OR REPAIR ON
A BOILER WHICH IS HOT AND/OR UNDER PRESSURE.**

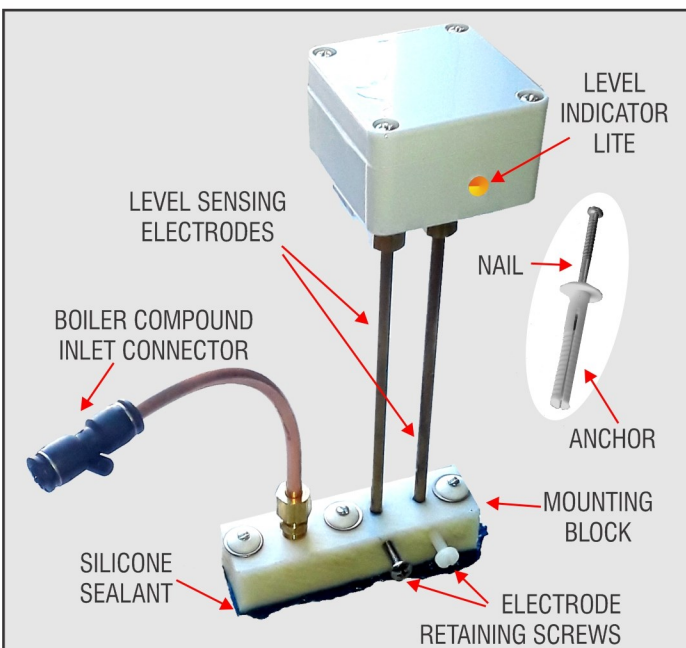
INSTALLING THE EZ-DOSE

MOUNTING TO THE RETURN TANK



STEP 1:

On vertical return tanks usually there will be a round access plate bolted to the top of the tank, this plate is usually an excellent place to mount the Level Sensor. On horizontal return tanks align the long side of the mounting block along the long axis of the return tank. Clean the section of the return tank you'll be positioning the drill template on. Tape the drill template to the top of the Return Tank. Be sure to note the arrow on the drill template which indicates the direction the Level Sensor will face so the level indicator lite will be easily seen from a convenient location. Before attempting any drilling be sure to use a center punch to mark the holes so the drill bit doesn't "walk" during drilling. Take a magnet and test the area which you will be drilling. If the magnet "sticks" to the area use a HS grade drill bit. If the area is non-magnetic it is probably Stainless Steel and you will need Cobalt drill bits. The two larger holes can be either 13/32" or 7/16" the smaller three holes are 1/4". Be sure to use cutting oil when drilling, it will prevent dulling of the drill bit.



STEP 2:

Loosen the electrode retaining screw then slide the mounting block off of the level sensing electrodes. When mounting the level sensor, be sure the level indicator lite will be visible to a boiler operator. Smear silicone sealant on the area of the return tank on which you'll be positioning the mounting block. Place the Mounting Block over the holes drilled in the return tank, pushing the anchors down and through the block and tank until they are flush with the top of the Mounting Block. With the Mounting Block is properly positioned and anchors pushed flush hammer down the nails into the anchor. This will securely fasten the Mounting Block to the return tank. After the mounting block is securely fastened to the return tank carefully slide the electrodes back through the holes in the mounting block.

PIPING THE EZDOSE CONTROLLER WATER INLET MANIFOLD

INSTALLATION OVERVIEW

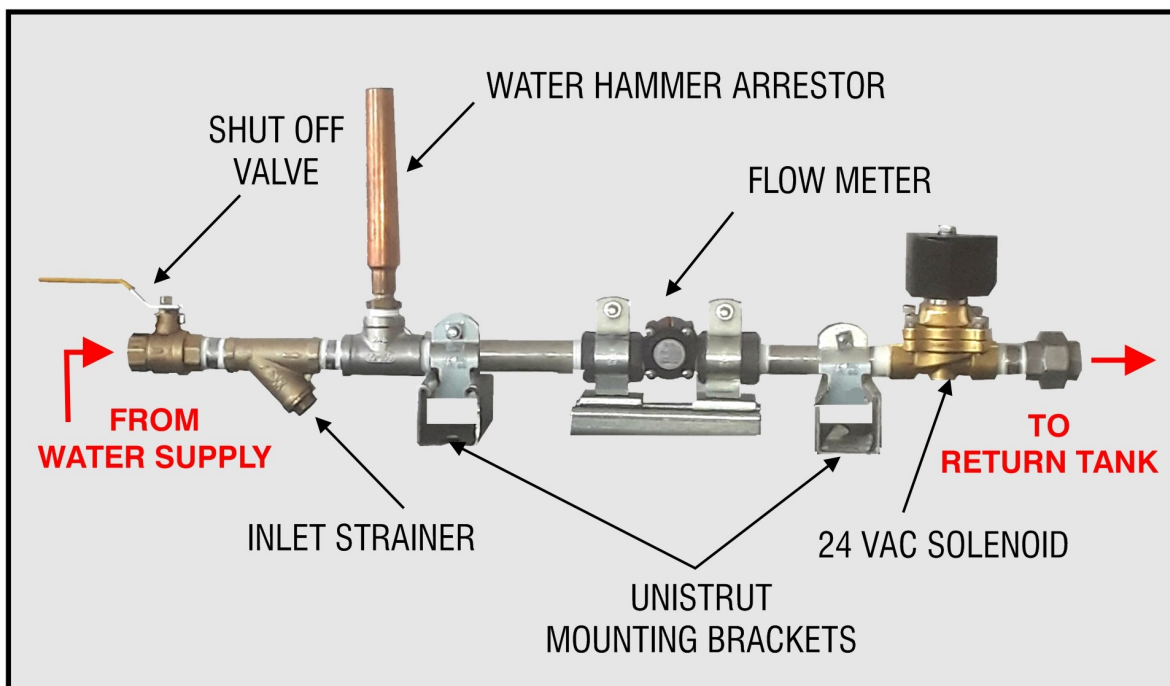
What we are doing here is removing the ball float valve that controls the flow of “make up water” into the return tank and replace it with Ezimers WATER INLET ASSEMBLY. This kit containing the required parts to install the EZDOSE. However, because of the many different piping schemes that exist we can only outline a general procedure to follow. When doing the plumbing for this installation remember that the Water Inlet Manifold must not be used as supporting structures for other piping components.

CAUTION- DO NOT USE THE WATER INLET MANIFOLD AS A SUPPORT FOR OTHER COMPONENTS

WATER INLET MANIFOLD

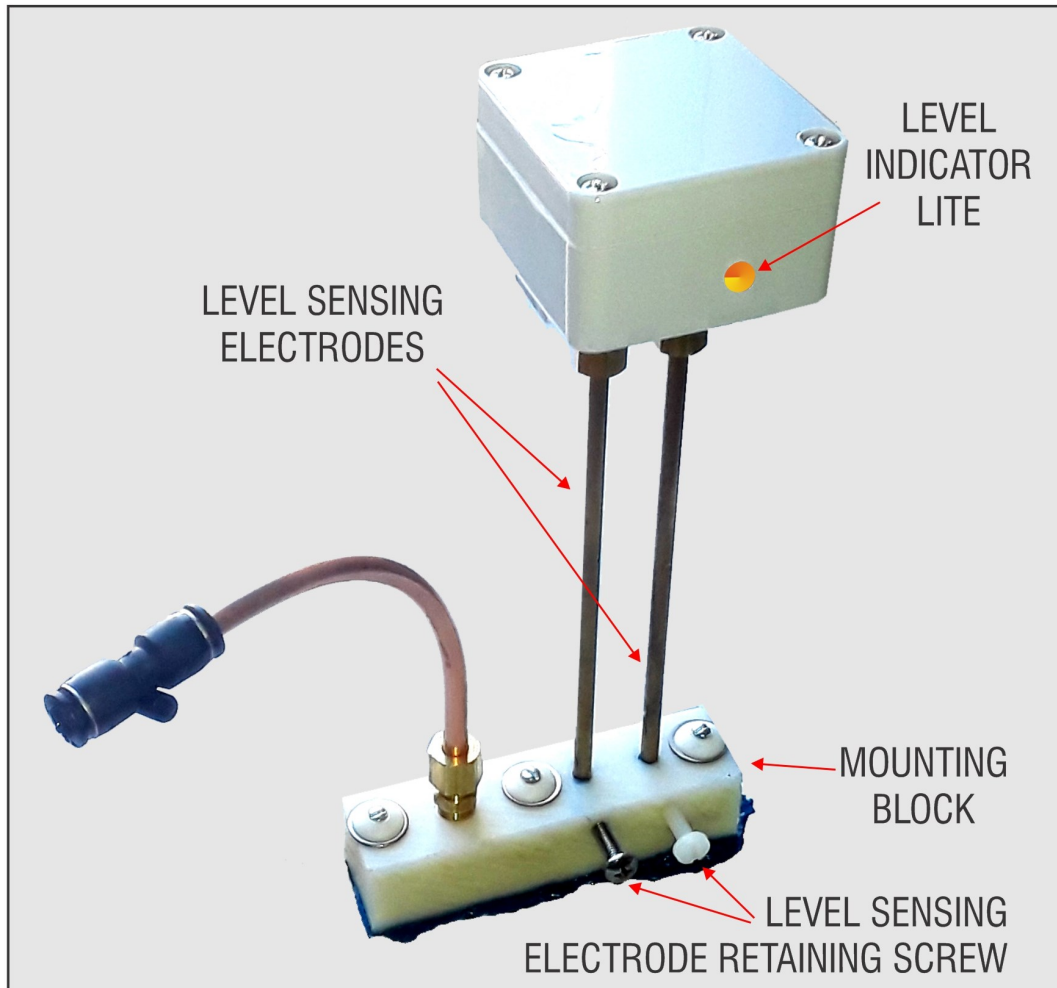
STEP 1: Shut off the water supply to the existing ball float valve in the Return Tank and remove ball float valve. There are numerous different plumbing configurations. However, the general idea is to adapt at some convenient location to the ½”FPT inlet on the Shut Off Valve.

STEP 2: Connect the ½” union on the Water Inlet Manifold to the existing fitting on the removed ball float valve that supplied “city, or make up water” to ball float valve.



STEP 3: Once all the connections are made and tightened close the Shut off Valve on the Water Supply Manifold and turn on the water supply to the manifold. After the water is turned on slowly open the Shut off Valve, there may be a short surge of water through the Water Inlet Solenoid. Check for leaks.

ADJUSTING THE RETURN TANK LEVEL

**STEP 1:**

MAKE SURE THE RETURN TANK SIGHT GLASS IS CLEAR ENOUGH TO SEE THE WATER LEVEL THEN FILL THE RETURN TANK ABOUT HALFWAY UP THE SIGHT GLASS.

STEP 2:

BE SURE THE LEVEL SENSING ELECTRODE SCREWS ARE UNSCREWED ENOUGH TO ALLOW THE LEVEL SENSING ELECTRODES TO SLIDE EASILY UP AND DOWN IN THE MOUNTING BLOCK.

STEP 3:

GENTLY PUSH THE LEVEL SENSOR DOWN UNTIL THE LEVEL INDICATOR LITE BLINKS GREEN. THEN SLIDE THE LEVEL SENSOR UP UNTIL THE LEVEL INDICATOR UNTIL THE LEVEL SENSOR LITE TURNS ORANGE. GENTLY PUSH THE LEVEL SENSOR BACK DOWN UNTIL IT JUST BLINKS GREEN AGAIN. THE LEVEL IS NOW SET. IF THE LEVEL SENSOR LITE IS ORANGE FOR A FEW SECONDS IT WILL TURN RED. SHOULD THIS HAPPEN JUST PUSH THE LEVEL SENSOR BACK DOWN AN INCH OR TWO AND START AGAIN. AFTER THE ELECTRODES CONTACT WATER FOR ABOUT 20 SECONDS THE LEVEL INDICATOR LITE WILL RESET TO BLINKING GREEN.

STEP 4:

GENTLY TIGHTEN THE LEVEL SENSING ELECTRODE SCREW UNTIL THEY JUST TOUCH THE LEVEL SENSING ELECTRODES. **DO NOT OVER TIGHTEN.**

EZ DOSE OPERATIONS

WARNING!

**NEVER PERFORM ANY MAINTENANCE OR REPAIR
ON A BOILER WHICH IS HOT AND/OR UNDER
PRESSURE.**

AVAILABLE OUTPUTS:

1. **WATER INLET SOLENOID**– A 24 VAC signal powers the solenoid which allows make up water to flow into the Return Tank.
2. **BOILER COMPOUND DOSING PUMP**– A 24 VAC signal powers the peristaltic compound dosing pump which pumps boiler compound into the return tank.

THEORY OF OPERATIONS***The EZ DOSE does the following:***

1. Controls the level of water in the Return Tank electronically, eliminating the troublesome ball-float valve. The volume of water added is measured by a flow meter.
2. Doses the return tank with proper volume of boiler compound required to treat the new water introduced into the return tank. This is computed using the formula -number of compound dosing pump revolutions=((flow meter revolutions/flow meter revolutions per gallon) X boiler compound concentration in ml per gallon))/volume of boiler compound dosed per revolution of compound pump.

GETTING STARTED

110 VAC power within 10 ft. of the EZ LEVEL is required. Plug the 24 V transformer into the power outlet and turn on the power (**CAUTION-THE POWER TRANSFORMER MUST NOT LIE IN WATER SO DON'T SET IT DOWN ON THE BOILER ROOM FLOOR. DEDICATE AN OUTLET FOR ITS USE AND USE THE SCREW IN THE MOUNTING TAB SECURE IT TO THE OUTLET PLATE**).

Normally the EZ DOSE unit will be shipped from the factory with the correct initial settings set. If for some reason these need to be altered go to page 9 titled USING THE CHANGE SETTING BUTTON. Please call the factory at 702-376-6693 with any questions.

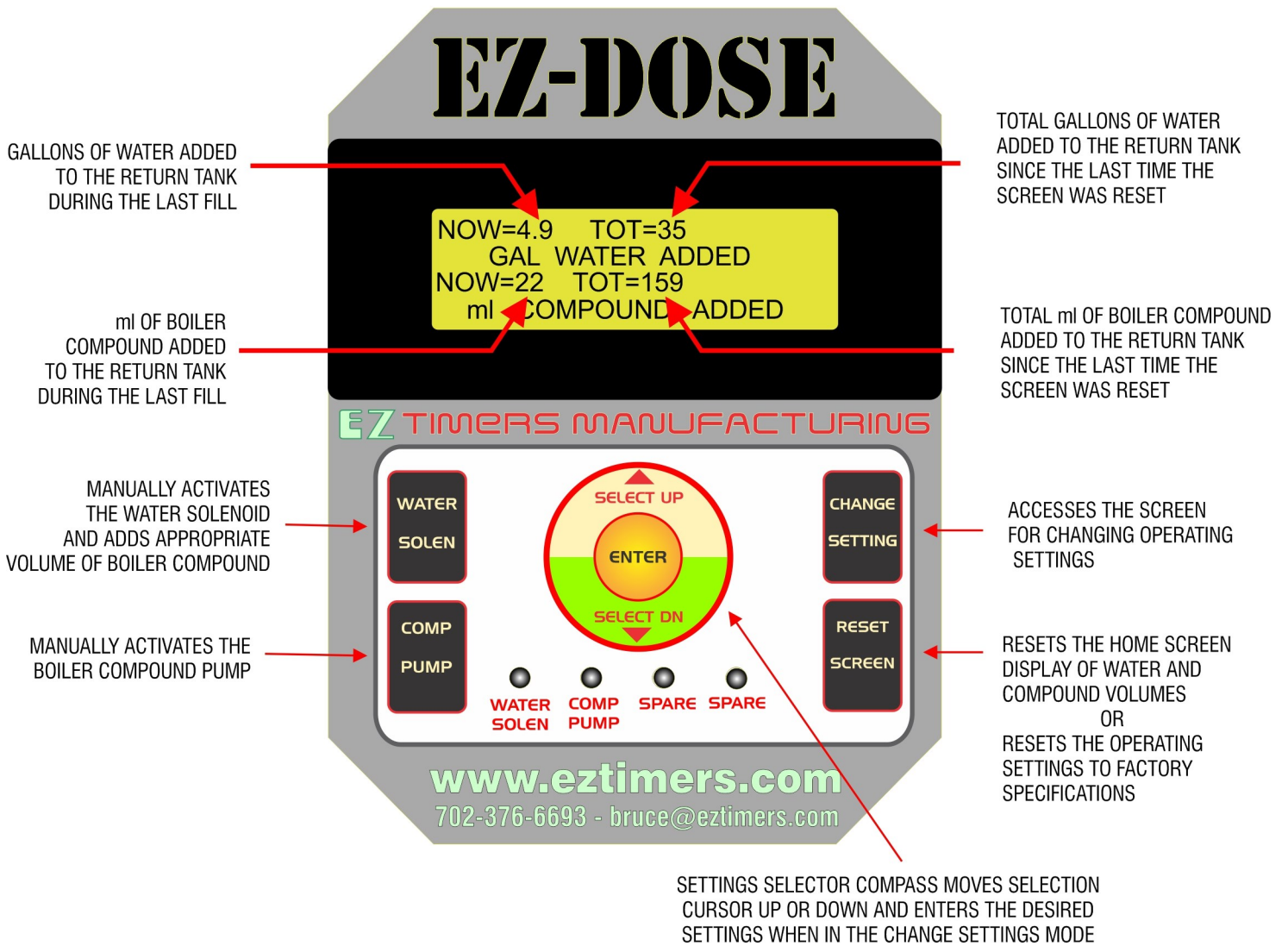
AVAILABLE INPUTS:

1. **RETURN TANK WATER LEVEL SENSING**– A pair of brass conductivity probes senses the presence of water by a minute current flow between them when water contact both probes. There is a an immediate change in the color of the **LEVEL STATUS** lite from green to orange when the level is low. After a few seconds the **WATER SOLENOID** lite will turn red indicating the signal to open has been sent to the WATER INLET SOLENOID.
2. **WATER INLET SOLENOID TEST SWITCH**– A push button switch which manually sends a signal to open the WATER INLET SOLENOID.

AVAILABLE OUTPUTS:

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ELECTRONIC PANEL LCD SCREEN AND TOUCH CONTROLS

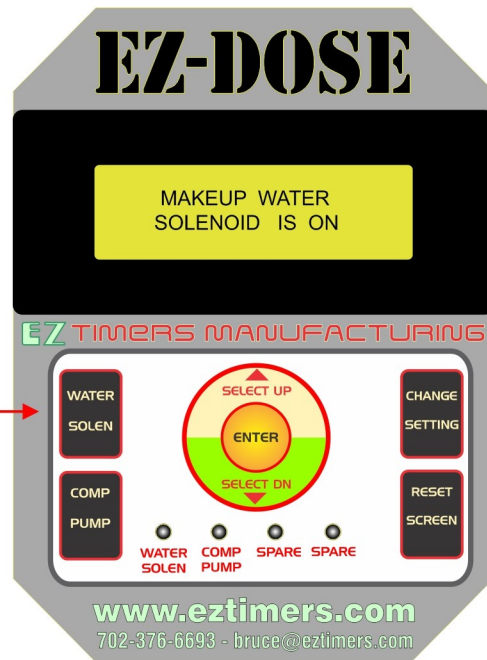


USING THE WATER SOLEN AND COMP BUTTON

NOTE:
AFTER BEING TOUCHED FOR ABOUT 10 SECONDS A BUTTON WILL DEACTIVATE. TO CONTINUE WITH AN OPERATION IN PROGRESS, STOP TOUCHING THE BUTTON FOR A MOMENT AND THEN RETOUCH THE BUTTON AGAIN. THIS DEACTIVATION IS SIMILAR FOR ALL THE BUTTONS ON THE PANEL.

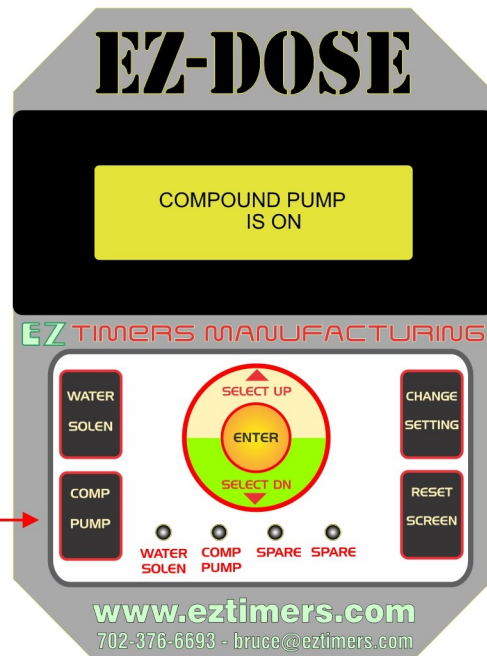
TOUCHING THE WATER SOLENOID BUTTON WILL ACTIVATE THE WATER INLET SOLENOID AND ALLOW CITY WATER TO FLOW INTO THE RETURN TANK. THIS NEW WATER REQUIRES TREATMENT WITH BOILER COMPOUND, THE FLOW METER WILL TRACK THE VOLUME OF THE NEW WATER USED TO CALCULATE THE PROPER VOLUME OF BOILER COMPOUND TO BE DISPENSED FOR THE VOLUME OF NEW WATER ADDED.

WATER SOLENOID
ACTIVATED SCREEN



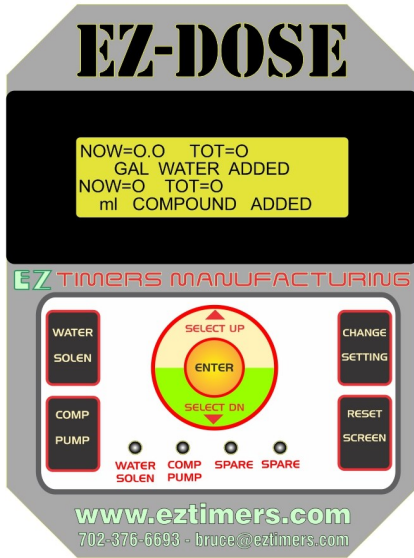
COMPOUND DOSING
PUMP ACTIVATED SCREEN

TOUCHING THE COMP PUMP BUTTON WILL ACTIVATE THE COMPOUND DOSING PUMP AND PUMP BOILER COMPOUND INTO THE RETURN TANK. MANUAL ADDITION OF COMPOUND IS NOT TRACKED AND IS GENERALLY USED TO PRIME THE COMPOUND DOSING PUMP.

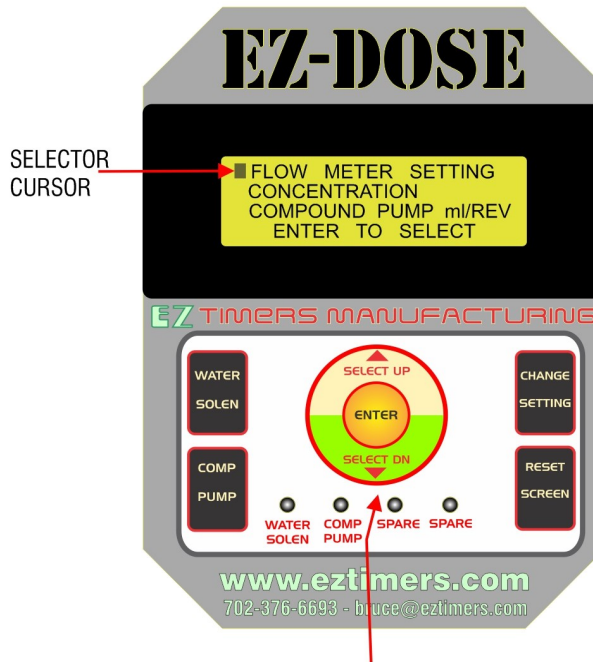


USING THE CHANGE SETTINGS BUTTON

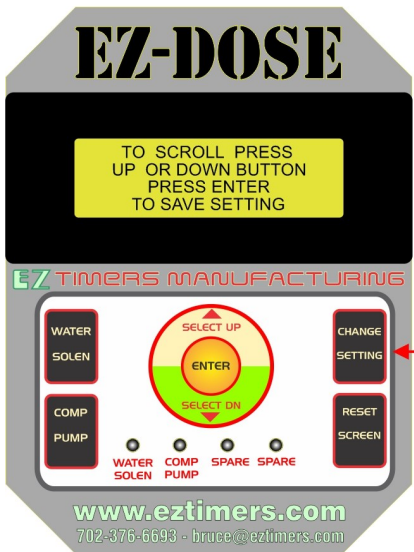
HOME SCREEN



SELECTOR SCREEN



SELECTOR INSTRUCTION SCREEN



STEP 1:
TOUCH BUTTON TO
ACTIVATE SETTINGS
SCREEN

STEP 2:

USE THE UP AND DOWN ARROWS ON THE SELECTOR COMPASS TO CHOOSE WHICH OPERATION SETTING YOU WANT TO CHANGE, CHOICES ARE:

1. THE NUMBER OF FLOW METER ROTATIONS PER GALLON OF WATER-THIS SETTING IS DETERMINED BY THE PARTICULAR FLOW METER BEING USED.
2. THE CONCENTRATION OF BOILER COMPOUND IN ml PER GALLON OF WATER-THIS SETTING WILL BE USED TO ADJUST FOR VARIATIONS IN WATER QUALITY AND BLOW DOWN FREQUENCY.
3. THE VOLUME OF COMPOUND ADDED FOR EACH REVOLUTION OF THE COMPOUND DOSING PUMP-THIS SETTING IS DETERMINED BY THE PARTICULAR DOSING PUMP BEING USED.

AFTER SELECTING AND SETTING THE DESIRED NUMBERS TOUCH THE ENTER SWITCH TO RECORD THE SETTING FOR FURTHER OPERATIONS.

STEP 3:

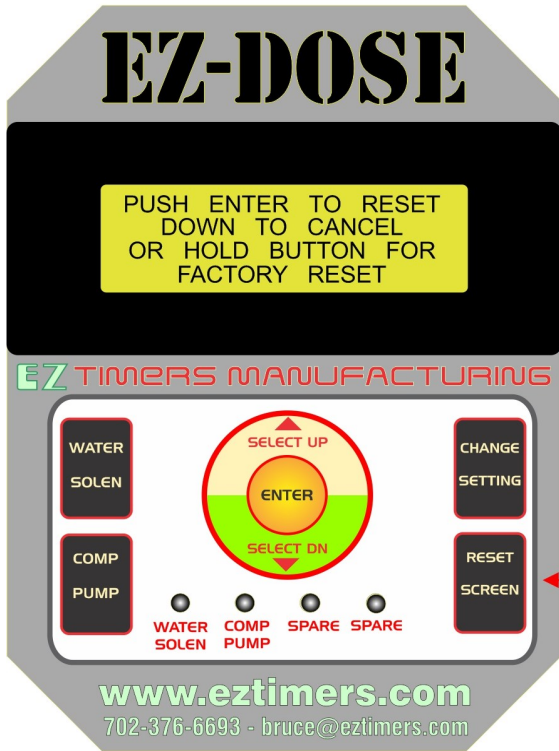
USE THE UP AND DOWN ARROWS ON THE SELECTOR COMPASS TO CHOOSE THE DESIRED NUMBER. THE SPEED AT WHICH THE NUMBERS CHANGE INCREASES AFTER THE BUTTON IS PRESSED FOR A FEW SECONDS. WHEN THE DESIRED NUMBER IS REACHED, PRESS THE ENTER BUTTON TO SAVE THE SETTING.

SETTINGS AT FACTORY SPECIFICATIONS

- FLOW METER SETTING=1704**
- CONCENTRATION=4.7**
- COMPOND PUMP= ml/REV**

SET FLOW METER TO 1704 REV PER GALLON

USING THE RESET BUTTON



RESET BUTTON-SCREEN OPERATIONS

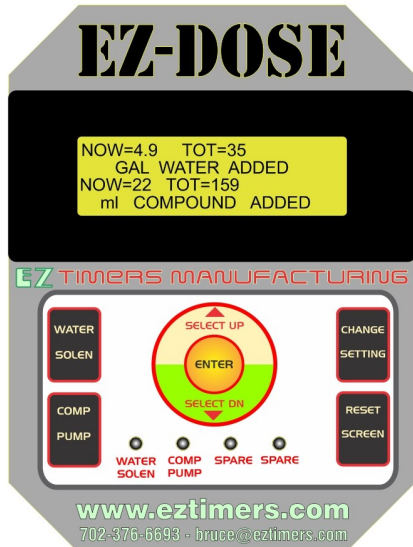
THE RESET BUTTON HAS TWO PURPOSES:

1. TO RESET THE HOME SCREEN DISPLAY OF WATER AND COMPOUND ADDED TO THE RETURN TANK TO ZERO, TOUCH THE RESET SCREEN BUTTON AND WHEN PROMPTED TOUCH THE ENTER BUTTON. IF YOU WANT TO CANCEL THE RESET OPERATION PRESS THE DOWN ARROW.
2. TO RESET SYSTEM SETTINGS TO THE ORIGINAL FACTORY SPECIFICATIONS **PRESS AND HOLD** THE RESET SCREEN BUTTON FOR ABOUT 5 SECONDS. THE LCD SCREEN WILL INDICATE WHEN THE SETTINGS HAVE BEEN RESET AND THE BUTTON CAN BE RELEASED.

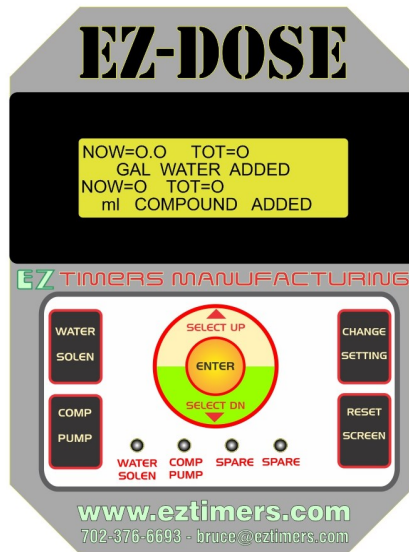
TOUCH TO RESET WATER AND COMPOUND VOLUMES DISPLAYED ON THE HOME SCREEN OR HOLD IN TO CHANGE ALL SETTINGS TO THE FACTORY SPECIFICATIONS.

SETTINGS AT FACTORY SPECIFICATIONS
FLOW METER SETTING= 1704
CONCENTRATION= 4.7
COMPOUND PUMP= ml/REV

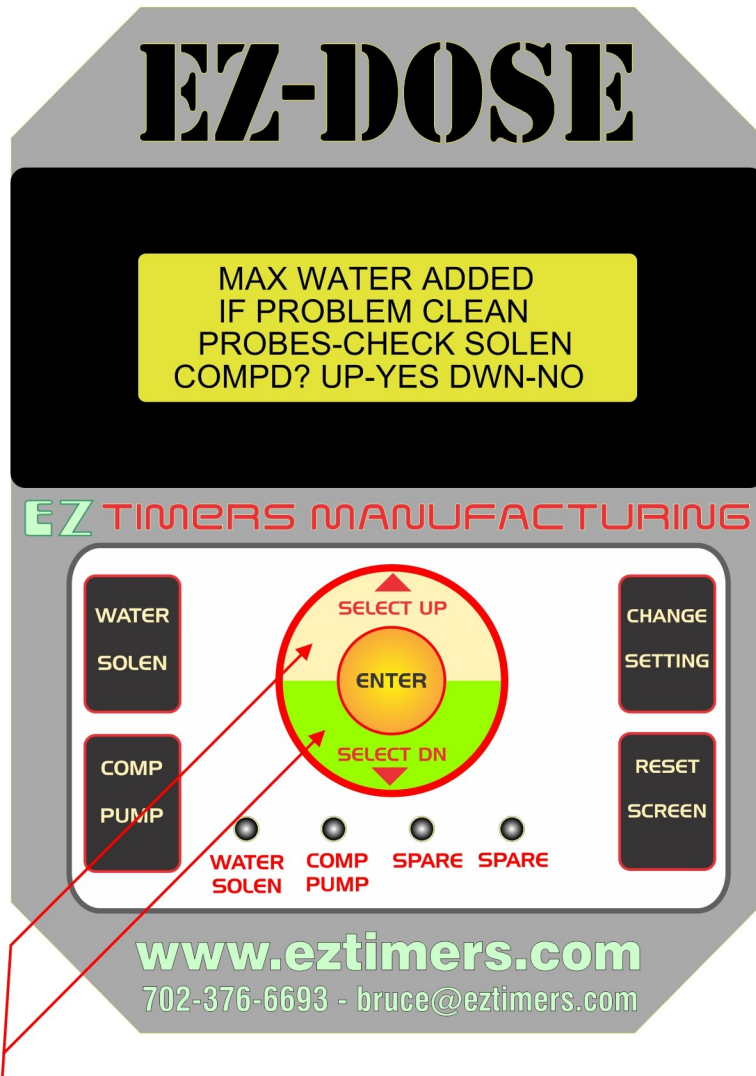
HOME SCREEN BEFORE RESET



HOME SCREEN AFTER RESET



USING THE ANTI-FLOODING FEATURE



SELECT UP ARROW TO
ADD BOILER COMPOUND
OR DOWN ARROW TO
SKIP THE BOILER
COMPOUND ADDITION

ANTI-FLOODING SCREEN OPERATIONS

THE EZ-DOSE HAS AN ANTI-FLOODING FEATURE, AFTER 50 GALLONS HAS FLOWED INTO THE RETURN TANK THE SOLENOID SHUTS OFF AND AWAITS INPUT FROM THE OPERATOR.

1. IF YOU ARE REFILLING AN EMPTY RETURN TANK, THERE IS NOT A PROBLEM AND YOU WANT TO ADD THE PROPER DOSE OF BOILER COMPOUND TOUCH THE UP ARROW AND THE DOSING PUMP WILL DISPENSE THE PROPER AMOUNT OF COMPOUND.
2. IF THERE IS A PROBLEM IN THE RETURN TANK LIKE A LEAK OR A DRAIN VALVE LEFT OPEN AND YOU DON'T WANT TO ADD COMPOUND, FIX THE PROBLEM THEN TOUCH THE DOWN ARROW AND THE FILL SEQUENCE WILL CONTINUE NORMALLY.
3. IF YOUR RETURN TANK IS LARGE AND REQUIRES MORE THAN FIFTY GALLONS TO FILL SELECT THE COMPOUND ADDITION CHOICE YOU DESIRE AND THE EZ-DOSE WILL JUST REPEAT THE PROCESS UNTIL THE TANK REACHES THE PROPER LEVEL AT WHICH TIME THE PROPER VOLUME OF BOILER COMPOUND WILL BE DISPENSED.