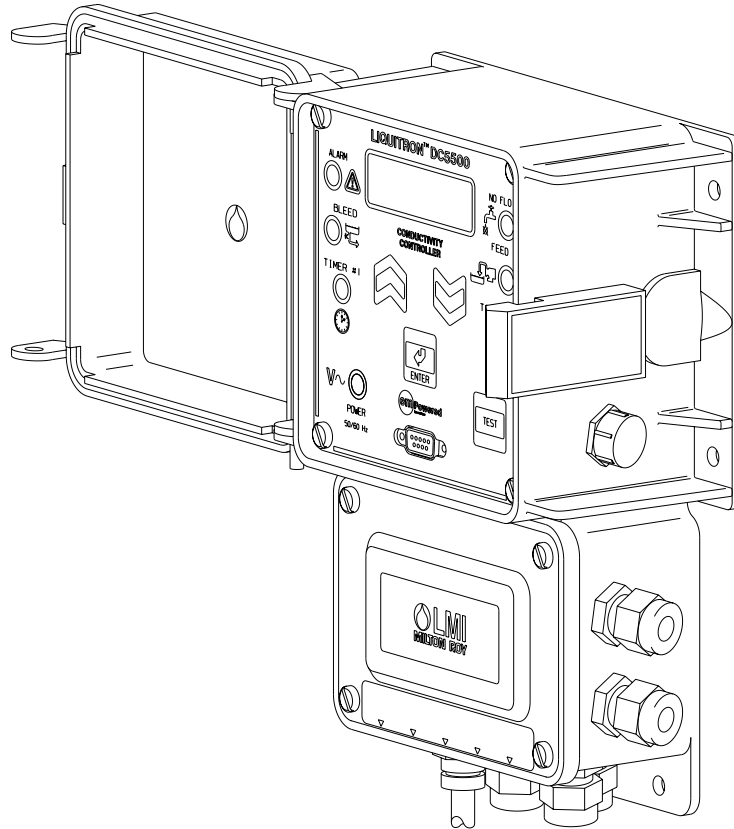


Instruction Manual

Liquitron™ DC5500 Series



For file reference, please record the following data:

Model No: _____

Serial No: _____

Installation Date: _____

Installation Location: _____

When ordering replacement parts for your LMI Controller or accessory, please include the complete Model Number and Serial Number of your unit.



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1.0 Introduction

The DC5500 is a microprocessor-based conductivity controller. It is designed for use in a variety of water treatment applications requiring precise control of totally dissolved solids and chemical feed. Among its many uses, the DC5500 will control conductivity and chemical feed in cooling towers and closed loop systems.

LMI's DC5500 conductivity controller allows the greatest programming flexibility for cooling tower system applications. This is accomplished through the use of an extensive options menu that is easy to use.

BLEED or BLOWDOWN of system water by valve control is based on several setpoint factors:

- Conductivity setpoint
- Hysteresis (deadband) to avoid valve operation chattering
- Rising or Falling conductivity trip points

FEED of chemical (inhibitor) can be based on four (4) different methods and the pump control can be either On/Off or pulse:

- FEED at the same time system BLEEDS (lockout timer limits maximum FEED time)
- FEED time calculated as a percentage of total BLEED time
- FEED based on a timed cycle (pump is on for a percentage of this timed cycle)
- FEED based on flow meter pulse input

DUAL BIOCIDES chemical addition may be accomplished by the use of two (2) individually programmable relays or optocoupler outputs. These outputs provide control of two individual chemical metering pumps based on the following options:

- On/Off or pulse type pump control
- 28-DAY programmable timer (1, 2, 3, or 4 week selectable cycle)

ALARM indicators and relay outputs are energized based on the following conditions:

- THREE tank level input setpoints
- HIGH conductivity set point is reached
- LOW conductivity setpoint is reached
- NO FLOW condition exists (flow switch must be installed)

The display is a 32-character, two line backlit LCD (liquid crystal display) which is visible in all light conditions. A three-key position membrane is used to enter data and settings (see Figure 1).

The conductivity range is 0 - 20,000 μ Siemens. The units can be either μ Siemens or PPM/TDS (total dissolved solids).

- A Test/Calibration push button is accessible from the front panel

All setpoints and parameter settings are retained permanently in a special nonvolatile computer chip memory, preventing their loss due to a power outage. This nonvolatile memory chip allows the unit to be programmed before installation. Fifteen seconds of power is required after program change to retain new values. No battery powered backup is required.

Built in test circuits are provided to test each individual relay output wiring and to allow for quick field service isolation of faulty probe, circuit cards, pumps, or solenoids for ease of troubleshooting.

A display for temperature is also provided. The range is 32° F to 158° F [0° C to 68° C]. The display can be either fahrenheit or centigrade. This reading also provides the basis for temperature compensation which is performed in all modes.

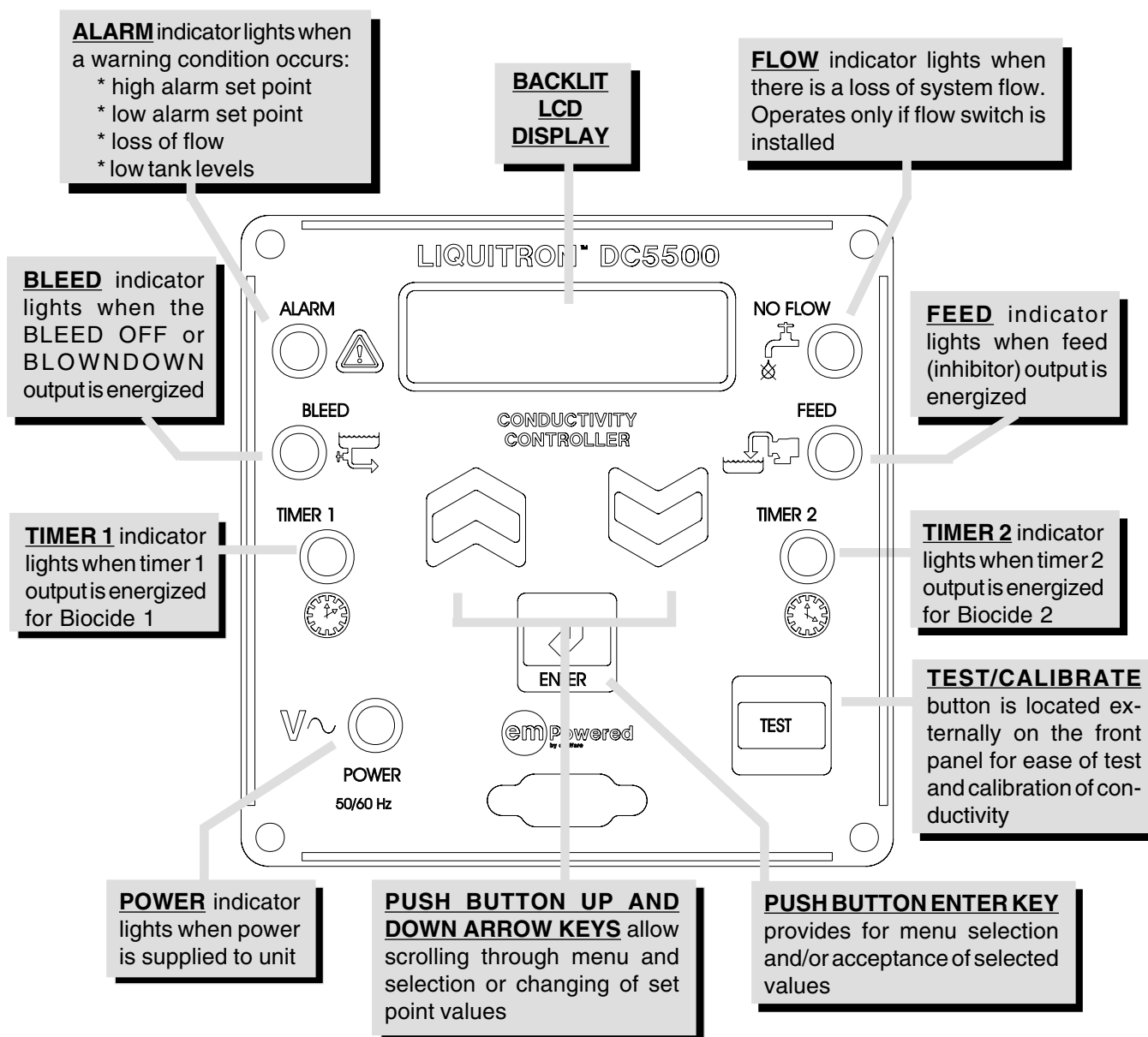


Figure 1

An analog data (or control) output is provided. This is a non-isolated 4 - 20 mA signal. The conductivity reading that corresponds to minimum and maximum analog signals is fully adjustable. This signal can be used to power chart recorders or other pumps and devices. If an isolated 4-20 mA output is required, contact your LMI distributor for a signal isolator.

The controller operates in two (2) distinct modes, 'SYSTEM RUN' and 'SYSTEM START-UP' or 'PROGRAMMING MODE'. The unit will be in the 'SYSTEM RUN' mode when it is first turned on. The various program screen menus are used to calibrate the unit, set the control and alarm points, set the inhibitor feed operating parameters, program the biocide [two (2) chemical metering] pumps, and manually test the relays and wiring connections.

In the 'SYSTEM RUN' mode the DC5500 monitors the conductivity and activates the appropriate control or alarm relay as necessary based on the set points entered in the 'SYSTEM START-UP' mode.

The DC5500 is packaged in a NEMA 12X, flame-retardant, molded TPE enclosure. When ordered, 115 VAC units come fully wired to include input power cord and relay output pigtails to allow for simple installation. The unit can be hardwired through conduit to the lower junction box portion of the enclosure when required. Hard wiring makes the unit suitable for NEMA 4X applications.

2.0 Installation

2.1 Mounting the Controller Enclosure

The DC5500 conductivity controller is supplied with integral wall-mounting flanges. It should be mounted with the display at eye level on a vibration free surface. All accessible mounting holes should be utilized. The maximum allowable ambient temperature is 122° F [50° C]. This should be considered if installation is in a high-temperature location. Once the DC5500 is wall mounted, the metering pumps may be located at any distance from the controller. The conductivity probe should be placed as close to the controller as possible, to a maximum distance of 300 ft [91 m]. Under 25 ft [7.6 m] is recommended. Over 25 ft [7.6 m], the cable may need to be isolated or shielded from background electrical noise.

2.2 Enclosure Mounting Dimensions

When using the prewired unit, the enclosure is configured as NEMA 12X. If the unit is connected through watertight conduit, the enclosure is configured as NEMA 4X.

The following clearances should be observed for proper mounting (see Figures 2 and 3).

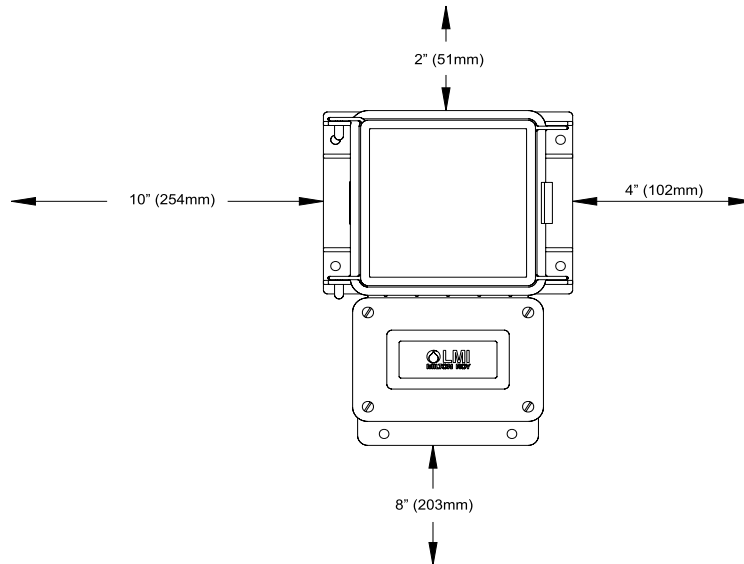


Figure 2

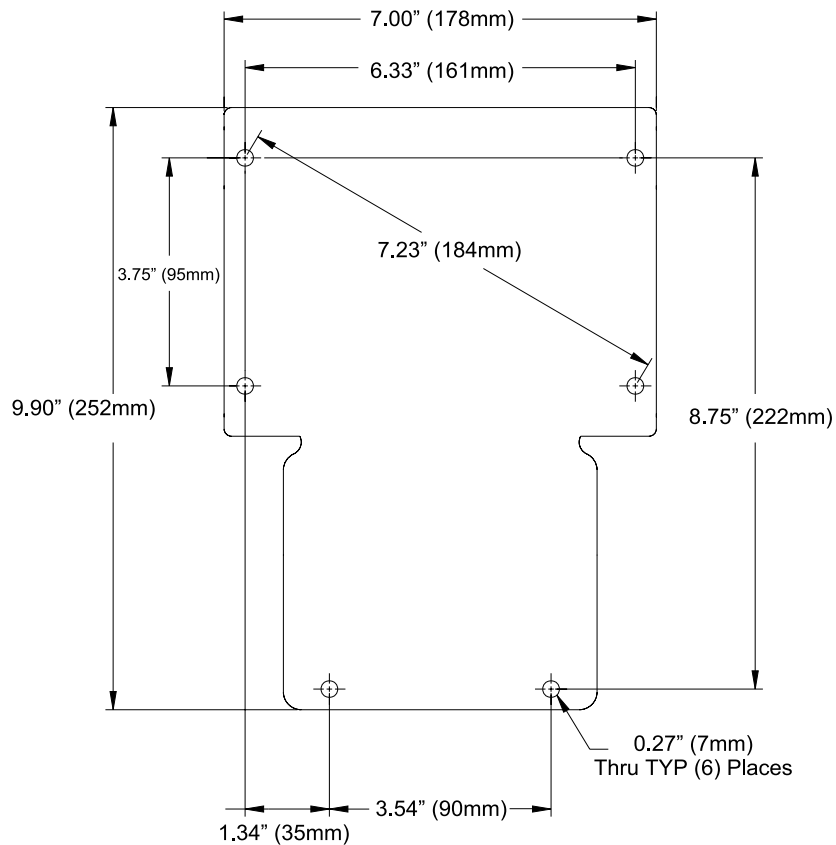


Figure 3

2.3 Electrical Wiring Information



To reduce the risk of electrical shock, the controller must be plugged into a grounded outlet with ratings conforming to the specifications on the data nameplate. It must be connected to a viable ground circuit. DO NOT USE ADAPTERS (see Figure 4)! All wiring must conform to required electrical codes.

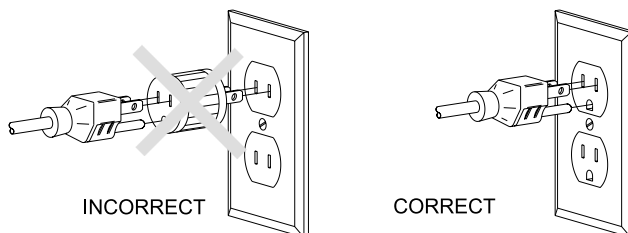


Figure 4

The DC5500 conductivity controller is available in either 115 or 230 VAC 50/60 Hz. The 115 VAC version is supplied with one (1) 6-foot grounded AC power cord and four (4) 12-inch output pigtails for plug-in connection of controlled devices.

A four-pin connector is provided for the temperature compensated conductivity probe.



The DC5500 controller is provided with a voltage selector switch to allow the unit to be used with a 115 VAC or 230 VAC power source. To change the voltage selection, disconnect the unit from the power source and remove the front keypad panel. The selector switch is located on the circuit board attached to the back panel. When switching voltages ensure that power cord and pigtails are appropriately changed.

2.4 Terminal Strip Layout

To access the wiring connections inside of the conductivity controller:

1. Disconnect the unit from electrical power.
2. Remove the four (4) screws and the junction box cover on the lower half of the unit.
3. Consult the specific instructions below for the connections required.

AC Power Input

| | |
|----------|-------|
| Hot: | TB2-1 |
| Neutral: | TB2-3 |
| Ground: | TB4-4 |

Bleed Blowdown Control Relay Output

| | |
|-------------|-------|
| Hot (N.O.): | TB5-1 |
| Hot (N.C.): | TB5-2 |
| Neutral: | TB1-3 |
| Ground: | TB4-3 |

Feed Output

| | |
|---------------|-------|
| <u>On/Off</u> | |
| Hot: | TB6-1 |
| Neutral: | TB1-1 |
| Ground: | TB4-1 |

| | |
|---------------------|-------|
| <u>Pulse Output</u> | |
| High: (+) | TB9-3 |
| Low: (-) | TB9-4 |

Alarm Output

| | |
|----------|-------|
| Hot: | TB6-2 |
| Neutral: | TB1-4 |
| Ground: | TB5-4 |

4 - 20 mA Output

| | |
|-------|-------|
| (+) | TB9-1 |
| (-) | TB9-2 |

Biocide #1 Pump Output

On/Off

| | |
|----------|-------|
| Hot: | TB6-3 |
| Neutral: | TB2-4 |
| Ground: | TB3-4 |

Pulse Output

| | |
|-------------|-------|
| High: (+) | TB8-1 |
| Low: (-) | TB8-2 |

Biocide #2 Pump Output

On/Off

| | |
|----------|-------|
| Hot: | TB6-4 |
| Neutral: | TB2-3 |
| Ground: | TB3-3 |

Pulse Output

| | |
|-------------|-------|
| High: (+) | TB8-3 |
| Low: (-) | TB8-4 |

Flowmeter Input

The inputs are reversible on a two wire, reed switch type flowmeter which has no polarity.

| | |
|---------|--------------|
| F/MTR1: | TB10-1 (+) |
| | TB10-2 (-) |

| | |
|---------|-------------|
| F/MTR2: | TB7-4 (+) |
| | TB7-3 (-) |

When using a three wire, hall effect type flowmeter, use the 5V+ provided on the terminal strip for the loop power. Then use the terminals for the desired flowmeter for the trigger wires. These are polarity sensitive.

| | |
|------|--------|
| 5V+: | TB11-2 |
|------|--------|

Flow Switch Input

This input can be used to connect a flow switch or other device providing a switch closure output. If a device such as this is connected to the DC5500, it will serve to disable the controller outputs when this switch is in the “OPEN” position.

This function can be used as a safety override to prevent controller/pump operation during loss of flow.

The inputs are reversible since the flow switch connection has no polarity.

TB10-3

TB10-4

Tank Level Sensor Connections



DGND refers to any of the following I/O board connections.

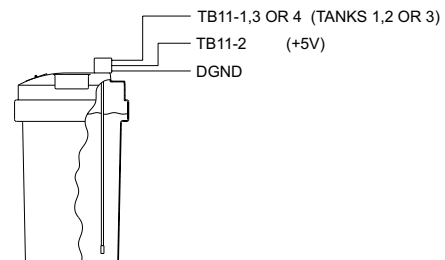
TB7-3, TB10-2, TB10-4

Tank Level Input

Tank 1 Level

Input - TB11-4

0-5V



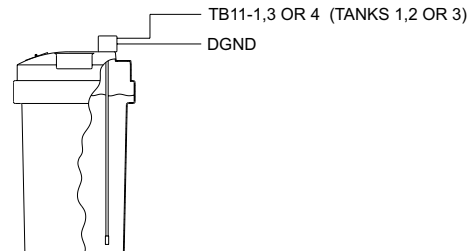
Tank 2 Level

Input - TB11-3

Tank 3 Level

Input - TB11-1

4-20mA



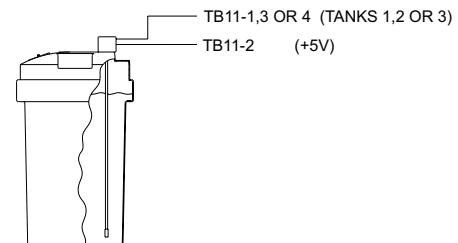
Digital Grounds

TB7-3

TB10-2

TB10-4

Switch Closure



The use of a digital ground is needed when utilizing the 0-5VDC or 4-20 mA tank level option. It is a multi-purpose terminal that completes the current loop for the tank input. They are shared with the water meter and flow switch inputs. **Do not** use an earth ground to complete these circuits.

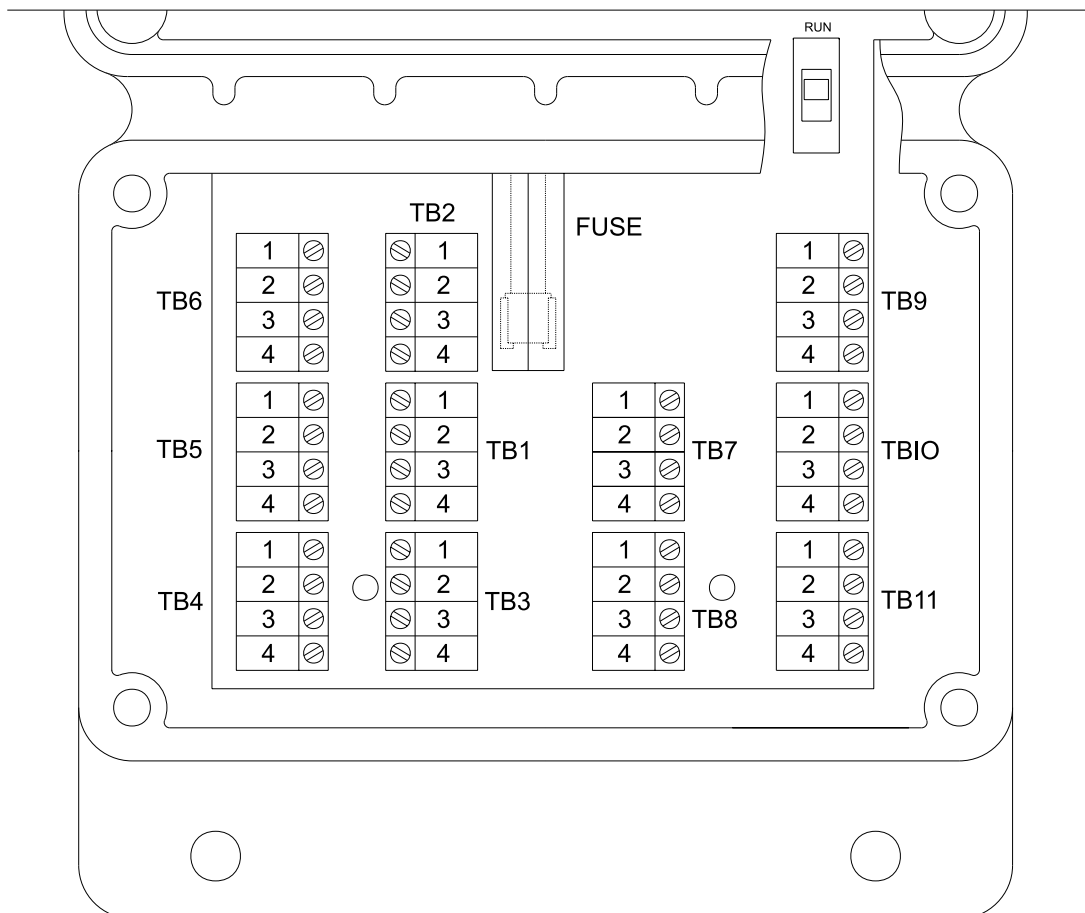
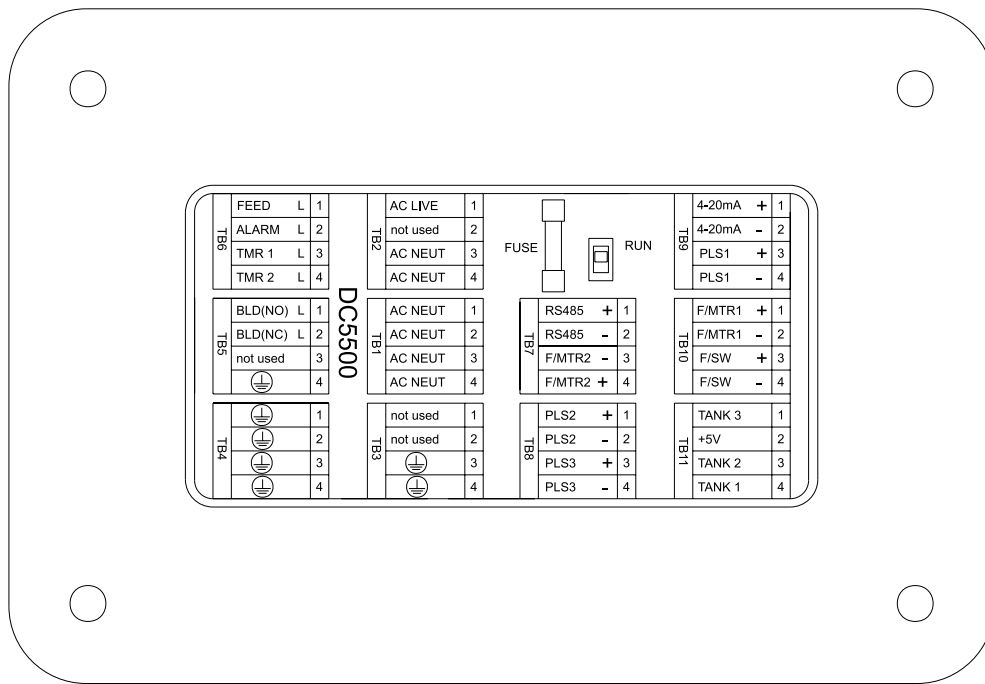
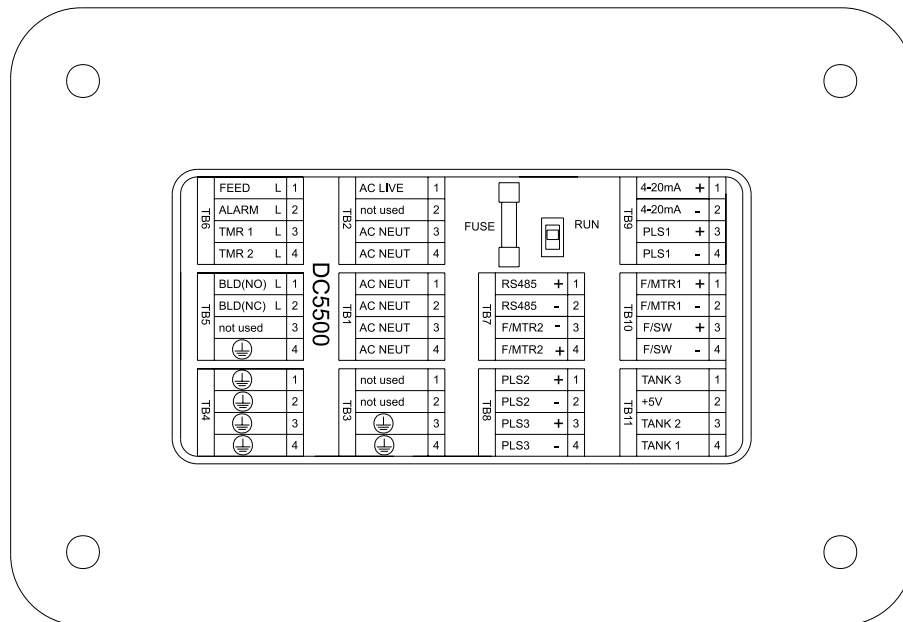
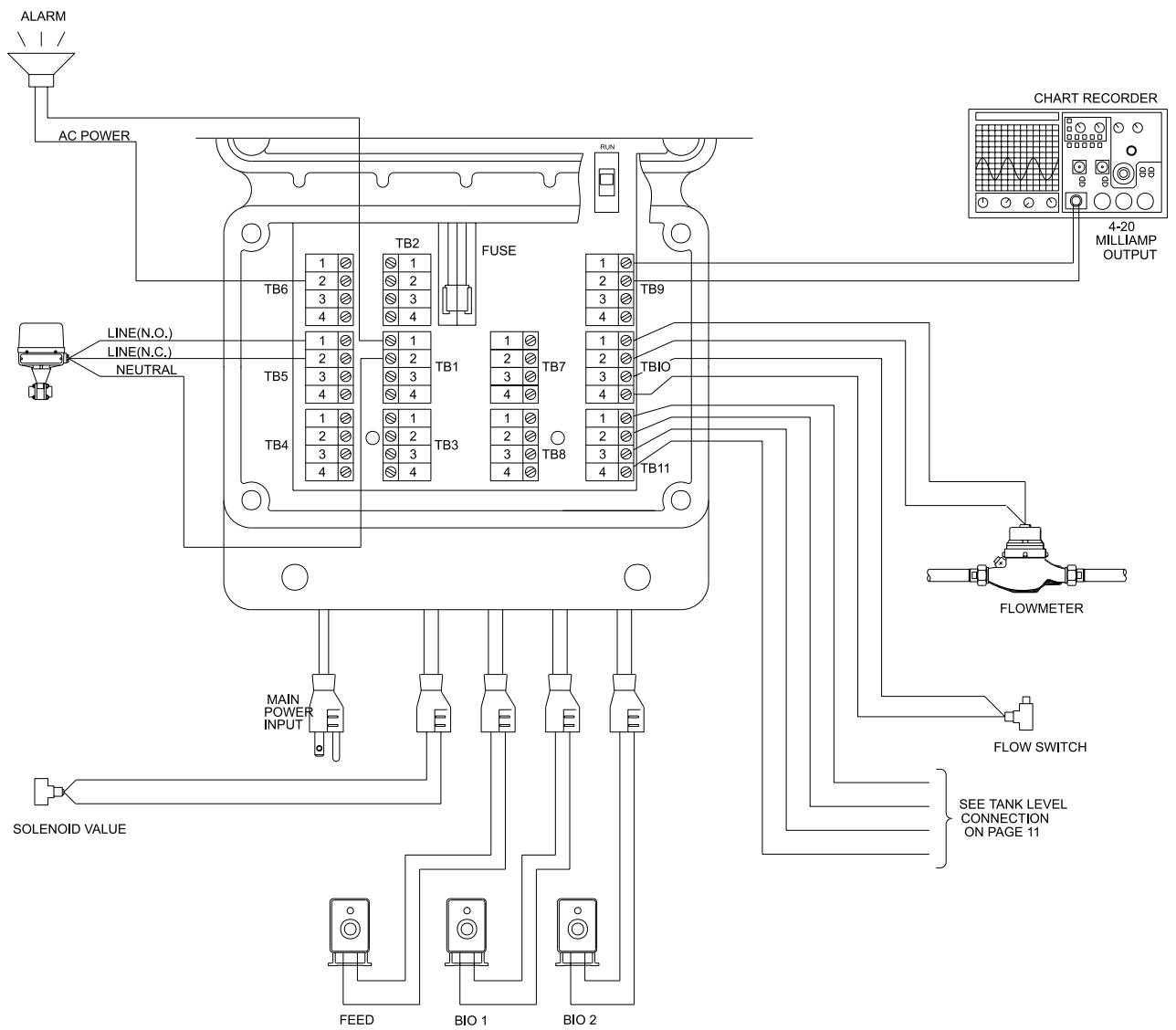
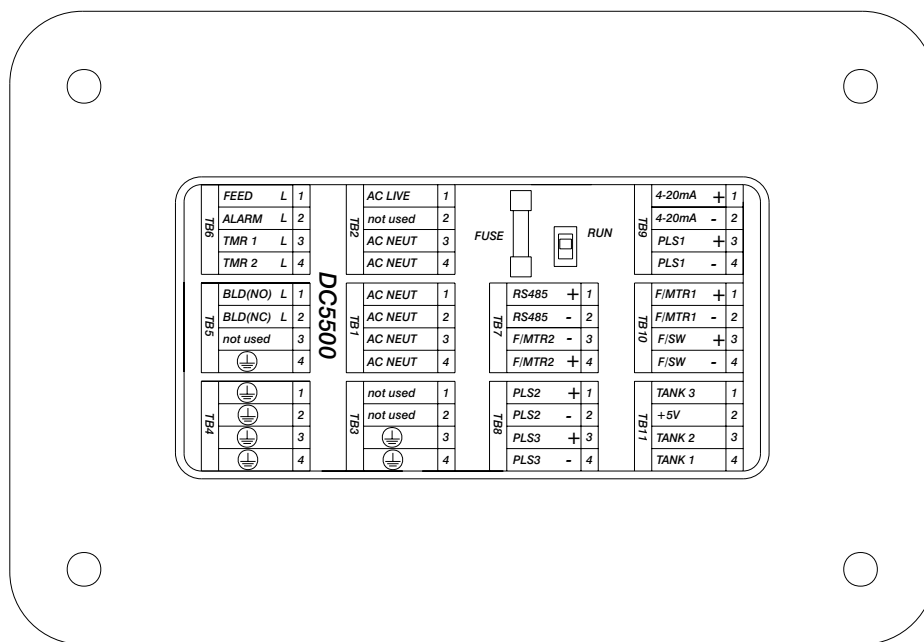
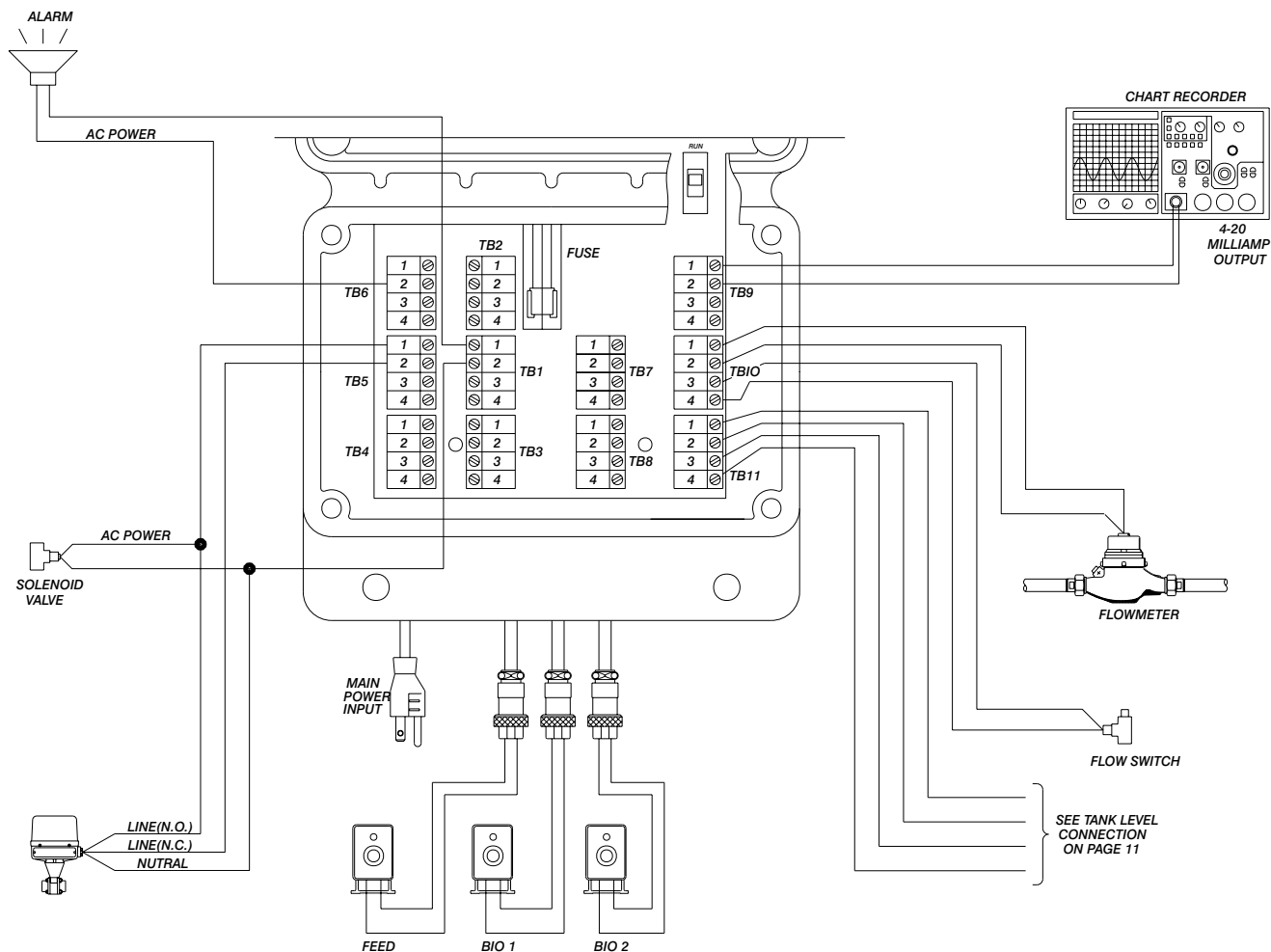


Figure 5: Bottom of controller with cover open.



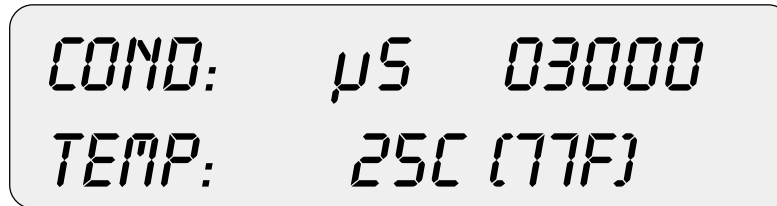
Wiring diagram for ON/OFF output control.



Wiring diagram for external pulse output control.



3.0 Operating the Controller

The Conductivity Read Screen or “System Run”:



The normal operating display for the DC5500 Series Controller is the conductivity reading screen (shown above). This screen is referred to as “System Run” throughout this manual. The screen will display the conductivity reading and the temperature or alarm condition. The controller relay outputs cannot be activated unless the unit is in the “System Run” or conductivity reading mode. The only exception is when the unit is in the test mode.



After reviewing or changing the conductivity controller setpoints, the unit must be returned to the “System Run” or conductivity reading screen to allow automatic control to proceed. There are three ways to return to the “System Run” screen and mode:

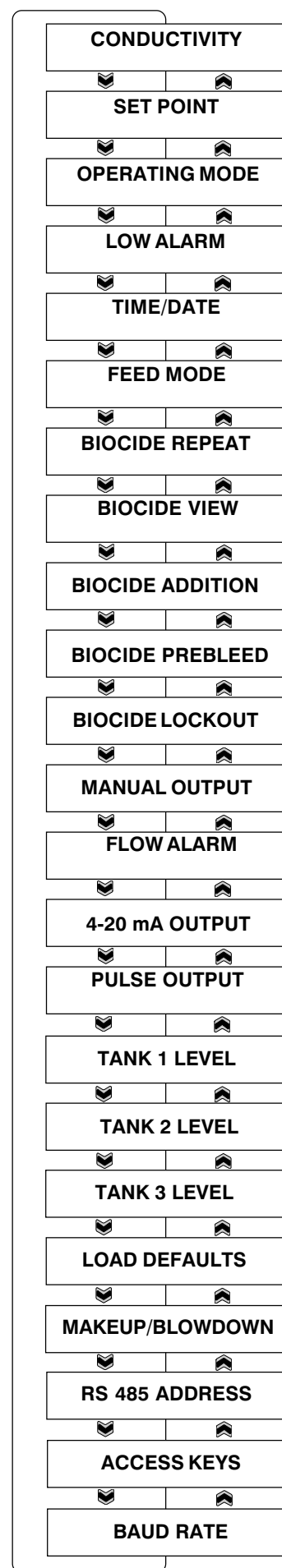
1. Use the  or  keys to move through the various menus, and back to the “System Run” screen.
2. Push ANY two (2) keys simultaneously. This will return the unit immediately to the “System Run” screen.
3. The unit will return to the “System Run” screen automatically after three (3) minutes if no keys are pressed.

3.1 Menu Overview

When the “System Run” screen is displayed in the window, the unit automatically switches to the run/operate mode of operation.



This “System Run” display line is the top menu page item. Pressing the  or  keys will move the display window to another line item. When not in the “System Run” mode the outputs to the control relays are disabled.



3.2 Conductivity

COND: μ S 03000
TEMP: 25C (77F)

Conductivity Reading Screen

The “CONDUCTIVITY” screen displays the conductivity reading in either μ Siemens or PPM/TDS (parts per million/total dissolved solids). When the controller is displaying this screen it is considered to be in the SYSTEM RUN mode. This means that the pumps, solenoids, and alarm outputs will be activated based on the controller’s programmed set points. When the controller is in any other display screen all the outputs are disabled and will not be energized. Press “ENTER” to access calibration or units of measure screen.

USE $\uparrow\downarrow$ TO SELECT
CAL OR μ S/PPM

The “CAL” feature allows the controller to be calibrated to the solution sample taken near the probe. It could be a known buffer or calibrated to a reading taken by a hand held conductivity meter from a sample point in the system, preferably near the probe. Press “ENTER” to access the calibration mode. Verify sample conductivity. Using the “UP” and “DOWN” arrows, change the value to match sample and press “ENTER” to retain conductivity reading.

USE $\uparrow\downarrow$ TO CHANGE
RATIO 10 μ S = 5PPM

The conductivity reading can be displayed in Microsiemens or Parts Per Million. If “PPM” is selected the user can set the ratio. The user may select a ratio from 10:5 through 10:9 Microsiemens/PPM. Use the arrows to select and press “ENTER” to retain settings.

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.3 Set Point/Hysteresis

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

SET POINT 02000
HYSTERESIS 00100

Set Point/Hysteresis Screen

The “SET POINT” screen allows access to the conductivity value that will energize the bleed output relay and allow for the opening of the bleed valve. The relay can be programmed in the operating mode menu to respond to either rising or falling conductivity values.

USE ↑↓ TO CHANGE
SET POINT 02000

Pressing “ENTER” from the main menu “SET POINT” screen accesses the conductivity reading trip value and allows the value to be changed. The value will have a flashing cursor indicating that it can be changed. Press the “UP” or “DOWN” key to increase or decrease the value. Press “ENTER” to save the value.

USE ↑↓ TO CHANGE
HYSTERESIS 00100

The hysteresis screen will be accessed next. Press the “UP” and “DOWN” arrows to adjust this setting to the desired range. Pressing “ENTER” will save the value and return to the main screen.

3.4 Operating Mode

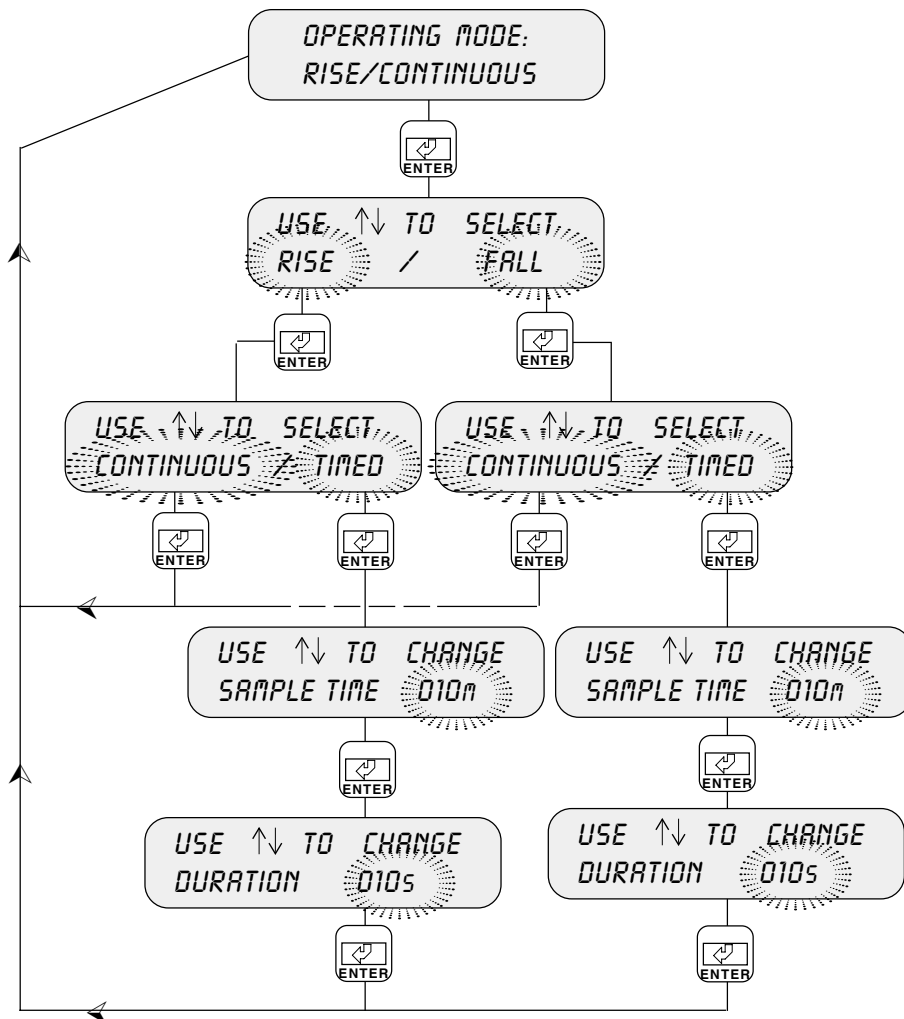
OPERATING MODE:
RISE/CONTINUOUS

Operating Mode Screen

Pressing “ENTER” will access the trip setting for the operating mode. Use the “UP” and “DOWN” arrows to choose between “RISE” or “FALL”. The blinking cursor will be the selected trip.

Press “ENTER” and the choice of “CONTINUOUS” or “TIMED” will be prompted this will determine the operation of the bleed valve. Pressing “ENTER” will save this option and return to the main screen.

See Section 4.3 for details about continuous and timed sampling.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.5 Low Alarm/High Alarm

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

LOW ALARM 00000
HIGH ALARM 00000

Low Conductivity/High Conductivity Alarm Set Point

The settings of the “LOW ALARM” and “HIGH ALARM” can be programmed by pressing the “ENTER” key from this menu:
The values for the “LOW ALARM” can be changed by using the “UP” and “DOWN” arrows. Pressing “ENTER” will save the values and access the “HIGH ALARM” setting. The values for this will be programmed the same way. “ENTER” will save the value and return to main access screen.

USE ↑↓ TO CHANGE
LOW ALARM 01000

Low Conductivity Alarm Set Point

USE ↑↓ TO CHANGE
HIGH ALARM 04000

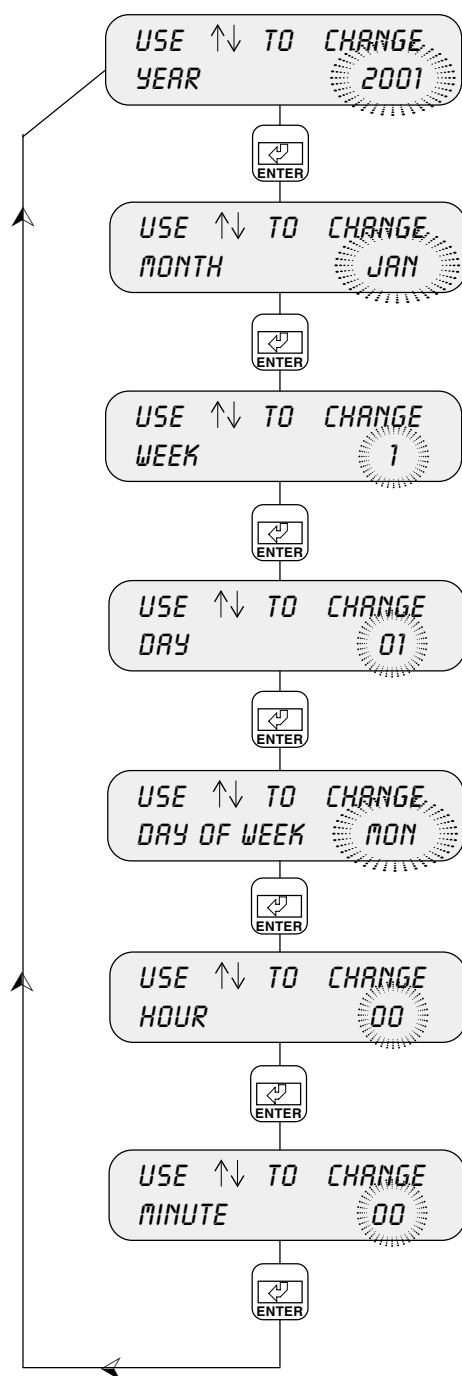
High Conductivity Alarm Set Point

3.6 Real Time Clock

WEEK 1 00:00
MON JAN 01

Real Time Clock Screen

The “CLOCK” screen displays the current week, day, and time. The time is based on a 24-hour clock. The number week that is displayed reflects the current week during the selected biocide programming based on a 1, 2, 3, or 4 week repeating cycle.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.7 Feed

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

*FEED MODE:
FEED PULSE TIMER*

Feed Pump Screen

The “FEED” screen displays the current Inhibitor Feed Pump mode selected. There are four different FEED modes that may be selected from. The current active mode is displayed in parenthesis. The four possible modes to select from are:

- 1.) **Water Meter Pulse** Pump output based on flow meter input.

*FEED PULSE TIMER
OR ↑↓ TO NEXT MENU*

- 2.) **Feed as % of Time** Pump output based on a repeating cycle timer.

*FEED AS % TIME
OR ↑↓ TO NEXT MENU*

- 3.) **Feed as % of Bleed** Feed after Bleed with a limit timer to control maximum pump run time. Pump output run time is based on a % of the total Bleed time.

*FEED AS % BLEED
OR ↑↓ TO NEXT MENU*

- 4.) **Feed and Bleed** Feed and Bleed simultaneously with limit timer to control maximum feed pump run time.

*FEED AND BLEED
OR ↑↓ TO NEXT MENU*

Use the “UP” or “DOWN” key to scroll through the four different modes. Pressing the “ENTER” key from the main menu screen “FEED” (*Mode*) accesses the FEED sub-menu selections.

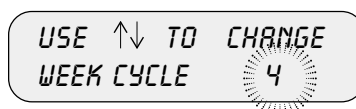
When the mode desired is displayed on the screen press “ENTER” to access the particular settings for that mode. The variables and settings that are available for each option are displayed (“m” indicates time in minutes, “s” indicates time in seconds). Use the “UP” or “DOWN” key to change the settings. Press “ENTER” to save that setting.

3.8 Biocide Repeat Cycle



Biocide Repeat Screen

The “BIOCIDE REPEAT CYCLE” will select the number of weeks that will occur before a cycle is repeated. Pressing “ENTER” will access this menu and the number of weeks can be selected by using the “UP” and “DOWN” arrows. Pressing “ENTER” again will save the value and return to the main menu.



The BIOCIDE cycle reflects the number of weeks that repeat in the BIO 1 and BIO 2 programming. For example, if a two-week repeating biocide pumping cycle is desired, then a “BIO WEEK = 2” would be selected. The “weeks” may be selected to be OFF, 1, 2, 3, or 4 week repeating cycle. Selecting “OFF” will result in no biocide feed.

The setting for the BIOCIDE weekly repeat cycle can only be modified at the controller. This setting can not be adjusted remotely. The factory default setting is “1 week.”

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.9 Biocide View

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

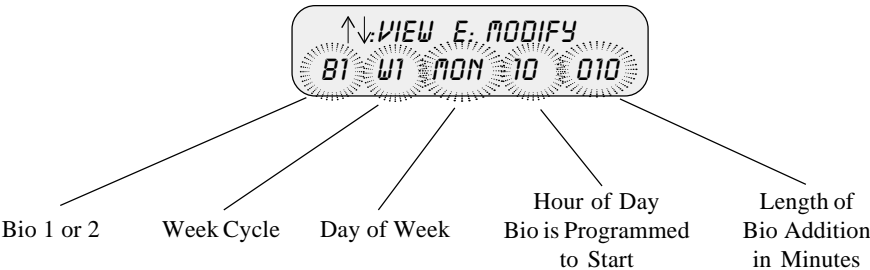
ACCESS KEYS

BAUD RATE

BIOCIDE VIEW
MODIFY/DELETE

Review Current Programmed Biocides

The “BIOCIDE VIEW” menu will allow the user to view, modify or delete any bicide events that have previously been programmed. Pressing the up and down arrows will allow the user to select the desired bicide event. Pressing “ENTER” will allow access to changes.

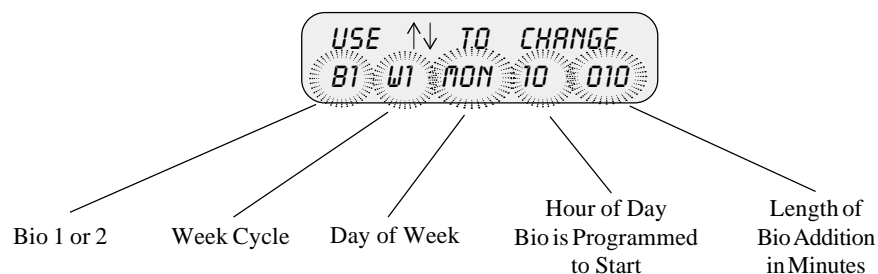


3.10 Biocide Addition

BIOCIDE ADDITION

Biocide Addition Screen

Biocide pump events may be programmed or added in this main menu selection screen. Press “ENTER” to access the sub-menu screens that allow the programming options for each Biocide pump. Once in these sub-menu selection screens, press the “UP” or “DOWN” keys to change each one of the values. The values that may be changed will have a flashing cursor. Press the “ENTER” key to save that value and move to the next sub-menu screen. The DC5500 software program will not allow both biocide pumps to operate simultaneously. If two biocides (Bio 1 & Bio 2) are programmed to add at the same time, Bio 1 will be added, then Bio 2.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.11 Biocide Prebleed

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDIC CYCLE

BIOCIDIC VIEW

BIOCIDIC ADDITION

BIOCIDIC PREBLEED

BIOCIDIC LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

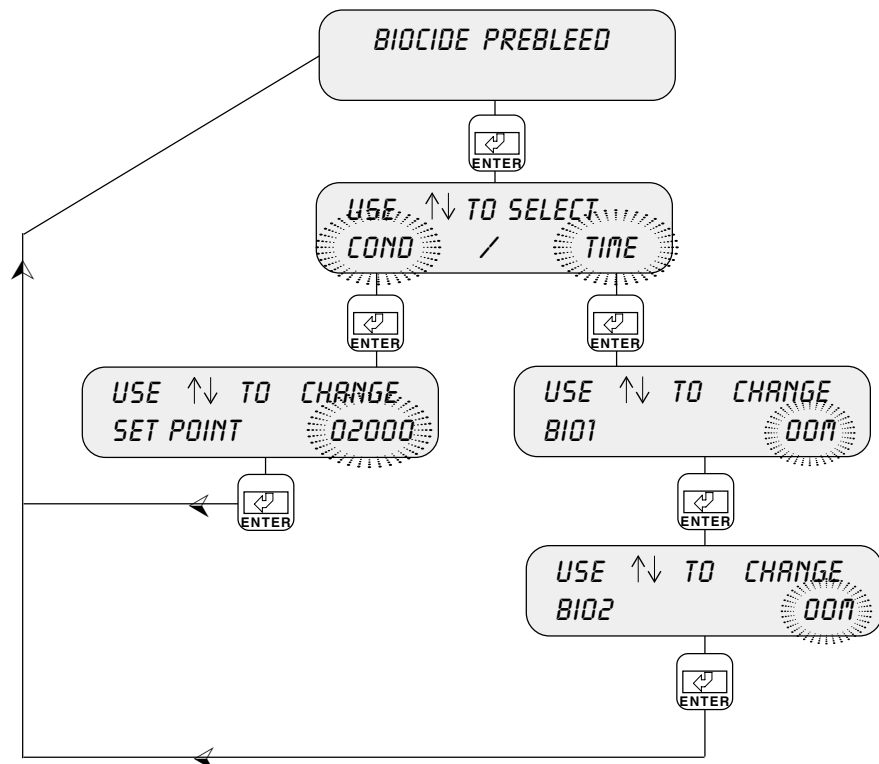
ACCESS KEYS

BAUD RATE

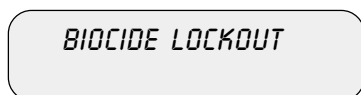
BIOCIDIC PREBLEED

Biocide Prebleed Screen

The Biocide pump “PREBLEED” option is available in order to bleed down the cooling tower to below conductivity limits prior to biocide chemical addition. This option is programmable in one of two modes. The prebleed may be selected for either a programmed amount of time or a conductivity set point. If the time option is selected, then the cooling tower will be bled down for that programmed amount of time prior to the biocide pump “on” time. If the conductivity set point is selected, then the cooling tower will be bled down to this set point prior to the biocide chemical addition. This set point prebleed starts at the programmed biocide pump “on” time. The biocide pump will come on after this conductivity point has been reached.

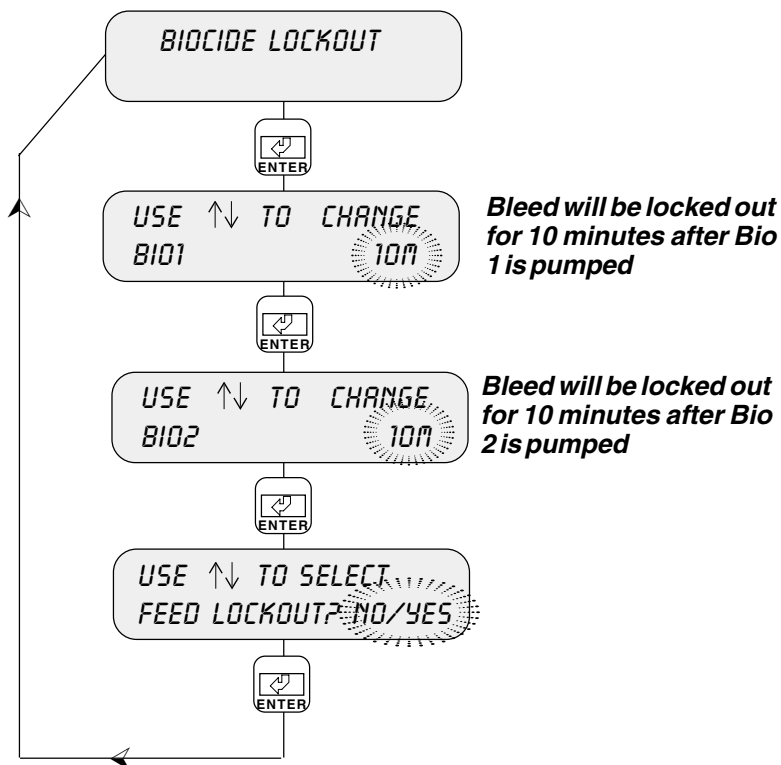


3.12 Biocide Lockout



Biocide Lockout Screen

The “BIOCIDE LOCKOUT” screen selection allows for the programming of a system bleed lockout time. This option prevents the bleed of a cooling tower immediately following biocide addition. Press “ENTER” to access the “LOCKOUT” screens where this option is programmed. The number of minutes that the bleed function needs to be disabled can be varied as required. Each Biocide pump lockout time can be individually programmed. It also allows lockout of the feed pump during a “BIOCIDE LOCKOUT”.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

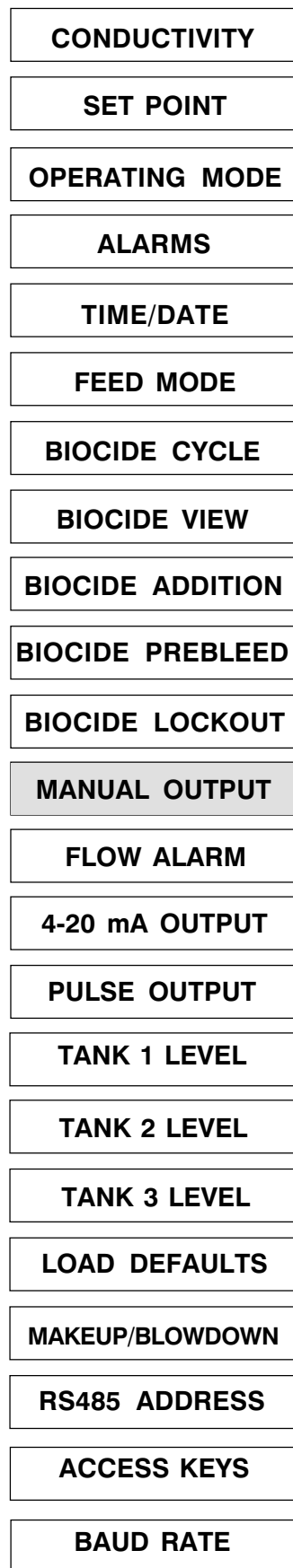
MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.13 Manual Output

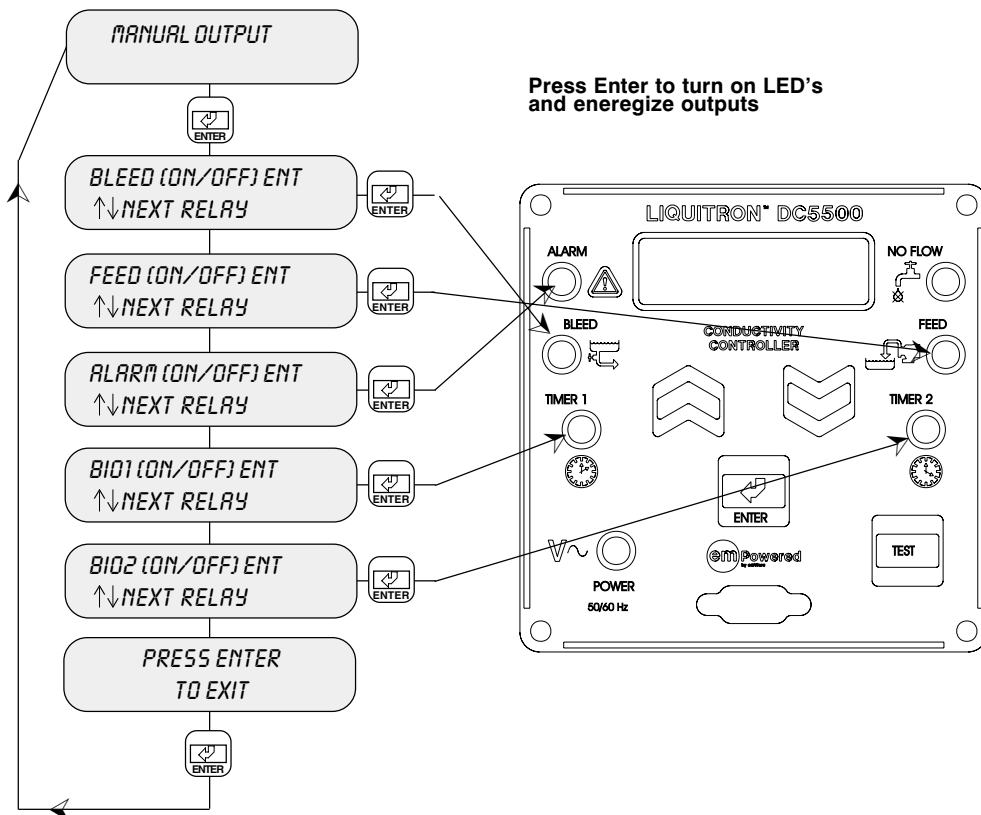


MANUAL OUTPUT

Manually Energize Relay Outputs

The “MANUAL OUTPUTS” mode is provided to allow for manual energizing of each relay output. Once the external devices have been connected, they may be individually or collectively energized and tested. Testing of all these components is recommended after system installation and prior to system start up. Press “ENTER” to access these sub-menu screens. Press the “UP” or “DOWN” key to move to each relay control screen. Press “ENTER” from each relay output screen to energize that output relay. Press “ENTER” a second time to de-energize that relay. One or all of the relays may be energized in this manner. The output relays will be de-energized if:

- (1) No Keys are pressed for 3 minutes and the controller returns to the “system run” screen.
- (2) The operator manually de-energizes each relay output.
- (3) The operator manually exits the “MANUAL OUTPUT” sub-menu screens.

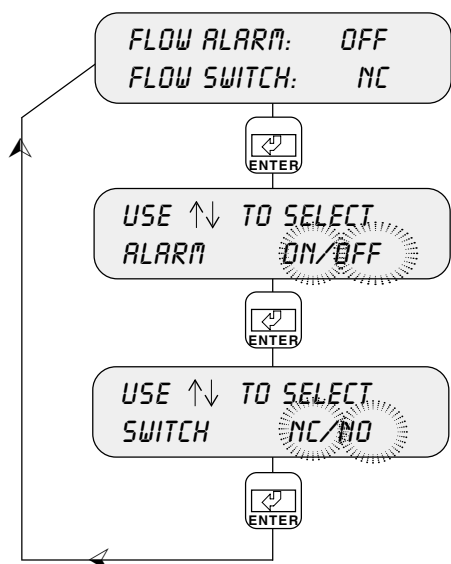


3.14 Flow Alarm/Flow Switch

FLOW ALARM: OFF
FLOW SWITCH: NC

Flow Alarm/Flow Switch Screen

The Flow Alarm can be set in the “ON” or “OFF” position by pressing “ENTER” and using the arrow keys to select the desired option. Pressing “ENTER” will select that option and bring up the Flow Switch menu. Use the arrow keys to select “NO” (Normally Open) or NC (Normally Closed) relay contact and then press “ENTER” to save. LMI flow switches are NC (Normally Closed).



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.15 4-20 mA Output

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

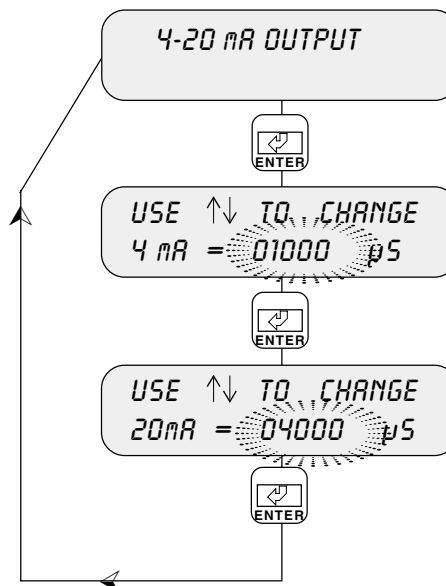
ACCESS KEYS

BAUD RATE

4-20 mA OUTPUT

4-20 mA Output Screen

The 4-20 mA output menu sets the output scale of the conductivity reading. Press “ENTER” to access this menu and use the arrow keys to set the 4 mA output to the desired conductivity reading. The “ENTER” key will save that value and access the 20 mA reading. Use the arrows to set the scale and the “ENTER” key will save the value and return to the main menu.



Note

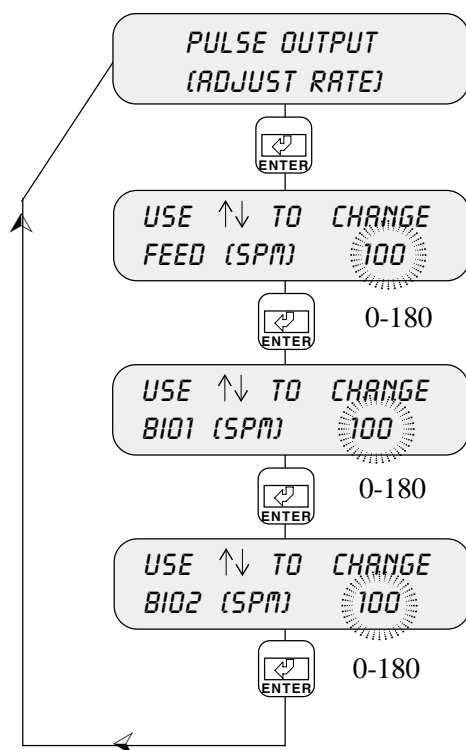
The 4-20 mA output is non-isolated. If an isolated 4-20 mA output is required contact your LMI distributor for a signal isolator.

3.16 Pulse Output

*PULSE OUTPUT
(ADJUST RATE)*

Pulse Output Screen

This menu adjusts the rate of the Feed, Bio 1 & Bio 2 pumps in Strokes Per Minute (SPM) if you choose to use the pulse output to control the metering pumps. Pressing “ENTER” will access the feed pump setting used for a pulse output. Use the arrow keys to change the speed from 0-180 SPM. Pressing “ENTER” will save the value and return you to the main menu. Repeat process for Bio 1 & Bio 2. Pumps must be wired to pulse output terminals to utilize this feature.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.17 Tank Level

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 2 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

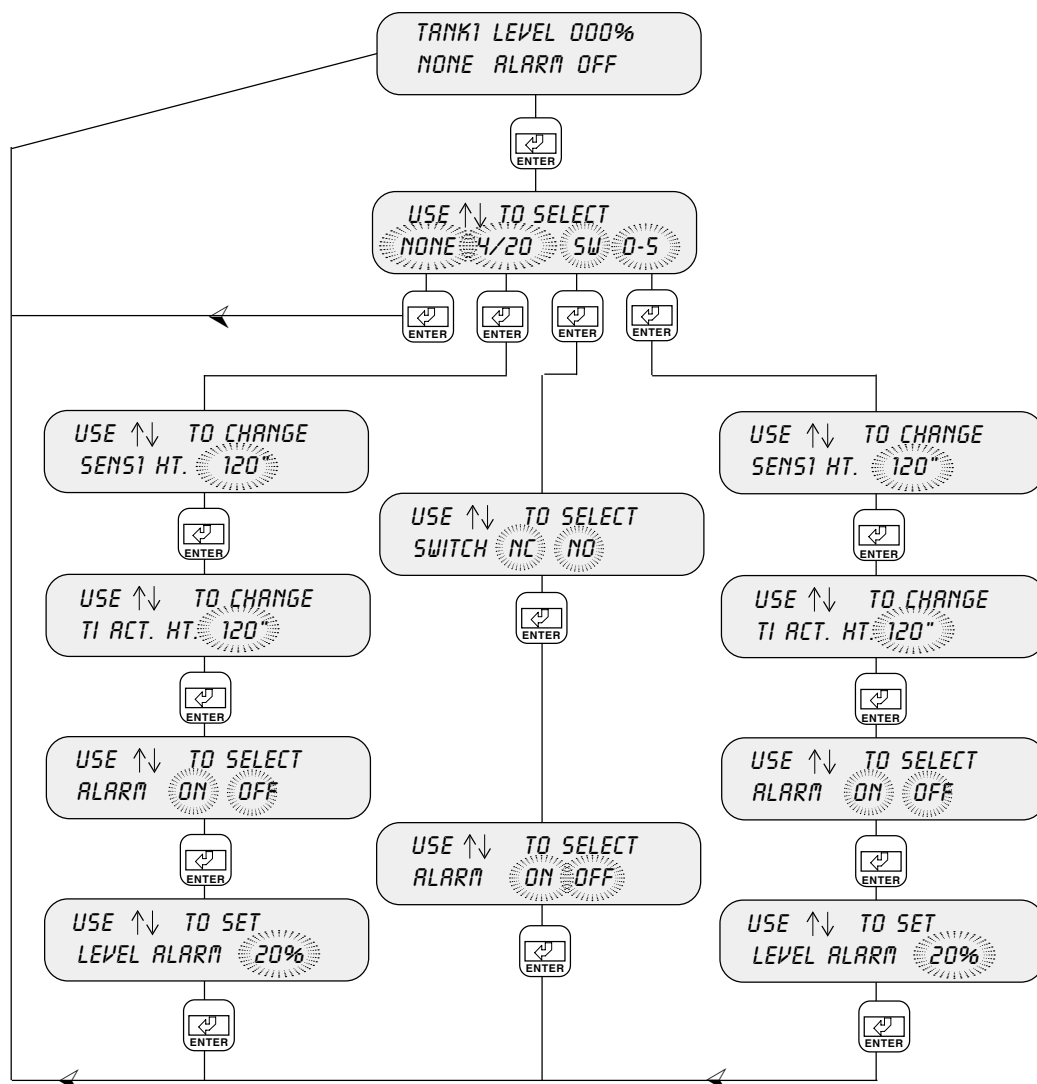
ACCESS KEYS

BAUD RATE

TANK1 LEVEL 000%
NONE ALARM OFF

Tank1 Level Screen

The tank level inputs can be programmed in one of four ways: None, Switch Closure, 4-20 mA or 0-5VDC. Press “ENTER” to access, use arrow keys to select and “ENTER” to save. If “NONE” is selected it will return you to the main menu and automatically set the alarm to the “OFF” position. If the Switch Closure (sw) is chosen, it will prompt you for the type of switch NO (Normally Open) or NC (Normally Closed). The choice to have the alarm on or off will then be asked. Press “ENTER” to select and save. The 4-20 mA and 0-5VDC menus are the same. Use the arrow keys to access the settings. Choose the alarm type, on or off, press “ENTER” then use the arrow keys to set the percentage that you want the level alarm to be activated. Press “ENTER” to save and return to the main menu.



Tank 1 Level, Tank 2 Level and Tank 3 Level are programmed in the same manner.

3.17 Tank Level

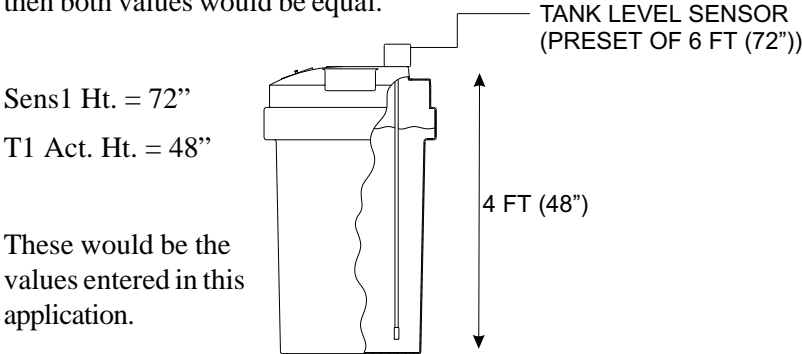
Sens1 Ht. = 120” (Tank 1 Sensor Height)

This option is used for the preset height value of the level sensor that is being used in inches. If a 6-foot level sensor is being used, then the value would be set to 72”. The calibration height of the level sensor is pre-programmed by the sensor manufacturer.

T1 Act. Ht. = 120” (Tank 1 Actual Height)

Enter in the actual height of the tank being used. If a 4-foot tank is being used, then the value would be set to 48”.

The value entered in these two fields will adjust the tank level height of 0-100% proportionately to the 4-20mA input. If sensor height and tank height are the same, then both values would be equal.



If tank height and sensor height are the same, enter the same height for both valves, Sens1 Ht. and T1 Act. Ht.

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.18 Load Defaults

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

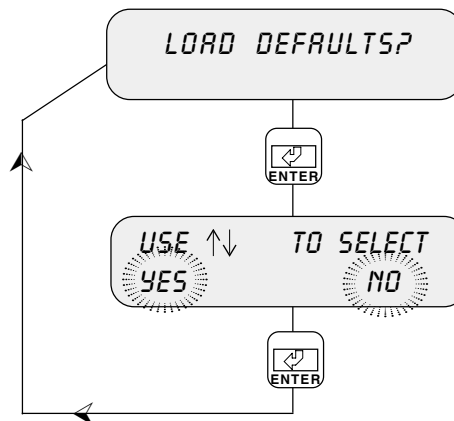
BAUD RATE

LOAD DEFAULTS?

Load DefaultsScreen

On the Load Defaults screen press “ENTER”. Use arrow keys to select Yes or No. Press “ENTER” to return to Load Defaults screen.

Refer to Section 8.0 (Page 45) for factory default settings.



3.19 Makeup/Blowdown

MAKEUP H20:00000
BLOWDN H20:00000

Makeup/Blowdown Screen

Makeup = F/MTR1

Blowdown = F/MTR2

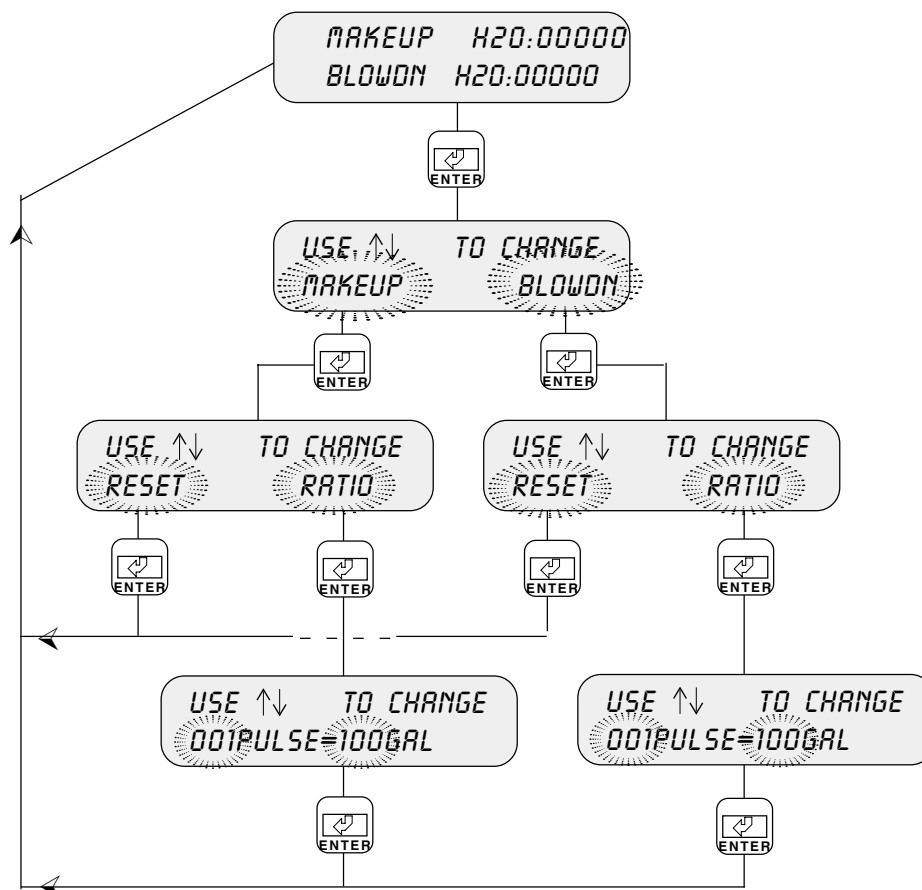


Note

Makeup is for the water meter on the makeup line.

Blowdown is for the water meter on the blowdown line.

On the Makeup/Blowdown screen press “ENTER”. Use arrow keys to select Makeup or Blowdown. Press “ENTER” to access the Reset/ Ratio screen. Selecting Reset will zero the totalizers and return you to the Makeup/Blowdown screen. Selecting Ratio will bring you to Gallon/ Pulses screen use arrow keys to enter the ratio of pulses per gallon. Press “ENTER” to return to Makeup/Blowdown screen.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.20 RS485 Address

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

RS485 ADDRESS
001

RS485 Address Screen

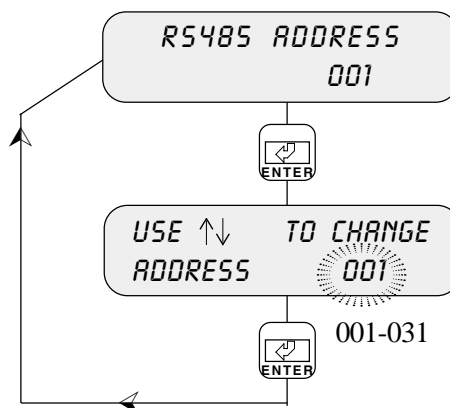


Note

The RS485 Address will only be used when a LiquiComm™ Remote Communications package is purchased.

The RS485 Address will identify which one of up to thirty-one DC5500 Controllers is being dialed up with LMI's Remote Communications Package. For more information on the LiquiComm™ Remote Communications Package, contact your local LMI distributor.

Press "ENTER", use arrow keys to change address then press "ENTER" to save settings.



Note

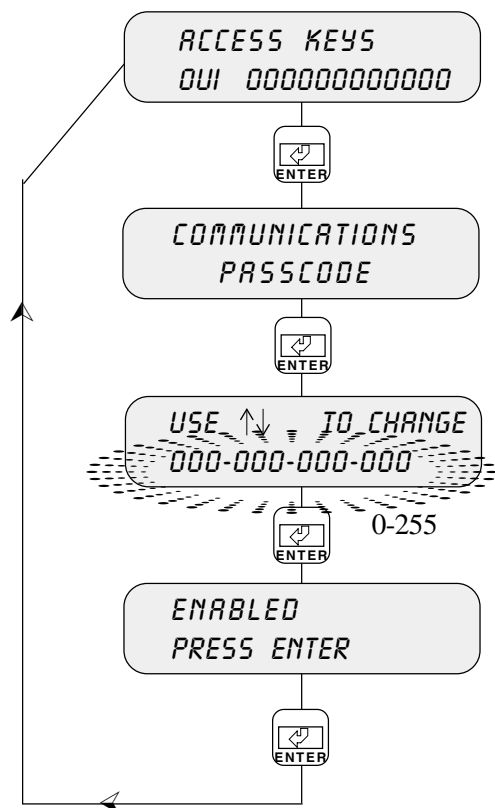
The RS485 Address Number needs to correspond with the appropriate device number listed in the LMI DataComm™ Software, which is included with the LiquiComm™ Remote Communications Package.

3.21 Access Keys

ACCESS KEYS
OUI 000000000000

Access Keys Screen

The Access Keys will enable remote communication with the DC5500. The menu will display a 12-digit OUI number and prompt the user to enter their passcode which will be given to the user at time of purchase of a communications activation.



CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

3.22 Baud Rate

CONDUCTIVITY

SET POINT

OPERATING MODE

ALARMS

TIME/DATE

FEED MODE

BIOCIDE CYCLE

BIOCIDE VIEW

BIOCIDE ADDITION

BIOCIDE PREBLEED

BIOCIDE LOCKOUT

MANUAL OUTPUT

FLOW ALARM

4-20 mA OUTPUT

PULSE OUTPUT

TANK 1 LEVEL

TANK 2 LEVEL

TANK 3 LEVEL

LOAD DEFAULTS

MAKEUP/BLOWDOWN

RS485 ADDRESS

ACCESS KEYS

BAUD RATE

RS232 BAUD RATE
57600

Baud Rate Setting Screen (For Communications Only)

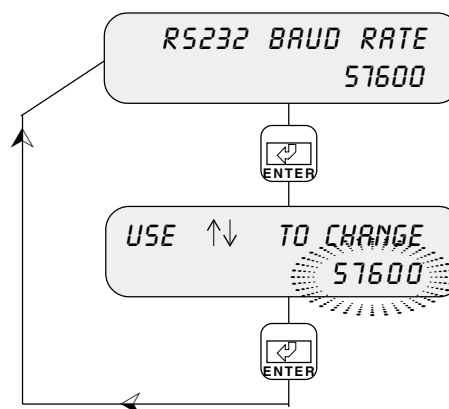


Note

The baud rate setting is only changed when using a RS232 Serial Cable longer than 50 feet in length for downloading data. The factory default setting for the baud rate is 57600.

The RS232 Baud Rate is the rate at which data will be downloaded from a DC5500 Liquitron Unit to a PC, laptop or Palm Pilot Device. The baud rate is only adjusted if the RS232 Serial Cable is greater than 50 feet in length, or if there is a significant amount of electronic noise from other equipment in the area. Cable length and electrical noise inhibit the rate at which data can be accurately downloaded, and the baud rate must be reduced. A reduced baud rate will increase download time proportionately. The following settings are recommended:

| <u>RS232 Cable Length</u> | <u>Baud Rate</u> |
|---------------------------|--------------------------|
| 1-50' | 57,600 (Factory Setting) |
| 50-80' | 19,200 |
| 80-150' | 9,600 |
| 150-300' | 4,800 |



4.0 Start-Up

4.1 Cooling Tower Installation

The DC5500 Series Controller should be installed based upon the recommended system diagram below. A bypass loop for open recirculating water systems is the best method of conductivity monitoring and control.

The conductivity sensing probe used with the conductivity controller must receive an active representative sample of system water. The probe should be installed so that it is removed horizontally from its mounting tee. Water flow should enter from the bottom of the conductivity tee and exit out the top. This type of installation insures that the probe tee is full of water whenever system flow is on and that the probe is fully emersed. This prevents the probe from becoming air bound.

Manual system shut off/isolation valves are recommended for installation on either side of the conductivity sensing probe. This allows for ease of system isolation and probe removal. A sample cock valve and a strainer are recommended to allow for periodic water sampling and water filtering.

Injection of required water treatment chemicals can be effected directly into the bypass line. When chemicals are injected into the bypass line, they should be downstream of the conductivity sensing probe to avoid interference with readings.

An installed flow switch is recommended for the bypass line to allow for disabling of controller/pump operation during system shutdown, maintenance or repair.

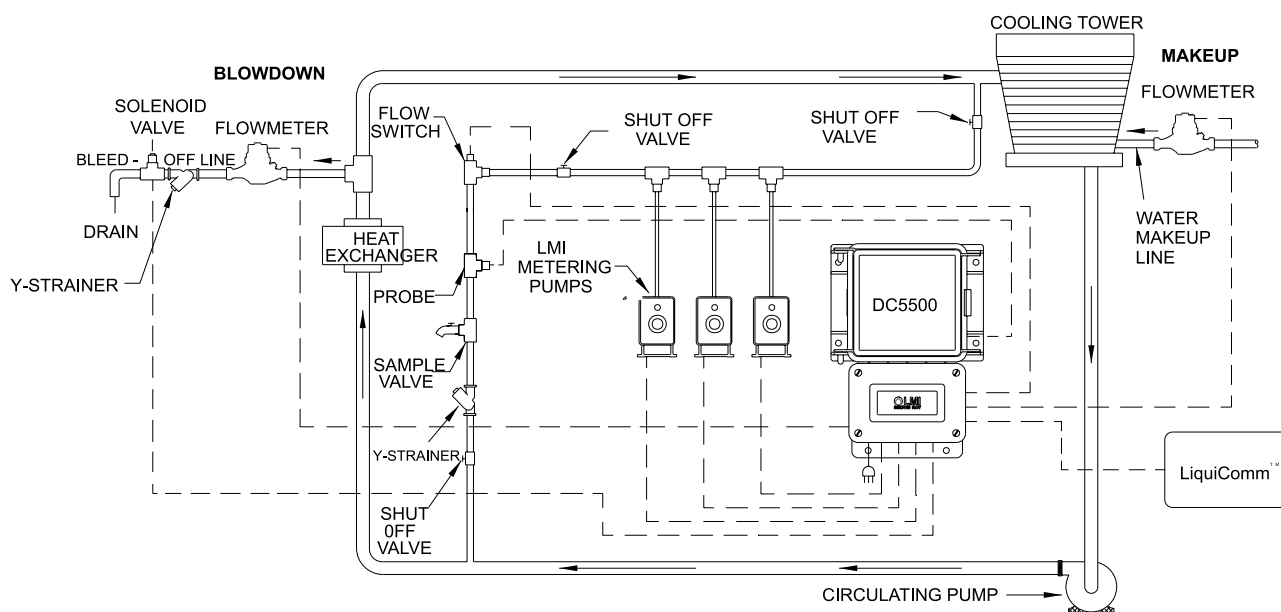


Figure 6

4.2 Cooling Tower Start-up

The DC5500 can be programmed for a multitude of tasks for cooling tower applications. Prior to powering up the DC5500 Conductivity Controller it is recommended that the following PRE-START UP work sheet be completed to determine required system operating parameters.

1. Current System Conductivity _____
2. Desired Conductivity Set Point _____
3. Differential (Hysteresis) Range _____
4. Method of Chemical Inhibitor Feed (choose one of the following) _____
 - (1) PULSE TIMER (Pump output based on flowmeter input).
 - (2) % of TIME (Repeating cycle with pump ON time based on percent of the cycle time).
 - (3) % of BLEED or BLOWDOWN (Amount of feed is based on a percent of the total bleed/blowdown time).
 - (4) LIMIT (Chemical inhibitor feed at the same time as system bleed or blowdown).

The Feed pump can be controlled by either a powered relay output or by pulse output from controller. The direct power or On/Off mode requires the pump to be connected to the 'FEED L' and any 'AC NEUT' terminal connection on the pc board. If an LMI '7' or '9' series pump is being used the pump stroking speed may be directly controlled by the DC5500 pulsed output. The pump 4-pin connector must be wired to the 'PLS1 +' and 'PLS1 -' terminals on the pc board.

On/Off Pump Control _____
Pulse Control _____

5. High Alarm Setting _____
6. Low Alarm Setting _____
7. Flow Switch Alarm activation (Yes/No) _____

8. The DC5500 controller can be configured to control dual-chemical (biocide) pumps for water contamination/biological growth control based on a selectable 1-4 week timer. Use the table below to assist in setting up the program operating periods for the pumps when using the 1-4 week timer option.

| BIOCIDE CHEMICAL TIMETABLE | | | | |
|----------------------------|--------|--------|--------|--------|
| | Week 1 | Week 2 | Week 3 | Week 4 |
| Sun | | | | |
| Mon | | | | |
| Tue | | | | |
| Wed | | | | |
| Thu | | | | |
| Fri | | | | |
| Sat | | | | |

The Biocide chemical pumps may be controlled by either On/Off or pulse modes. The On/Off mode supplies AC power to the pump based on relay control. The pulse mode supplies a series of dry switch closures to control pump speed.

The terminal connections on the I/O pc board for these modes are shown:

| | ON/OFF | | PULSE | |
|-----------|----------|-----------|--------------|---------------|
| | ACLine | ACNeutral | Signal input | Signal output |
| Biocide 1 | "TMR1 L" | "AC NEUT" | "PLS2 +" | "PLS2 -" |
| Biocide 2 | "TMR2 L" | "AC NEUT" | "PLS3 +" | "PLS3 -" |

9. Biocide Lockout Timer _____
10. Biocide Pre-Bleed Timer _____
11. 4 mA Output _____
12. 20 mA Output _____

Once the operating settings and parameters have been determined by the data entered in the previous pages, the DC5500 Controller can then be programmed. Supply power to the controller. Read the conductivity and verify the accuracy using a calibrated meter and conductivity sample. Calibrate the controller as needed. See Calibration Section.

See Section 3.0 Operating the Controller to program the operating parameters.

This completes the cooling tower start-up. Return the display to the 'SYSTEM RUN' or 'CONDUCTIVITY Reading' screen to begin operation.



The system will return to the 'SYSTEM RUN' mode automatically on its own after three (3) minutes if no keys are pressed.

4.3 Bleed or Blowdown Sampling Option

Operating Mode

The DC5500 Conductivity Controller can be configured to operate in one (1) of two (2) different operating modes for conductivity bleed or blowdown:

- (1) Timed Conductivity Blowdown Sampling
- (2) Continuous Conductivity Blowdown Sampling (Standard Method)

The Continuous Conductivity Bleed/Blowdown is the most commonly used method. When the conductivity is above a setpoint, a valve is opened and water is bled off until the conductivity is below the setpoint minus the hysteresis. All DC5500 Controllers are factory set for this method of control.

In the “TIMED SAMPLING” mode, the conductivity is only looked at periodically. If the conductivity is high, the valve will be opened and the water bled off until the conductivity is brought back to the desired setpoint. The probe is generally installed on the drain line. It allows for minimal piping requirements.

The programmed settings for this method are 1) sampling time, and 2) sampling duration.

- **SAMPLING TIME** - is the amount of time in between active conductivity readings. If the conductivity is above the setpoint during this time, the unit will not bleed.
- **SAMPLING DURATION** - At the end of the Sampling Time, the bleed valve will automatically open and start bleeding off water. The unit will bleed water off for the entire sample duration time. This is done to get a good clean sample near the probe. At the end of the sample duration the valve will be closed if the conductivity is below the setpoint, or held open if the conductivity is above the setpoint. It will then continue to bleed until the setpoint is reached.

5.0 Calibration

Calibration will be required during system start up or when a variation in conductivity readings exists between the displayed conductivity and the conductivity value determined from a reliable source (such as a hand held tester). The conductivity probe should be cleaned prior to calibration (see 7.0 MAINTENANCE for probe cleaning instructions).

The 'SYSTEM RUN' or 'CONDUCTIVITY *reading*' screen is used to calibrate the controller. Press the 'ENTER' key from this main menu screen to access the calibration mode. The 'CALIBRATION' screen will display the word CAL and then the current conductivity reading. Use the 'UP' or 'DOWN' keys to enter the correct conductivity reading, and then press enter. This will save the reading value and re-calibrate the controller based on this value.





If the probe reading is off by more than 50%, then the controller will indicate an error by displaying 'CAL LIM uS'. This means that the probe has failed or needs cleaning.

Alternately, a sample of cooling tower water may be analyzed by a precalibrated conductivity monitor, and the DC5500 controller calibrated to match that reading using the sample as a standard solution.

From Conductivity Screen....press Enter....to Calibrate

| | | |
|--------|----------|-------|
| COND: | μS | 00000 |
| ALARM: | LOW COND | |

In Calibration....

1) press  or  to adjust conductivity value

2) press  to save calibrated value

The DC5500 Controller provides a circuit board test-switch to aid in troubleshooting the unit and system. The switch is located under the access cover on the lower section of the controller (see Figure 5).

The conductivity test key allows the user to determine if the conductivity circuit is operating correctly. When placed in the test mode, this switches the conductivity probe and wiring out of the circuit and places an internal precision resistor. This resistor has a known conductivity reading of 3000 μS +/- 5%. If the unit has been calibrated then this reading could be displayed as + or - 50% of this 3000 μS value (+4500 μS , -1500 μS).

6.0 Maintenance

6.1 Controller

The DC5500 controller itself requires very little maintenance. Wiping the controller down with a damp cloth will clean it. Do not spray down the controller unless the enclosure door is closed and latched.

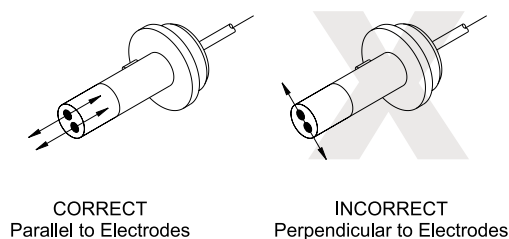
6.2 Probe



The controller must be recalibrated after cleaning the probe.

Cleaning Procedure

The probe can normally be cleaned using a cloth or paper towel and a mild cleaning solution such as **409** cleanser. Occasionally, a probe may become coated with various substances which require a more vigorous cleaning procedure. Usually the coating will be visible, but not always. To clean a coated probe, use a fine grit abrasive, such as emery paper. Lay the paper on a flat surface and move the probe in a back and forth motion as shown in Figure 7. The probe should be cleaned parallel to the carbon electrodes, NOT perpendicular.



Frequency

Figure 7

The probe should periodically be cleaned to maintain accurate measurements. The frequency of cleaning required will vary from application to application. In a new installation, it is recommended that the probe be cleaned after two (2) weeks of service. In order to determine the frequency of cleaning, use the following procedure.

1. Read and record the conductivity with probe in system.
2. Remove the probe, clean it, and place it back into the system.
3. Read the conductivity of the probe after it is cleaned and record it.

Compare the first conductivity with the second. If the variance in readings is greater than 5%, increase the frequency of probe cleaning. If there is less than a 5% change in the reading, the probe was not dirty and can be cleaned less often.

7.0 Troubleshooting



Disconnect power to the controller before opening the front panel! Troubleshooting and repair of a malfunctioning controller should only be attempted by qualified personnel using caution to insure safety and to limit unnecessary further damage. Contact your local LMI distributor for assistance.

| PROBLEM | POSSIBLE CAUSE | SOLUTION |
|----------------------|-------------------------------|--|
| No Power Light | Blown main fuse | Test with multimeter / replace if required |
| | No power supplied | Check power source |
| | Loose/incorrect wiring | Verify wiring connections |
| No Display | Blown main fuse | Test with multimeter / replace if required |
| | Blown secondary fuse | Test with multimeter / replace if required |
| | Faulty pcboard | Consult factory |
| No Pump Power | Alarm State/No Flow Exists | Check flow switch : 'Alarm Light On' below |
| | Incorrect wiring to pump | Check wiring by using Relay Test program |
| | Pump has failed | Plug pump directly into live outlet |
| | Incorrect pump settings | Check programmed settings and modes |
| No Valve Power | Flow switch off | Check flow switch and wiring |
| | Incorrect wiring to valve | Check wiring by using Relay Test program |
| | Valve has failed | Test per manufacturers instructions |
| | Incorrect Blowdown setpoint | Verify setpoint and rising/falling trip selection |
| Low Conductivity | Bypass valve open | Verify valve alignment |
| | Airbound probe | Change probe location |
| | Solenoid valve stuck open | Repair or replace |
| | Sensor disconnected | Check and verify sensor |
| | Faulty cable or connector | Replace as required |
| High Conductivity | Probe is fouled or dirty | Clean as required - recalibrate |
| | Solenoid valve stuck shut | Repair or replace |
| Erratic Conductivity | Unit out of calibration | Recalibrate |
| | Unit will not calibrate | Out of range limits - Use Conductivity Test switch |
| | Stagnant sample | Check system for proper flow |
| | Reading is stuck on one value | Verify test switch is in Run mode not Test mode |
| | Faulty pc board | Consult factory |
| Alarm Light On | Alarm Condition Exists | Verify high conductivity set point |
| | | Verify low conductivity set point |
| | | Low chemical tank level (when wired) |
| Alarm & BIO LEDs On | Biocides pump at same time | Check programmed settings and modes |
| | | Ensure prebleed and lockout do not conflict |
| No Flow Light On | No Flow circuit energized | Check wiring from flow switch to terminals |
| | | Verify flow switch is moving freely |
| | | Verify flow is present in manifold line |

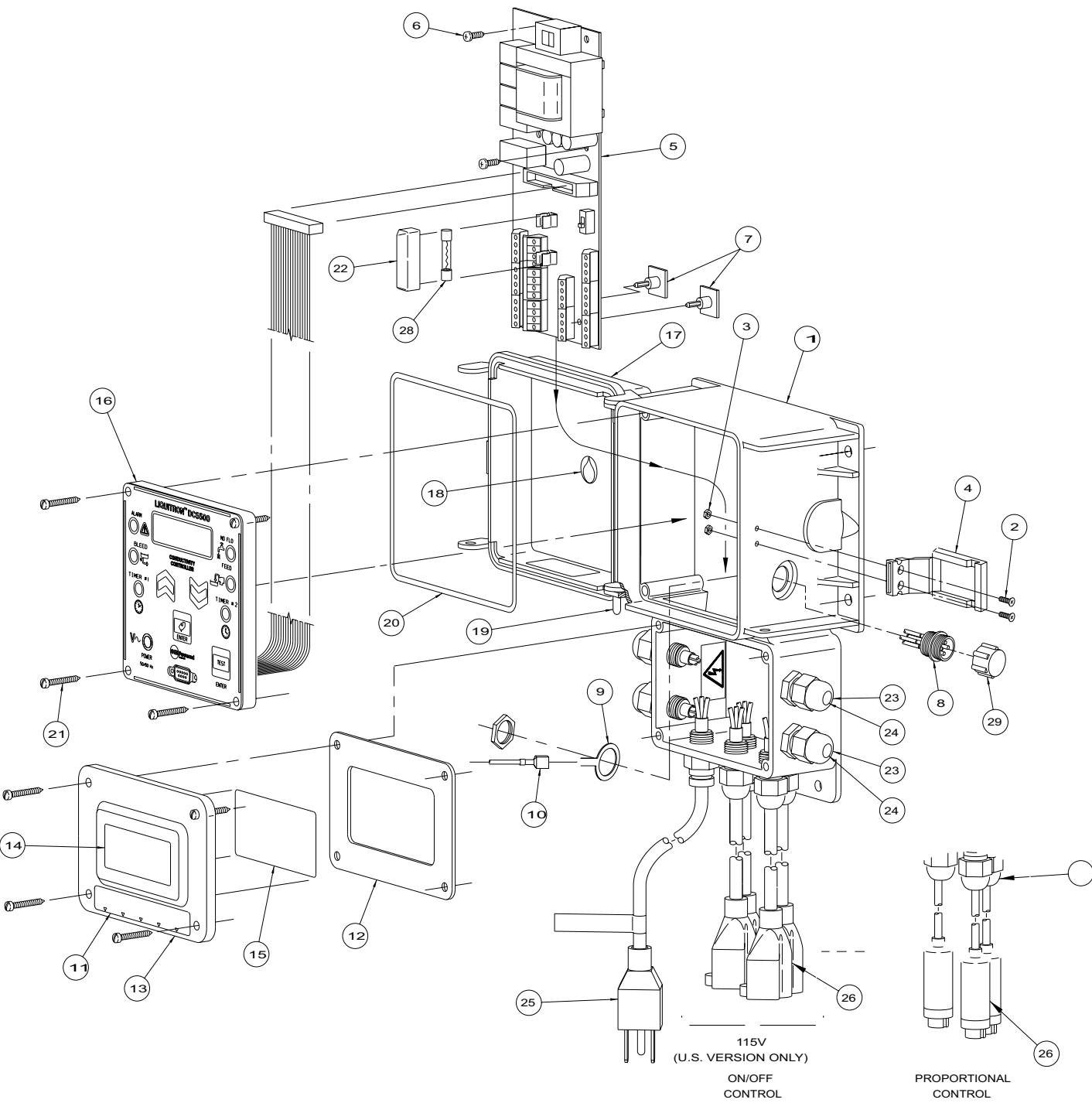
8.0 Factory Settings

| | |
|---|--------------------|
| Day | Random |
| Hour | Random |
| Minute | Random |
| Temperature | Fahrenheit |
| Conductivity Set point | 2000 μ S |
| Delta Differential | 100 μ S |
| Low Alarm | 100 μ S |
| High Alarm | 4000 μ S |
| Feed Mode | Pulse Timer |
| Pulse Timer | 10 seconds |
| Pulse Count | 1 flow meter count |
| % Time - Cycle Time | 10 minutes |
| % Time - | 10% |
| Feed after Bleed | 10% |
| Feed after Bleed - Limit | 10 minutes |
| Limit (Feed & Bleed) | 10 minute limit |
| Flow Alarm (On/Off) | Off |
| Trip (Rise/Fall) | Rise |
| 4 mAmp setting | 0 μ S |
| 20 mAmp setting | 20,000 μ S |
| Display (μ S/PPM TDS) | μ S |
| Pump Pulse Feed (0-180 SPM limit) | 100 strokes/minute |
| Pump Pulse Biocide #1 (0-180 SPM limit) | 100 strokes/minute |
| Pump Pulse Biocide #2 (0-180 SPM limit) | 100 strokes/minute |
| Controller Cooling Continuous/Timed | Continuous |
| Biocide Lockout (0-999 minute limit) | 0 minutes |
| Biocide Prebleed (0-60 minute limit) | 0 minutes |
| Biocide Repeat Cycle (OFF-4 week limit) | 1 week |

9.0 Product Specifications

| | |
|------------------------------|--|
| Power Requirements | 115 VAC +/-15%, 50/60 Hz 230 VAC +/-15%, 50/60 Hz Voltage input selectable via a selector switch located on the I/O PCB. Fuse: 4A 250 VAC Time Delay |
| Inputs | Flow Switch. All low voltage inputs active low, i.e. the active state is when the switch is closed. The switch must be capable of switching 2 mA at +/-15 VDC. Tank Inputs: 4-20 mA, 0-5 VDC |
| Outputs | Pulse Pump A and B, Auxiliary, Alarm. All low voltage outputs capable of switching 2 mA at = 24 VDC. The pulse output frequency range is 0-180 SPM. The pulse output is active low. The pulse width is 100 milliseconds in the active low state. The output type is an opto-isolated NPN transistor open collector configuration. 4-20 mA: 600 ohms maximum |
| Keypad | Three key membrane keypad with tactile response. Material: Polyester with a hard coat finish. Actuation Force: 2.6N to 3.3N. |
| Temperature Input | Thermistor resistance 10k Ohms at 77° F [25° C] Circuit Accuracy: +/- 33° F [+/-0.5° C] Temperature Display: 32° F to 212° F [0° C to 100° C] Temperature resolution: +/- 1.8° F [+/- 1° C] |
| Probe Input | Cell constant of 1.5 ESD Protection: 700 Volts Three (3) sample readings / second : display updated every second |
| Relays | Fuse protected electromechanical. Control Relay (1): 250 VAC, 10amp contact relay Feed Relay (1): 250 VAC, 10amp contact relay Biocide Relay (2): 250 VAC, 10amp contact relay Contact type: Normally open and normally closed contacts (FORM C) Change over relay. |
| LCD Display | 32-Digit, 2 Line, Backlit Liquid Crystal Display [LCD] |
| Operating Temperature | 32° F to 122° F [0° C to 50° C] |
| Memory Backup | Data retention of 10 years minimum. |
| Environmental | Printed pc boards conformally coated. Enclosure: IEC IP65, NEMA 4X - hardwired. IEC IP NEMA - 12X prewired |
| Mechanical | Two (2) pc boards [three (3) if communication option installed]. Control CPU board: microcontroller and display - low voltage. Terminal power I/O board: transformer, fuses, terminal blocks, relays. Option board: 4-20 mA output - low voltage. |

10.0 Product Exploded View



11.0 Product Parts List

| Item No. | Part No. | Description |
|----------|----------|---|
| 1 | 38045 | Housing, DC5500-100 & DC5500-200 |
| | 38047 | Housing, DC5500 - all others |
| 2 | 32186 | Screw, 4-40 x 0.37 |
| 3 | 32187 | Nut, 4-40 flush |
| 4 | 32209 | Latch, machined |
| 5 | 35324 | I/O board assembly |
| 6 | 31632 | Screw, #6 x 0.38 |
| 7 | 34716 | Standoff, adhesive |
| 8 | 25990 | Connector assembly |
| 9 | 33566 | Solder lug terminal |
| 10 | 34735 | Ground wire assembly |
| 11 | 38044 | Label, DC5500 terminal cover |
| 12 | 34074 | Gasket, foam |
| 13 | 34088 | Cover, utility box |
| 14 | 32094 | Label |
| 15 | 35378 | Label, DC5500 |
| 16 | 38038 | Front panel assembly |
| 17 | 31617 | Cover, Liquitron |
| 18 | 30588 | Label |
| 19 | 32211 | Cap, 0.125 x 0.38 |
| 20 | 32352 | O-Ring sponge |
| 21 | 32395 | Screw, self-tapping |
| 22 | 34911 | Cover, fuse |
| 23 | 25957-1 | Cord clamp |
| 24 | 28892 | Dowel |
| 25 | 30749 | Power cord, 115 V |
| | 30751 | Power cord, 230 V US |
| | 30752 | Power cord, DIN |
| | 34783 | Power cord, UK |
| | 30754 | Power cord, AUST |
| | 34784 | Power cord, SWISS |
| 26 | 35711 | Power cord, 115 V, NEMA 15-R, (DC5500-111 only) |
| | 33636 | 4-pin cable assembly (DC5500-XX2 models) |
| 27 | 31571 | Cord clamp |
| 28 | 35712 | Fuse, 4A, time delay |
| 29 | 25930 | 4-pin jack cap |



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