HW-JS6 Series

Instruction **Manual**

- HW-JS6

CONDUCTIVITY CONTROLLER
FOR CONDENSATE WATER

Supplied by:

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Note: On-going product development at Convergent Water Controls may lead to changes in the specifications of this product.

Warranty: This product is guaranteed for a period of 12 months from installation date. The warranty applies to manufacturing or component defects which may cause the unit to malfunction under specified conditions. The guarantee does not cover damage due to abuse, tampering or improper installation.

Disclaimer: Convergent Water Controls will not be held liable for any consequential damage or loss arising resulting from product malfunction.

TABLE OF CONTENTS

1. INTRODUCTION 1

2. INSTALLATION 1

2.1 Mounting the Controller 1
2.2 Electrical Wiring Information 1
2.3 Probe Installation & Maintenance 2
2.4 Adding Optional 4-20mA Card (ordering code AF09) 2

3. COMMISSIONING 4

3.1 Start-Up 4
3.2 Set UNITS 5
3.3 Set OPERATION 6
3.4 Calibration 7
3.5 Priming Pump / Testing Solenoid 7

4. PROGRAMMING STEPS IN DETAIL (BLEED CONTROLLER) 8

4.1 Set Conductivity Setpoint 8
4.2 Set HIGH Alarm 9
4.3 Set TIMER Alarm 10
4.4 Set Buzzer 11
4.5 Set Bleed Cycle 12

5. PROGRAMMING STEPS IN DETAIL (DOSING CONTROLLER) 13

5.1 Set Conductivity Setpoint 13
5.2 Set LOW Alarm 14
5.3 Set TIMER Alarm 15
5.4 Set Buzzer 16
5.5 Set Dose Cycle 17

6. FACTORY SETTINGS / PROGRAMMABLE OPTIONS 18

7. SPECIFICATIONS 18

1. INTRODUCTION

The HW-JS6 controller, normally used for TDS bleed control, is easy to set up and operate, and has built in features to warn the user should any part of the process fail. The instrument samples the condensate water continuously and when the TDS exceeds the user programmable SETPOINT, then the output is activated to lower the TDS.

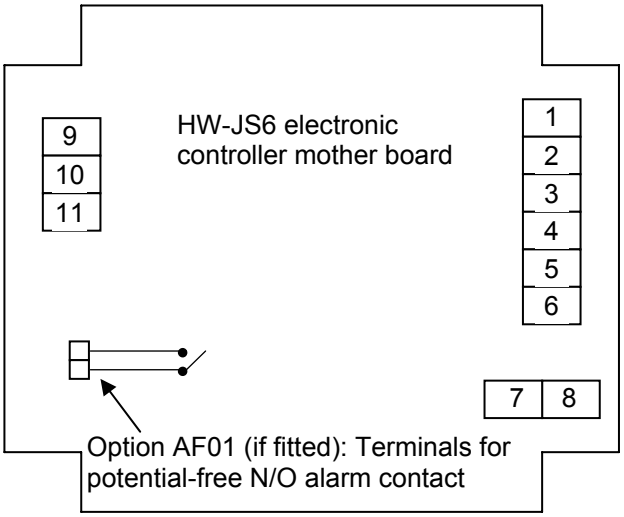
2. INSTALLATION

2.1 Mounting the Controller

1. Mount the controller on a flat vertical surface away from extreme heat, humidity or areas where temperature variation is extreme.
2. Mount the HW-JS6 such that the instrument is at eye-level to allow good visibility of the LCD display.

2.2 Electrical Wiring Information

The diagram below shows the motherboard of the controller, which is located below the processor board.



1. Active 240VAC supply
2. Neutral 240VAC supply

3. Auxiliary Active 240VAC supply
4. Auxiliary Neutral 240VAC supply

5. Active for output (solenoid or pump)
6. Neutral for output (solenoid or pump)

7. Common Earth
8. Common Earth

9. Probe PR+ (brown wire)
10. Probe PR- (yellow wire)
11. Probe CM+ (blue wire)

2.3 Probe Installation & Maintenance

The probe supplied should be screwed into a High Temperature Rated Tee piece such that the electrode tips are submerged in the water flowing through the Tee.

The probe's electrodes should periodically be cleaned to maintain accurate TDS measurements. The frequency of cleaning required will vary from one application to another. In a new installation, it is recommended that the probe be cleaned after 2 weeks of service.

To clean the probe, first unplug the probe lead and unscrew the probe from the manifold. The probe can normally be cleaned using a cloth or paper towel. Occasionally the probe's electrodes may be coated with certain substances which requires more vigorous cleaning (this coating may not always be visible).

After cleaning, apply more Teflon® tape to the probe thread and screw back into the manifold.

The controller should always be calibrated after probe cleaning.

2.4 Adding Optional 4-20mA Card (ordering code AF09)

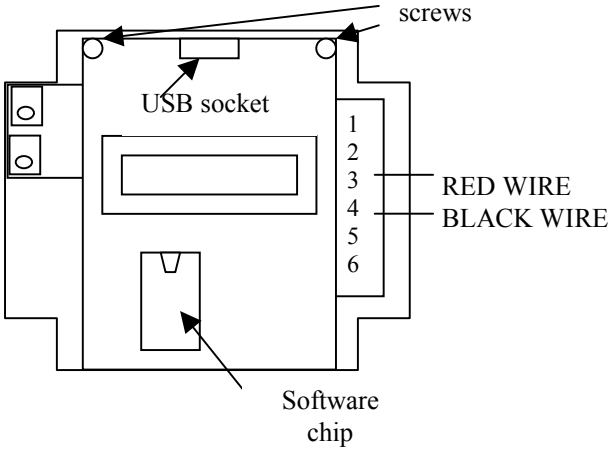
The HW-JS6 can be fitted with an optically isolated 4-20mA interface card to provide an output to a data logger, chart recorder or building management system. The interface card is an ordering option and can be retro-fitted to the HW-JS6, or can be supplied factory fitted.

The AF09 optional kit consists of the following:

1. Optically isolated 4 – 20mA card
2. Interconnecting communications cable.
3. 2 x 15mm metal spacers.

2.4 Adding Optional 4-20mA Card (continued)

You may skip this section if the card is factory fitted.



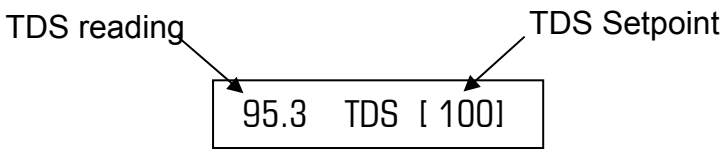
1. Make sure that the power is switched off and the controller is unplugged from mains power.
2. Remove cover of enclosure.
3. Locate the two screws as indicated in the diagram above and remove. Do not discard these screws.
4. Plug the interconnecting cable into the USB socket.
5. Screw the 2 metal spacers into space where the screws were removed.
6. Locate the two mounting holes on the interface card.
7. Use the screws removed in step 2 and fasten the card to the 2 metal spacers (installed in step 5).
8. Connect the RED wire of the interface card to terminal 3.
9. Connect the BLACK wire of the interface card to terminal 4.
10. Connect the +ve and –ve terminal of the 4-20mA card to your chart recorder, data logger or building management system. It is important to observe the correct polarity of these connections.
11. Replace cover of enclosure.
12. Plug into mains and switch on.

NOTE: The 4-20mA signal transmitted spans the conductivity range of 0 to twice the TDS setpoint. For instance, if the setpoint=100 TDS, 4-20mA spans the conductivity range: 0-200 TDS.

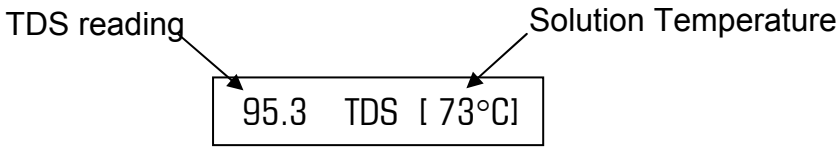
3. COMMISSIONING

3.1 Start-Up

After power-up, the HW-JS6 controller is ready to perform conductivity (TDS or μS) indication and control. All the relevant information is displayed on the LCD display as explained below.

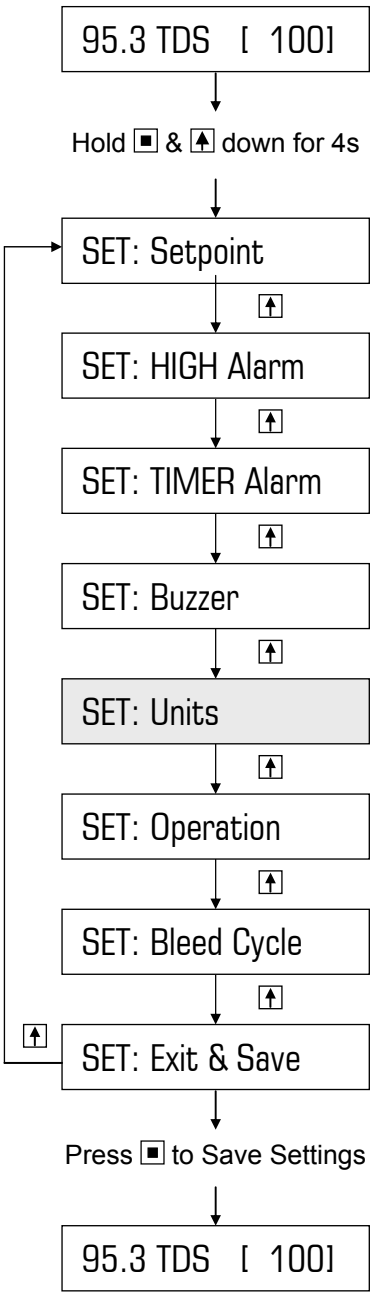


Which alternates with ..



Display **during normal operation**:	Measured TDS & TDS Setpoint alternating with measured TDS & solution temperature, as shown above.
Display **during programming**:	Programming information (eg. “SET: Setpoint”).
Display **if alarm is reported**:	Displays alarm activated, eg. “**Alarm !! [HIGH]**”

3.2 Set UNITS



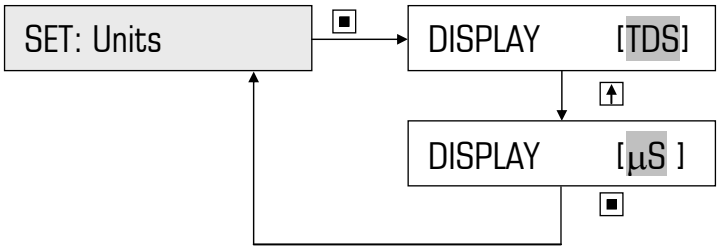
Conductivity can be displayed in either:

TDS (ie. Total Dissolved Solids), or
μS (ie. microsiemens)

The displayed units, ie. either TDS or μS should be selected before performing calibration and before programming conductivity setpoint.

To leave the display in TDS, ie. factory default setting, proceed to section 3.3.

Example:
Changing the factory default of TDS to μS



Item flashing on display:

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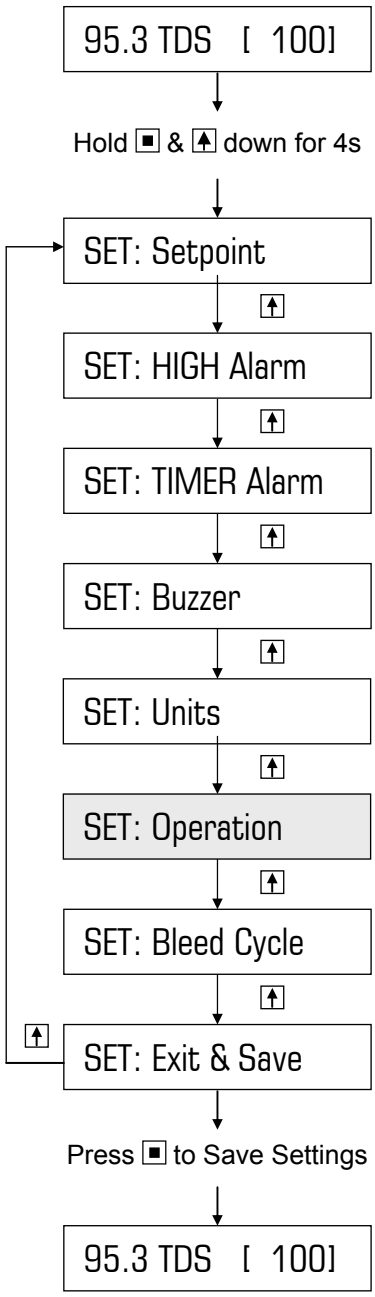
▣ Press to Select/Enter

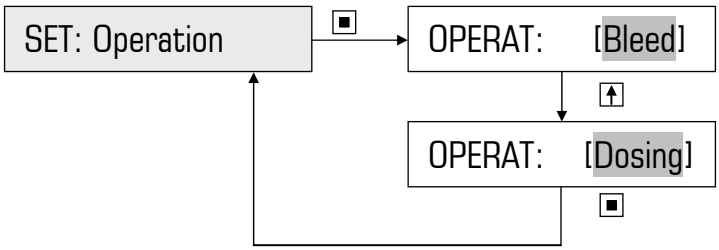
Note: Shading represents flashing

3.3 Set OPERATION



The HW-JS6 can be set to operate either as a bleed controller or as a dosing controller.

Example:
Changing the factory default of Bleed Controller to Dosing Controller



Item flashing on display:

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▣ Press to Select/Enter

Note: Shading represents flashing

3.4 Calibration

Take a sample of water close to the probe and measure the TDS with a hand-held conductivity meter. Should the TDS readout on the display differ from the sample taken, calibrate the controller as follows:

The following can be performed, BUT only by a qualified technician.

IMPORTANT: AS THE UNIT NEEDS TO BE POWERED, BE VERY CAREFUL NOT TO TOUCH ANY OF THE SCREW TERMINALS OR THE CIRCUIT BOARDS, AS THEY MAY BE LIVE, AND CAN RESULT IN ELECTRIC SHOCK, OR EVEN DEATH.

1. Remove the lid of the controller
2. Locate the trim potentiometer on the right-hand side of the processor board.
3. Slowly turn the potentiometer with an insulated miniature screwdriver until the desired reading is obtained.
4. Replace the lid of the controller, ensuring that the seal is in place and no wires are trapped between the lid and the base.

3.5 Priming Pump / Testing Solenoid

Press the SCROLL pushbutton ⍐ for at least 2 seconds. The display will read:

Testing Output …

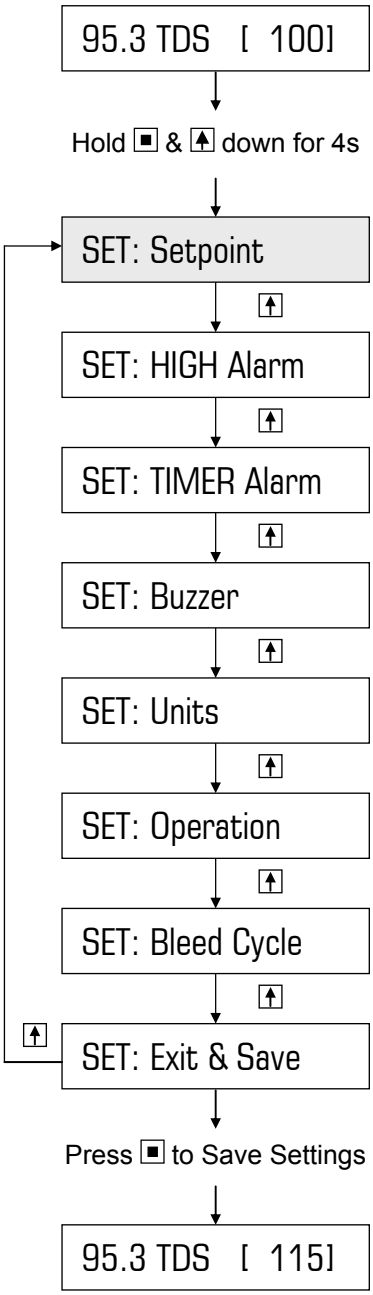
The solenoid or pump will activate for approximately 2 minutes before reverting to normal mode.

However, to stop testing before then, press SCROLL ⍐ again.

4. PROGRAMMING STEPS IN DETAIL (Bleed controller)

IMPORTANT: It is assumed that the HW-JS6 has been setup as a Bleed Controller. Section 5 outlines the programming steps where the HW-JS6 has been setup as a Dosing Controller.

4.1 Set Conductivity Setpoint

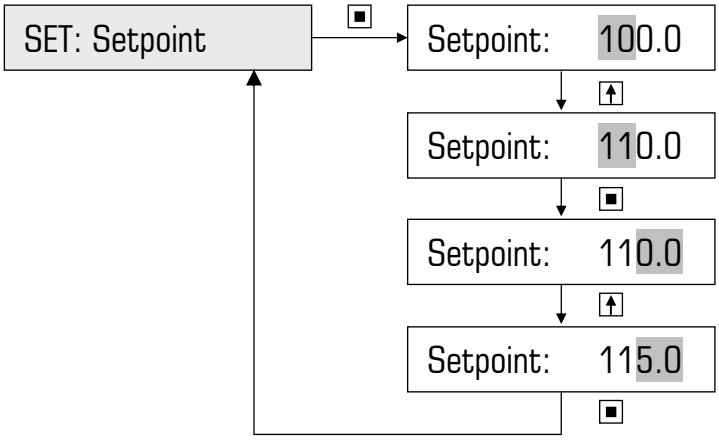


The programmed operation of the HW-JS6 is conductivity bleed control, ie. the solenoid opens (ie. bleeds) when the TDS rises above the setpoint. When this occurs, the system water is usually flushed to drain.

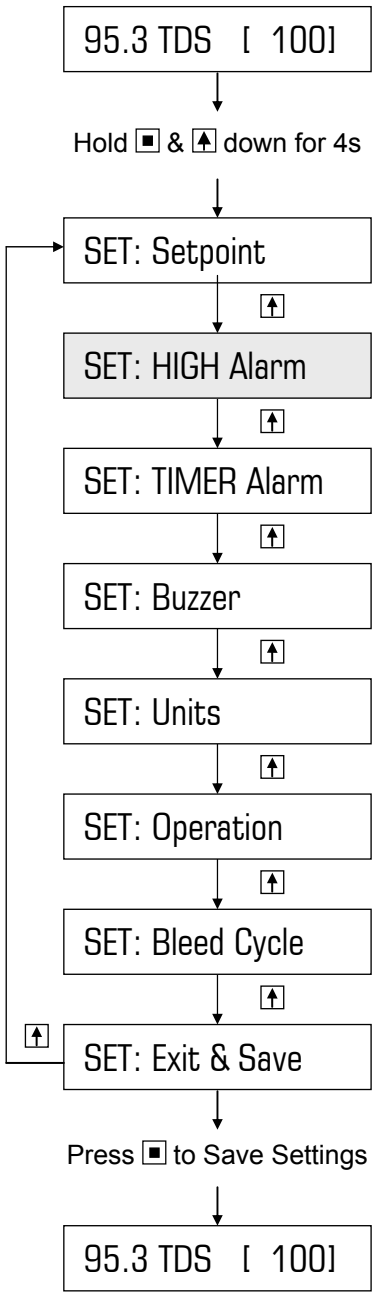
The setpoint is entered as an actual number (eg. 100.0 TDS).

The controller can be programmed to bleed continuously (ie. factory default), or on a duty cycle (as outlined in section 4.5), when the system TDS > setpoint.

Example:
Increasing factory default setpoint of 1000 TDS to a new setting of 1150 TDS



4.2 Set HIGH Alarm



Item flashing on display:

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▣ Press to Select/Enter

Note: Shading represents flashing

To leave the alarm in its disabled state, ie. factory default setting of 000.0, proceed to section 4.3.

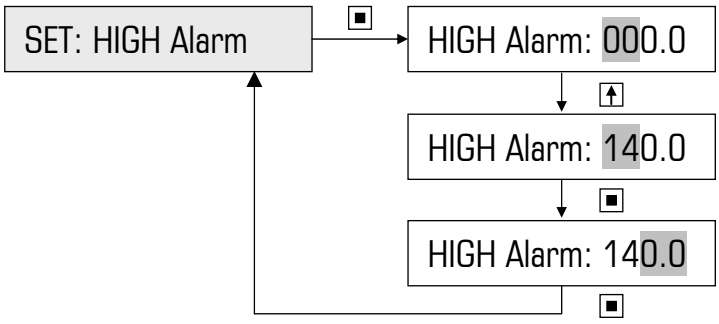
Enabling the alarm requires you to program a HIGH TDS value that is higher than the programmed setpoint.

If the TDS rises above the HIGH alarm level, the high alarm will be reported on the display and the alarm LED will illuminate. Furthermore, if enabled, the audible alarm buzzer will sound.

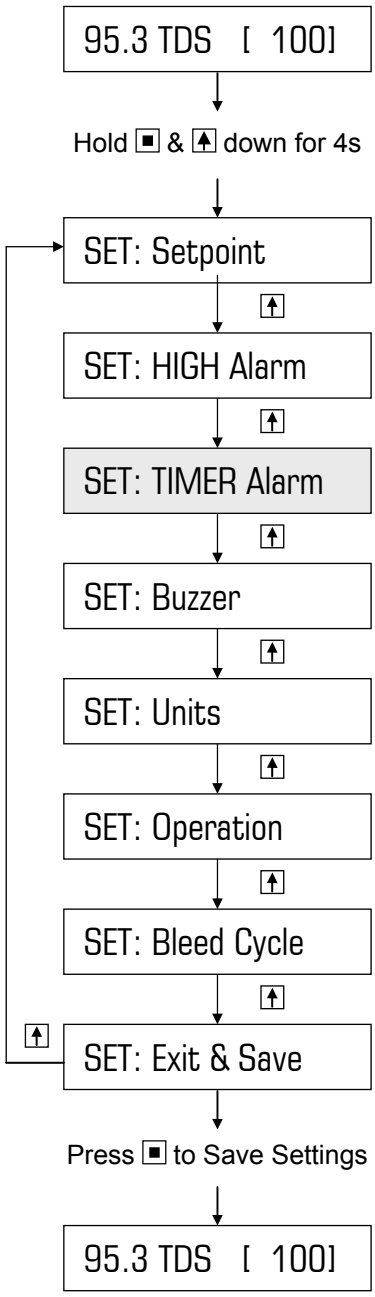
The HIGH alarm condition can be reset by pressing & holding the ENTER button (until the Alarm LED switches off) or will automatically cancel once the conductivity drops to a level below the HIGH alarm level.

When an alarm is reported, the display will alternate between the alarm and the normal display. For instance, if HIGH Alarm = 140.0 TDS, the display will alternate between "Alarm !! [HIGH]" and "145.6 TDS [100]", assuming 145.6 TDS is the measured conductivity.

Example:
Change factory default of 0000 to 140.0
(ie. alarm reported when conductivity > 140.0)



4.3 Set TIMER Alarm



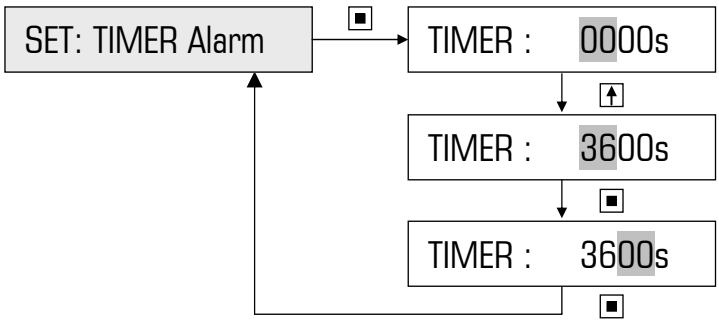
The TIMER alarm activates when the maximum permissible continuous bleed time is exceeded. This alarm is designed to protect the system from excessive bleeding as a result of a system fault or a faulty probe. The TIMER alarm prevents these excessive conditions.

To leave the alarm in its disabled state, ie. factory default setting of 0000s, proceed to section 4.4

If the TDS reaches the setpoint within the programmed time, the timer resets. However, if the timer times out before the TDS reaches the setpoint, the bleed solenoid switches off and is disabled until the unit is manually reset by holding down the ENTER button. Until then, the alarm will be reported on the display and the alarm LED will illuminate. Furthermore, if enabled, the audible alarm buzzer will sound.

When an alarm is reported, the display will alternate between the alarm and the normal display. For instance, the display will alternate between "Alarm !! [Timer]" & "113.7 TDS [100]", assuming the TDS reading from the probe is 113.7 TDS.

Example:
Factory default: 0000s (ie. alarm disabled)
Change to: 1 hour, ie. 3600s



Item flashing on display:

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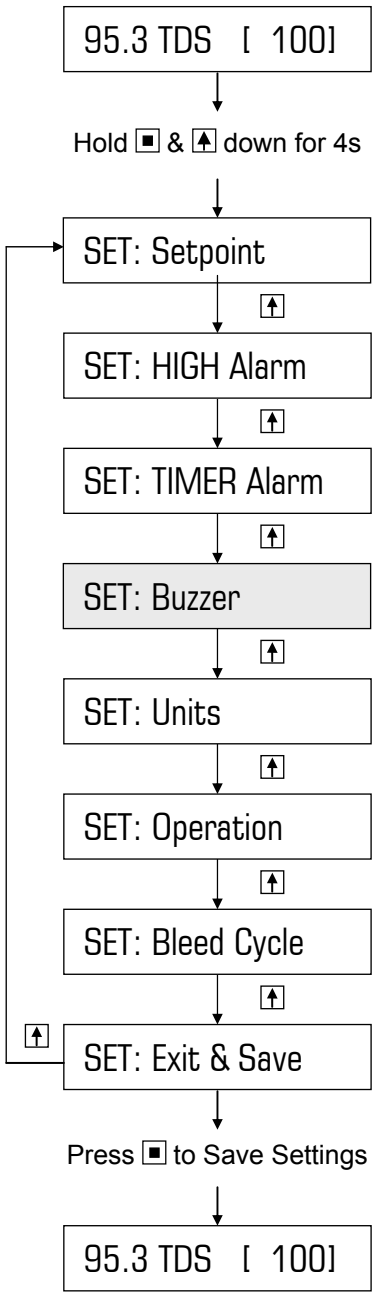
■ Press to Select/Enter

Note: Shading represents flashing

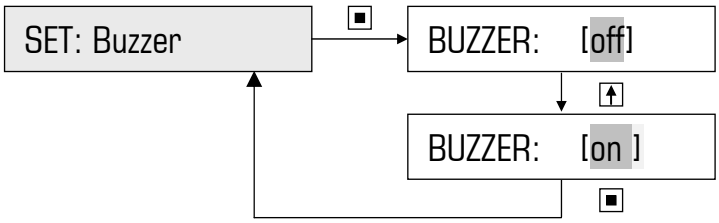
4.4 Set Buzzer



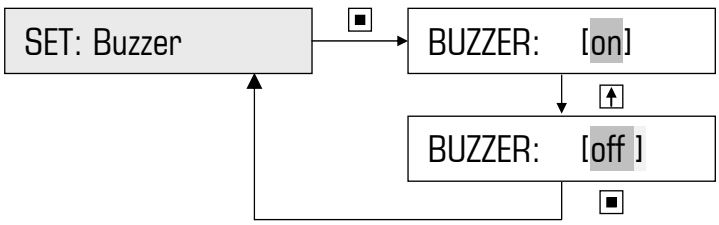
To leave the buzzer in its disabled state, ie. factory default setting of "OFF", proceed to section 4.5.

If the buzzer is enabled (ie. set to ON), the operator will be alerted by an audible noise when any of the alarms are activated.

Example 1 – enabling buzzer:
Changing factory default of Off to On



Example 2 - disabling buzzer:
Changing setting of On to Off.



Item flashing on display:

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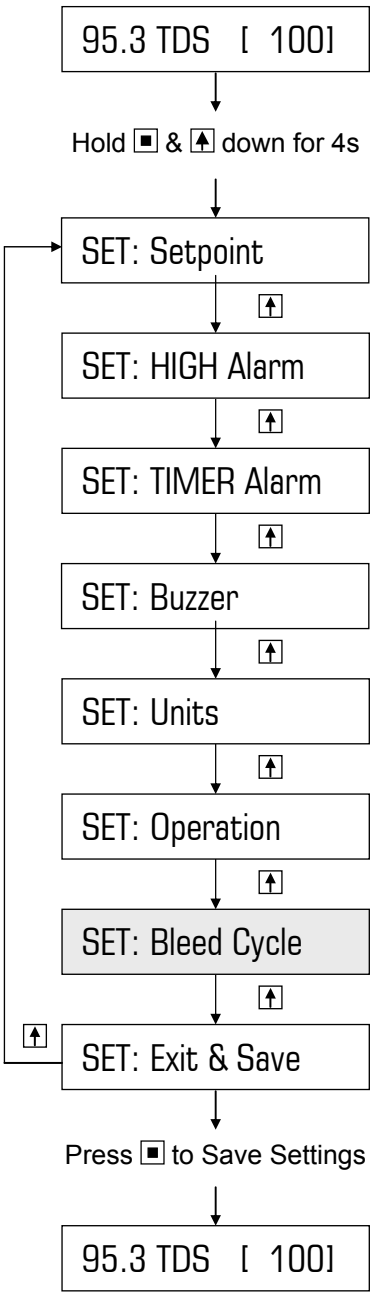
▣ Press to Select/Enter

Note: Shading represents flashing

4.5 Set Bleed Cycle



Item flashing on display:

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▣ Press to Select/Enter

Note: Shading represents flashing

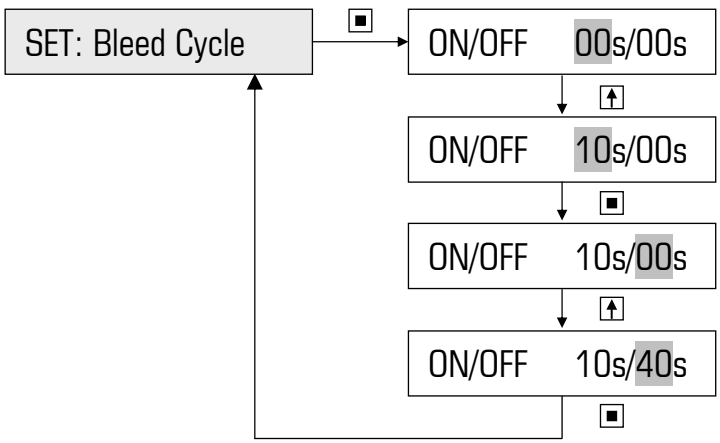
To leave the Bleed Cycle in its disabled state, exit from the main menu. This is the factory default setting of ON/OFF=00s/00s which means that the solenoid will bleed continuously when measured TDS > Setpoint. However, this may lead to excessive bleed.

To overcome this problem, as well as allowing the make-up to efficiently mix, the controller has two timers that regulate the duty of the bleed solenoid. These timers are the ON and OFF times of the BLEED CYCLE. Each ON time is followed by an OFF time and repeated until the measured TDS < setpoint. For instance, the timers can be programmed to operate the solenoid for say 10 seconds, and then allow 40 seconds for mixing time (ie. dilution), before the bleed is activated again. This action prevents excessive bleeding. In this example, the Bleed ON/OFF CYCLE would be set to 10s/40s. The solenoid would, hence, bleed for 10s every 50s (ie. 10s+40s) which equates to a 20% duty cycle.

Should the measured TDS rise more than 25% above the programmed SETPOINT, the controller doubles the ON time and halves the OFF time to bring the TDS within 25% of the setpoint very quickly. As soon as the measured TDS comes back to within 25% of the SETPOINT, normal bleed duty cycle (ie. programmed ON/OFF times) will resume.

Example:

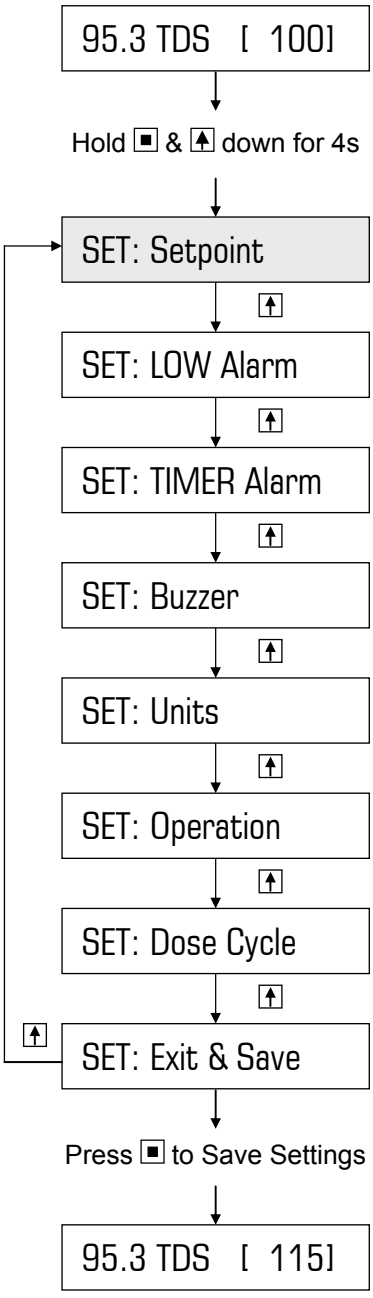
Factory default:	00s/00s (ie. bleed solenoid activated continuously when TDS > TDS setpoint).
Change to:	10s/40s (ie. 20% duty cycle), calculated as 10/(10+40).



5. PROGRAMMING STEPS IN DETAIL (Dosing controller)

IMPORTANT: It is assumed that the HW-JS6 has been setup as a Dosing Controller. Section 4 outlines the programming steps where the HW-JS6 has been setup as a Bleed Controller.

5.1 Set Conductivity Setpoint

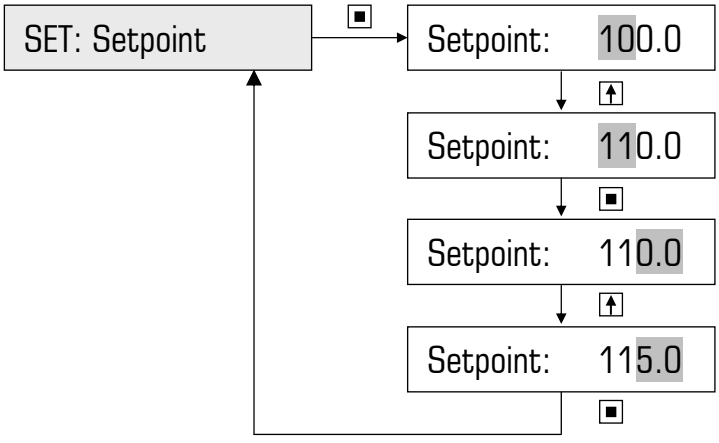


The programmed operation of the HW-JS6 is conductivity dosing control, ie. the pump doses when the TDS drops below the setpoint. When this occurs, chemical is dosed into the system, thus increasing the conductivity of the system.

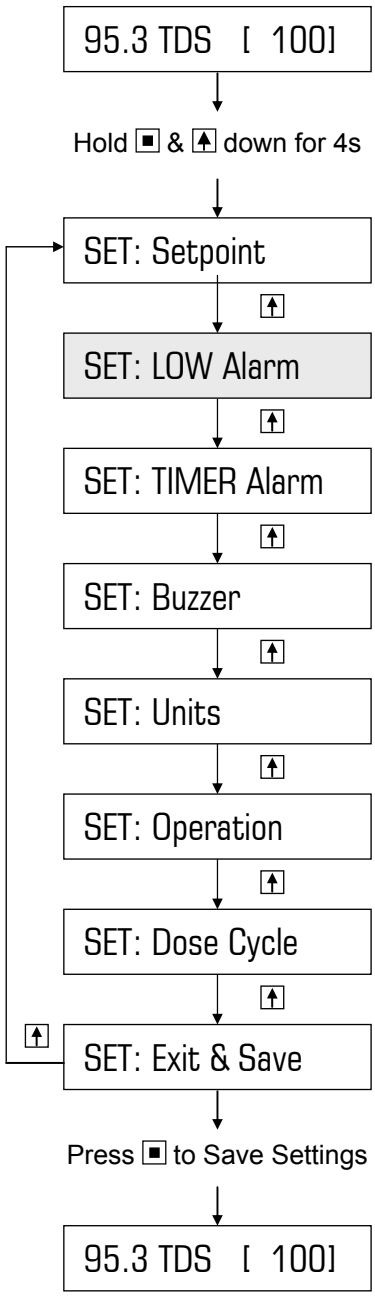
The setpoint is entered as an actual number (eg. 100.0 TDS).

The controller can be programmed to dose continuously (ie. factory default), or on a duty cycle (as outlined in section 5.5), when the measured TDS < setpoint.

Example:
Increasing factory default setpoint of 100 TDS to a new setting of 115 TDS



5.2 Set LOW Alarm



To leave the alarm in its disabled state, ie. factory default setting of 000.0, proceed to section 5.3.

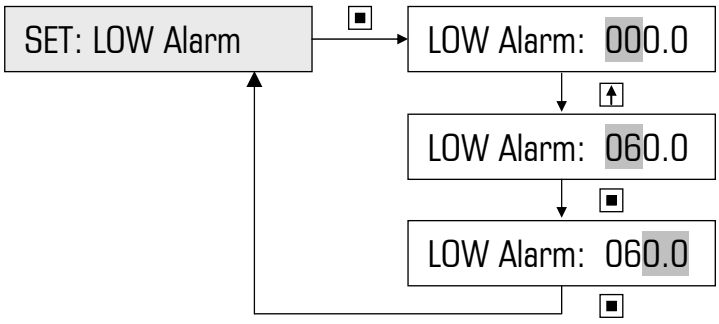
Enabling the alarm requires you to program a LOW TDS value that is lower than the programmed setpoint.

If the TDS drops below the LOW alarm level, the low alarm will be reported on the display and the alarm LED will illuminate. Furthermore, if enabled, the audible alarm buzzer will sound.

The LOW alarm condition can be reset by pressing & holding the ENTER button (until the Alarm LED switches off) or will automatically cancel once the conductivity rises to a level above the LOW alarm level.

When an alarm is reported, the display will alternate between the alarm and the normal display. For instance, if LOW Alarm = 60.0 TDS, the display will alternate between "Alarm !! [LOW]" and "55.7 TDS [100]", assuming 55.7 TDS is the measured conductivity.

Example:
Change factory default of 000.0 to 60.0
(ie. alarm reported when conductivity < 60.0)



Item flashing on display:

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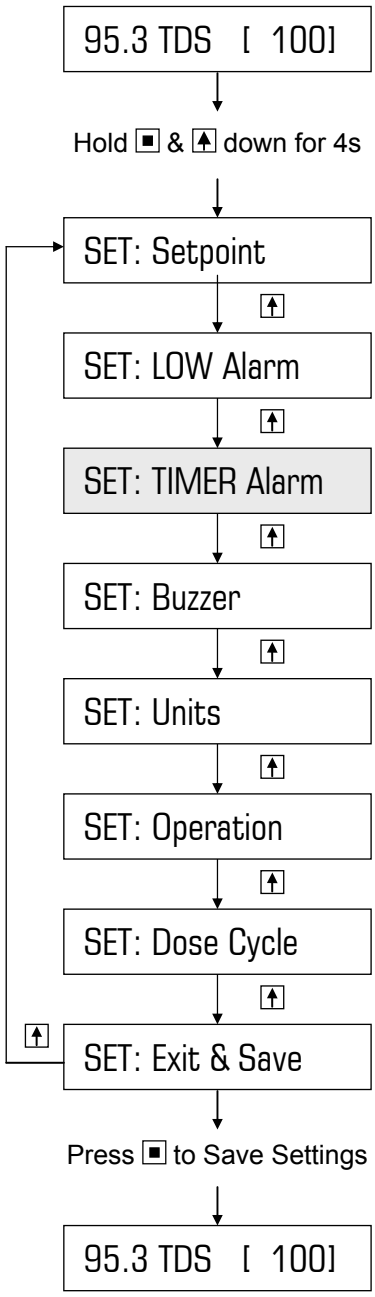
Note: Shading represents flashing

5.3 Set TIMER Alarm



Item flashing on display:

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▣ Press to Select/Enter

Note: Shading represents flashing

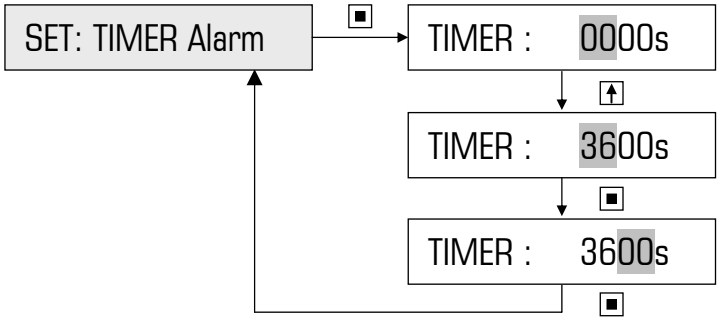
The TIMER alarm activates when the maximum permissible continuous dosing time is exceeded. This alarm is designed to protect the system from excessive overdosing. For instance, a faulty TDS probe may read a low TDS when in fact the TDS is high, and the pump will continue to dose indefinitely. The TIMER alarm prevents these excessive conditions.

To leave the alarm in its disabled state, ie. factory default setting of 0000s, proceed to section 5.4

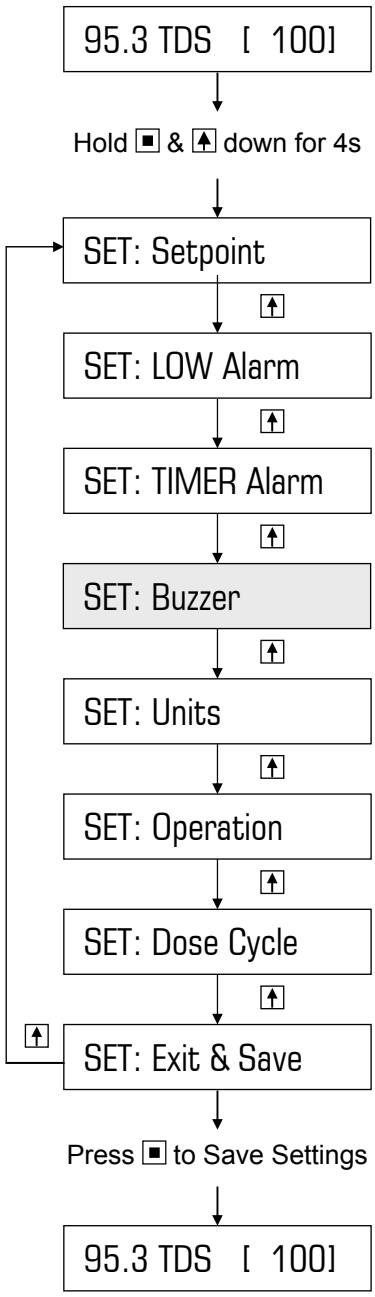
If the TDS reaches the setpoint within the programmed time, the timer resets. However, if the timer times out before the TDS reaches the setpoint, the pump switches off and is disabled until the unit is manually reset by holding down the ENTER button. Until then, the alarm will be reported on the display and the alarm LED will illuminate. Furthermore, if enabled, the audible alarm buzzer will sound.

When an alarm is reported, the display will alternate between the alarm and the normal display. For instance, the display will alternate between "Alarm !! [Timer]" & "73.5 TDS [100]", assuming the TDS reading from the probe is 73.5 TDS.

Example:
Factory default: 0000s (ie. alarm disabled)
Change to: 1 hour, ie. 3600s



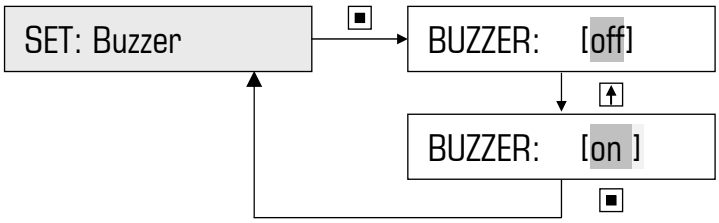
5.4 Set Buzzer



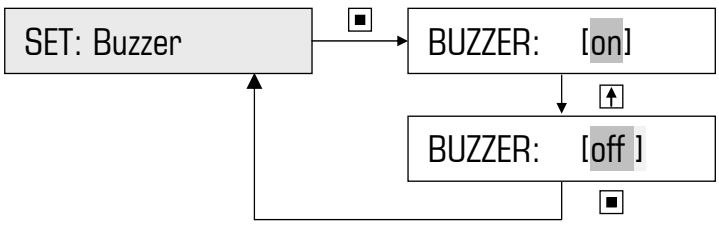
To leave the buzzer in its disabled state, ie. factory default setting of "OFF", proceed to section 5.5.

If the buzzer is enabled (ie. set to ON), the operator will be alerted by an audible noise when any of the alarms are activated.

Example 1 – enabling buzzer:
Changing factory default of Off to On



Example 2 - disabling buzzer:
Changing setting of On to Off.



Item flashing on display:

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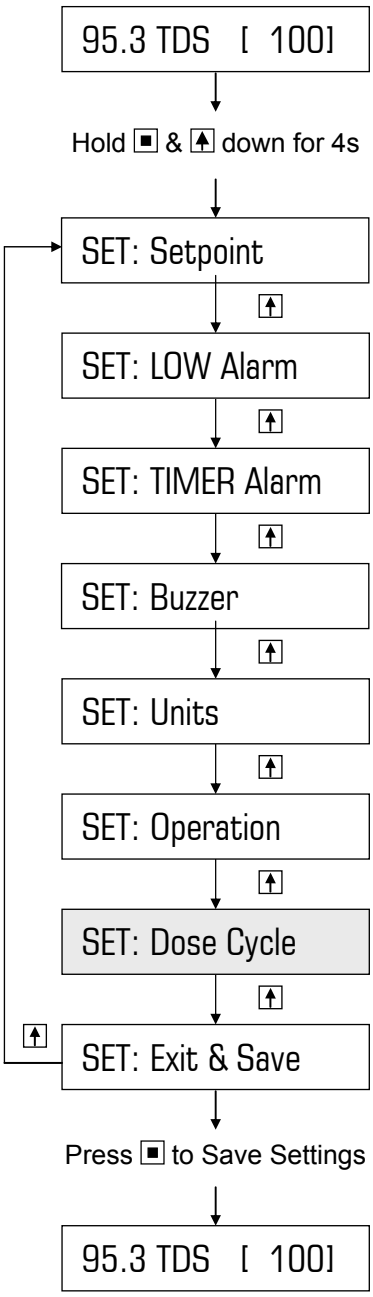
■ Press to Select/Enter

Note: Shading represents flashing

5.5 Set Dose Cycle



Item flashing on display:

▲ Press to Scroll
▣ Press to Select/Enter

Note: Shading represents flashing

To leave the Dose Cycle in its disabled state, exit from the main menu. This is the factory default setting of ON/OFF=00s/00s which means that the dosing pump will dose continuously when measured TDS < Setpoint.

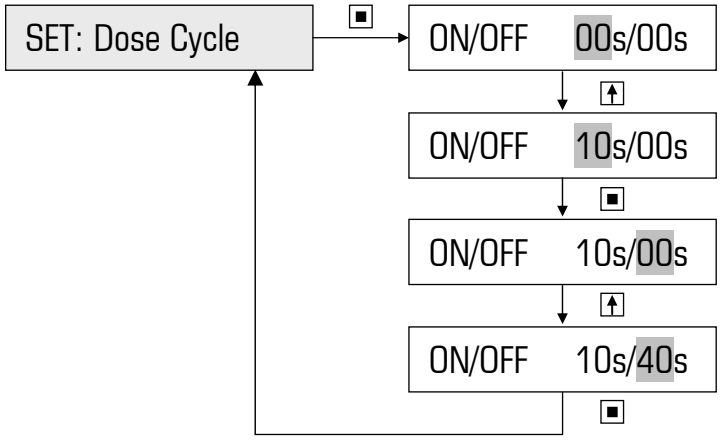
However, when a chemical product is dosed for TDS correction, some time is required for agents to react. Depending upon the location of the dosing point and the volume of water in the system, it may take some time before the chemicals reach the conductivity probe. If the response is slow, overdosing can occur due to the delay between dosing and measurement.

To overcome this problem, the controller has two timers that regulate the duty of the dosing pump. These timers are the ON and OFF times of the DOSE CYCLE. Each ON time is followed by an OFF time and repeated until the setpoint is reached. For instance, the timers can be programmed to operate the pump for say 10 seconds, and then allow 40 seconds for reaction time, before the pump is activated again. This action prevents overdosing. In this example, the DOSE ON/OFF CYCLE would be set to 10s/40s. The pump would, hence, dose for 10s every 50s (ie. 10s+40s) which equates to a 20% duty cycle.

Should the measured TDS drop to less than 25% below the programmed SETPOINT the controller doubles the ON time and halves the OFF time to bring the TDS within 25% of the setpoint very quickly. As soon as the measured TDS increases to within 25% of the SETPOINT, normal pump duty cycle (ie. programmed ON/OFF times) will resume.

Example:

Factory default:	00s/00s (ie. pump doses continuously when TDS < TDS setpoint).
Change to:	10s/40s (ie. 20% duty cycle)



6. FACTORY SETTINGS / PROGRAMMABLE OPTIONS

Item	Factory Setting	Option	Note
Setpoint	100.0 TDS	1– 999.9 μS/TDS	Determine the desired system TDS/μS
High Alarm/ Low Alarm	000.0 TDS	0– 999.9 μS/TDS	0000 = alarm disabled Otherwise HIGH alarm setting must be greater than Setpoint / LOW alarm setting must be less than Setpoint
Timer Alarm	0000 sec	0 – 9999 sec	0000 = alarm disabled
Buzzer	Off	Off or On	Audible when alarms activate if set to on.
Units	TDS	TDS or μS	Must be set before calibrating & programming
Operation	Bleed	Bleed / Dosing	
Bleed/Dose Cycle	00s/00s	ON = 0-99 sec OFF = 0-99 sec	00s/00s = continuous bleed / continuous dosing

7. SPECIFICATIONS

Power Supply:	220 – 240 VAC
Inputs:	Conductivity Probe supplied (DCON-P10FS) Flow switch (Option AF04)
Standard Outputs:	240VAC applied to Solenoid/Pump Output (5A max). Volt free contact available on request.
Optional Outputs:	AF01: Potential–free relay N/O contact for alarms AF09: Isolated 4-20mA card to remotely monitor conductivity level
Measured TDS Resolution:	0.1 TDS / μS
Hysteresis:	6%
LED Indication:	Power ON, Solenoid/Pump Operate, Alarm
Controller Enclosure rating:	IP55 (ie. completely weatherproof)
Operating Temperature:	0 - 50°C
Memory backup:	EEPROM. Data retention of 10 years min.
Probe material:	Body: PP, Electrodes: Stainless Steel
Max Probe Temperature:	95°C
Probe thread size	¾" BSP