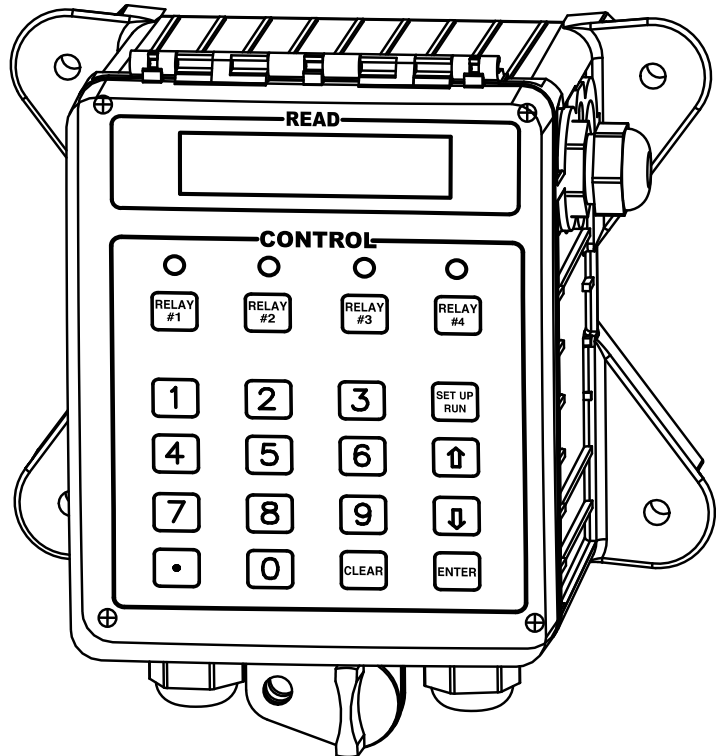


MicroTron Boiler Controller

***Installation
Maintenance
Repair
Manual***



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11/2009

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*Instructions herein apply to all MicroTron boiler controllers.
Additional options described in this manual may or may not be present on your unit. Refer to Model Numbering on Page 3.*

I. Introduction

MicroTron controllers are microprocessor based menu driven units for control of recirculating and other water applications. All settings are entered into the controller through a simple front panel keypad which includes relay test keys.

Model Numbering

MicroTron boiler controllers have several base functions and optional features available. Your unit may be supplied with one or more of the options that are described in this manual. To determine what features apply to your unit, check the model number label located on the controller enclosure.

Base Functions

- MHC** Boiler conductivity control with a VFD display
- MCC** Condensate conductivity control, VFD display
- LHC** Boiler conductivity control with an LCD display
- LCC** Condensate conductivity control, LCD display
- F** Single programmable feed timer
- F-2** Dual feed timers
- F-3** Triple feed timers
- F-4** Quadruple feed timers
- P** pH control

Optional Features

- A-1** Prewired for solenoid
- A-2** Prewired for MBV
- C** 0-5 Volt output
- C-4** 4-20 mA output
- D** 220 Volt
- E** Time Delay Relay
- E-6** Auto Stop Input
- G** Serial Line Connection
- H** Serial Line with Modem
- J** Windows software
- M** Alarm relay
- N** Non standard scales
- P** Remote pH transmitter
- Q** Probe options
- S** NEMA 1 steel enclosure
- W** 25 amp relays
- X** Tank low level alarms
- Z** Special options
- 9** Hall effect meter input

Note: The list of functions and options represents past and current offerings. Some of these may no longer be available on new units, but are listed for reference.

II. Description

Control Functions

Each of the control functions are based on an analog input from a probe and will include user settable relay control plus high and low alarm values. Each control function will include a control relay output. When the reading reaches the Set Point the control relay is activated until the reading changes by the Differential amount.

1. **Conductivity** – The conductivity function of the controller is designed to monitor and control Total Dissolved Solids (TDS) in a recirculating system like a boiler or condensate line in terms of electrical conductivity measured in MicroSiemens/cm. The unit can be programmed to operation as a **timed sample, sample and hold** or **continuous** blowdown control. This and all other settings are entered into the controller through the front keypad. Standard units come complete with a BE-32 electrode which includes a 1" cross. Timed sample and sample and hold operations are for boilers with a blowdown requirement which is less than 5000 lbs./hr. If the blowdown requirements exceed 5000 lbs./hr then continuous sampling is recommended.

Timed sampling incorporates a sample timer which allows the boiler to be sampled at periodic intervals. Sample intervals are adjustable from 1 minute to 99 hours, 59 min. Sample duration (on-time) is adjustable from 1second to 99 minutes, 59 seconds.

Sample and hold uses a sample timer for periodic sampling intervals. The unit will sample for its duration then hold the blowdown valve closed for a settable period (hold time). The conductivity is checked at the end of the hold period, if additional blowdown is required the blowdown valve is held open for a preset amount of time (blowdown time). Then sample cycle is repeated.

Continuous sample has a sample of boiler or condensate water go past the probe continuously. If the reading is above the set point, blowdown will continue until the set point has been satisfied.

2. **pH** – The pH function monitors and controls pH on a scale of 0-14 pH units.

Chemical Feed Timers

Selectable Chemical feed timers (base function F) are designed to automate the addition of various chemicals by activating a relay output. Multiple timers can be supplied depending upon the model number and each timer will include a relay output. All timers can be programmed to be one of the following types.

1. **Pulse Time** – This timer accepts dry contact pulses from a make-up water meter (supplied separately). It can accumulate 1-99 pulses to activate the timer to run from 0-99 minutes in minutes and seconds.
2. **Feed with Blowdown** – This timer activates the relay output simultaneously with the bleed. The timer limits the amount of time the relay output will be on during the bleed cycle, thereby preventing chemical overfeed.
3. **Feed after Blowdown**- This timer activates the relay output based on a user defined percentage of the bleed off time. The relay is activated after a bleed cycle and runs for the set percentage of that bleed cycle. A limit timer is also set for the maximum amount of time the timer can run for one cycle.
4. **Percentage** – The relay is on for a percentage of a continuously repeating cycle time. Both the percentage and cycle time are programmable.

III. Installation

Mounting Instructions

Select a mounting location that provides the operator easy access to the unit and a clear view of the controls through the cover of the controller. The location should be convenient to grounded electrical connections, the required sample line plumbing, and installed on a stable vertical surface.

The electrode is designed for mounting in the skimmer(surface) blowdown line. For a successful installation, it is critical to observe the recommended distances and pipe sizes provided in the installation drawing.



WARNINGS:

Avoid locations that expose the controller to direct sunlight, vapors, vibration, liquid spills or extreme temperatures; less than 0°F (-17.8°C) or greater than 120°F (50°C). EMI(electromagnetic interference) from radio transmissions and electric motors can also cause damage or interference and should be avoided.

Electrical Wiring

The standard MicroTron boiler controller has an internal regulated power supply that will operate in the range of approximately 105 to 135 VAC on the incoming wiring. Output relay(s) are protected with a replaceable fuse. Relay outputs voltage will equal incoming line voltage.

Optional prewired units are supplied with a 16 AWG cable with 3-wire grounded USA 115 volt plug for incoming power and 16 AWG 3-wire grounded receptacle cords for all control relay outputs.

Standard conduit units are predrilled at the factory and supplied with conduit knockouts for easy hard wiring to supplied connectors located in the lower section of the controller. Remove the screws of the lower panel for access and to view wiring diagram.



WARNINGS:

1. The controller should be connected to its own isolated circuit breaker, and for best results, the ground should be a true earth ground, not shared. Wiring must be done according to all applicable local codes.
2. Power (line voltage) must be disconnected while making any connections. If power is supplied to the unit, line voltage will be present on the relay cards.
3. Low voltage signal wires (probes, flow switch, water meter, etc.) should never be run in conduit with high voltage wires.

Electrical Installation

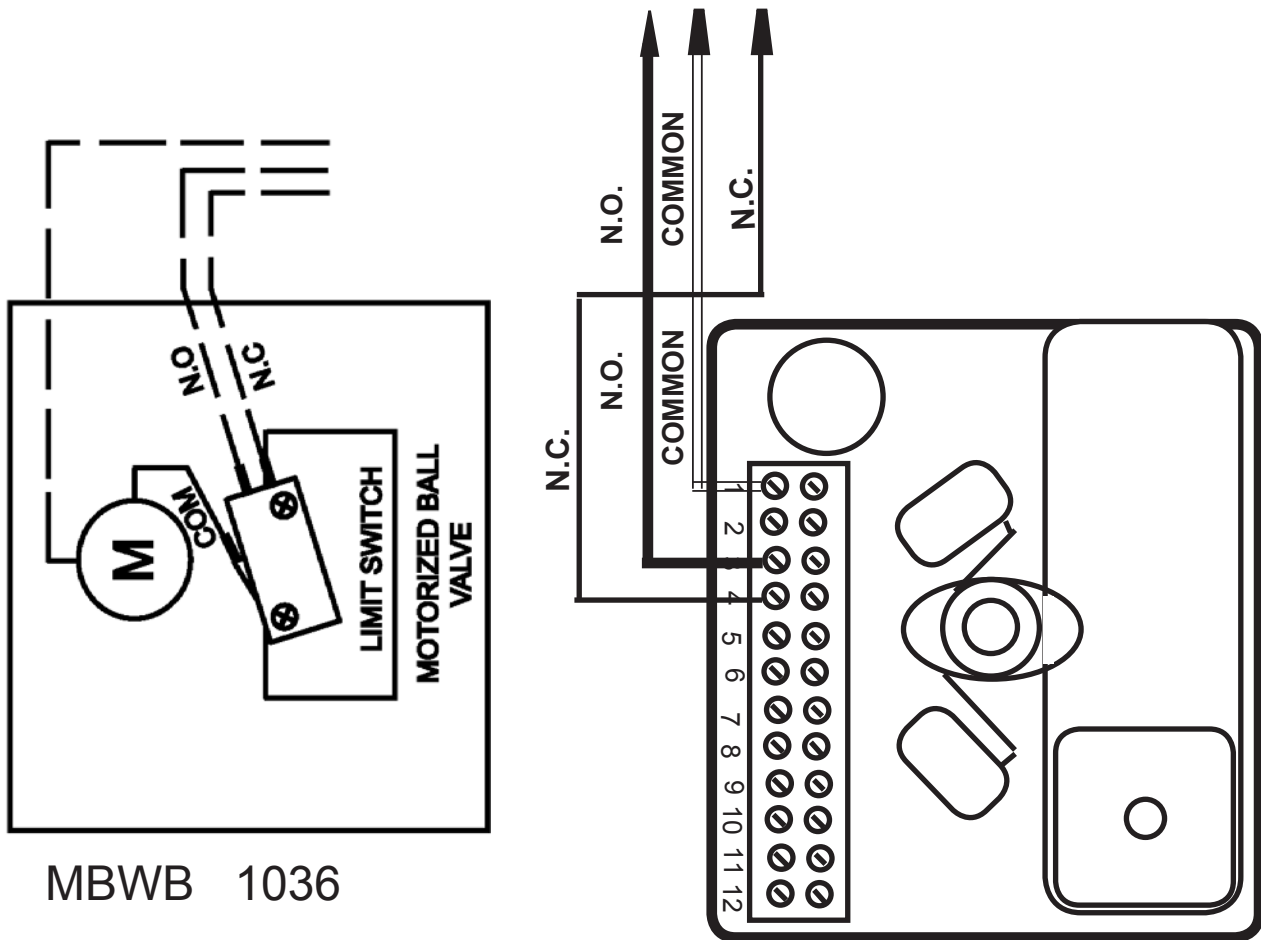
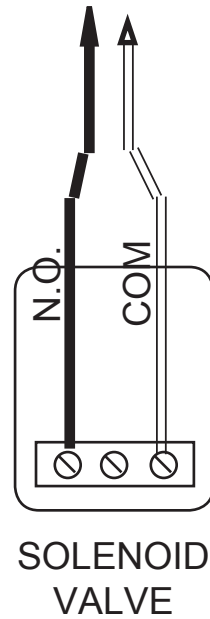
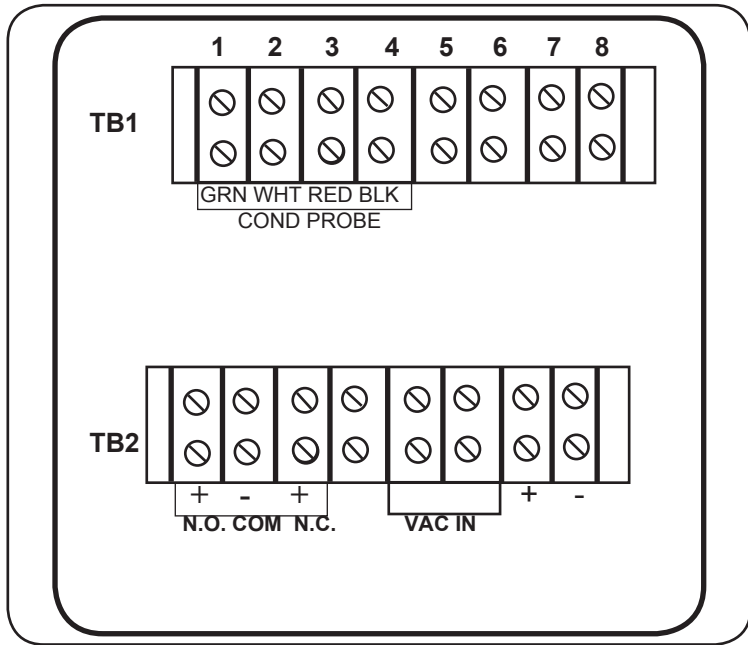
With the control box mounted in a convenient location remove the 4 screws from the lower section of the enclosure. Then using a flat screwdriver blade, pop panel loose from the control box, from the right side. This will expose the terminal connections in the bottom of the box.

Terminal Strip Connections

Using the Terminal Strip Drawing on the back of the lower panel and Conduit Layouts on page 6 and 7 to make all electrical connections. If the drawing in the panel differs from this manual follow the panel.

CONDUIT LAYOUT

See Label inside lower enclosure for exact wiring.

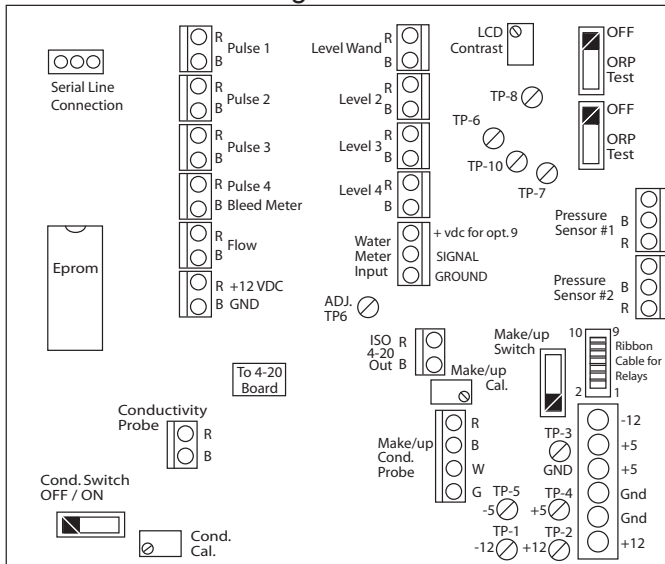


MBWB 1036

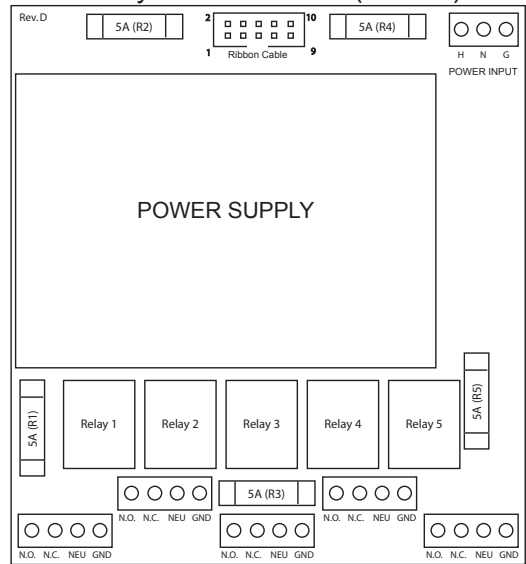
MBWA 1075

Conduit Layout for LCD Display

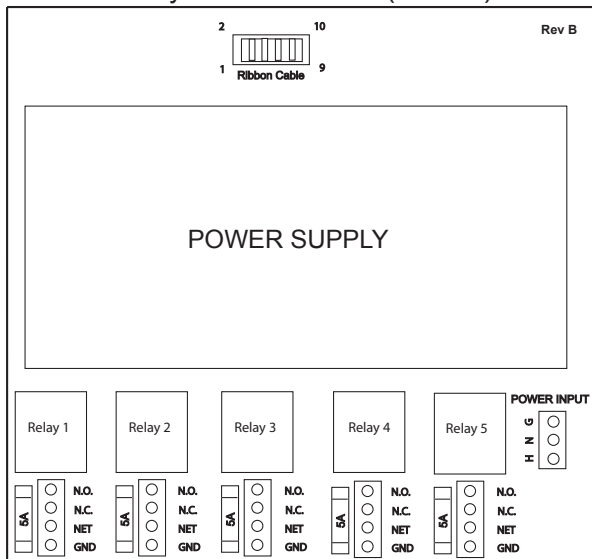
Logic Board



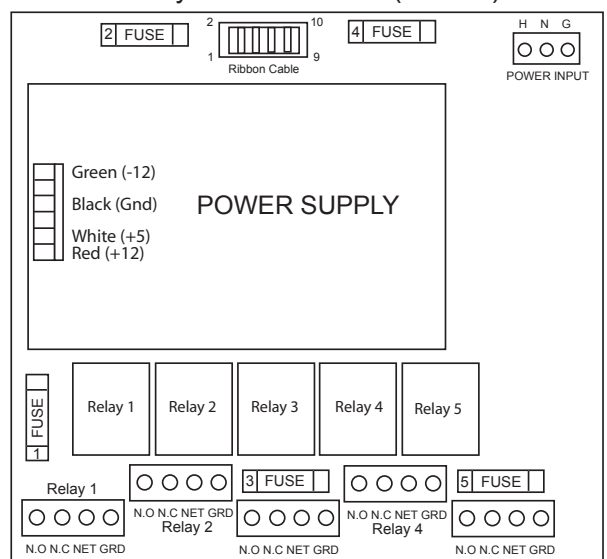
Relay / Power Board (Rev. D)



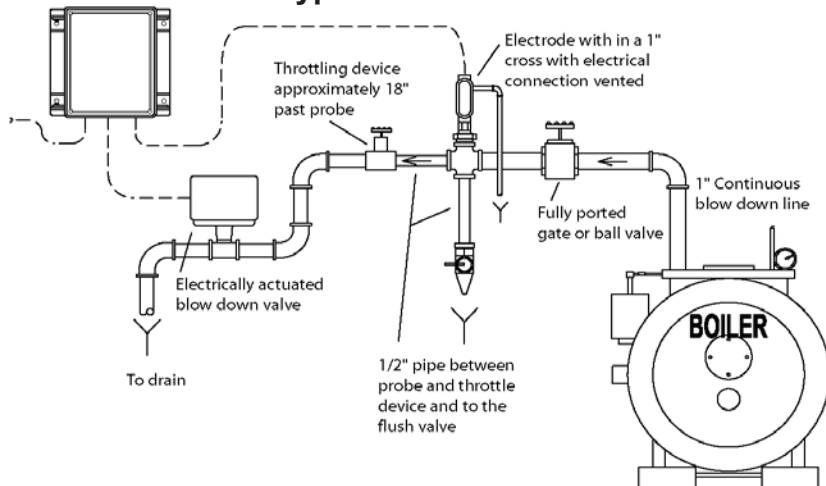
Relay / Power Board (Rev. B)



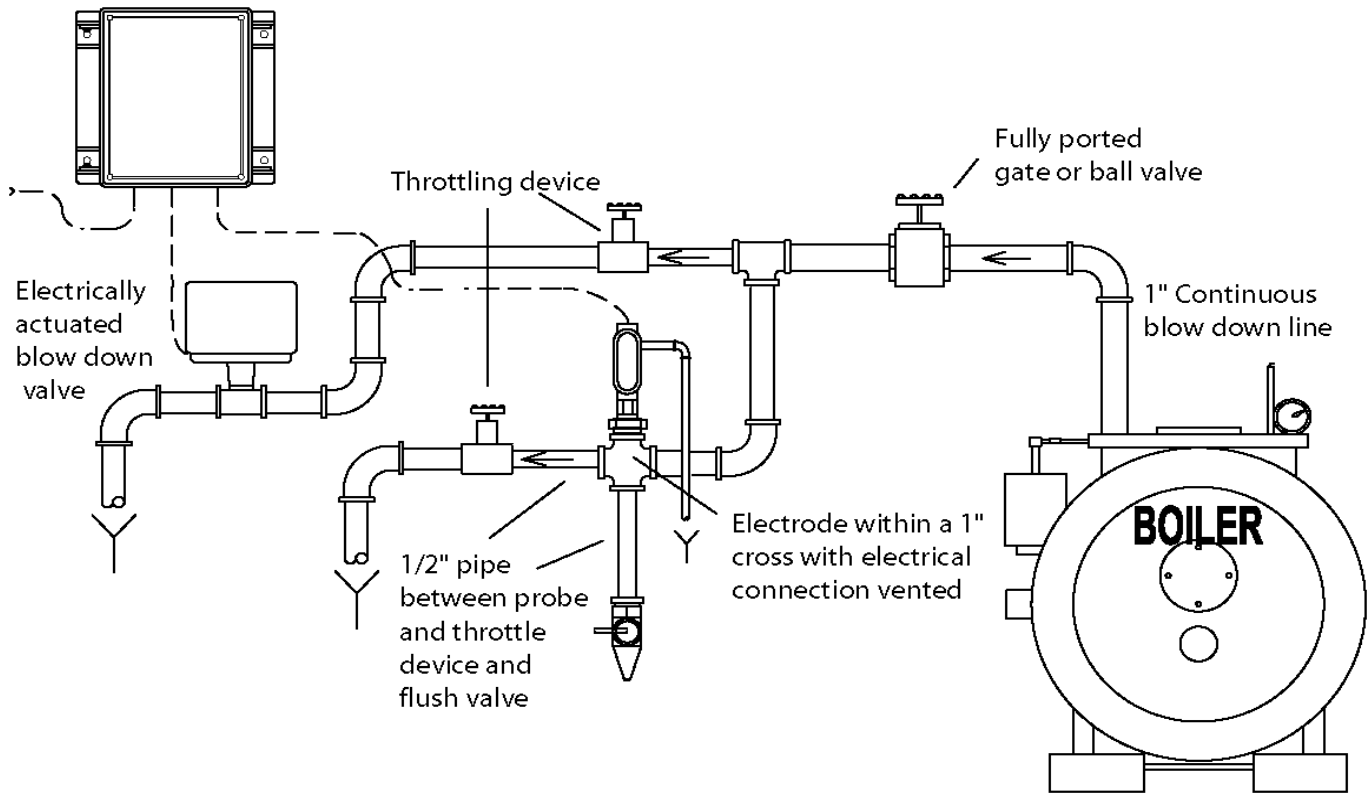
Relay / Power Board (Rev. C)



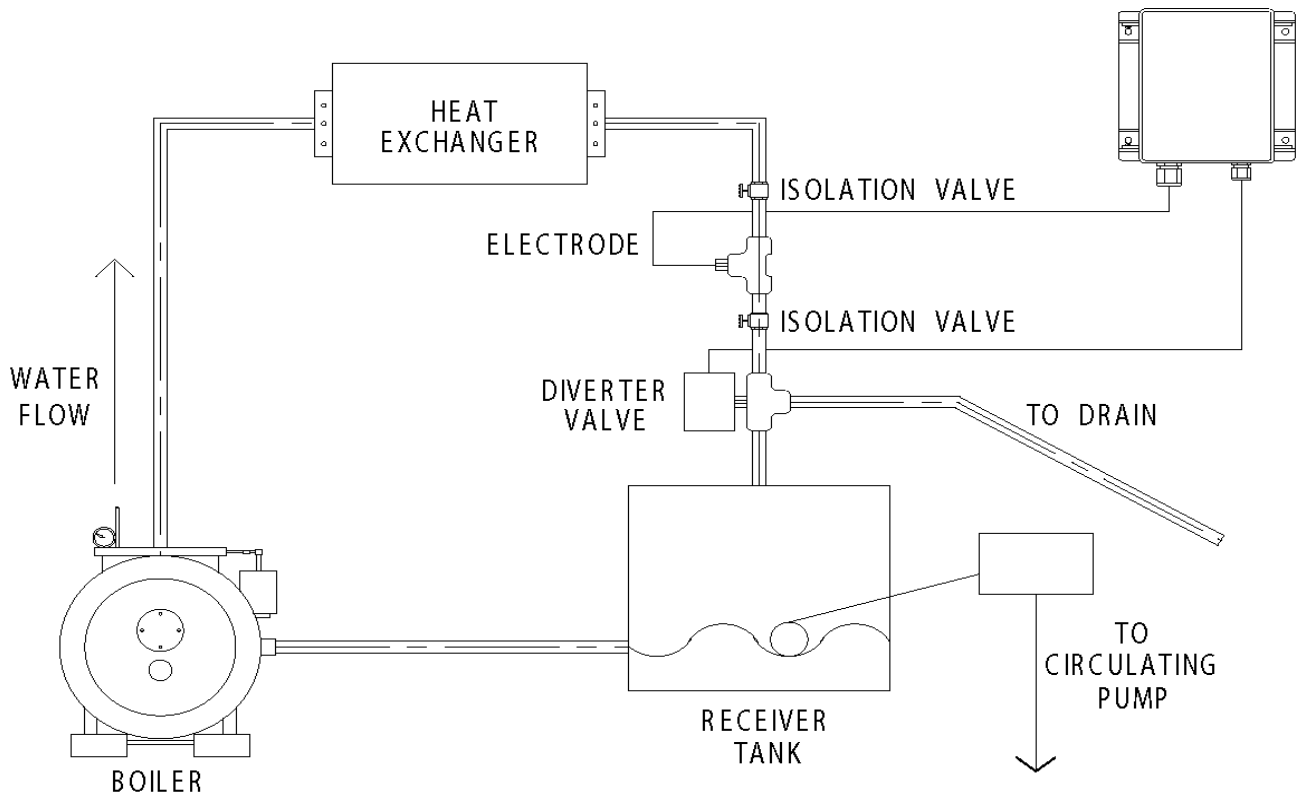
Typical Installation



Timed Sample and Sample and Hold Methods Recommended Installation



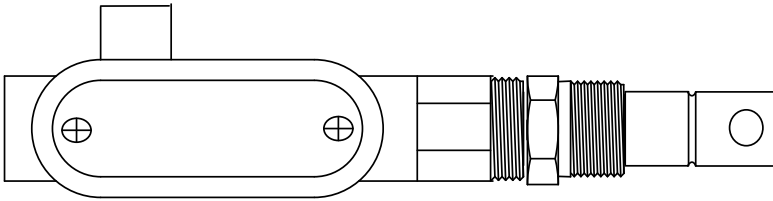
Continuous Sample Method Recommended Installation



Typical Condensate Installation

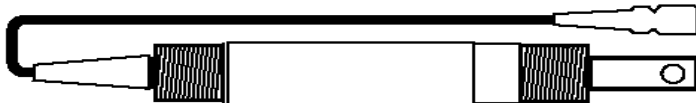
Standard Electrodes

BE-32 Conductivity Electrode



Standard conductivity probes are supplied with a 1" cross as probe assembly number BE-32.

PE-21H pH Electrode



Standard PE-21H condensate pH electrodes come with 1/2" MNPT connection for installation into a horizontal pipe run with the tip of the probe pointing down. Max temperature 212 degrees F and 100 psi.

Warning!! pH probes must stay submerged at all times and not be exposed to steam.

Electrode Installation

Boiler

For best results, the electrode cross should be mounted on a 1" skimmer blowdown line within 4' of the boiler. Smaller line sizes and greater distances may affect the response time and accuracy of the electrode. Install a fully ported type valve between the electrode and the boiler. This allows the electrode to be isolated for removal and cleaning. It is recommended that a flushing line and 1/4 turn type ball valve be installed in the bottom of the cross (see installation drawing). This line is used to periodically "flush" sediment from the electrode chamber. Threads of the BE-32 electrode are tapered. Before installing, wrap the probe with 5 or 6 rounds of Teflon tape. Insure that the probe is not cross threading in the cross. Once the probe is tight be sure the alignment holes on the probe are running with the pipe.

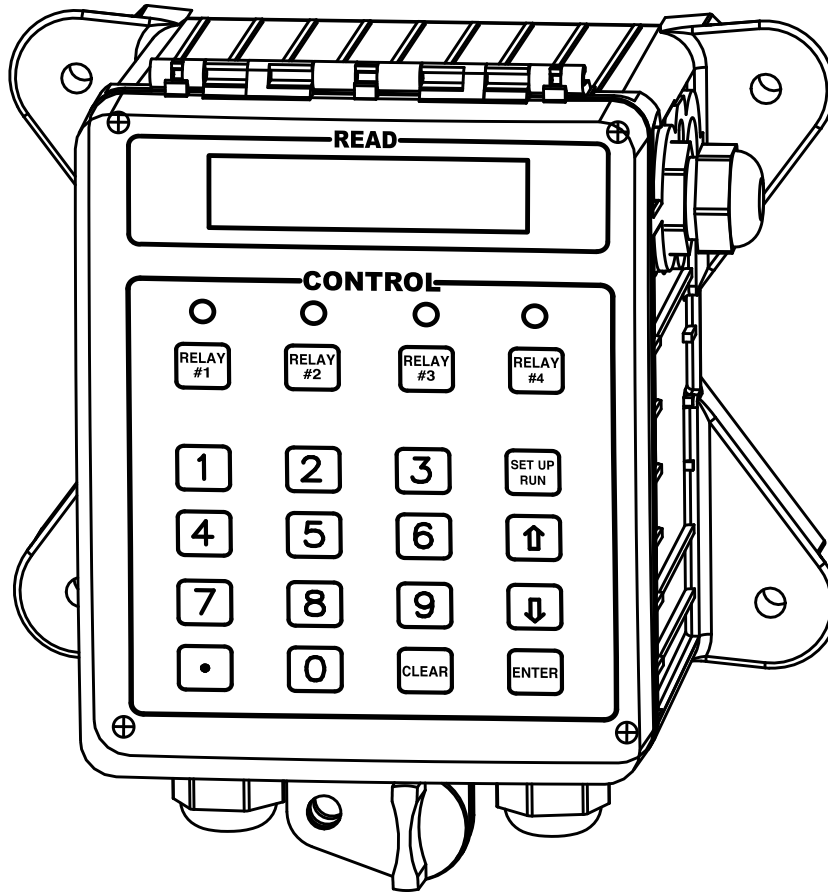
Throttling Device Installation

A flow throttling device is required to ensure that the electrode is exposed to water and not steam. Properly installed and adjusted, this device will prevent flashing in the electrode chamber. The throttling device should be installed 1 to 3 feet after the electrode cross.

Note: Flashing occurs due to insufficient back pressure at the electrode. It occurs because the orifice size is too large, or the valve open setting is too great. Flashing is indicated by an unstable conductivity reading. If flashing occurs, reduce the size of the flow control opening.

Condensate

Condensate conductivity probes should be installed similarly to the instructions above for boiler probes. Condensate pH probes should be in the same line as the condensate conductivity probe. The PE-21H is constructed of CPVC with 1/2" MNPT fitting for threading into a user supplied cross or tee. The pH probe must be mounted into a horizontal pipe run with the tip of the probe pointing down into the pipe. Both condensate probes should be in a line where they will always be submerged in water. If steam is allowed on the probes damage may occur. If a pH probe is allowed to become dry damage will occur.



IV. Front Panel Description

READ: 1x16 (1/4") Alpha Numeric Display.

CONTROL: Relay 1, Relay 2, Relay 3, Relay 4 - HOA switches for control relays.



SET UP/RUN key - System initializes into RUN mode. Press this switch to toggle the controller from SET UP mode to RUN mode.



UP/DOWN arrows - Used to change the display from one line to the next. All menus are circular, so when all items in a menu have been displayed, the display will return to the originally displayed item.



ENTER key - Used to access a menu and to log a changed value into the program.



CLEAR key - Used to clear numerical values from items being changed in the SET UP mode.



DECIMAL key - Used at certain places to change a function or displayed items. For example, when temperature is being displayed, pressing the DECIMAL key will change the reading from Fahrenheit to Celsius or visa versa.



NUMERICAL keys - Used to enter new values in the SET UP mode.

V. System Operation Overview

MicroTron controllers have two modes of operation, RUN and SET UP. Both the RUN and SET UP menus are circular. Pressing the DOWN key in either menu will display the next line of information on the display. After the last item in a menu has been displayed, pressing the DOWN key will return the display to the top line of that menu.

RUN MODE - This mode is for normal operation. The control relays will only be automatically activated in this mode. In the RUN mode the display will read system values. If an alarm is present the display flashes with the alarm status.

The RUN menu will display values such as conductivity, pH, day, time, date and other values depending upon the features present on the unit. The unit will automatically return to the RUN mode if no keys are pressed for three minutes.

SET UP MODE - This mode is used to make adjustments to settings and readings on the controller. To access the SET UP mode from the RUN screen, press the SETUP/RUN key. Use the up or down arrow to scroll through the various SET UP menus. When you want to enter a specific SET UP menu, press the ENTER key. Once you have entered a SET UP sub menu you will be able to step through that menu's options with the down arrow key.

Relays may be forced on while in the SET UP mode. Press the desired relay test key to force it on. Press it a second time to turn it off. Once the unit returns to the RUN mode, relays will activate automatically.

The relay 4 test key will activate relay 4 on the first press, then will activate relay 5 on the second and will turn both 4 and 5 off on the third.

A. Description of SET UP Menu Screens

The SET UP menu is the main menu circle of set up sub-menus used to customize your unit to the particular parameters needed for your installation. Listed on the following pages is a description and menu map of each SET UP menu.

NOTES:

1. Your unit may not have all of the SET UP menus listed depending upon your model number.
2. After you press ENTER or CLEAR to change a numerical value in the SET UP menu, use the number keys to define the new value. Press ENTER again to enter the new value.
3. When entering new numeric values, all available digits (characters) must be entered. The number of available digits depends upon the scale of operation. Position of cursor indicates number of digits to be entered.

For example, when entering a run time value for a timer in the minute and seconds scale (10:30 would equal 10 minutes and thirty seconds). You would need to key in a number of 0030 to make it 0 (zero) minutes and 30 seconds.

1. CALIBRATION

All MicroTron controllers are factory calibrated for conductivity and pH (if present). These values should be verified for accuracy, and adjusted as per the instructions listed below and to the side.

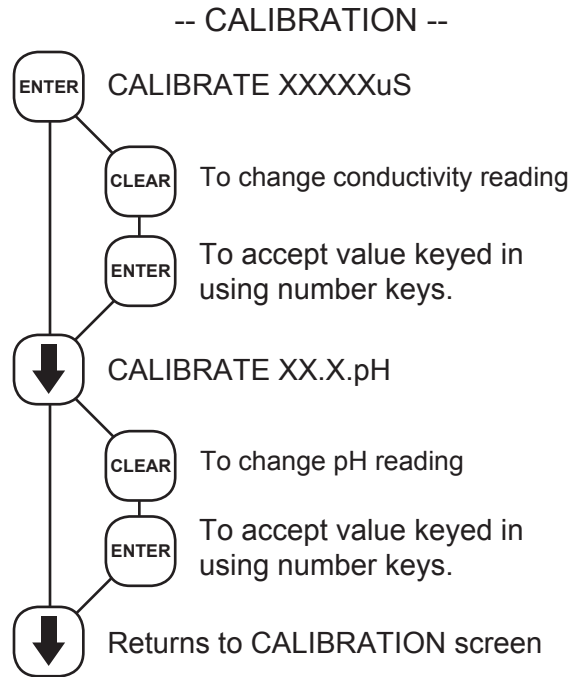
NOTE: MicroTron boiler controllers are designed to read water. If steam flashing is being seen at the probe good readings will not be possible. Flashing occurs due to insufficient back pressure at the electrode. It occurs because the orifice size is too large, or the valve open setting is too great. Flashing is indicated by an unstable conductivity reading. If flashing occurs, reduce the size of the flow control opening.

Calibrating the Conductivity reading, force a blowdown across the probe for 2-3 minutes. Select "CALIBRATE uS" from the "CALIBRATION" menu. Press CLEAR, then key in the corrected conductivity value. Press ENTER to log in that reading.

Calibrating the pH with the probe in solution on line. Select "CALIBRATE PH" from the "CALIBRATION" menu. Press CLEAR, then key in the corrected pH value. Press ENTER to log in that reading.

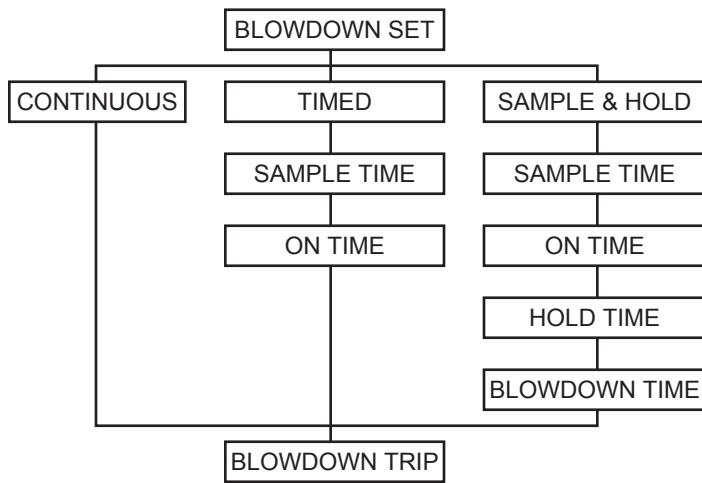
NOTE: For severe calibration problems, see Reset Zero, Recentering pH and Manual Calibration on page 22.

The limits on this factor are from 50% to 200% and any entry which would lead to a factor outside this range will cause it to default back to the previous value.



2. BLOWDOWN SET

Used to set sample method, set points and sample times. First select between Continuous, Timed Sample or Sample and Hold. Depending on which is selected the following menu(s) will appear:



After the sample method and times are set the following values will appear:

Blowdown Trip - Is the conductivity value that will activate the blowdown relay.

Differential - Normally a rising trip point, the relay goes off when the conductivity falls below the trip point minus the differential.

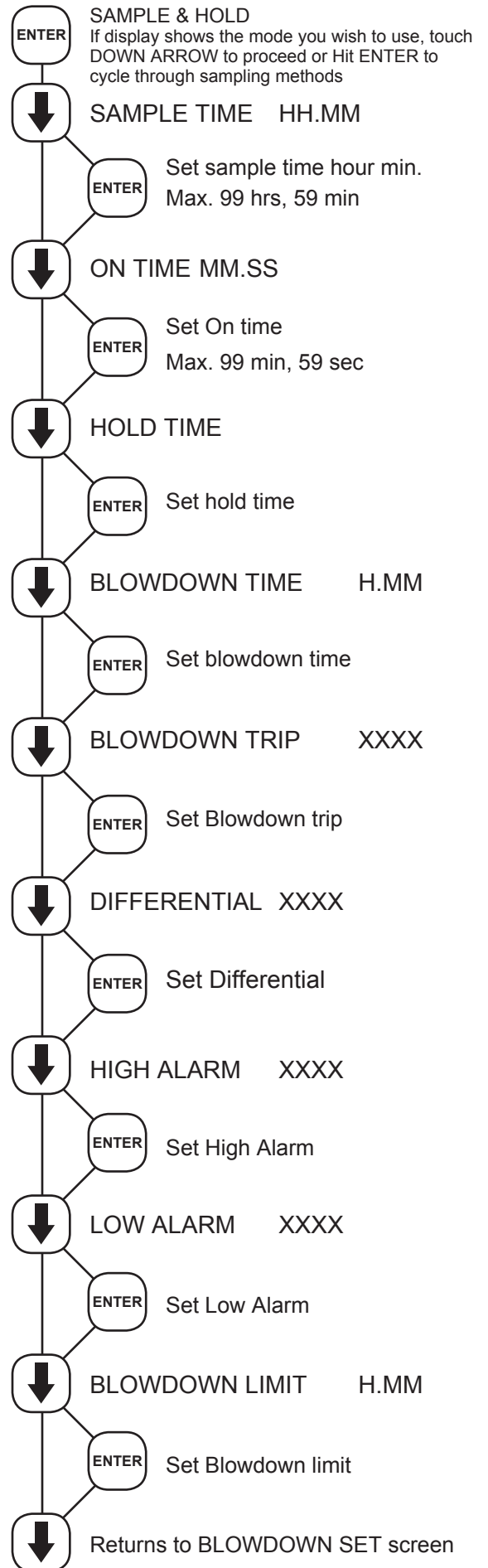
The differential may be made negative by pressing the DECIMAL key when changing differential setting. When the differential is negative, the Trip Point changes from rising to falling.

High Alarm Setting - Setting for a high conductivity alarm condition.

Low Alarm Setting - Setting for a low conductivity alarm condition.

Blowdown Limit Timer (For Continuous and Timed)
The blowdown limit timer is set in hours and minutes. If the unit bleeds longer than the limit timer is set for an alarm is given. Maximum value is 9 hours and 59 minutes. A setting of zero disables the timer.

-- BLOWDOWN SET --



3. PH FEED SET

This menu is used to set pH control parameters including set point, differential, high and low alarms plus a feed limit timer. (This menu choice will be present only if you have the pH control option, see model numbering on page 2.)

pH Trip - The pH reading value that will activate the pH relay.

pH Diff - Normally a rising trip point, the pH relay comes on if pH exceeds the trip point and goes off when it falls below the trip point minus the differential.

The differential may be made negative by pressing the DECIMAL key when changing differential setting. When the differential is negative, the Trip Point changes from rising to falling.

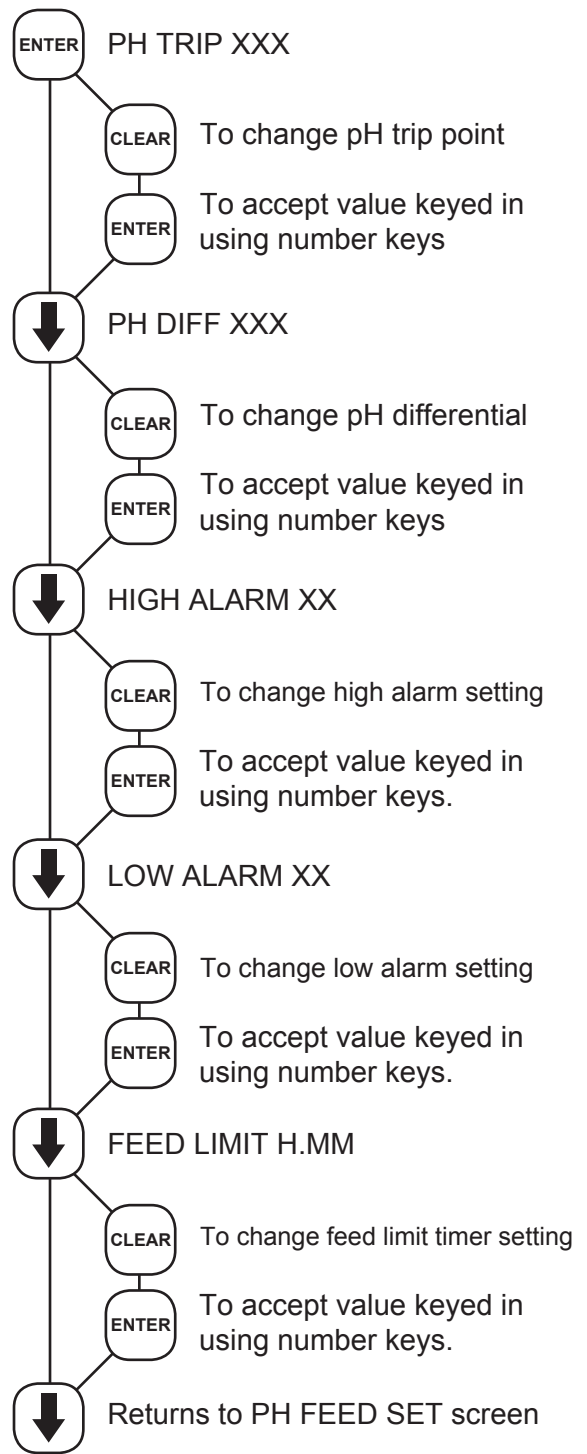
High Alarm Setting - Setting for a high pH alarm condition.

Low Alarm Setting - Setting for a low pH alarm condition.

pH Limit Timer - The pH limit timer is set in hours and minutes. If the unit calls for feed longer than the limit timer is set for, an alarm is given and the pH feed is stopped. Maximum value is 9 hours and 59 minutes. A setting of zero disables the timer.

After entering a new numerical value hit the ENTER key to accept value and advance.

-- PH FEED SET --

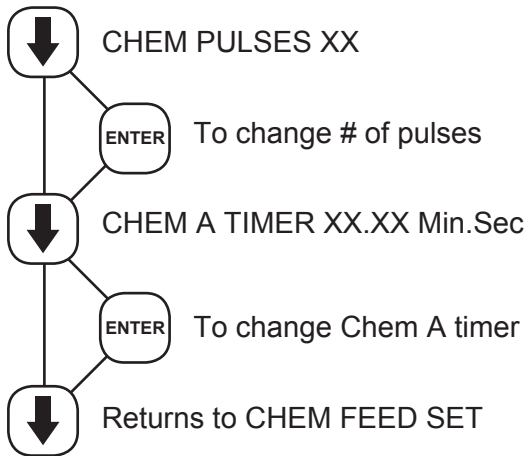


4. CHEM FEED SET

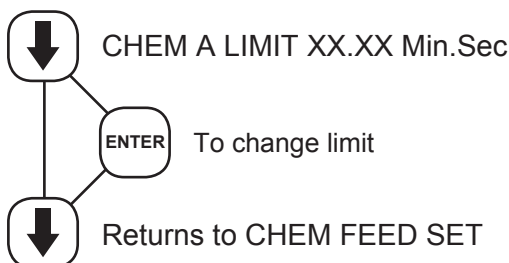
Units with selectable feed timer(s) will have this SET UP menu for selecting the chemical feed method and setting the feed time. A selectable feed timer can be programmed to be one of the following:

1. **PULSE TIME** - A timer activated by dry contacts from a contacting head water meter and includes an accumulator for counting the number of pulse (contacts) before starting the timer.
2. **WITH BLOWDOWN** - A feed limit timer that runs during a blowdown cycle. The chemical feed will run for as long as the blowdown occurs or until the limit time is reached.
3. **POST BLOWDOWN** - This timer counts how long a blowdown cycle lasts then runs the chemical feed after the cycle is over for a user defined percentage of the blowdown time. A limit timer prevents over feeding.
4. **PERCENTAGE** - A continuously repeating timer where the cycle timer can be programmed along with the percentage of ON time for the cycle.

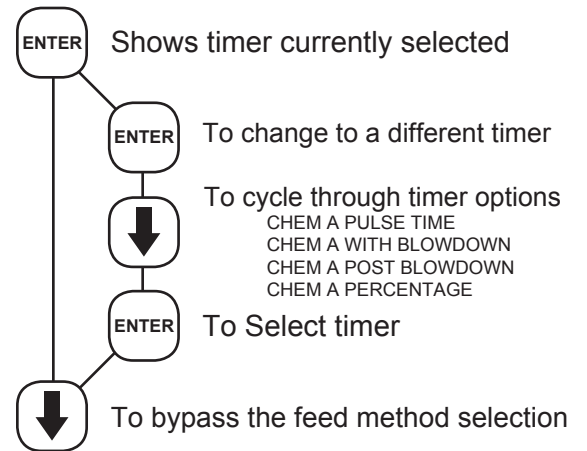
-- CHEM A PULSE TIME --



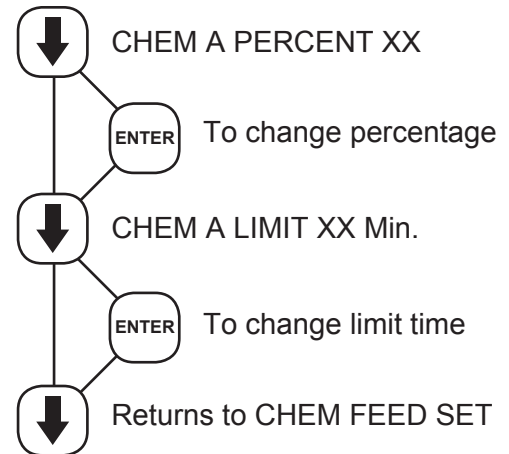
-- CHEM A WITH BLOWDOWN --



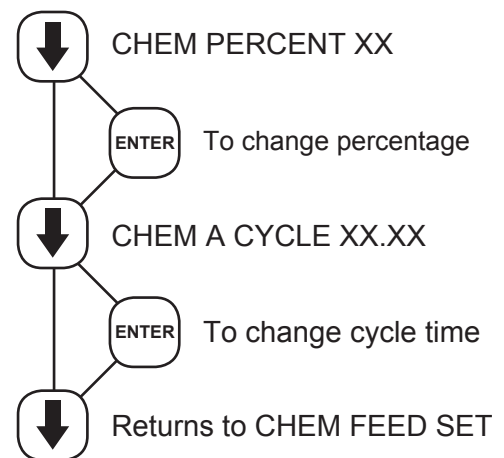
-- CHEM FEED SET --



-- CHEM A POST BLOWDOWN --



-- CHEM A PERCENTAGE --

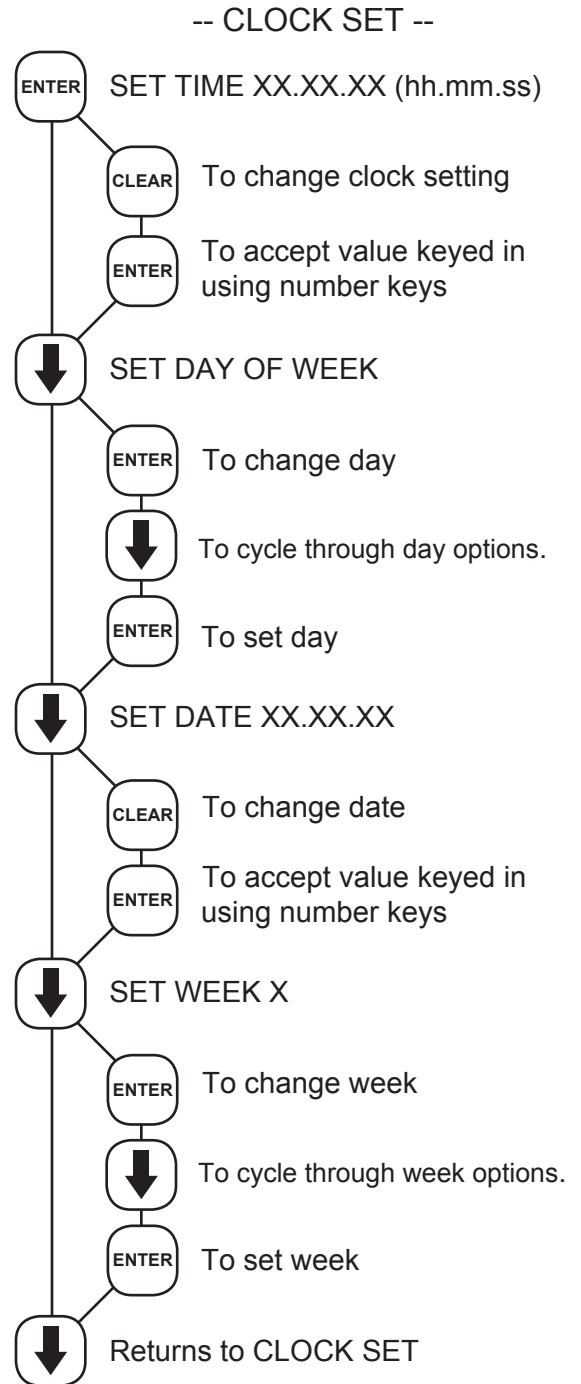


5. CLOCK SET

The CLOCK SET menu is for adjusting the time, date and day of the week.

After entering a new value, hit the ENTER key to accept the value and advance.

The clock time is based on a 24 hour clock. So, a time of 1 pm would be shown as 13.00.00.



6. SYSTEM SET

This menu is used to configure the controller to specific operational needs. All of the items in this menu may not apply depending on the controller model but will always be present.

NOTE: Do not use this menu to make calibration adjustments. Use the Calibration screen.

PASSWORD - If a value of 0000 is entered, a password is not required. If a password is entered, it must be used to operate the controller. If the first digit is zero, relays may be activated without a password.

RESET WATER METER COUNT - Does not apply unless the unit has selectable feed timer.

WATER METER IN - Select a contacting head water meter or a paddle wheel flow meter.

GAL/PULSE - If a feed timer is using a contacting head water meter this tracks make-up volume by entering the number of gallons a contact equals. Use • key to change to pulse/gal for flowmeter.

STRAIGHT/PROPORTIONAL OUTPUTS - A straight output setting means the optional 4-20 output span will be the same as the full scale. The proportional setting allows the span of the 4-20 mA output to be selected by the user based on the setpoint and differential.

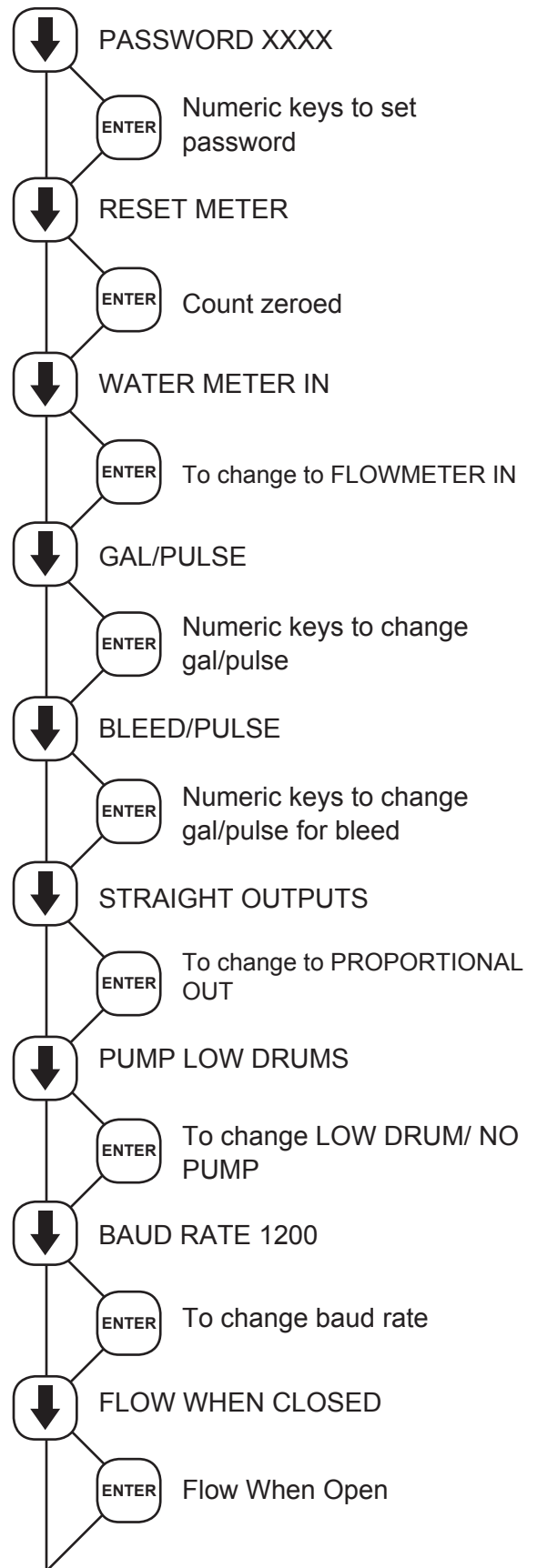
LOW DRUM NO PUMP/PUMP LOW DRUMS - If unit has low level alarms, allows the associated feed timer to be forced off when drum is low.

COMM Setup:

BAUD RATE - For units ordered with the serial line or modem option.

FLOW WHEN CLOSED - For flow switches.

-- SYSTEM SET --



System Set continued on next page.

SYSTEM SET (continued)

FLOW ALARM - With FLOW ALARM ON when the system loses flow, an alarm signal can be sent. FLOW ALARM OFF means that no alarm signal is sent in the event of loss of system flow.

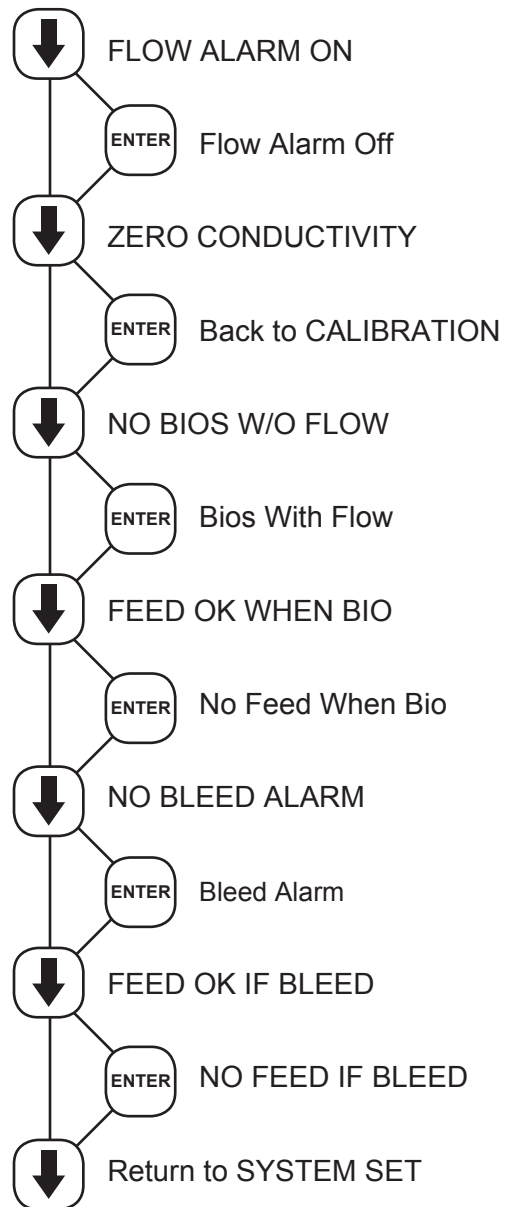
ZERO CONDUCTIVITY - This is normally not required, and is not recommended to use this function unless instructed to do so by the factory.

NO BIOS WITHOUT FLOW - Allows the biocide timer(s) to run only with a flow condition or to ignore the flow and always run even without flow.

FEED OK WHEN BIO - The chemical feed timer can be prevented from activating during a biocide timer run time.

NO BLEED ALARM - With the optional bleed flow alarm, the unit can produce an alarm if it is not sensing flow in the bleed line when bleeding.

FEED OK IF BLEED - Lets the unit feed chemical only when not bleeding or at anytime it is bleeding if called for.



7. DIAGNOSTICS

This menu is used to select, enter and test the following items.

MODEL NUMBER - Read only screen.

SOFTWARE VERSION NUMBER - Read only screen. Please have this number should you need to contact customer service.

Have both available for service

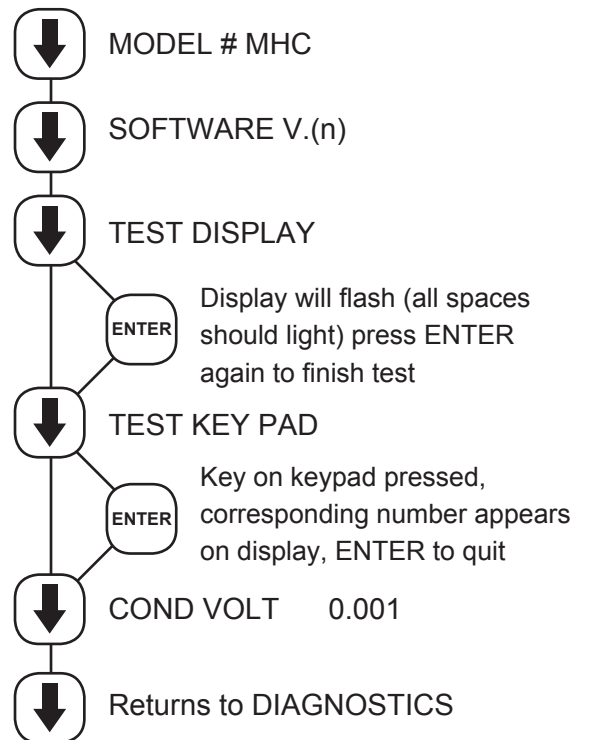
TEST DISPLAY - Press ENTER and all pixels will flash. Make a visual check to see that all pixels are lit.

TEST KEYPAD - Press ENTER, then press each individual key to test its function. NOTE: Pressing the SET UP/RUN key returns display to the main menu. Pressing ENTER again returns to TEST KEYPAD.

RESET CALIBRATE - Resets ALL calibration data to factory default calibration.

CONDUCTIVITY VOLTAGE - This read only screen displays the current raw input voltage that the AD converter is seeing for the conductivity value.

-- SYSTEM SET --



B. Run Menu

During normal operations the controller will be in the RUN mode where current values are displayed. If left in the SET UP mode the display will revert to the RUN mode screen if no keys are touched for 3 minutes. If an alarm is present it will be flashed on the screen in the RUN mode.

If the controller has been programmed to be continuous sampling the conductivity will be displayed, if it is set for a timed sample or sample and hold, it will show how long until the next sample and only update the conductivity during a sample or hold period.

While in the RUN mode if you press the down arrow the following items may be shown:

| | |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| COND | Current conductivity value. |
| PH | Current pH value. |
| DAY-TIME | Current day or the week and time. |
| DATE | Current date. |
| BLOWDN TIME | If blowing down, how long it has been blowing down. |
| CHEM (A) | If a chemical feed relay is on, how long it has been on. |
| GALLONS | If a water meter is being used, total number of gallons made up. |
| WATER METER | If a water meter is being used, number of contacts |
| BLEED METER | If a bleed-off water meter is being used, total number of gallon. If bleed/pulse = 0 bleed pulses is displayed otherwise bleed gallons |

VI. Maintenance

The only required maintenance for normal uninterrupted operation of your MicroTron boiler controller is cleaning of the electrode(s).

After initial start up, it is a good idea to clean the electrode(s) frequently until a schedule based on need has been developed. Since each application is unique, it is difficult to estimate the required frequency of cleaning. To determine the required cleaning frequency, record the reading on the controller before the electrode is removed for cleaning. After cleaning, record the new reading. If a change is observed in the two readings, the electrode was dirty. The more significant the change, the dirtier the electrode. If no change occurs, cleaning can be done less often.

Conductivity Electrode Cleaning Procedure

1. Record the current conductivity reading.
2. Turn off water flow from tower to the electrode loop, bleed pressure from the line, and remove electrode.
3. Use a clean cloth and a mild cleaning solution to clean the flat surface of the electrode.
4. If deposits such as scale are attached to the electrode surface, use a more aggressive cleaning approach. There are several ways to do this, the preferred method is the one that is easiest for the user.
 - a. Use a mild acid solution to dissolve deposits.
 - b. Scrape probe surface perpendicular to the electrodes. Using sand paper (200 grit or finer) sand the electrode on a flat surface to remove stubborn deposits.
5. Reinstall the electrode in the system. When reading stabilizes, calibrate the unit to a reliable test reading.

pH & ORP Electrode Cleaning Procedure

Prior to servicing, the electrode must be removed from the system.

1. Remove the pH/ORP electrode from the system by turning counter-clockwise until fully released.
2. Spray with water and/or detergent, using a soft brush to dislodge any particulate matter.
(Cold water applied to a hot probe may cause damage.)
3. Visually inspect the electrode for signs of damage.
4. Calibrate the electrode.
5. Replace the PTFE tape and re-mount into the system, avoid twisting on the cable.

The pH glass is susceptible to coating by many substances. The speed of response, normally 95% of the reading in less than 10 seconds, is dramatically degraded when the pH glass is coated.

Slow response or non-reproducible measurements are signs that the electrode has become coated, clogged or dead. pH probes should be replaced annually under good conditions.

VII. Troubleshooting

The Advantage Microtron controller is designed for many years of trouble free operation. Should a problem occur, refer to the following chart to help identify the problem.

| SYMPTOM | POSSIBLE CAUSE | SOLUTION |
|------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| False reading | Bad or dirty electrode Out of calibration | Clean as needed Calibrate unit, see Page 12 |
| Will not calibrate | Dirty electrode Faulty electrode Faulty wiring to electrode Out of calibration | Clean electrode Replace controller or electrode as needed. Calibrate unit see Page 12 Check diagnostics menu - Pg 22 |
| No system power | Power source Cable from power supply board to relays or fuse | Check power source Secure cable |
| No output power | Check relay fuse Check ribbon cable from login board to relays | Replace as needed Secure ribbon cable & orientation |
| Not receiving water meter contacts | Connection between unit and water meter | Check cable between water meter and unit |

If problem persists, contact our customer service department with the model number and serial number of unit for free factory technical assistance at 800-743-7431.

Reset Zero Conductivity

It may be necessary to reset the zero value of the conductivity scale if the calibration is not responsive.

1. Remove the probe from the line and make sure it is clean and dry. Leave it out, or disconnect black and red wire at probe.
2. Make note of current blowdown settings (trip, diff, Hi/lo Alarms and Limit) as they will be reset by this procedure.
3. Push SET UP/RUN key and arrow to DIAGNOSTICS.
4. Push ENTER and arrow down to RESET CALIBRATE.
5. Push ENTER and arrow up to SYSTEM SET.
6. Push ENTER and arrow down to ZERO CONDUCTIVITY.
7. Push the decimal key • and your current conductivity scale will appear. Continue to press the decimal key until the conductivity scale loops through the various scale settings and comes back to your scale, then push ENTER twice.
8. Reenter you blowdown settings under the BLOWDOWN SET menu.
9. Reinstall the probe in the line and check conductivity against the actual reading.
10. Calibrate as needed using the CALIBRATION menu.

Manual Conductivity Calibration

For severe problems where the controller is reading outside of the factor limits, a nonstandard calibration can be performed. The manual calibration adjusts the raw voltage the processor uses to calculate the conductivity reading. The raw voltage range is 0-4 volts.

This procedure allows you to set the raw voltage to a point corresponding to the known conductivity reading. For example a known conductivity reading of 4000 in a 0-10,000 scale is 40% of the scale. The raw voltage should be set for a reading equal to 40% of the 0-4 scale or 1.6 volts.

The probe must be seeing a fresh hot sample when adjusting the voltage.

- 1) Choose "RESET CALIBRATE" from the DIAGNOSTIC menu. The calibration of the software must be reset first.
- 2) Remove 4 screws holding keypad in.
- 3) Locate the potentiometer. MHC models it is situated at R9 (labeled CAL1), by the ribbon cable on the power board in the back of the box. On LHC it is located on the front logic board at R89 labeled COND.
- 4) Go to the raw conductivity voltage in the DIAGNOSTIC menu.(See Page 19)
- 5) Adjust the potentiometer until the raw voltage reads the correct percentage of scale. Be careful not to touch any high voltage on power board.
- 6) Replace screws.

Manual calibration is now complete. Proceed to standard menu calibration.

Recentering the pH

Prior to servicing, the electrode must be removed from the system.

1. Remove the pH electrode from the line and clean the sensor tip with a clean, non-abrasive cloth.
2. Place the electrode in a buffer solution with a known and accurate pH of 7. Solution must be grounded by placing temp comp ground probe in solution also.
3. Scroll through the set up menu until you reach the "SYSTEM SET" screen.
4. Press ENTER and use the DOWN arrow to find the "CENTER PH" option. Press ENTER while the electrode is in the buffer solution.
5. Replace the pH electrode in the line and make any necessary adjustments to the pH reading using the normal pH calibration procedure.
6. Press the SET UP/RUN key to resume normal operation

VIII. Advantage Controls' Product Warranty

Advantage Controls warrants 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 installation. Liability is limited to repair or replacement of any failed equipment or part proven defective in material or workmanship upon manufacturer's examination. Removal and installation costs are not included under this warranty. Manufacturer's liability shall never exceed the selling price of equipment or part in question.

Advantage disclaims all liability for damage caused by its products by improper installation, maintenance, use or attempts to operate products beyond their intended functionality, intentionally or otherwise, or any unauthorized repair. Advantage is not responsible for damages, injuries or expense incurred through the use of its products.

The above warranty is in lieu of other warranties, either expressed or implied. No agent of ours is authorized to provide any warranty other than the above.

30 Day Billing Memo Policy

Advantage Controls maintains a unique factory exchange program to ensure uninterrupted service with minimum downtime. If your in warranty controller malfunctions, call 1-800-743-7431, and provide our technician with Model and Serial Number information. If we are unable to diagnose and solve your problem over the phone, a fully warranted replacement unit will be shipped, usually within 48 hours, on a 30 Day Billing Memo.

This service requires a purchase order and the replacement unit will be billed at current list price for that model less any applicable resale discount. Upon return of your old unit, credit will be issued to your account if the unit is in warranty. If the unit is out of warranty or the damage not covered, a partial credit will be applied based upon a prorated replacement price schedule dependent on the age of the unit. Any exchange covers only the controller or pump. **Electrodes, liquid ends and other external accessories are not included.**

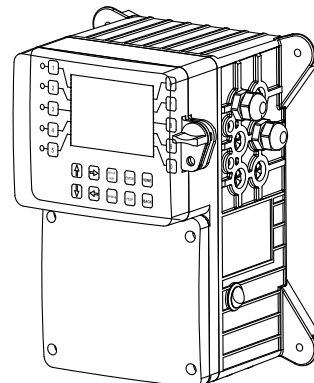
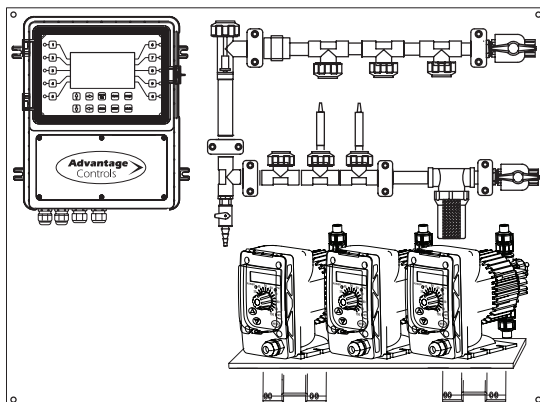
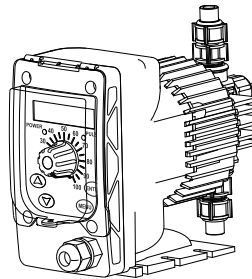
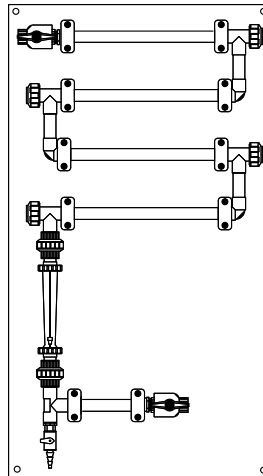
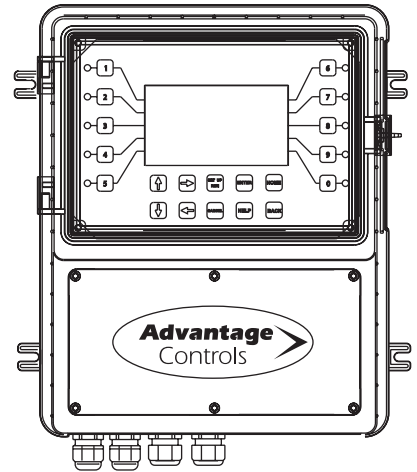
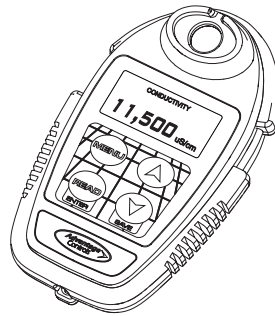
FCC Warning

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instruction, 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.

Get the Advantage in Water Treatment Equipment

Advantage Controls can give you the *Advantage* in products, knowledge and support on all of your water treatment equipment needs.

- Cooling Tower Controllers
- Boiler Blow Down Controllers
- Blow Down Valve Packages
- Solenoid Valves
- Water Meters
- Chemical Metering Pumps
- Corrosion Coupon Racks
- Chemical Solution Tanks
- Solid Feed Systems
- Feed Timers
- Filter Equipment
- Glycol Feed Systems
- Pre Fabricated Systems



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