

PULSATrol[®]

**MICROPROCESSOR-BASED WATER
TREATMENT CONTROLLER**

MBC 300 SERIES

MODEL MBC 310

**INSTALLATION
OPERATION
MAINTENANCE
INSTRUCTION**

PULSATROL@ FACTORY SERVICE POLICY

Your PULSATrol™ controller is a state of the art microprocessor based unit with on-board diagnostics. If you are experiencing a problem with your PULSATrol™ controller, first consult the troubleshooting guide in your operation and maintenance manual. If the problem is not covered or cannot be solved, please contact our Technical Services Department for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder Electronic Control Operations. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder ECO. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

PULSATROL@ WARRANTY

Pulsafeeder, Inc. warrants PULSATrol™ control systems of its manufacture to be free of defects in material or workmanship. Liability under this policy extends for 24 months from date of shipment. The manufacturer's liability is limited to repair or replacement of any failed equipment or part which is proven defective in material or workmanship upon manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed the selling price of such equipment or part.

The manufacturer disclaims all liability for damage to its products through improper installation, maintenance, use, or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any unauthorized repair. The manufacturer is not responsible for consequential or other damages, injuries, or expense incurred through the use of its products.

The above warranty is in lieu of any other warranty, whether expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to provide any warranty other than the above.

FCC WARNING

This equipment generates and uses radio frequency energy. If not installed and used properly, in strict accordance with the manufacturer's instructions, it may cause interference to radio communications. It has been type tested and found to comply with the limits for a class A computing device pursuant to subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial or industrial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures necessary to correct the interference.

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1. INTRODUCTION

The PULSAtrol™ Series of microprocessor based controllers have been designed with the capability to control and monitor a wide range of parameters, both analog and digital.

This instruction manual covers the functions of the MBC300 Series of PULSAtrol™ controllers. Refer to Table 1 for the specific standard features and options for the model number of your controller. All standard features are covered in this manual and most options have instructions where applicable.

For your convenience, there is an abbreviated instruction and software “MENU MAP” laminated card supplied with all manuals to be kept with the controller. This card is not a substitute for this instruction manual. It is supplied as a quick reference only and should be used in conjunction with the instruction manual.

DESCRIPTION

The MBC300 Series of controllers is designed to monitor and control Total Dissolved Solids (TDS) in steam boiler systems in terms of electrical conductivity measured in microSiemens/cm ($\mu\text{S}/\text{cm}$). The controller allows the user to choose sample methods, either continuous sample or timed sample. A set point of the acceptable conductivity limit is entered into the controller through the front keypad. If the maximum limit is exceeded in the continuous sample mode, a blowdown valve is opened. The system water with higher levels of TDS is blown down while fresh make-up water is added. This results in reduced TDS levels in the boiler. In the timed sample mode, the controller opens the blowdown valve on a timed interval for a preset length of sample time. If TDS is below the set point, the valve will close until the next timed sample. If the TDS is above the maximum limit, the valve will remain open until the solids are reduced to below the set point.

The design also includes a high/low conductivity alarm indicator which is available with optional relay output and/or dry contacts. The alarms can be operated in one of two modes. In follow set point, an alarm offset is entered and the alarms automatically adjust themselves around the set point. The other mode is independently set. This allows the user to independently set both the high and low alarms. The alarm conditions that will energize the output are programmable.

The design allows the MBC300 Series to accept options such as selectable inhibitor feed timers, analog outputs, second boiler control and communications. A self charging capacitor is used to maintain time and history for up to two weeks. The EEPROM protects operating parameters during power outages. Hand/Off/Auto keys are provided on the keypad for immediate control of pumps, solenoid valves, etc., without scrolling through menus.

TABLE 1 The MBC 300 Series

| STANDARD FEATURES | OPTIONS |
|--|--|
| MBC310 | MBC310 |
| Conductivity Control | A BN-2 Electrode |
| Selectable Sample Mode (Continuous or Timed) | C Selectable Timer: Percent, Limit, or Pulse with Accumulator |
| | D Alarm Output Relay |
| | E Second Boiler Control |
| | K Dry Alarm Contact |
| | L-1 Serial Line Communications with Software |
| | L-2 Serial Line Communications with Software and Modem |
| | M-1 0-1 mA Recorder Output, Linear |
| | M-2 4-20 mA Recorder Output, Linear |
| | M-3 4-20 mA Isolated Programmable Proportional Output |



**!!WARNING!!
CONTROLLER COULD BE
DAMAGED AND VOID
WARRANTY!**

Avoid locations where the controller would be subjected to extreme cold or heat [less than 0°F (-17.8°C) or greater than 122°F (50°C)], direct sunlight, vibration, vapors, liquid spills or EMI (electromagnetic interference; i.e., strong radio transmission and electric motors).

2. INSTALLATION

LOCATION

Select a mounting location convenient to grounded electrical and plumbing connections. Mount controller on a wall or other vertical surface. Position so operator has access to the unit and a clear view of front panel display. Avoid locations where the controller would be subjected to extreme cold or heat (See Warning at left!) Installation should comply with all national, state and local codes. An actual size mounting template is provided in the back of this manual for your convenience. Refer to Section 6 Diagrams, Diagram 1, pg. 24 for mounting details and dimensions of our standard enclosure.

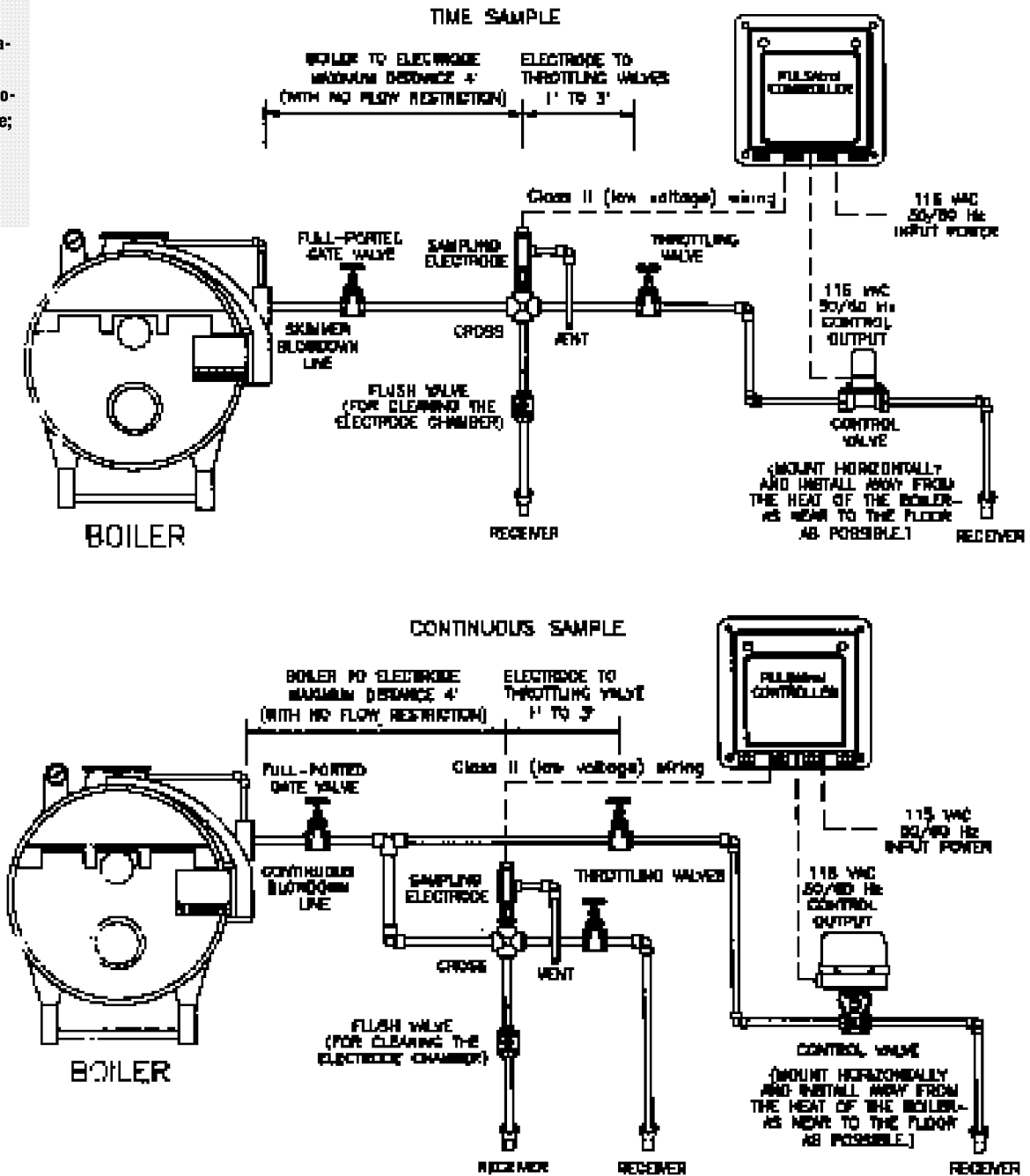


FIGURE 1 Typical Installations

INSTALLATION NOTES

1. Assure skimmer line is 4 to 6 inches below the surface and yet not below the first row of tubes.
2. DO NOT use a column to automate blowdown.
3. DO NOT automate bottom blowdown.
4. Measuring surfaces of the electrodes must be continuously immersed in system water.
5. Valves installed between the electrode and the boiler must be full port.
6. A throttling device must be installed in the blowdown and sample line(s) on the system side of the blowdown valve and after the electrode. This will be used for throttling the blowdown.
7. Install water meters horizontally with meter face up and observe temperature and pressure ratings.
8. Electrode should be installed with a gate valve on the bottom of the cross for flushing and cleaning the electrode.
9. Blowdown valves should be mounted horizontally and installed away from heat of the boiler and near to the floor.
10. When installing sampling assembly and blowdown assembly, distances specified in Figure 1 should be adhered to as closely as possible.
11. Electrode wiring is to be run in a dedicated conduit. Do NOT run in conduit with 120 VAC wiring. Connect conduit to top hole on access union - NOT side vent hole.
12. Flow arrows on electrode should be parallel with the piping run.

ELECTRODE INSTALLATION

Controller should be per installation diagram (see Figure 1). Make sure all fittings and connections are secure:

1. Remove power from the controller.
2. Close isolation valve located before the electrode (Figure 1).
3. Open the flush valve to drain water from electrode housing; to insure no water or pressure is present in this part of the assembly (Figure 1).
4. Apply at least six wraps of teflon tape to threads of electrode. Install nipple and adapter if not already installed (Figure 2).
5. Install electrode into cross housing. Make sure that flow arrows marked on electrode are lined up parallel with the piping run and point in direction of flow (Figure 3).
6. Pass wires to the controller through threaded nipples, union and access tee. Leave vent open on access tee. Refer to Section 6, Diagram 2, page 25. (Figure 4)
7. Tighten all connections. Do not over tighten.
8. Close flush valve. Open isolation valve up-line from electrode slowly to prevent water hammer. Carefully inspect for leaks.
9. Make sure sample port on flow assembly is closed and apply pressure and flow by opening hand valves slowly to avoid water hammer. Refer to Section 6, Diagram 2, pg. 25, for information and specifications for the electrode supplied with your system.



!!WARNING!!

Always use extreme caution when installing or removing electrode. System water is HOT and under HIGH PRESSURE!

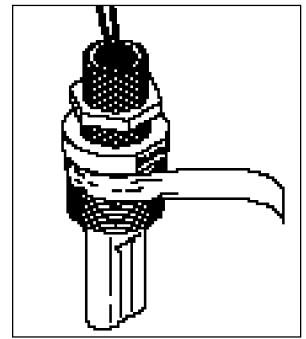


FIGURE 2

Apply at least 6 wraps of Teflon tape to electrode threads.

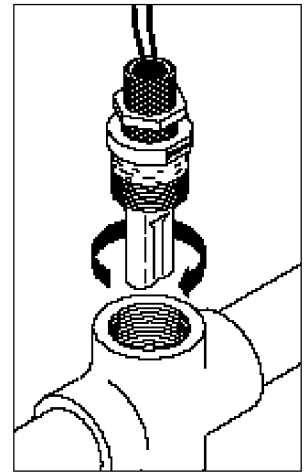


FIGURE 3

Install electrode into cross housing. Make sure "FLOW" marked on electrode is parallel to piping run.

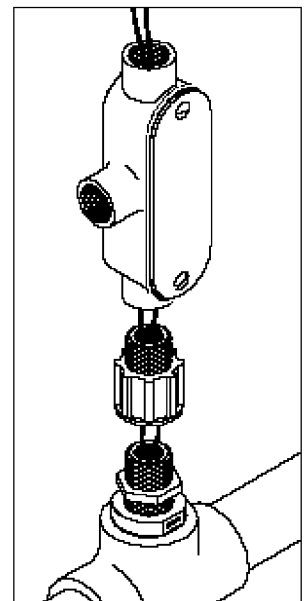


FIGURE 4

Complete electrode assembly installation.

ACCESSORIES

(Available through your Pulsafeeder distributor or sales representative, but not included as standard)

Boiler Conductivity Timed Sample

1. Blowdown valve, solenoid, strainer or motor operated ball valve.
2. Needle valve or orifice union and plates for throttling blowdown flow rate.
3. A full-port gate valve for isolation of blowdown assembly for cleaning and calibration.
4. A flush valve for sensor to empty sensor line for cleaning and calibration.
5. Chemical metering pumps as required.
6. Contact head water meter, if controller incorporates as pulse timer (optional).
7. External alarm, if controller incorporates alarm relay. Refer to Figure 1, Typical Installation, pg. 5.

Boiler Conductivity Continuous Sample

1. Blowdown valve, solenoid and strainer or motor operated ball valve.
2. Two needle valves or two orifice unions and plates for throttling blowdown.
3. A full-port gate valve for isolation of blowdown assembly.
4. A flush valve for sensor.
5. Chemical metering pumps as required.
6. Contact head water meter, if controller incorporates as pulse timer (optional).
7. External alarm, if controller incorporates alarm relay. Refer to Figure 1, Typical Installation.



!!CAUTION!!

Line voltage is present on the power supply located behind the Safety/EMI cover behind the front panel. Line voltage is also present on the relay board located in the bottom of enclosure, even when power is off.

POWER MUST BE DISCONNECTED WHILE CONNECTIONS ARE BEING MADE!



!!NOTICE!!

For proper rejection of AC line voltage spikes, sensor EMI noise rejection and personal safety, the case ground (SAFETY GROUND) must be properly installed. If there is ANY doubt, consult a qualified electrician.

ELECTRICAL WIRING

The PULSAtrol™ Series 300 electronic circuitry is protected with a .25 amp 250V fuse (little fuse 313.250), located on the power supply board (in previous versions, Bussman BK/PCE-5 or S504-2 were used).

Units are factory predrilled with easily accessible terminals for hard wiring. See Diagram 3, Relay Board, pg. 26, and Diagram 4, Electrical Output Connections, pg. 27, for input and output power connections.

The controller should be connected to its own 15 amp power branch (i.e., its own wiring, circuit breaker, etc.).

NOTE: Use only 16 or 18 AWG wire for conduit power and load connections. Never run power and signal wiring (Example: Sensor, proportional or recorder outputs) together in the same conduit.

NOTE: Liquid tight fittings are provided for all low voltage signal leads. When connections are required by the end user, follow the instructions below:

Open Enclosure

- 1) Loosen thumb screw on dust cover and lift up.
- 2) Remove the captive screws from upper control panel and open panel. **NOTE:** the screws are retained and will not fall out.

Power

The power source connection is made on J5 (Refer to Diagram 3, Relay Board, pg. 26).

Terminals: 1= black hot, 2 = white neutral, and 3 = green ground.

The controller should be connected to its own 15 amp power branch (i.e., its own wiring, circuit breaker, etc.). This connection supplies power to both the controller and relay controlled devices. Use only 16 or 18 AWG wire.

Sensor Connections

Refer to Diagram 5, Daughter Board, pg. 28, for location of connections. For standard non-temperature compensated probes, two-wire shielded cable should be used with shield being connected only at controller. If temperature compensated probe is used, three wire shielded cable should be used. See Figure 5 and 6.

Water Meter/Pulse Timer

If a Selectable Inhibitor Feed Mode is present and the Pulse Timer Mode is chosen, connect the water meter on relay board to connector J4; connections are pin 9 and pin 10 Water Meter, see Figure 7. Each individual timer is supplied with its own water meter input connection. If more than one selectable timer is to be used as a pulse timer with only one water meter, short water meter 1 input connection (Pin 10) to any additional water meter connections (water meter 2 - Pin 14, water meter 3 - Pin 16). These connections are provided on the Relay Board. This connection may or may not be made at the factory. If individual water meter inputs are required, make sure connections are individually made and not jumpered. Refer to Diagram 3, Relay Board, pg. 26.

Alarm Dry Contact

Alarm dry contacts (Rated @ 500 mA) are provided when Option K has been ordered for user connection. Refer to Diagram 3, Relay Board, pg. 26.

Use the Electrical Output Connections Table (refer to Diagram 4, pg. 27) in conjunction with the Relay Board drawing (Diagram 3) for electrical output connections.

Relay

Relay connections are made on J8 and J9. Use only 16 or 18 AWG wire (refer to Diagram 3, pg. 26 for the location of connections). Refer to Diagram 4, pg. 27, for relay assignments specific to your controller's model number. Each relay output is individually protected by a replaceable (Bussman BK/PCE-5) plug-in 5 amp fuse located on the relay board.

There are 3 connections provided for each relay: 1=Common, 2=Normally Closed, and 3=Normally Open.

Typically an on/off device, like a pump, is wired in the normally open state (that is 1 and 3). When wired this way, the device is activated (i.e., turns on) when the relay activates. Some components, like motorized ball valves typically used for "blowdown", require power to be supplied in either state. In this situation, use all three contacts as illustrated in Diagram 4, Electrical Output Connections, pg. 27.

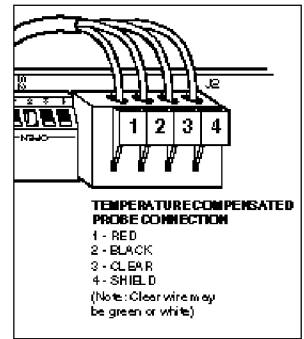


FIGURE 5
Temperature compensated probe connection.

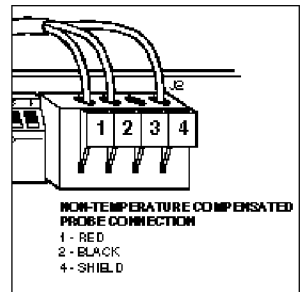


FIGURE 6
Non-temperature compensated probe connection.

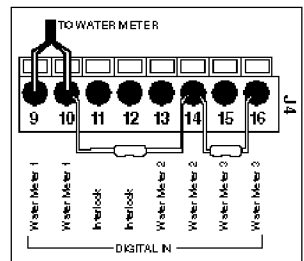


FIGURE 7
Water meter connection on relay board. Shown with jumpers installed.



!!WARNING!!

When power is supplied to the unit, line voltage is present on the Relay Board located in the bottom of the enclosure even with the Logic Power switch



NOTE:

When Initializing or Re-Initializing your controller, all of the system settings will be overwritten by original factory default settings. The controller must be re-configured to your specifications.

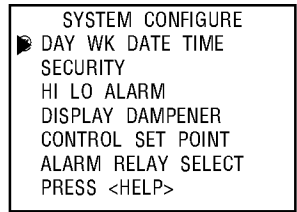
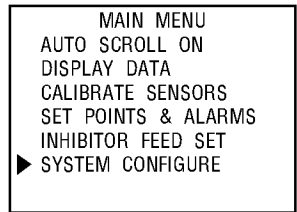
3. Start-Up Instructions

READ THE FOLLOWING BEFORE PROCEEDING ANY FURTHER!!

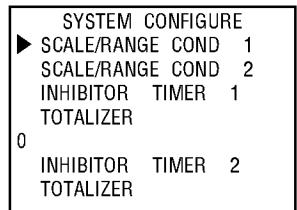
INITIALIZATION

This unit requires initialization upon start-up. Before applying power, insure that devices being controlled are not in a position to cause harm or damage if activated upon initial start-up. With the controller now installed in a convenient location, INITIALIZE Controller. Supply power to the controller and turn the Logic Power switch on. The power LED indicator light will be illuminated. When controller is powered up, the MAIN MENU (shown right) will be displayed.:

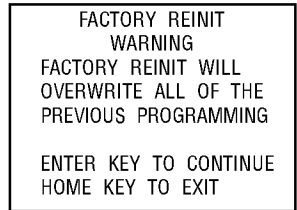
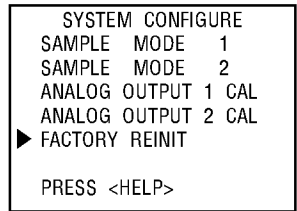
1. Use the ARROW keys to move the prompt to **SYSTEM CONFIGURE** and press ENTER.
2. Use the ARROW keys to move the prompt to **FACTORY REINIT** and press ENTER.
3. The Factory Re-Init Warning will be displayed. Press the ENTER key to execute Initialization. Press the HOME key repeatedly to return to the **MAIN MENU**.



Press SCROLL DOWN to reveal rest of System Configure Menu. Actual screens displayed may vary according to options available.



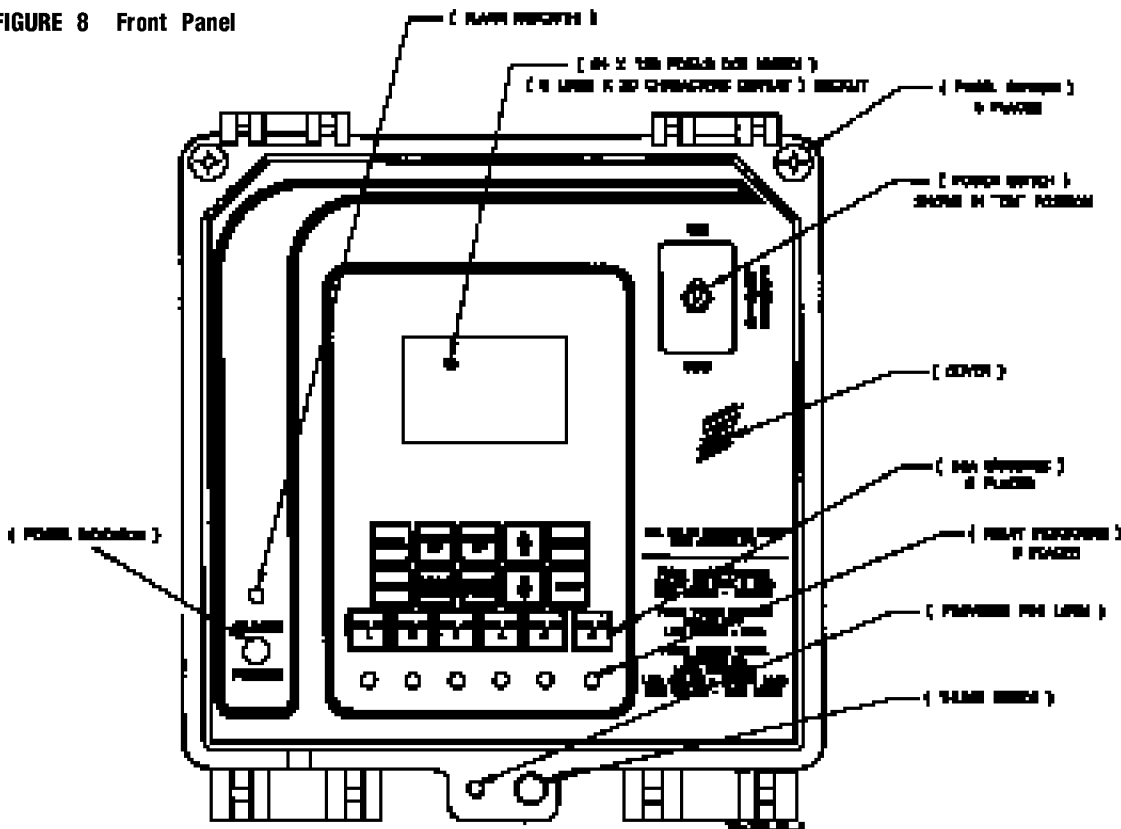
Press SCROLL DOWN to reveal rest of System Configure Menu. Actual screens displayed may vary according to options available. FACTORY REINIT is present on all controllers.



FRONT PANEL

Take a moment to review Figure 8, to become familiar with the MBC300 Series front panel.

FIGURE 8 Front Panel





TIP:

For help with menu locations, please refer to the Menu Map@supplied with your controller.

MENU STRUCTURE

The PULSAtrol™ menu structure and hardware are designed to be user friendly. This Main Menu structure diagram shows first level of all sub-menus in a MBC300 Series PULSAtrol™. Not all sub-menus may be present with your controller. The laminated “MENU MAP” supplied with the controller reflects your specific system with options ordered.



Auto Scroll Displays Date, Time, Week Number, Software Version, and present sensor readings. It also shows System Alarms and source if alarm is activated. Note: After five minutes of no keypad activity, the controller will start to Auto Scroll automatically.

Display Data This menu displays system parameters only. No settings or adjustments are made through this menu. Present System Conductivity, configured rising or falling set points, and active alarms and source are displayed.

Calibrate Sensor(s) This menu is for analog input conductivity sensor calibration. In this menu, the user is prompted to choose either 1 or 2 point calibration. After a choice is made, the user is prompted to enter the LO and HI values, or just the HI value if one point calibration is chosen.

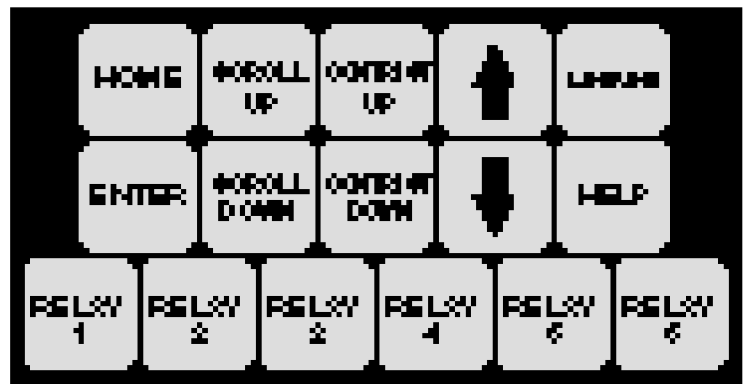
Set Points and Alarms In this menu, the user is prompted to enter settings pertaining to alarms and set points that control the system operation.

Inhibitor Feed Set In this menu, the user is prompted to enter settings pertaining to the inhibitor feed mode chosen in the System Configure menu.

System Configure This is the first selection made at start up. In this menu, the user is prompted to configure system functions and options to your specific application. System Configure can include such things as time of day, date, security code, track set point or independent set of high/low alarm, display dampener, rising or falling set points, alarm relay selections, operating scale, the selection of the inhibitor feed mode, water meter pulse totalizer, analog output selection, and sample mode type.

KEY PAD OPERATION

The Key Pad on the MBC300 Series is easy to use and will guide you through all the sub menus and functions of the controller. Feel free to try out these keys as you read about them. You will not hurt the controller and the values will need to be reprogrammed later anyway.



Home Press this key to return to previously displayed menu.

Scroll Up/Scroll Down Some menus contain more choices than can be displayed at once. Press either key to reveal other items on menu displayed. If no other choices are present, nothing will happen when pressing Scroll Keys. The Menu Map supplied with your controller will show you which menus need to be scrolled to show additional choices.

Contrast Up/Contrast Down Press these keys to control contrast of viewing screen.

Arrows These keys are used to move the triangular cursor or “prompt” as it is referred to in this manual (see Main Menu screen at top of page.) The Arrow Keys are also used to change the numbers associated with the various settings you will be entering. Use “down” arrow to select lower numbers and the “up” arrow to select higher numbers.



TIP:

When using the Arrow Keys, press once to change numbers by one unit. Continuously holding down either Arrow Key will change numbers more rapidly.

Language The language key will be used for alternative foreign languages for our international customers.

Enter This key has three functions:

FIRST, after moving the prompt with the Arrow Keys to a menu choice, press the Enter Key to display the sub menu of the choice you selected.

SECOND, within the sub menu, after moving the prompt with the Arrow Keys to the selection of your choice, pressing the Enter Key will activate the selection (the prompt and the value to be changed will begin to flash).

THIRD, after selecting the value needed with the Arrow Keys, press the Enter Key to “lock-in” the value. The prompt and value selected will quit flashing. Or, if other values are present within the selection chosen, the prompt and the next value in line will begin flashing.

Help When pressed, this key will display simple instructions for the operation of the Enter, Home, Arrows, and Scroll keys.

Relays (1-6) These Hand/Off/Auto (HOA) keys allow immediate control of pumps, solenoid valves, etc. affected by the controller without scrolling through the menus. Press a Relay Key once to force relay on for 5 minutes (an amber light will appear below that key). Press Relay Key again to force relay off (a red light will appear below that key, relay will be forced off until key is pressed again). Press a Relay Key a third time to return relay to auto control (green light will indicate that relay is on, no light indicates that relay is not activated).



IMPORTANT:

NEVER leave a screen with choices still @lashing@
Controller accuracy may be affected, and/or controller may not operate properly

SAMPLE PROGRAMMING

The following is a detailed example of how to program your controller. Once you have mastered this exercise, you will be ready to set up the controller to your specifications.

IMPORTANT! Please note that in all programming instructions, *keypad instructions* are presented as all capitals—“ENTER,” items as they *appear in the display* are presented as all capitals and bold face—“**DISPLAY DATA.**”

For this exercise, you will set “DATE and TIME.”

1. If not already displayed, press HOME key until **MAIN MENU** is displayed. Then use ARROW keys to move prompt to **SYSTEM CONFIGURE.**

```
MAIN MENU
AUTO SCROLL ON
DISPLAY DATA
CALIBRATE SENSORS
SET POINTS & ALARMS
INHIBITOR FEED SET
▶ SYSTEM CONFIGURE
```

Press ENTER to display SYSTEM CONFIGURE menu.

```
SYSTEM CONFIGURE
▶ DAY WK DATE TIME
SECURITY
HI LO ALARM
DISPLAY DAMPNER
CONTROL SET POINT
ALARM RELAY SELECT
PRESS <HELP>
```

2. Move Prompt with ARROW keys to **DAY WK DATE TIME.**

Press ENTER to display **DAY WK DATE TIME** menu.

```
DAY WK DATE TIME
ENTER
▶ DATE 00/00/1 995
TIME 00:00
PRESS <HELP>
```

3. Move Prompt with ARROW keys to line below **ENTER.**

Press ENTER. Month entry and prompt will begin to flash

(Continued on next page)



TIP:

Be sure to press keys firmly until you feel or hear a faint click, then pause before you try again. There is a very slight delay for the controller to react to your command. This is normal.

```
DAY WK DATE TIME
ENTER
▶ DATE      03/00/1995
TIME      00:00
PRESS <HELP>
```

6. Select current Month with ARROW keys.

Press ENTER.

```
DAY WK DATE TIME
ENTER
▶ DATE      03/05/1995
TIME      00:00
PRESS <HELP>
```

7. Prompt and Date will flash. Select current date with ARROW keys.

Press ENTER.

```
DAY WK DATE TIME
ENTER
▶ DATE      03/15/1995
TIME      00:00
PRESS <HELP>
```

8. Prompt and Year will flash. Select current year with ARROW keys.

Press ENTER.

```
DAY WK DATE TIME
ENTER
DATE      03/15/1995
▶ TIME      08:00
PRESS <HELP>
```

9. Move Prompt with ARROW keys to **TIME**. Press ENTER. Prompt and Hour will flash. Select current hour (24 hour clock) with ARROW keys.

Press ENTER.

```
DAY WK DATE TIME
ENTER
DATE      03/15/1995
▶ TIME      08:00
PRESS <HELP>
```

10. Prompt and Minutes will flash. Select current minutes with ARROW keys.

Press ENTER. Nothing should be flashing and that completes **DAY WK DATE TIME** programming.

Congratulations, you've done it! Now, press HOME key repetitively until **MAIN MENU** appears.



!!WARNING!!

When power is supplied to the unit, line voltage is present on the Relay Board located in the bottom of the enclosure even with the Logic Power switch



NOTE:

When Initializing or Re-Initializing your controller, all of the system settings will be overwritten by original factory default settings. The controller must be re-configured to your specifications.



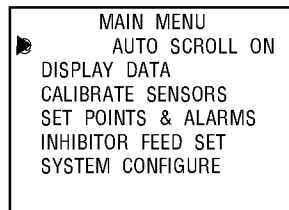
TIP:

For help with menu locations, please refer to the Menu Map@supplied with your controller.

4. MBC300 Series CONTROLLER SET UP

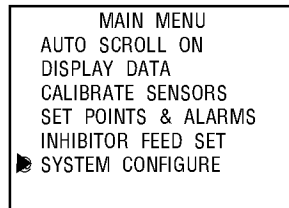
GENERAL INFORMATION

Before applying power, insure that devices being controlled are not in a position to cause harm or damage if activated upon initial start-up. With the controller now installed in a convenient location, INITIALIZE Controller (see Initialization procedure on pg. 9). Supply power to the controller and turn power switch on. The power LED indicator light will be illuminated. When controller is powered up, the MAIN MENU (shown right) will be displayed.



SYSTEM CONFIGURE

Configure the controller functions using the ARROW keys to move the Prompt to **SYSTEM CONFIGURE** on the main menu (shown at right). Press ENTER and the selections to be configured will be displayed. If a security code has been entered, press ENTER and enter code as prompted.



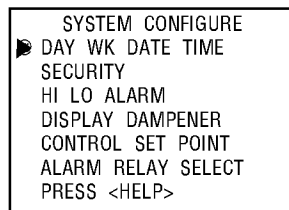
A) Set CONTRAST ADJUSTMENT:

1. If display contrast requires adjustment, use the CONTRAST UP or CONTRAST DOWN keys on the control panel key pad to adjust screen for best viewing.



B) Set DAY WEEK DATE TIME:

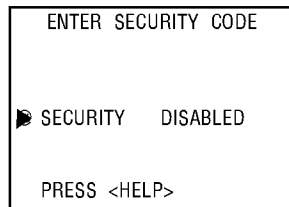
1. Please refer to Section 3 (pg.11) Sample Programming.
2. When completed press HOME once to return to **SYSTEM CONFIGURE** menu.



C) Set SECURITY Access Code:

The Controller can be configured to have a Security Access Code. One must know this code to access the System Configure menu.

1. Use the ARROW keys to move the Prompt to **SECURITY** and press ENTER. **SECURITY DISABLED** will appear. (If a security code has been entered, "SECURITY 0000" will be displayed. Press ENTER, prompt will flash. Enter security code using ARROW keys. Press ENTER, System Configure menu items will be displayed.)



To set a security code, press ENTER. Press the UP ARROW key to display the desired code and press ENTER. After a security code has been entered, the operator must know the code to access the System Configure menu items.

2. To disable the code after it has been entered, you must first know the code. Use the ARROW keys to move the Prompt to **SYSTEM CONFIGURE** on the main menu. Press ENTER.

3. **ENTER SECURITY CODE** menu will be displayed. Press ENTER, prompt will flash, use the ARROW keys to enter the security code. Press ENTER, display will return to **SYSTEM CONFIGURE** menu with prompt next to **SECURITY**.

4. Press ENTER to return to **ENTER SECURITY CODE** menu. Press ENTER, prompt will flash. Press and hold DOWN ARROW key until display shows **DISABLED** and press ENTER.

5. Press HOME once to return to **SYSTEM CONFIGURE** menu.

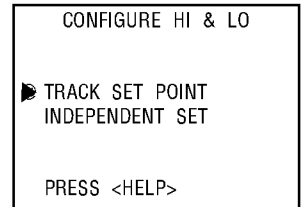
D) Set HI LO ALARM

You have the choice to select “Track Set Point” or “Independent Set Point.” “Track Set Point” triggers Hi or Low alarm based on the same Alarm Offset range over or under the controller set point.

“Independent Set Point” allows you to enter Hi and Low values of your choice over or under the controller set point.

The values for “Track Set Point” or “Independent Set Point” are set in the SET POINTS & ALARMS selection in the MAIN MENU.

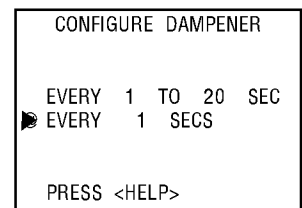
1. Use the ARROW keys to move the prompt to **HI LO ALARM** and press ENTER. The prompt indicates the present alarm mode, either **TRACK SET POINT** or **INDEPENDENT SET** (independent set of high and low alarms).
2. Use the ARROW keys to move the prompt to the desired alarm mode. Press ENTER and the prompt will blink, reminding you to ENTER your choice.
3. Press HOME to return to the **SYSTEM CONFIGURE** menu.



E) Set DISPLAY DAMPENER

The setting determines the average number of seconds before a new reading is displayed. This reduces the typical fluctuation of digital displays.

1. Use the ARROW keys to move the prompt to **DISPLAY DAMPENER**, press ENTER. The display dampener last set or the factory setting will be displayed.
2. Press ENTER and the display will prompt you to set sensitivity or display dampening with the ARROW keys, **1** being the most sensitive and **20** being the least, press ENTER.
3. Press HOME to return to **SYSTEM CONFIGURE**.



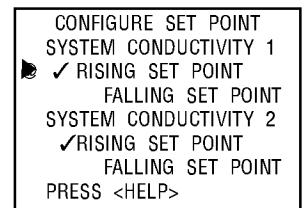
NOTICE:

Pressing **Scroll Up** or **Down** will show more of the menu if additional selection choices are available in that menu.

F) Set CONTROL SET POINT

This setting gives you the option to configure either a rising or falling set point for Conductivity values.

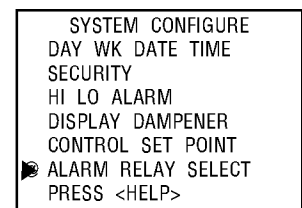
1. Use the ARROW keys to move the prompt to **CONTROL SET POINT**. Press ENTER.
2. When the Configure Set Point screen appears, the position of the prompt will indicate the present control set point mode, **RISING** or **FALLING**. Use the ARROW keys to move the prompt to the desired control set point mode. Press ENTER and the prompt will flash. Press ENTER again to enter your choice. A “✓” mark will appear or disappear confirming your choice.
3. Use the ARROW keys to move the prompt to configure other set point if your controller is equipped with a second boiler controller (Option E).
4. Press HOME to return to **SYSTEM CONFIGURE**.



G) Set ALARM RELAY SELECT (Option D)

This setting lets you choose which system condition will activate an external alarm relay

1. Use the ARROW keys to move the prompt to **ALARM RELAY SELECT** and press ENTER. When Alarm Relay Select menu appears, a “✓” indicates which system condition will activate the alarm relay. Use the ARROW keys to move the prompt to the





NOTE:

Only the alarm relay will be disabled without the @heck@ mark. Front panel alarm light will still flash if alarm condition exists.



IMPORTANT:

If the Scale-Range is changed (present scale is displayed in the @Auto Scroll On@ menu), the keypad becomes inoperative for 15 seconds. A reminder will appear that a switch on the daughter must be changed also! See table at right for proper switch configuration.



NOTE:

Inhibitor Timer selections will appear if your controller is equipped with Option C. Example at right shows two Inhibitor Timers installed.

system condition you want to activate/deactivate the alarm relay.

2. Press ENTER. Press ENTER again and a "✓" will appear or disappear next to your selection depending on what was showing at that system condition.

3. Press HOME to return to **SYSTEM CONFIGURE**.

H) Set SCALE/RANGE

This selection lets you choose the conductivity range you wish your controller to monitor.

1. SCROLL DOWN in **SYSTEM CONFIGURE** menu to reveal **SCALE/RANGE** selection.
2. Press ENTER and the prompt will indicate the present scale. Use the ARROW keys to move the prompt to the desired scale.
3. Press ENTER and the prompt will flash, reminding you to press ENTER again to make the selection. A message will appear, reminding you change switch on daughter board, display will freeze for 15 seconds.
4. Use ARROW keys to move prompt to **SCALE/RANGE COND 2** and repeat steps 2 and 3 above if your controller is equipped with a second boiler control.
5. Press HOME to return to **SYSTEM CONFIGURE** menu.

Scale/Range Table (refer to Diagram 5 Daughter Board, pg. 28)

| | S2-"5" | S2-"4" | S2-"3" | S2-"2" | S2-"1" |
|--------------|--------|--------|--------|--------|--------|
| 0-500 | | | | | ● |
| 0-2,000 | | | | ● | |
| 0-5,000 | | | ● | | |
| 0-10,000 | | ● | | | |
| 0-5V0-20,000 | ● | | | | |

● = Closed or On

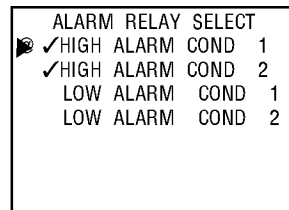
Your PULSAtrol™ comes from the factory pre-configured to monitor conductivity in the range of 0-5,000 mS/cm. The ranges listed in the Scale/Range Table can be selected by the setting of the five dip switches located just left of the sensor input on the conductivity daughter board. Refer to Section 6, Diagram 5, pg 28.

Note: Assure that only one switch is in the closed position. The corresponding range must also be selected from the keypad under the **SYSTEM CONFIGURE** menu.

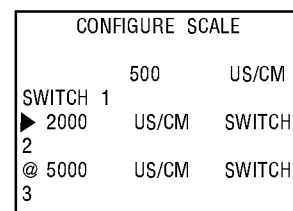
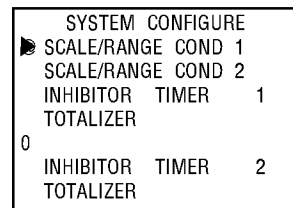
I) Set INHIBITOR TIMER (Option C)

This selection lets you choose the method desired to control the operating duration of the inhibitor feed pump.

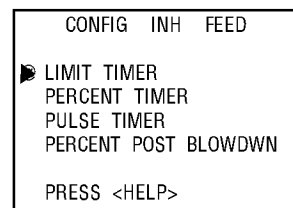
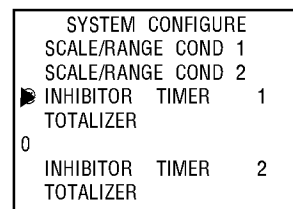
1. Use the ARROW keys to move the prompt to **INHIBITOR TIMER** in System Configure menu.
2. Press ENTER and the prompt will indicate the present inhibitor feed mode. Use the ARROW keys to move the prompt to desired feed mode.
3. Press ENTER and the prompt will flash, reminding you to press ENTER again to make the selection.
4. Use ARROW keys to move prompt to **INHIBITOR TIMER 2** and repeat steps 2 and 3 above if your controller is equipped with a second Option C.



Press Scroll Down to reveal more of the System Configure menu to locate SCALE/RANGE settings.



Press Scroll Down to reveal more of the System Configure menu to locate INHIBITOR TIMER settings.





NOTICE:

TOTALIZER keeps track of water meter pulses. Totalizer will count even if the system is not in pulse timer feed mode and a water meter with a contact head is connected.



NOTICE:

Pulse count may also be read in the **INHIBITOR FEED SET** main menu if system is configured for pulse timer.

5. Press HOME to return to **SYSTEM CONFIGURE** menu.

J) Set TOTALIZER

The Totalizer displays the accumulated number of pulses received from a contact head equipped water meter. This selection lets you reset or enter a count value.

1. Use the ARROW keys to move the prompt to **TOTALIZER**.
2. To reset the totalizer, press ENTER. Use the ARROW keys to set the reset to zero or to the desired count and press ENTER. Press HOME to return to **SYSTEM CONFIGURE** menu.

K) Set SAMPLE MODE

The Sample Mode determines whether your controller will monitor the boiler system water on a timed or continuous reading.

1. Use the ARROW keys to move the prompt to **SAMPLE MODE** in the **SYSTEM CONFIGURE** menu and press ENTER.
2. Use ARROW keys to move prompt to continuous sample or timed sample.
3. Press ENTER and the prompt will flash, reminding you to press ENTER again to make the selection.
4. If your controller is equipped with a second boiler control, set **SAMPLE MODE 2** at this time.

L) Set ANALOG OUTPUT (Option M1, M2, M3)

The M Options are analog outputs designed for interfacing with recorders, pumps and computers.

M-1 Option is a 0 to 1 mA output, designed to interface with an analog recorder or pump. The output is 0 to 1 mA over the full scale of the controller. For example, if the analog input was conductivity and the scale was 0 to 2000 µS/cm, the analog output would be 0 mA at 0 µS/cm and 1 mA at 2000 µS/cm.

M-2 Option is a 4 to 20 mA output, designed to interface with an analog recorder. The output is 4 to 20 mA over the full scale of the controller. For example, if the analog input was conductivity and the scale is 0 to 2000 µS/cm, the analog output would be 4 mA at 0 µS/cm and 20 mA at 2000 µS/cm.

M-3 Option is an Isolated Proportional 4 to 20 mA output, designed to interface with an analog recorder, metering pump or computer. The output is 4 to 20 mA over a programmable range. For example, if the analog input was conductivity, the output could be programmed to be 4 mA at 100 µS/cm, the "LO RANGE" set point, and 20 mA at 3000 µS/cm, the "HI RANGE" set point".

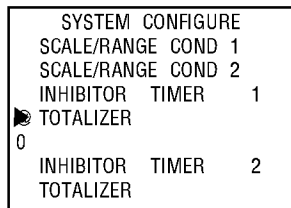
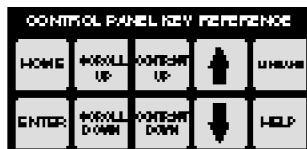
The M Options, analog outputs require calibration upon initial start up. Calibration is recommended after changing scales or after factory reinitialization. For accurate calibration of the analog output, a milliamp meter is required.

Calibration

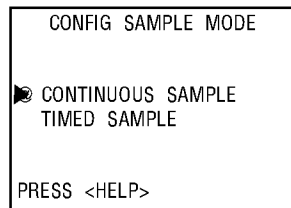
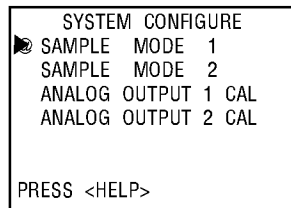
Note: LO = 0 mA for M1 and 4 mA for M2 & M3
HI = 1 mA for M1 and 20 mA for M2 & M3

1. Remove signal wires if installed and connect a milliamp meter to output connections on daughter board. Observe proper polarity (+/-). Refer to Diagram 7, pg. 30, for connections.

Note: The Diagram reflects a dual or 2 channel board, if only one M Option is present there will only be connections for one output (three wires).



Press Scroll Down to reveal more of the System Configure menu to locate SAMPLE MODE settings.



2. Use the ARROW keys to move the prompt to **ANALOG OUTPUT 1 CAL** (you will need to scroll in System Configure menu to get to these selections). If more than one analog output is present, use the ARROW keys to move the prompt to the analog output to be programmed. Refer to menu screen, shown right.

```

SYSTEM CONFIGURE
SAMPLE MODE 1
SAMPLE MODE 2
▶ ANALOG OUTPUT 1 CAL
ANALOG OUTPUT 2 CAL

PRESS <HELP>

```

3. Press ENTER and the analog output (**SYSTEM CONDUCTIVITY**) to be controlled or monitored will be displayed. Use ARROW keys to move the prompt to the analog output to be tagged and programmed. Press ENTER, the prompt will flash.

```

ANALOG OUTPUT 1 CAL

▶ SYSTEM CONDUCTIVITY

PRESS <HELP>

```

4. Press ENTER and SCROLL DOWN to **LO ADJUST OUTPUT**. Press ENTER and while the prompt is blinking, use the keys to adjust the “LO” mA reading on the externally connected milliamp meter. Press ENTER to enter the “LO” calibration adjustment, i.e. 0 for 0-1 mA.

```

ANALOG OUTPUT 1 CAL

▶ LO ADJUST      OUTPUT
HI ADJUST      OUTPUT
LO RANGE      0
US/CM
HI RANGE      5000
US/CM

```

5. Use the ARROW keys to move the prompt to **HI ADJUST OUTPUT**. Press ENTER and while the prompt is blinking use the ARROW keys to adjust the “HI” mA reading on the externally connected milliamp meter. Press ENTER to enter the “HI” calibration adjustment, i.e. 4 for 4-20 mA.

```

ANALOG OUTPUT 1 CAL

LO ADJUST      OUTPUT
▶ HI ADJUST      OUTPUT
LO RANGE      0
US/CM
HI RANGE      5000
US/CM

```

If Option M3 is present continue with steps 6 and 7. If not, continue with step 8 below.

Setting “LO RANGE” and “HI RANGE” (M3 Option)

6. Use the ARROW keys to move the prompt to **LO RANGE** (unit of measure for analog low range set point will be displayed). Press ENTER, prompt will flash. Use the ARROW keys to set **LO RANGE** as prompted. Press ENTER to enter **LO RANGE** set point.

```

ANALOG OUTPUT 1 CAL

LO ADJUST      OUTPUT
HI ADJUST      OUTPUT
▶ LO RANGE      0
US/CM
HI RANGE      5000
US/CM

```

7. Use ARROW the keys to move the prompt to **HI RANGE** (unit of measure for analog high range set point will be displayed). Press ENTER prompt will flash. Use the ARROW keys to set **HI RANGE** as prompted. Press ENTER to enter **HI RANGE** set point.

```

ANALOG OUTPUT 1 CAL

LO ADJUST      OUTPUT
HI ADJUST      OUTPUT
LO RANGE      0
▶ US/CM
@ HI RANGE      5000
US/CM

```

8. Press HOME to return to **SYSTEM CONFIGURE** menu. If more than one “M” option is present, use the ARROW keys to move the prompt to analog output not previously programmed and repeat steps 3 through 5. If no other analog outputs are present, continue with step 9.

9. Press HOME to return to **SYSTEM CONFIGURE** menu. Press HOME again to return to **MAIN MENU**.

10. Remove milliamp meter and connect analog recorder, metering pump or computer.



NOTICE:

Set Point can be either R=rising or F=falling depending on setting made in Control Set Point selection under System Configuration menu.

SET POINTS AND ALARMS

Rising or Falling Set Point

The Rising or Falling Set Point is the setting at which the controller activates an output, such as a solenoid valve when the conductivity set point is exceeded.

1. Use the ARROW keys to move the prompt in **MAIN MENU** to **SET POINTS & ALARMS**. Press ENTER and the **SET POINTS & ALARMS** menu will be displayed.
2. Use the ARROW keys to move the prompt to **SYSTEM CONDUCTIVITY 1**. Press ENTER, **SYSTEM CONDUCTIVITY** menu will appear.
3. Use ARROW keys to move prompt to **R SET PT ___ US/CM** (the factory setting or the last set point entered) will be displayed. Press ENTER, prompt will flash. Use the ARROW keys to set the desired set point. Press ENTER to enter your value.

Set Point Differential

Also referred to as dead band or hysteresis. The offset applied to a set point to prevent chattering of an output relay around a set point.

4. Use the ARROW keys to move the prompt to **SPT DIFF ___ US/CM** (the factory setting or the last set point differential entered will be displayed. Press ENTER, prompt will flash. Use the ARROW keys to set the desired set point differential. Press ENTER to enter your value.

High or Low Alarm Settings

Every analog input has a high/low alarm indicator. The alarms can be configured one of two ways. The controller is factory configured to track the set point meaning an alarm offset is entered that sets the alarm point above and below the set point of the controller. Example: With an "AL OFFSET 200 μ S/cm", and a set point of 1200 μ S/cm, the displayed alarms will be "HI ALARM 1400 μ S/cm" and "LO ALARM 1000 μ S/cm". The high/low alarms can also be configured with independent set points for the "high alarm" and the "low alarm". This is accomplished in "HI LO ALARM" under the "SYSTEM CONFIGURE" menu.

5. Use the keys to move the prompt to **AL OFFSET** (AL OFFSET is displayed if HI LO ALARM has been configured to "Track Set Point" under System Configuration. If so, skip steps 6 & 7. If HI LO ALARM was configured for "Independent Set", skip step 5 and proceed with steps 6 & 7).
The factory setting or the last alarm offset entered will be displayed. Press ENTER, prompt will flash. Use the ARROW keys to set desired alarm offset. Press ENTER to enter your value.
6. Use the ARROW keys to move the prompt to **HI ALARM**. The factory setting or the last high alarm entered will be displayed. Press ENTER, prompt will flash. Use the ARROW keys to set desired Hi Alarm setting. Press ENTER to enter your value.

7. Use the ARROW keys to move the prompt to **LO ALARM**. The factory setting or the last high alarm entered will be displayed.

| |
|-----------------------|
| MAIN MENU |
| AUTO SCROLL ON |
| DISPLAY DATA |
| CALIBRATE SENSORS |
| ▶ SET POINTS & ALARMS |
| INHIBITOR FEED SET |
| SYSTEM CONFIGURE |

| |
|-------------------------|
| SET POINTS & ALARMS |
| ▶ SYSTEM CONDUCTIVITY 1 |
| SYSTEM CONDUCTIVITY 2 |
| |
| PRESS <HELP> |

| |
|-----------------------|
| SYSTEM CONDUCTIVITY 1 |
| ▶ R SET PT 1500 |
| US/CM |
| SPT DIFF 100 |
| US/CM |
| HI ALARM 1700 |
| US/CM LO |
| ALARM 1300 US/CM |

| |
|-----------------------|
| SYSTEM CONDUCTIVITY 1 |
| R SET PT 1500 |
| ▶ S/CM |
| @ SPT DIFF 100 |
| US/CM |
| HI ALARM 1700 |
| US/CM LO |
| ALARM 1300 US/CM |

| |
|-----------------------|
| SYSTEM CONDUCTIVITY 1 |
| R SET PT 1500 |
| US/CM |
| SPT DIFF 100 |
| US/CM |
| ▶ HI ALARM 1700 |
| US/CM LO |
| ALARM 1300 US/CM |

| |
|-----------------------|
| SYSTEM CONDUCTIVITY 1 |
| R SET PT 1500 |
| US/CM |
| ▶ SPT DIFF 100 |
| US/CM |
| @ HI ALARM 1700 |
| US/CM LO |
| ALARM 1300 US/CM |

| |
|---------------------|
| SYSTEM CONDUCTIVITY |
| R SET PT 1500 |
| US/CM |
| SPT DIFF 100 |
| ▶ S/CM |
| HI ALARM 1700 |
| US/CM @ LO |
| ALARM 1300 US/CM |



TIP:

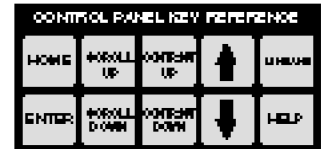
For help with menu locations, please refer to the @Menu Map@supplied with your controller.

Press ENTER, prompt will flash. Use the ARROW keys to set desired Lo Alarm setting. Press ENTER to enter your value.

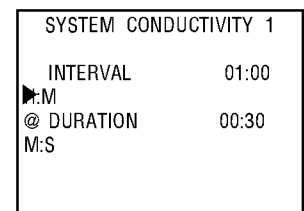
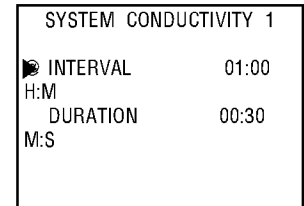
Timed Sample

A programmable timer. Programmed to open a blowdown valve for an operator set sample time. The sample duration is adjustable in one second increments up to 59 minutes and 59 seconds. The intervals between samples is adjustable in on minute increments up to 23 hours and 59 minutes. If the solids are less than the set point, the valve will close until the next sample time. If the solids are above the set point, the controller holds the valve open until the boiler has blowdown enough to reduce conductivity (solids) below the set point.

8. Press SCROLL DOWN to reveal INTERVAL and DURATION programming. Use the ARROW keys to move the prompt to INTERVAL, press ENTER.
9. Prompt and "hours" will flash. Use arrow keys to enter hours, press enter and "minutes" will flash. Use arrow keys to enter minutes and press ENTER. Prompt will stop flashing.
10. Use ARROW keys to move prompt to DURATION, press ENTER.
11. Prompt and "minutes" will flash. Use arrow keys to enter minutes, press enter and "seconds" will flash. Use arrow keys to enter seconds and press ENTER. Prompt will stop flashing.
12. Press HOME key to return to SET POINTS & ALARMS menu. Repeat steps 2 through 11 to configure set points, alarms, interval and duration for second boiler control if equipped.
13. Press HOME key repeatedly to return to MAIN MENU.



SCROLL DOWN while in System Conductivity 1 menu to reveal Interval and Duration settings.



NOTICE:

When configuring Inhibitor Feed Timer in System Configure menu, you may select only one of the modes present.

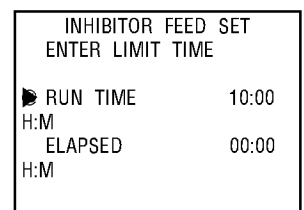
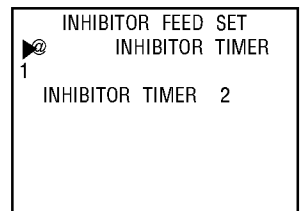
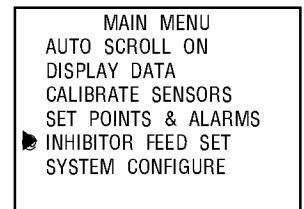
SELECTABLE INHIBITOR FEED TIMER

The inhibitor feed timer for this controller is selectable; the user can choose one of four modes on which to base the addition of inhibitor. The selection of timer modes is made in the **SYSTEM CONFIGURE** menu. Only the mode selected in System Configure will be displayed in the **INHIBITOR FEED SET** menu. Refer to the following timer mode instructions for the mode you selected in the **SYSTEM CONFIGURE** menu.

Feed Limit Timer

LIMIT TIMER, also referred to as lockout timer. The chemical feed pump is actuated based on conductivity simultaneously with blowdown. The timer limits the length of time the pump can be activated during any single blowdown cycle, preventing overfeed that could occur if the blowdown line were clogged. The timer is adjustable in one minute increments up to 23 hours and 59 minutes with an elapsed-time display.

1. Use the keys to move the prompt through the **MAIN MENU** to **INHIBITOR FEED SET**. Press ENTER, **INHIBITOR FEED SET** menu will be displayed with prompt next to **INHIBITOR TIMER 1**. **INHIBITOR TIMER 2** will be displayed if your controller is equipped with Option C, Second Inhibitor Timer.
2. Press ENTER, **ENTER LIMIT TIME** will be displayed with prompt next to **RUN TIME**. Press ENTER and use the ARROW keys to set the desired limit time (**RUN TIME __:__ H:M**) as prompted, press ENTER.
3. Press HOME key repeatedly to return to **MAIN MENU**.





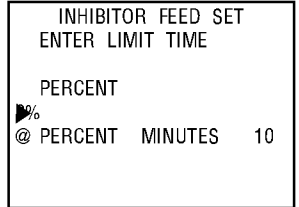
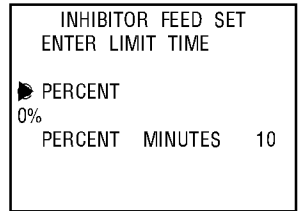
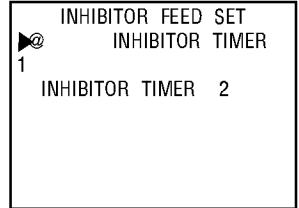
TIP:

For help with menu locations, please refer to the Menu Map@supplied with your controller.

Percent Timer

Also referred to as a cycle timer. The timer runs continuously on an adjustable time cycle, such as ten minutes, with the output being activated for an adjustable percentage of the time cycle. The timer is adjustable in one percent increments up to 100 percent and the cycle time is adjustable from one to 120 minutes.

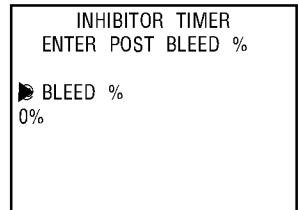
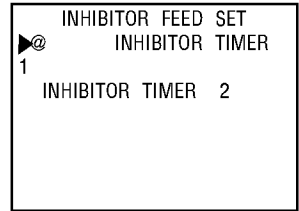
1. Use the keys to move the prompt through the **MAIN MENU** to **INHIBITOR FEED SET**. Press ENTER, **INHIBITOR FEED SET** menu will be displayed with prompt next to **INHIBITOR TIMER 1**.
2. Press ENTER, **ENTER PERCENT TIMER** will be displayed with prompt next to **PERCENT**. Press ENTER and use the ARROW keys to set the desired percent of on-time, **PERCENT ____%**, as prompted, press ENTER.
3. Use the ARROW keys to move the prompt to **PERCENT MINUTES**. Press ENTER and use the ARROW keys to set the desired cycle time as prompted, press ENTER.
4. Press HOME key repeatedly to return to **MAIN MENU**.



Post Blowdown Percent Timer

PERCENT POST BLOWDOWN. This timer is adjustable in one percent increments up to 100 percent of the blowdown time. The timer keeps track of the total blowdown time and activates the chemical feed when the blowdown deactivates for the percent of total blowdown time set.

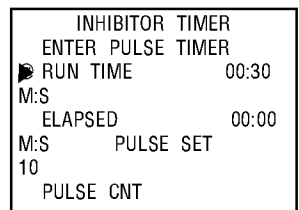
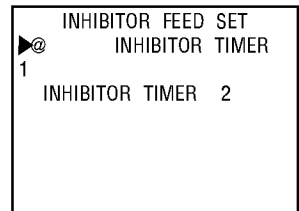
1. Use the keys to move the prompt through the **MAIN MENU** to **INHIBITOR FEED SET**. Press ENTER, **INHIBITOR FEED SET** menu will be displayed with prompt next to **INHIBITOR TIMER**.
2. Press ENTER, **ENTER POST BLEED %** will be displayed with prompt next to **BLEED**. Press ENTER and use the ARROW keys to set the desired percent of on-time as prompted, press ENTER.
3. Press HOME key repeatedly to return to **MAIN MENU**.



Pulse Timer/Accumulator

PULSE TIMER. Also referred to as water meter or reset timer. The timer accepts pulses from a water meter to actuate a chemical feed pump. The timer has an adjustable feed time (RUN TIME) in one second increments up to 250 minutes and 59 seconds with an elapsed-time display. It has a built-in accumulator (PULSE SET) that can count pulses up to 255 before activating the output with an elapsed pulse counter (PULSE CNT). Also incorporated into the timer is a pulse totalizer (TOTALIZER _____) that keeps an ongoing count of the number of pulses received by the timer. This pulse totalizer can be reset to zero or any other number; this is accomplished in the SYSTEM CONFIGURE menu.

1. Use the keys to move the prompt through the **MAIN MENU** to **INHIBITOR FEED SET**. Press ENTER, **INHIBITOR FEED SET** menu will be displayed with prompt next to **INHIBITOR TIMER**.
2. Press ENTER, **ENTER PULSE TIMER** will be displayed with prompt next to **RUN TIME**. Press ENTER and use the ARROW keys to set the desired **RUN TIME ____:__ M:S** as prompted, press ENTER. The elapsed run-time (**ELAPSED ____:__ M:S**) is displayed on the next line.



!!WARNING!!

If **PULSE SET** is entered to zero (0), pulse timer will run continuously.



NOTE:

The pulse counter will store only one (1) overlapping pulse, if received while pumping.

- Use the ARROW keys to move the prompt to **PULSE SET**. Press ENTER and use the ARROW keys to set the desired number of pulses required to activate the timer, press ENTER.
- The present number of pulses (**PULSE CNT** __) received is displayed on the next line.
- The total number of pulses received from the water meter (**TOTALIZER**) is displayed on the next line. This can be reset from the **SYSTEM CONFIGURE** menu.
- Press HOME key repeatedly to return to **MAIN MENU**.

| | |
|-------------------|-------|
| INHIBITOR TIMER | |
| ENTER PULSE TIMER | |
| RUN TIME | 00:30 |
| M:S | |
| ▶ ELAPSED | 00:00 |
| M:S @ PULSE SET | |
| 10 | |
| PULSE CNT | |



TIP:

For help with menu locations, please refer to the Menu Map@supplied with your controller.

5. SYSTEM CALIBRATION

Important: Verify calibration before proceeding with final system start-up. Make sure probes are clean (refer to Section 9, Maintenance, pg.35) before proceeding with system calibration.

BOILER CONDUCTIVITY CALIBRATION NOTES

- When reading or calibrating the conductivity of a boiler controller there must be an active sample flowing by the sensor. In the case of a timed sample system, the blowdown valve must be open long enough to have raised the temperature of the sensor to that of the sample.
- Always compare an un-neutralized sample to the boiler controller, because changes in pH will affect the conductivity; a neutralized sample will not reflect this change due to pH, but the conductivity controller will reflect this change as it is an un-neutralized sample.
- One point calibration assumes “zero” for the low calibration solution.
- Two point calibration can be accomplished by opening the flush valve located below the sensor and then closing the full-port gate valve upstream of the sampling electrode (refer to Figure 1, pg. 5). This should prevent the flow of water across the sensor creating zero (0) conductivity for low cal setting.
- Obtain a sample of system water from the surface blowdown line and test the sample with a reliable tester. If a non-temperature compensated tester is used, manually compensate or cool the sample to 25°C (77°F) and read the conductivity of the sample. If the tester and the PULSAtrol™ agree, proceed with programming parameters; if not, proceed with system calibration.
- If blowdown temperature is greater than 125°C, non-standard calibration may be required to manually compensate for temperature.

Non-Standard Calibration

Only to be utilized with non-standard conductivity probes and/or boiler applications where a non temperature compensated probe is used with temperatures above 125°C. Proceed to “General Calibration Procedure” if non-standard calibration is not required.



TIP:

For help with menu locations, please refer to the Menu Map@supplied with your controller.



NOTE:

In all cases, you must select either S1-@ or S1-@@

A Potentiometer and Switch are located on the conductivity daughter board (see Diagram 5, pg. 27). This allows the use of probes with virtually any cell constant with linear results.

Note: The calibration selector switches are S1-“1” through “5”, and S2 “1” through “5”. If your unit is equipped with a second boiler control you will set S3-“1” through “5” and S4-“1” through “5” in a similar fashion.

Information on Conductivity Daughter Board switch functions

(Refer to Diagram 5, pg. 27.) Switches 1-5, on the S1 and S3 switch blocks, have the following functions:

- S1-1: Disable standard probe temperature compensation
Open (up/off) for temperature compensated probe
Closed (down/on) for non-temperature compensated probe
- S1-2: Non-standard probe calibration
Open (up/off) for standard calibration
Closed (down/on) for non-standard calibration
- S1-3: Does not apply, leave Open (up/off)
- S1-4: Select Carbon Graphite Probe
Open (up/off) if Carbon Graphite probe is not used
Closed (down/on) if Carbon Graphite probe is used
- S1-5: Select Stainless Steel Probe
Open (up/off) if Stainless Steel probe is not used
Closed (down/on) if Stainless Steel probe is used

Figure 9 shows the factory default setting. It is configured for standard probe calibration with a temperature compensated carbon graphite probe.

Figure 9A shows the setting for non-standard probe calibration with temperature compensated stainless steel probe.

Figure 9B shows the setting for non-standard probe calibration with non-temperature compensated stainless steel probe.

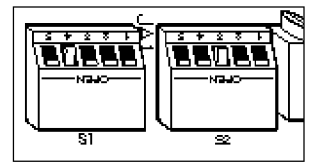


FIGURE 9

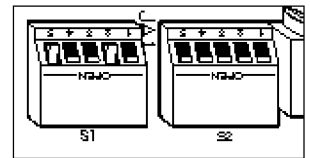


FIGURE 9A

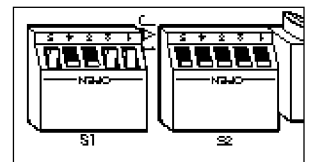


FIGURE 9B



!!WARNING!!

Boiler system water is extremely hot and under pressure. Use extreme care when removing or installing conductivity probe!

Non-Standard Conductivity Daughter Board Set-Up

If non-standard calibration is required (refer to Diagram 5, Daughter Board Conductivity, pg. 27):

1. All switches on S2 must be in the open (up) position.
2. Set S1-“1” to the open (up) position for a temperature compensated probe (Figure 9A).
3. Set S1-“1” to the closed (down) position for a non-temperature compensated probe (Figure 9B).
4. Place S1-“2” to the closed (down) position for non-standard calibration. See Figure 9.
5. Switch S1-“4” must be in the closed (down) position for carbon graphite type probe or, S1-“5” must be in the closed (down) position for stainless steel type probe (as shown in Figure 9A).



NOTE:

LO @S/CM is displayed only if 2 point calibration is chosen. This step is not required for 1 point calibration.

Non-Standard Calibration Procedure

1. Obtain a sample of system water, test the sample with a reliable, calibrated tester. If tester and the PULSAtrol™ agree, proceed with programming parameters, if not, proceed with step 2.
2. Locate manual temperature and/or cell constant adjustment potentiometer on daughter board. See Figure 10 and refer to Diagram 5, pg. 28.
3. With probe installed, and sample flow across probe, adjust potentiometer until controller reads approximately the same as the tester.
4. Proceed with general calibration procedure below.

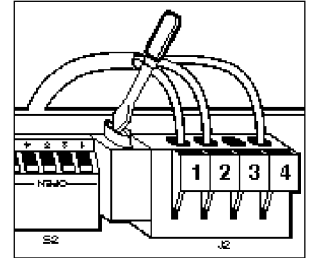
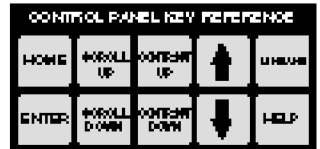
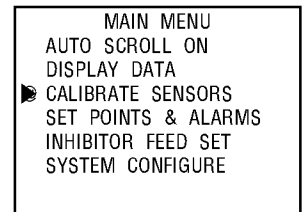


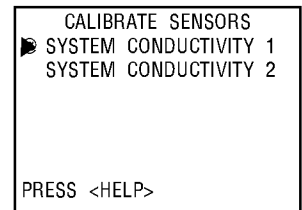
FIGURE 10

General Calibration Procedure

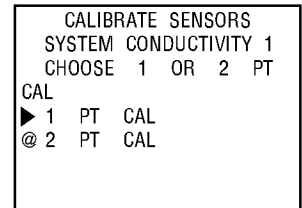
1. Use the ARROW keys to move the prompt to **CALIBRATE SENSORS** on the main menu. Press ENTER.



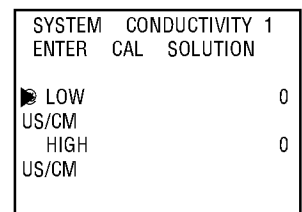
2. **CALIBRATE SENSORS** menu will be displayed with the prompt next to **SYSTEM CONDUCTIVITY 1**. (SYSTEM CONDUCTIVITY 2 will be displayed also if your controller is equipped with Option E, Second Boiler Controller.) Press ENTER.



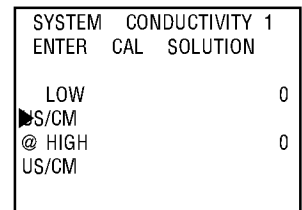
3. The **SYSTEM CONDUCTIVITY 1** menu will be displayed. Move prompt with ARROW keys to either **1 PT CAL** (1 point calibration) or **2 PT CAL** (2 point calibration selected) and press ENTER.



4. **ENTER CAL SOLUTION** menu will be displayed with prompt next to **LO 0 µS/CM**. Press ENTER and the prompt will flash. Use ARROW keys to enter **0**. Press ENTER.



5. Use the ARROW keys to move the prompt to **HI 0 µS/CM**. Press ENTER and the prompt will flash. Enter the value of the calibration solution with the ARROW keys, press ENTER. Press HOME twice to return to the **CALIBRATE SENSORS** menu. Repeat instructions 3 through 5 to calibrate SYSTEM CONDUCTIVITY 2 if equipped.



6. Press HOME key repeatedly to return to the **MAIN MENU**.

6. DIAGRAMS: INSTALLATION, COMPONENT, AND ELECTRICAL

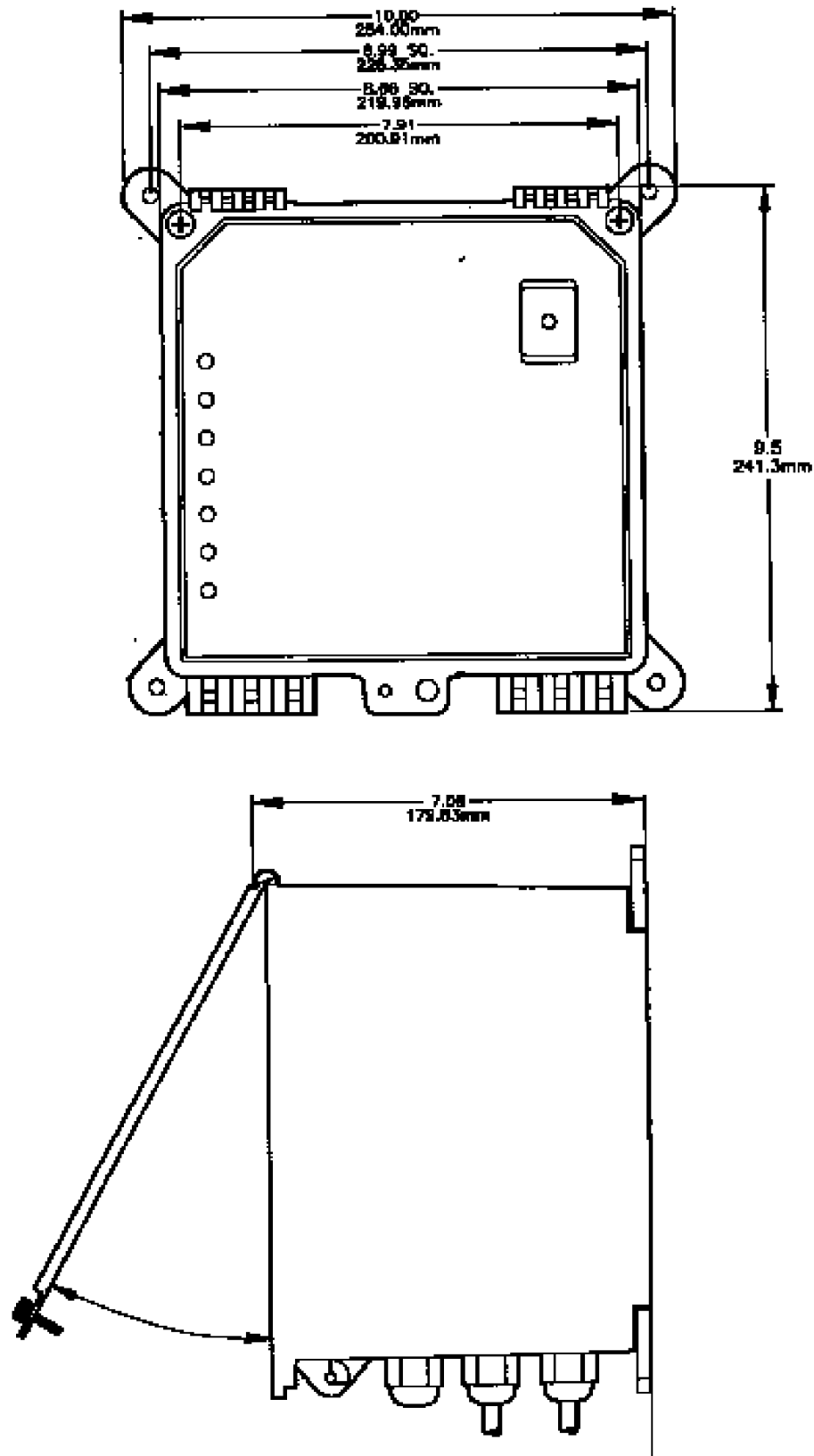
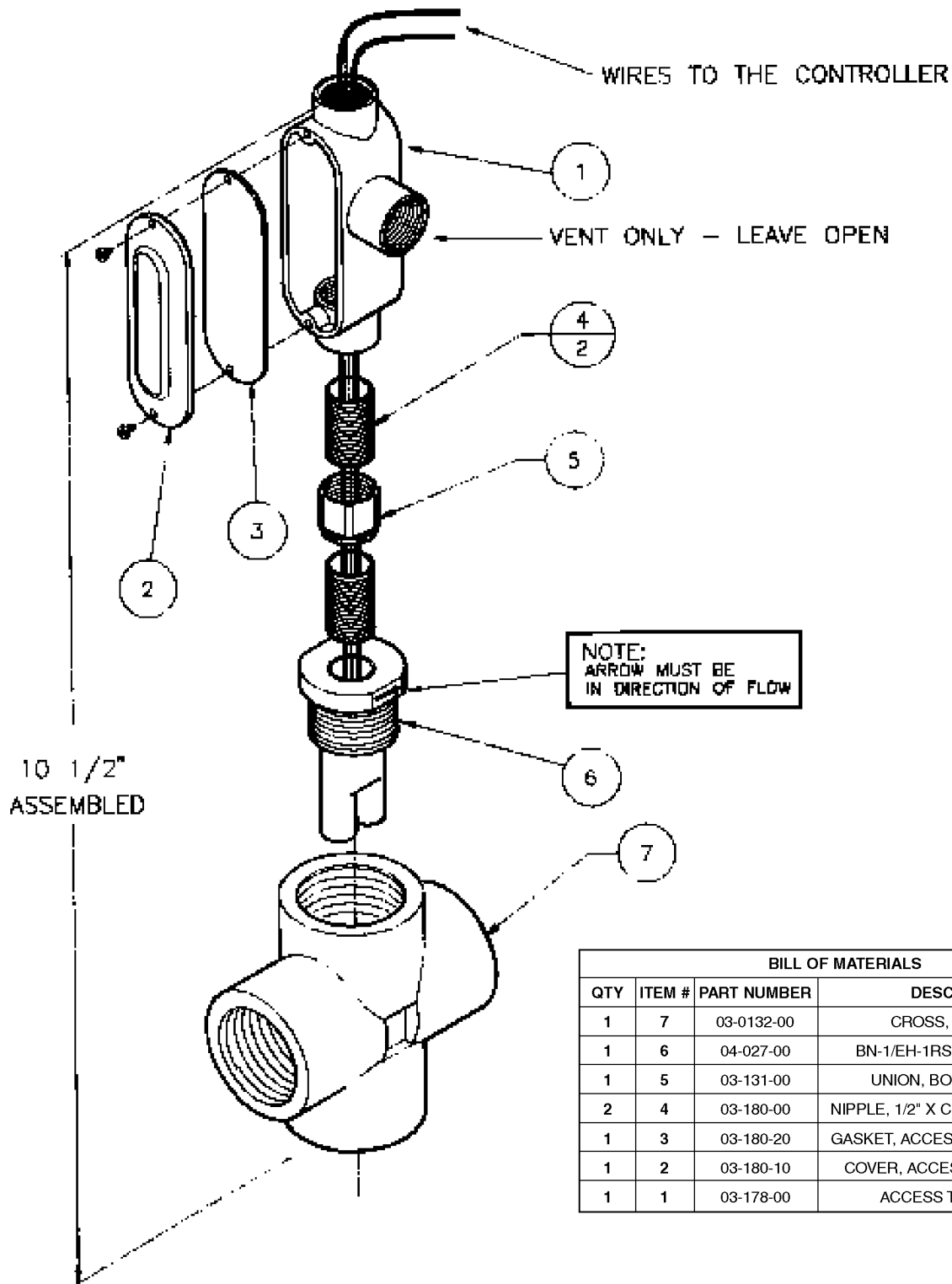


DIAGRAM 1 ENCLOSURE DIMENSIONAL DATA



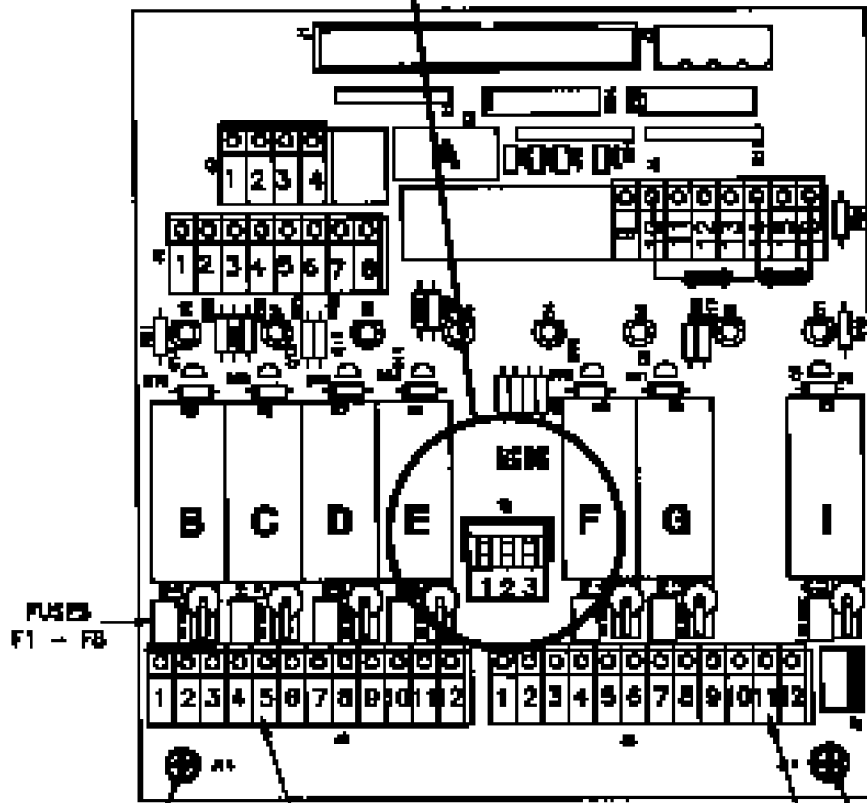
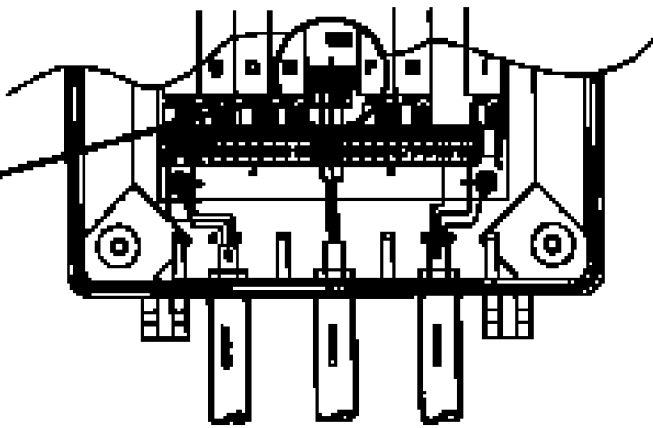
SPECIFICATIONS

Pressure Rating250PSI (17.3 BAR)
 Temperature Rating400°F (204°C)
 Thread Size.....1" (2.5 cm) NPT
 Construction.....Stainless Steel, Ryton
 Cell Constant1.5
 Wiring.....Fitting for 1/2" (1.3 cm) Conduit

DIAGRAM 2 CBN-1 ELECTRODE

AC VOLTAGE CONNECTIONS "J5"

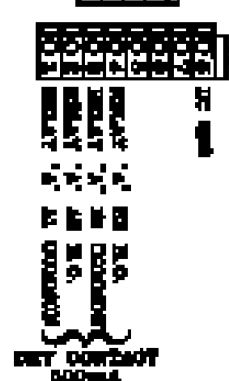
- 1 - BLACK HOT
- 2 - WHITE NEUTRAL
- 3 - GREEN GROUND



SHIELD FOR DIGITAL IN CONNECTIONS



DIGITAL IN



FUSES
F1 - FB

EARTH GROUND
SCREW TERMINAL

CONDUIT CONNECTIONS OF RELAY OUTPUTS

- 1 4 7 10 NEUTRAL
- 2 5 8 11 N.C.
- 3 6 9 12 N.C.

EARTH GROUND
SCREW TERMINAL

DIAGRAM 3 RELAY BOARD



!!WARNING!!
Line Voltage
present.
DISCONNECT
POWER!

Find the model number of your controller in the far left column. Find the output in the column to the right. The connection for that output will be the letter in the row labeled “Fuse/Relay Connection”.

Options, like “A, L, M, and P” are to be ignored. For example, for a MBC 310A, use the MBC 310 connection.

Note: Use a small screwdriver to depress orange tab and push wire in corresponding hole. Remove pressure from tab and pull on wire to insure a good connection.



NOTE:

Use a small screwdriver to depress orange tab and push wire in corresponding hole. Remove pressure from tab and pull on wire to insure a good connection.

| Fuse/Relay Connection | Relay 1 B | Relay 2 C | Relay 3 D | Relay 4 E | Relay 5 F | Relay 6 G | Relay I | Relay A |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------------|
| MBC310 | Blowdown 1 | | | | | | | |
| MBC310C | Blowdown 1 | Timer Out 1 | | | | | | |
| MBC310CC | Blowdown 1 | Timer Out 1 | Timer Out 2 | | | | | |
| MBC310CCC | Blowdown 1 | Timer Out 1 | Timer Out 2 | Timer Out 3 | | | | |
| MBC310CCCC | Blowdown 1 | Timer Out 1 | Timer Out 2 | Timer Out 3 | Timer Out 4 | | | |
| MBC310CCE | Blowdown 1 | Blowdown 2 | Timer Out 1 | | | | | |
| MBC310CCCE | Blowdown 1 | Blowdown 2 | Timer Out 1 | Timer Out 2 | Timer Out 3 | | | |
| MBC310CCCCE | Blowdown 1 | Blowdown 2 | Timer Out 1 | Timer Out 2 | Timer Out 3 | Timer Out 4 | | |
| MBC310E | Blowdown 1 | Blowdown 2 | | | | | | |
| MBC310CEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Timer Out 1 | | | | |
| MBC310CCEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Timer Out 1 | Timer Out 2 | | | |
| MBC310CCCEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Timer Out 1 | Timer Out 2 | Timer Out 3 | | |
| MBC310EE | Blowdown 1 | Blowdown 2 | Blowdown 3 | | | | | |
| MBC310CEEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Blowdown 4 | Timer Out 1 | | | |
| MBC310CCEEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Blowdown 4 | Timer Out 1 | Timer Out 2 | | |
| MBC310EEEE | Blowdown 1 | Blowdown 2 | Blowdown 3 | Blowdown 4 | | | | |
| Option D | | | | | | | Alarm Relay | |
| Option K | | | | | | | | Alarm Dry Contact |

The figure illustrates how an actuated (motorized) ball valve, which is used for “blowdown”, is connected to the relay board. It employs a normally open (NO), a normally closed (NC), and Common (or Neutral) connection. In this example the connections are made at Relay B, J9, pins 1, 2, and 3.

Refer to Diagram 3, pg. 26, for J9 location.

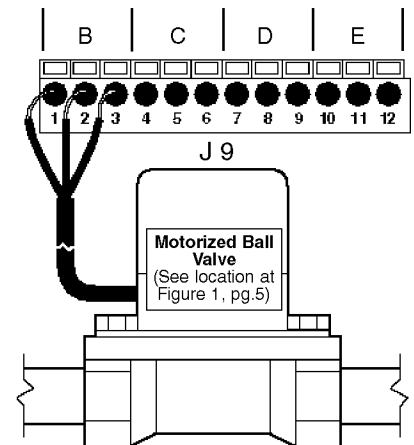
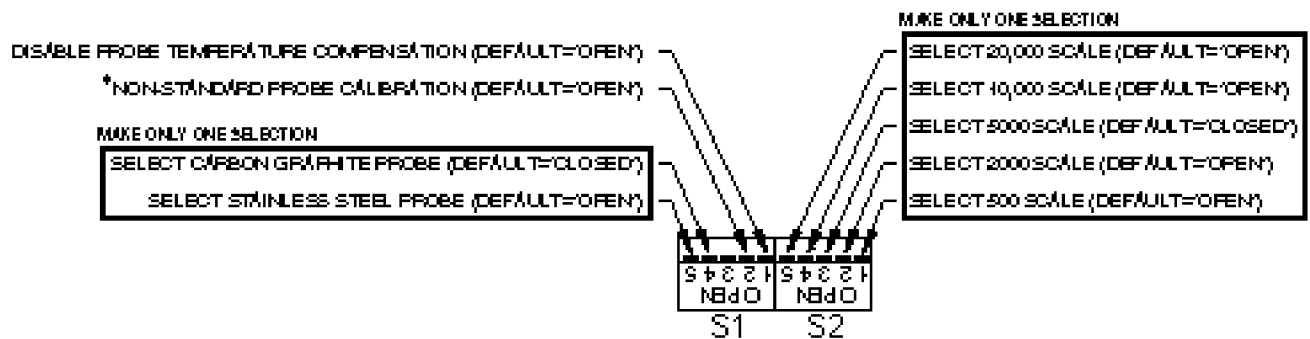
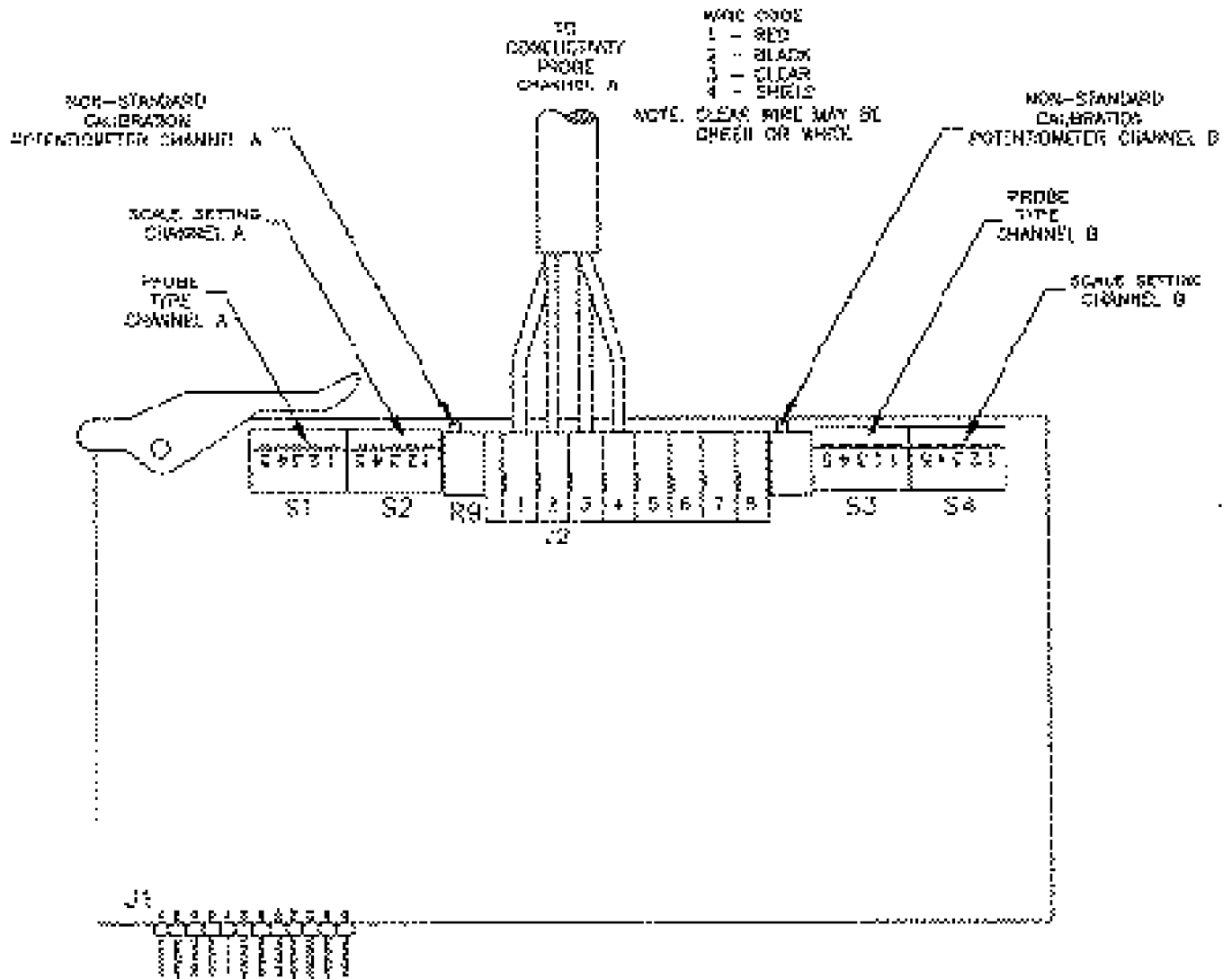
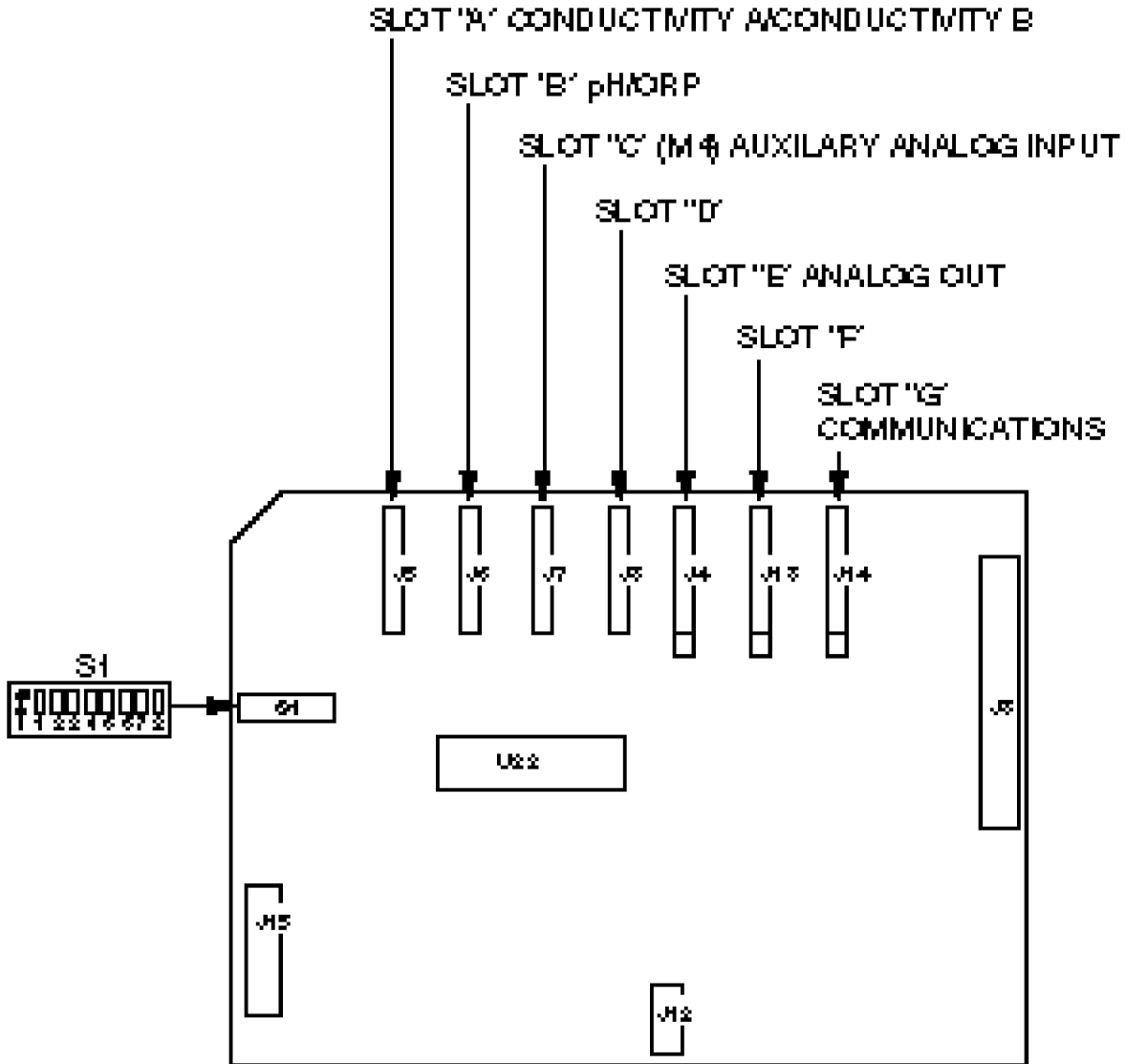


DIAGRAM 4 ELECTRICAL OUTPUT CONNECTIONS



*WHEN NON-STANDARD PROBE CALIBRATION IS 'CLOSED' ALL OF 'S2' POSITIONS MUST BE 'OPEN'

DIAGRAM 5 CONDUCTIVITY DAUGHTER BOARD



| S1 DIP SWITCH SETTINGS | | |
|------------------------|--------------------|---------------------|
| | "ON" | "OFF" |
| S1 | "1" (FUTURE USE) | (FUTURE USE) |
| S1 | "2" FLOW SW ENABLE | FLOW SWITCH DISABLE |
| S1 | "3" (FUTURE USE) | (FUTURE USE) |
| S1 | "4" (FUTURE USE) | (FUTURE USE) |
| S1 | "5" (FUTURE USE) | (FUTURE USE) |
| S1 | "6" (FUTURE USE) | (FUTURE USE) |
| S1 | "7" (FUTURE USE) | (FUTURE USE) |
| S1 | "8" (FUTURE USE) | (FUTURE USE) |

This unit requires initialization upon start-up:
See Initialization procedure on pg. 9

DIAGRAM 6 MOTHER BOARD

7. SPECIFICATIONS

(Factory settings are default values)

GENERAL

| | |
|-----------------------------------|--|
| Power Input | 90-250 VAC @ 50/60 Hz 100 VA. |
| Control Output | Line voltage @ 600 VA (5 amps @ 115 VAC) per relay. |
| Enclosure Conduit | High impact resistant polystyrene™ designed to NEMA 4X, factory predrilled with easily accessible terminals for hard wiring. |
| Display | 64 X 128 pixels dot matrix backlit display (8 line by 20 characters). |
| Power Switch | Recessed front panel. |
| H/O/A Switches | Front panel keypad. |
| Contrast Adjustment | Front panel keypad. |
| Lockable Viewing Window | Standard |
| Security Code | Standard |
| Environment | Ambient temp. 0°F (-17.8°C) to 122°F (50°C); rel. humidity 0 to 100%. |
| Dimensions | Width 10" (25.40 cm) X height 10" (25.40 cm) X depth 7.08" (17.98) |
| Controller Weight | 8 lbs. (3.63 kg) |
| Shipping Weight | 10 lbs. (4.54 kg) |
| Inputs | 4 Analog and 4 Digital |
| Outputs | 2 analog and 6 relays |

BOILER CONDUCTIVITY

| | |
|----------------------------------|---|
| Electrode | CBN-1 rated @ 250 psi (17.3 BAR) @ 400°F (205°C). |
| Set Point | Rising set point. Factory Setting @ 1500 µS/cm. |
| Range | Selectable 0 to 500, 2000, 5000, 10,000 & 20,000. Factory set @ 5000 µS/cm. |
| Accuracy | +/- 1% of full scale, at point of measurement, excluding electrode. |
| Differential | Adjustable. Factory setting @ 100 µS/cm. |
| High/Low Alarm | Adjustable. Select follow set point or independent set of HIGH and LOW, factory set follow set point @ +/- 200 µS/cm. |
| Selectable Sample Mode | Continuous or timed sample, factory set timed sample mode. Adjustable interval between samples (1 min. to 23 hr. 59 min.), factory set @ 30 minutes. Adjustable duration of sample (15 sec. to 5 min.), factory set @ 1 minute. |

SUMMARY OF KEYPAD

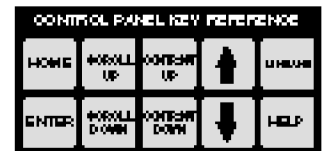
| | |
|-------------------------|---|
| Home | When pushed, returns displayed menu back one level in menu structure. |
| Enter | When pushed, enters displayed variable or value. |
| Scroll Up | Used to scroll-up through (view) menu structure. |
| Scroll Down | Used to scroll-down through (view) menu structure. |
| Contrast Keys | Used to control contrast of viewing screen. |
| Arrow Keys | Used to move between variables and to increase/decrease numerical settings. |
| Relay Keys | Hand/Off/Auto (HOA) switches, depressing key: ONCE - Forces corresponding output relay on for five minutes; LED color amber. TWICE - Forces corresponding output relay off indefinitely; LED color red. THREE times - Returns control to automatic; LED off if within set point, green if out of set point. |
| Language | Not functional. |
| Help | Used to display information about present displayed menu level. |

SUMMARY OF LED INDICATOR LIGHTS

| | |
|----------------------------|--|
| Power Indicator | Illuminates when power is supplied to unit. |
| Alarm Indicator | Flashes red when an alarm condition is present. |
| Relay Indicators | AMBER if forced on. RED if forced off. OFF if in auto mode an control function is not automatically activated. GREEN if activated automatically. |

9. TROUBLESHOOTING GUIDE

If your controller is not operating properly, proceed through the troubleshooting instructions below.



MOTHER BOARD

| Symptom | Probable Cause | Possible Solution |
|--|----------------------------------|---|
| Keypad Locked Up | Conductivity scale changed | Scroll down or scroll up after 15 seconds. |
| No Display (See Power Supply first) | Improper contrast | Adjust contrast on mother board, see Diagram 5, pg. ?. |
| | Environment exceeds 122°F (50°C) | Relocate controller. |
| Erratic Readings | Improperly grounded power | Assure power and ground integrity. Shields of all sensors should be connected at controller end only. |

POWER SUPPLY BOARD

| Symptom | Probable Cause | Possible Solution |
|----------------|------------------------------|-------------------------------------|
| No Power Light | Blown fuse | Replace fuse on Power Supply board. |
| | Interconnecting cables loose | Check connections. |
| | No power supplied | Check power source. |
| | Power switch off | Turn power switch ON. |

RELAY BOARD

| Symptom | Probable Cause | Possible Solution |
|---|---|--|
| No Outputs (Each relay, on the Relay Board, has a fuse and a red LED) | If the Output front panel LED is lit and the Relay board LED is not lit: <ul style="list-style-type: none"> • ribbon cable. | Check ribbon cable connection or replace. |
| | If the Output front panel LED is lit and the Relay board LED is also lit: <ul style="list-style-type: none"> • blown fuse • bad relay | Replace fuse, if necessary, or replace relay |

BOILER CONDUCTIVITY

| Symptom | Probable Cause | Possible Solution |
|--|---|--|
| Display Erratic with Solids High and Increasing | Steam in sample line; check the following <ul style="list-style-type: none">• Surface skimmer not 4 to 6 inches below surface• Sample line not throttled | Lower skimmer 4 to 6 inches below surface. Throttle sample line. |
| Front Panel Blowdown LED Cycles On and Off | Steam in sample line; check the following <ul style="list-style-type: none">• Surface skimmer not 4 to 6 inches below surface• Sample line not throttled | Lower skimmer 4 to 6 inches below surface. Throttle sample line. |
| Controller Stays In Blowdown and Solids Continue To Increase | Blowdown line throttled too much | Increase blowdown rate. |
| Conductivity of System Stays Lower Than Set Point, Never Or Rarely Blows Down | Uncontrolled blowdown If timed sampling: <ul style="list-style-type: none">• Interval between samples too frequent for load• Duration too long for load | Blowdown valve leaking. Try the following: <ul style="list-style-type: none">• Realign ball valve.• Clean solenoid valve.• Close manual blowdown valve. Shorten sample period. |
| Conductivity of Controller Decreases While System Conductivity Increases | Fouled sensor | Clean sensor. |

REINITIALIZATION

If the above troubleshooting steps fail to explain or solve condition, perform a factory reinitialization (see Diagram 6, Mother Board, pg. 29). If condition still exists, contact factory for customer service assistance at (1/800-333-6677). A Return Authorization (RA) number is required for any return.

10. MAINTENANCE

Maintenance on the PULSAtrol™ MBC300 Series controller requires only that the operator periodically clean the electrode. It is recommended that you establish a regular maintenance schedule designed to meet the needs of your particular application. All other service should be performed by factory authorized personnel only. Modifications to or tampering with the circuit level components makes all warranties, written or implied, and/or manufacturer's responsibility for this controller null and void.

ELECTRODE INFORMATION

To remove an electrode from the skimmer blowdown line for cleaning and for reinstallation, keep the following in mind:

1. Remove power from the system.
2. Remove pressure from the system prior to unscrewing the electrode; to remove pressure, close isolation valve located before the electrode.
3. Open the flush valve to drain water from electrode. This will facilitate removal of electrode.
4. Remove electrode.
5. Reinstall electrode, paying attention to arrows on the electrode and direction of flow.
6. Close flush valve.
7. Reapply pressure and flow by opening isolation valve slowly to avoid water hammer.
8. Reapply power to the system.
9. You may want to recalibrate sensor at this time.

Refer to Diagram 2, pg. 25, for information and specifications for electrodes supplied with your system.



!!CAUTION!!

Use proper handling procedures including rubber gloves, eye protection and protective clothing, when handling any acid solution.

CLEANING THE ELECTRODE

1. Wipe the electrodes clean with a clean cloth.
2. Use a fine grain emery cloth for stubborn stains.
3. Oils can affect probe performance. Do not touch probe surface. The probe can be agitated in a mild solution of dish washing soap and water to remove oils transferred during handling.
4. Some fouled electrodes might require dipping in a mild solution of muriatic acid in order to remove fouling.

11. GLOSSARY

- Alarm Relay** an electric circuit when triggered by a predetermined signal will activate an externally connected alarm
- Analog** a device that represents in terms of physical variables, i.e. conductivity, pH, ORP
- Analog Recorder** a device such as a plotter that physically stores or presents quantities of data in a physical manner
- Auto Scroll** a function of the Controller which allows unit to automatically display system status, active alarms, time, date, etc.
- Bleed** (or blowdown) to release cooling tower water from the system, used to control conductivity
- Blowdown** see Bleed
- Blowdown Valve** the valve that opens or closes to release water from the system activated by a signal from the Controller
- Boiler** a container in which water can be heated under pressure and converted into steam
- Calibration** a procedure to match values “read” by probes and sensors to actual real world values
- Caustic** burning, corrosive, a characteristic of some chemicals especially strong alkalis
- Chattering** a situation that occurs when relay controlled device repeatedly turns off and on
- Chemical Feed Pump** a relay or proportionally controlled pump that disperses chemical into the system
- Chemical Metering Pump** see Chemical Feed Pump
- Conductivity** the ability of a substance to conduct electrical current. Concentrations of dissolved and suspended matter in system water that directly determines the conductivity of the water
- Conduit** hard wired
- Configure** procedure to set up basic functions of the controller, i.e. date, time, set point control, etc.
- Contacting head water meter** a water meter that outputs a dry contact signal every time it pulses
- Contrast** difference in brightness between adjacent objects, i.e., darkness of text in screen display versus lightness of the screen background.
- Cooling Tower** a structure of various sizes that allows heat to radiate away from the system water.
- Cycle Timer** a timing device that can be preset to turn off and on at specific intervals
- Daughter Board** an auxiliary circuit board within the controller dedicated to a specific function(s) of the controller
- Differential** also referred to as dead band or hysteresis, this is a range or offset applied to a set point value (see chattering)
- Dip Switch** very small switches located on the circuit boards usually used in combination with other dip switch settings
- Display Dampener** a setting in the System Configure menu that determines the number of samples that are averaged and the number of seconds before a new reading is displayed on the screen
- Dry Contact** relay contacts without power
- Duration** a programmable amount of time a sample is taken
- EEPROM** Electrically Erasable Programmable Only Memory
- Electrodes** or sensors, the metal protrusions that measure conductivity in the conductivity sensor assembly
- Fish Paper** thin paper that is inserted between battery and battery clip to prevent battery drain during shipping or storage of controller
- Float Switch** a mechanical switch that shuts off fresh water supply to the cooling tower system when water level rises to a predetermined height
- Flow** refers to the movement of water through the system
- Gate Valve** a type of on/off valve for controlling the flow of liquid
- GFPP** Glass Filled Polypropylene
- Ground Loops** unwanted stray electrical signals that adversely affect controller
- HCl** Hydrochloric Acid
- Hi Lo Alarm** a function of the controller that signals the user when conditions exceed a predetermined high or low value
- History Files** information that is stored in the controller, (history files are lost if battery fails or is removed)
- HOA** abbreviation for Hands Off Auto
- HOA Switches** manual relay switches or keys (relay 1 - 6) located on the control panel of the controller
- Home** this key when pressed returns user to the previous menu displayed on the viewing screen, press repeatedly to return to the main menu
- Independent Set Point** this feature, when selected under HI LO ALARM in the System Configure menu, allows user to independently set the high and low alarm values
- Inhibitor** a chemical or compound used to aid the control of corrosion or scaling in the system water lines
- Inhibitor Feed** term referring to the dispersment of inhibitor in to the system
- Inhibitor Timer** a function of the controller which regulates the amount of time inhibitor is introduced to the system
- Initialization** a procedure to set up the starting condition of the controller
- Inorganic Scale Deposits** undesirable precipitate formations within the water system lines
- Inputs** receptacles or hookups for signals delivered to the controller
- Interval** programmable amount of time between blow-down samples
- (ISO) Isolation Valves** general term which refers to valves in the system used to isolate various components of the system from the main flow
- Jumper** a wire connector (shunt) that connects two points
- KCl** Potassium Chloride
- LED** abbreviation for Light Emitting Diode

Limit Timer also referred to as lockout timer or feed limit timer, it limits the amount of time output is activated

Line Voltage voltage equivalent to outside source voltage to the controller

Lockout intentionally preventing blowdown or other functions of the system

Menu Map printed document supplied with controller illustrating all menu item locations

Metering Pump see chemical feed pump

Micro Siemens unit of measure of conductivity expressed as uS/cm

Mother Board main circuit board located in controller

NaOH Sodium Hydroxide

Outputs receptacles or hookups for signals originated at the controller

Overfeed a condition in which the quantity of an ingredient dispersed into the system exceeds the amount desired

Percent Post Blowdown refers to the amount of time as a percentage of blowdown time that chemical feed pumps are activated when blowdown is deactivated

Percent Timer also referred to as a cycle timer that runs continuously that activates an output to run as a percent of total cycle time

pH the measurement of acidity or alkalinity (acid or base) of an aqueous solution

Pre-Bleed refers to the time bleed (or blowdown) is executed before biocide feed

Pre-Blowdown see Pre-Bleed

Probe also referred to as a sensor or electrode; a device connected to the controller which monitors or measures a value in the cooling tower flow stream

Probeless Calibration a calibration procedure used to test and verify operation of the controller

Program Parameters the user programmed settings that determine how the controller responds to the conditions of the cooling tower water

Pulse the action of a water meter that when equipped with a contact head, can generate a signal sent to the controller

Pulse Timer a feature of the controller in which a timer accepts pulses from a water meter to actuate a chemical feed pump

Relay Board a circuit board in the controller for relay outputs, water meter hookups, flow switch, etc.

Relay Indicators lights (LEDs) located beneath the relay keys on the face of the control panel that indicates the status of individual relays

Sample Cock see Sample Valve

Sample Line a line within the cooling tower flow where probes and other monitoring devices are located controlled with isolation valves

Sample Stream Flow Assembly a PULSAfeeder option (standard on many models) which is a modular assembly that mounts to the controller with quick-release probe(s), flow switch and sample cock or (valve)

Sample Valve small valve on the flow assembly that provides user a means to drain small quantities of water from the system for testing

Scale/Range the adjustable monitoring range of the controller in reference to conductivity levels in the system

Security Code a code that can be entered by the user when configuring the system to secure access to the controller settings

Sensors see Probe

Set Point the user determined value within a monitored range at which the controller initiates action

Set Point Differential also referred to as dead band or hysteresis; the offset applied to a set point to prevent chattering of an output relay around a set point

Solenoid an electromagnetically controlled switch

Storage Boot small protective rubber boot filled with a junction wetting agent found on the tip of a new pH or ORP probe to keep tip wet during shipment and storage

System Overfeed usually a malfunction condition where a feed pump fails shut off

System Parameters see program parameters

System pH level of pH in the system water

TDS abbreviation for Total Dissolved Solids, measured in terms of electrical conductivity(u/Scm)

Temperature Compensation displays conductivity as if measured at 25°C

Temp Sensor used to measure temperature, not currently available on MCT series

Throttling the act of adjusting a valve or other flow control device to vary flow volume

Totalizer a resettable function of the controller which keeps count of the number of water meter pulses

Track Set Point a function of the controller in which set point offset range is determined by set point value

uS/cm micro Siemens

Water Hammer a potentially damaging situation that occurs if a valve in the system is opened too quickly, where the action results in a “hammering” effect throughout the system water lines

Y-Strainer inline filter or screen to remove debris from system flow assembly

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13. PULSAFEEDER MBC BOILER SERIES PRODUCT LINE UP

Our PULSAtrol™ line of controllers and monitors offer an easy, affordable way to meet your needs for versatile, accurate control of water treatment variables.

Leading edge microprocessor-based design, advanced surface mount component assembly techniques and a modular approach to hardware and software provide a wide choice of standard products.

Combined with an expanded selection of options, you can custom tailor these instruments to meet your exact requirements.

SELECTIONS

| SERIES | STANDARD FEATURES | AVAILABLE FOR OPTIONS | | | | | |
|--------|--|-----------------------|------------|------------|-------------|-----------|--------------|
| | | ANALOG IN | DIGITAL IN | ANALOG OUT | DRY CONTACT | RELAY OUT | SERIAL COMM. |
| 110 | Conductivity control with Selectable Sample Mode (Continuous or Timed) | 0 | 1 | 1 | 1 | 1 | 0 |
| 210 | Conductivity control with Selectable Sample Mode (Continuous or Timed) | 1 | 2 | 2 | 1 | 3 | 1 |
| 310 | Conductivity control with Selectable Sample Mode (Continuous or Timed) | 3 | 4 | 2 | 1 | 5 | 1 |

OPTIONS

| OPTION | DESCRIPTION | SERIES | REQUIRED FOR OPTIONS | | | | | |
|--------|---|-------------|----------------------|------------|------------|-------------|-----------|--------------|
| | | | ANALOG IN | DIGITAL IN | ANALOG OUT | DRY CONTACT | RELAY OUT | SERIAL COMM. |
| A | Conduit | 100/200/300 | | | | | | |
| C | Selectable timer: percent, limit, or pulse with accumulator | 100/200/300 | | 1 | | | 1 | |
| D | Alarm output relay (Series 100 requires relay out) | 100/200 | | | | | | |
| E | Second Boiler Controller | 200/300 | | | | | 1 | |
| K | Alarm dry contact (Series 100 requires relay out) | 100/200/300 | | | | 1 | | |
| L-1 | Serial line communications with software | 200/300 | | | | | | 1 |
| L-2 | Serial line communications with software and modem | 200/300 | | | | | | 1 |
| M-1 | 0-1 mA recorder output, linear | 100/200/300 | | | 1 | | | |
| M-2 | 4-20 mA recorder output, linear | 100/200/300 | | | 1 | | | |
| M-3 | 4-20 mA isolated programmable proportional output | 100/200/300 | | | 1 | | | |
| P | 220 VAC @ 50/60 Hz service (requires option A) | 100 (only) | | | | | | |



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