WEC Series Electrode-less (Toroidal) Conductivity Controller

Instruction Manual

Notice

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Proprietary Material

Statement of Limited Warranty

WALCHEM Corporation warrants equipment of its manufacture, and bearing its identification to be free from defects in workmanship and material for a period of 24 months for electronics and 12 months for mechanical parts and sensors from date of delivery from the factory or authorized distributor under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by WALCHEM Corporation and for the purposes disclosed in writing at the time of purchase, if any. WALCHEM Corporation's liability under this warranty shall be limited to replacement or repair, F.O.B. Holliston, MA U.S.A. of any defective equipment or part which, having been returned to WALCHEM Corporation, transportation charges prepaid, has been inspected and determined by WALCHEM Corporation to be defective. Replaceable elastomeric parts and glass components are expendable and are not covered by any warranty.

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1.0 INTRODUCTION

The Walchem WEC310 Series controllers are wall mount electrodeless conductivity controllers. The non-contacting sensor may be used for long periods of time in dirty, oily solutions without fouling. Common applications include cleaners, chromates, phosphating baths, acid pickling baths and rinse tanks. Two sensors may be attached to control two separate baths.

Four control relays are available that may be set up to feed chemicals, or as alarms. A fifth relay is used as a diagnostic alarm. One or two isolated 4-20 mA outputs that are proportional to the conductivity or temperature are optional.

Any set point may be viewed without interrupting control. Each set point change will take effect as soon as it is entered. An access code is available to protect set point parameters, while still allowing settings to be viewed.

Sensors are available in CPVC for lower temperature applications (to 180°F) and in PEEK for higher temperature applications (to 212°F).

2.0 SPECIFICATIONS

2.1 Measurement Performance

Conductivity Range:	1000µS	10,000µS	100mS	1000mS
Conductivity Resolution:	1µS	1µS	1mS	1mS
Conductivity Accuracy:	±3% below 50µS/cm accuracy ±25%	±1% below 1000µS/cm accuracy ±25%	±1% below 10mS/cm accuracy ±25%	±1% below 100ms/cm accuracy ±25%

Temperature Range:	32 to 212°F	0 to +100°C
Temperature Resolution:	1°F	1°C
Temperature Accuracy:	±1°F	±1°C

2.2 Electrical: Input/Output

Input Power

110-120 VAC	or	220-240 VAC
50/60 Hz, 10A		50/60 Hz, 5A

Outputs

Mechanical Relays (5):	@ 120VAC	@ 240 VAC
(Internally powered,	10 A resistive	6 A resistive
normally open)	1/8 HP	1/8 HP

4 - 20 mA (optional): Internally powered
Fully isolated
600 Ohm max resistive load
Resolution .001% of span
Accuracy ± 1% of reading

Agency Approvals

UL	UL 61010-1, 2nd Edition*
CSA	C22,2 No.61010-1 2nd Edition*
CE Safety	EN 61010-1 2nd Edition*
CE EMC	EN 61326 :1998 Annex A*

Note: For EN61000-4-6,3 the controller met performance criteria B.
*Class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

2.3 Mechanical

Enclosure Material:	Thermoplastic
NEMA Rating:	NEMA 4X
Dimensions:	8.5" x 6.5" x 5.5"
Display:	2 x 16 character backlit liquid crystal
Operating Ambient Temp:	32 – 122°F (0 – 50°C)
Storage Temperature:	-20 – 180°F (-29 – 80°C)

Sensor Specifications

Part Number:	**102730**	**190954**	**191145**
Sensor Material:	PEEK	CPVC	PEEK
O-Ring Material:	EPR	FKM (in-line only)	N/A
Mounting Adapter Material:	316SS	CPVC (in-line only)	316 SS (in-line only)
Dimensions:	7" long x 1" diameter	7" long x 1.75" diameter	7" long x 1.75" diameter
Sensing Coil:	0.5" (1.3cm) aperture	0.5 (1.3cm) aperture	0.5 (1.3cm) aperture
Temperature Limitations:	+20 to 250°F (-5 to 120°C)	+20 to 180°F (-5 to 80°C)	+20 to 250°F (-5 to 120°C)
Pressure Rating:	-15 to +250 psi (-0.1 to 1.75 MPa)	-15 to +140 psi (-0.1 to 0.98 MPa)	-15 to +250 psi (-0.1 to 1.75 MPa)
Mounting:			
Submersion	3/4" NPTF thread	1" NPTM thread	1" NPTM thread
In-Line	2" NPTM adapter	2" NPTM adapter	2" NPTM adapter

2.4 WEC Variables and their Limits

	Low Limit	High Limit
Conductivity Menu		
ppm Conversion factor	0.2	1.0
Calibration	0.5	2.0
Multipoint Calibration	2	5
% Concentration	0	200.0
Damping	12 seconds	48 seconds
Ranges	50	1000µS
	1000µS	10,000µS
	10,000µS	100mS
	100mS	1000mS
Temperature Menu		
Temp Comp	0.00% per °C	9.99% per °C
Control Menus		
Set Point	0	Full scale of range Or 300% concentration
Dead Band	0	Full scale of range
Proportional Band	0	Full scale of range
Sample Period	0	30 minutes
Time Limit	1 sec	59:59 (0 to disable)
Alarm Menus		
Set Point(s)	0	Full scale of range
Dead Band	0	Full scale of range
4-20 mA Menu		
4 mA setting	0	Full scale of range
20 mA setting	0	Full scale of range
Access Code		
New Value	0	9999

3.0 UNPACKING & INSTALLATION

3.1 Unpacking the unit

Inspect the contents of the carton. Please notify the carrier immediately if there are any signs of damage to the controller or its parts. Contact your distributor if any of the parts are missing. The carton should contain: a WEC310 series controller and instruction manual. Any options or accessories will be incorporated as ordered.

3.2 Mounting the electronic enclosure

The WEC series controller is supplied with mounting holes on the enclosure. It should be wall mounted with the display at eye level, on a vibration-free surface, utilizing all four mounting holes for maximum stability. Use M6 (1/4" diameter) fasteners that are appropriate for the substrate material of the wall. The enclosure is NEMA 4X rated. The maximum operating ambient temperature is 122°F (50°C); this should be considered if installation is in a high temperature location. The enclosure requires the following clearances:

Top:	2" (50 mm)
Left:	8" (203 mm)
Right:	4" (102 mm)
Bottom:	7" (178 mm)

3.3 Installation

Once the WEC series controller is mounted, the metering pumps may be located at any distance from the controller.

- Mount the sensor as close as possible to the controller.
- Use only Walchem extension cable if 20 feet of cable is not sufficient.
- Take care to shield the cable properly.
- Maximum cable length is 120 feet.
- Position the sensor such that a fresh, representative sample of the solution is available.
- Position the sensor such that air bubbles will not be trapped within the sensing area.
- Position the sensor where sediment or oil will not accumulate within the sensing area.
- If cable is installed in metal conduit (recommended), either flexible conduit should be used or some other provision made for removal of sensor from the process for maintenance.

Refer to the WEC Sensor Instructions for more detailed information.

3.4 Icon Definitions

Symbol	Publication	Description
	**IEC 417, No.5019**	**Protective Conductor Terminal**
	IEC 417, No. 5007	**On (Supply)**
	**IEC 417, No. 5008**	**Off (Supply)**
	**ISO 3864, No. B.3.6**	**Caution, risk of electric shock**
	**ISO 3864, No. B.3.1**	**Caution**

3.5 Electrical installation

Based on the model number, the following voltages are required:

WEC310-1xx	120 VAC, 50/60 Hz Prewired
WEC310-4xx	120 VAC, 50/60 Hz Hardwired
WEC310-5xx	240 VAC, 50/60 Hz Hardwired

The various standard wiring options are shown in figure 1, below. Your WEC series controller will arrive from the factory prewired or ready for hardwiring. Depending on your configuration of controller options, you may be required to hardwire some or all of the input/output devices. Refer to figures 3 and 4 for circuit board layout and wiring. For safety, the controller is shipped with all holes plugged. It will be necessary to remove some of the cable clamps before hardwiring.

Note: when wiring the optional 4-20 mA output or a remote flow switch, it is advisable to use stranded, twisted, shield pair wire between 22-26 AWG. Shield should be terminated at the controller ground stud (see figures 3 and 4).

CAUTION! There are live circuits inside the controller even when the power switch on the front panel is in the OFF position! The front panel must never be opened before power to the controller is REMOVED!
If your controller is prewired, it is supplied with a 8 foot, 18 AWG power cord with USA style plug. A tool (#1 phillips driver) is required to open the front panel.

CAUTION! When mounting the controller, make sure there is clear access to the disconnecting device!

CAUTION! The electrical installation of the controller must be done by trained personnel only and conform to all applicable National, State and Local codes!

CAUTION! Proper grounding of this product is required. Any attempt to bypass the grounding will compromise the safety of persons and property.

CAUTION! Operating this product in a manner not specified by Walchem may impair the protection provided by the equipment.

WEC Prewired Option

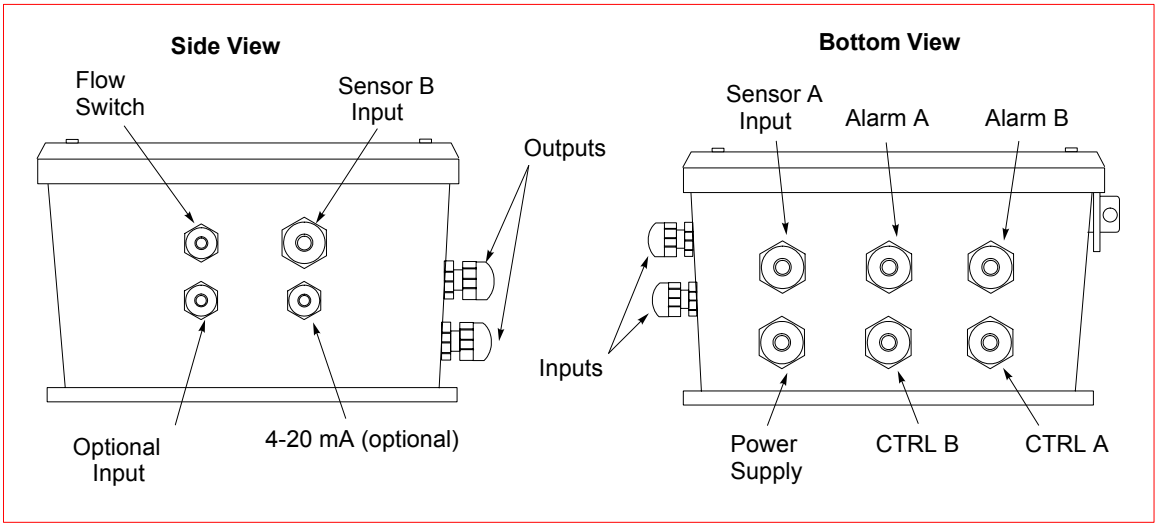
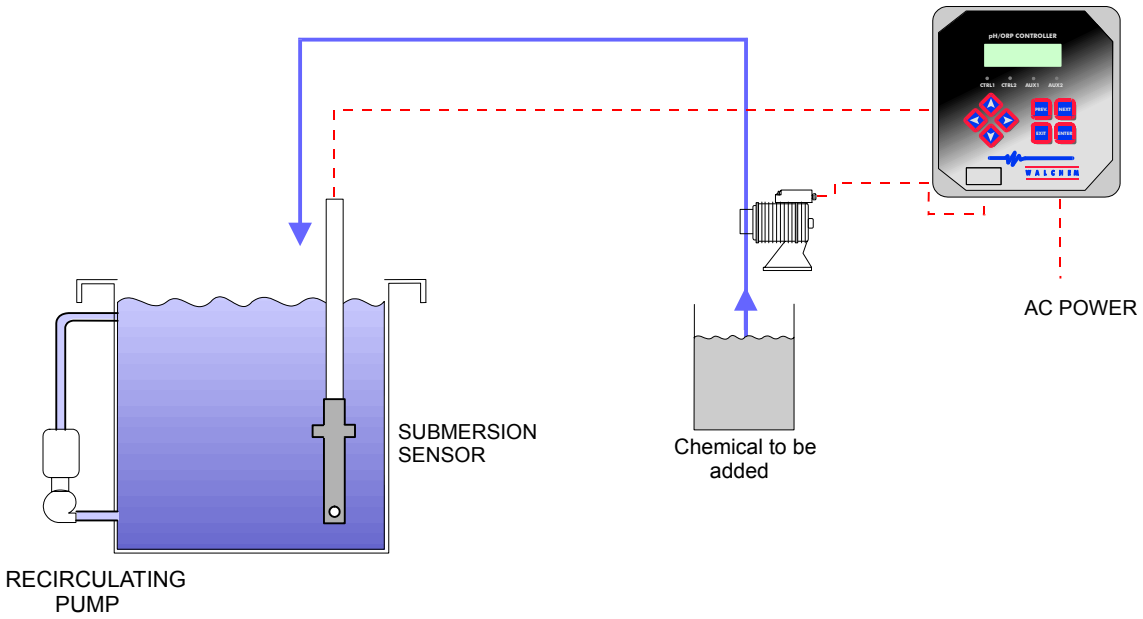


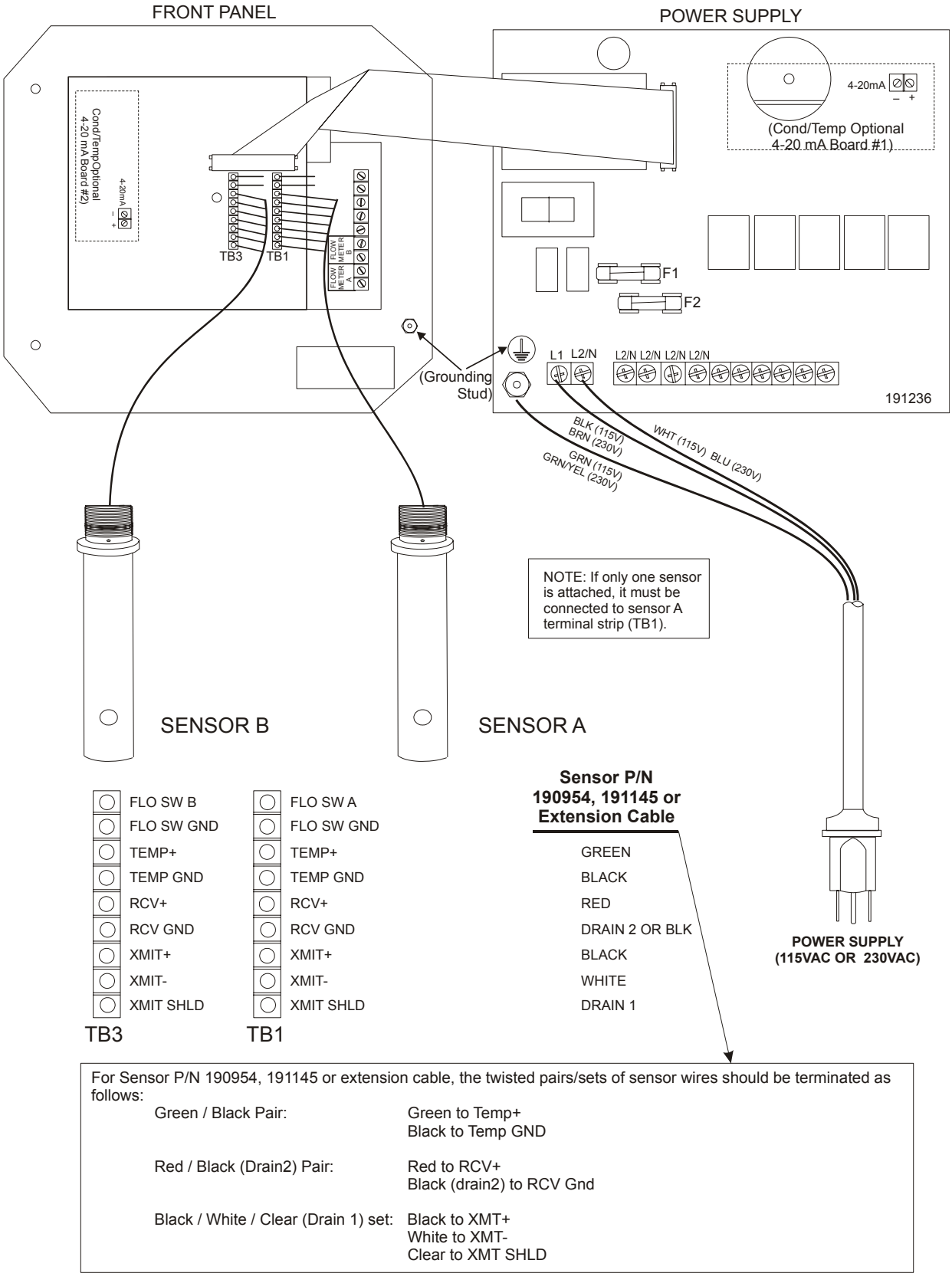
Figure 1 Conduit/Wiring Configuration



WEC with Submersion Sensor

Figure 2 Typical Installation

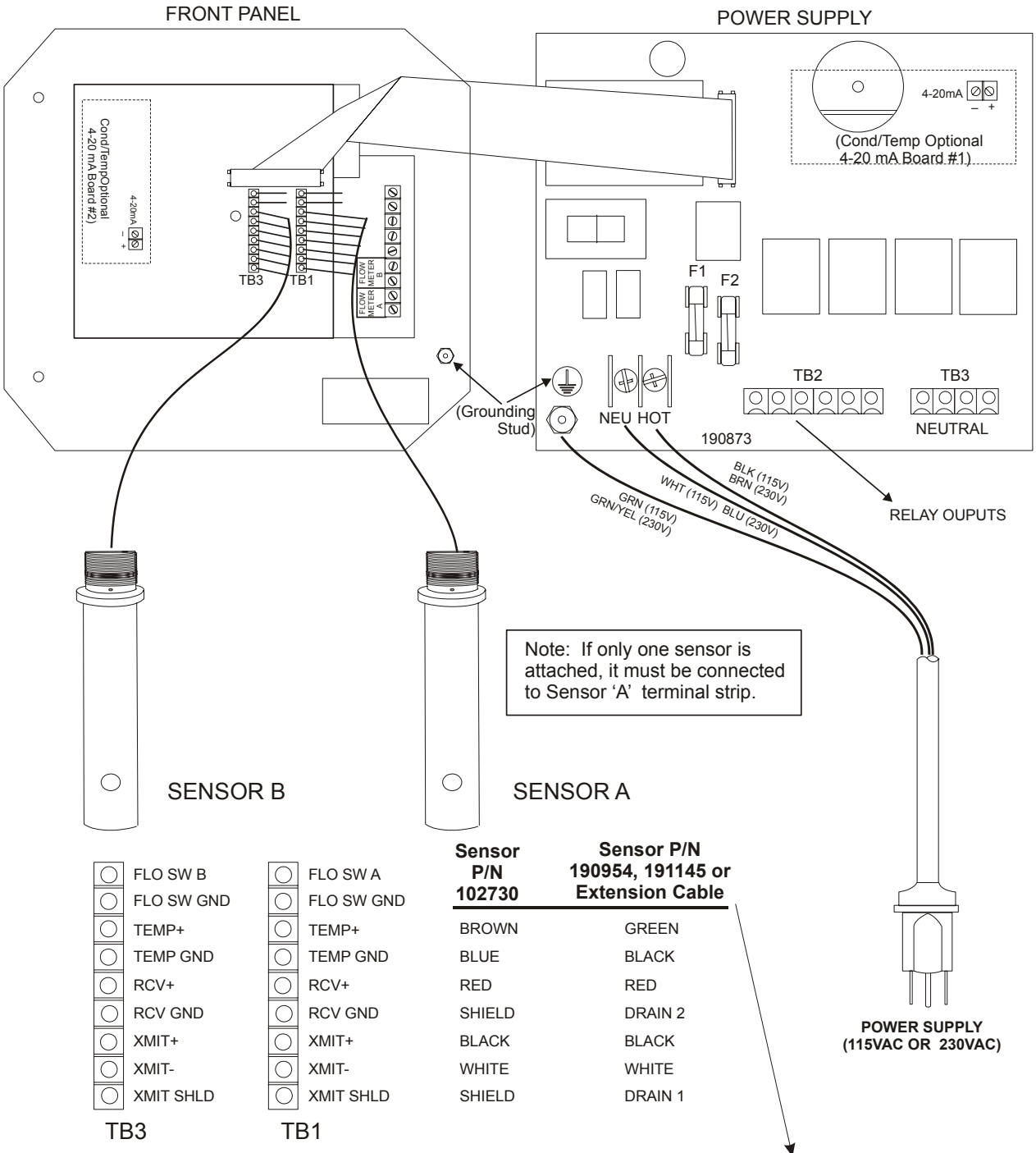
WEC Controller Sensor 190954, 191145 and Extension Cable Wiring



For Sensor P/N 190954, 191145 or extension cable, the twisted pairs/sets of sensor wires should be terminated as follows:

Green / Black Pair:	Green to Temp+ Black to Temp GND
Red / Black (Drain2) Pair:	Red to RCV+ Black (drain2) to RCV Gnd
Black / White / Clear (Drain 1) set:	Black to XMT+ White to XMT- Clear to XMT SHLD

Figure 3 Inputs (for power relay board #191236)



Sensor P/N 102730	Sensor P/N 190954, 191145 or Extension Cable
BROWN	GREEN
BLUE	BLACK
RED	RED
SHIELD	DRAIN 2
BLACK	BLACK
WHITE	WHITE
SHIELD	DRAIN 1

For Sensor P/N 190954, 191145 or extension cable, the twisted pairs/sets of sensor wires should be terminated as follows:

Green / Black Pair:	Green to Temp+ Black to Temp GND
Red / Black (Drain2) Pair:	Red to RCV+ Black (drain2) to RCV Gnd
Black / White / Clear (Drain 1) set:	Black to XMT+ White to XMT- Clear to XMT SHLD

Figure 3a Inputs (for power relay board #190873)

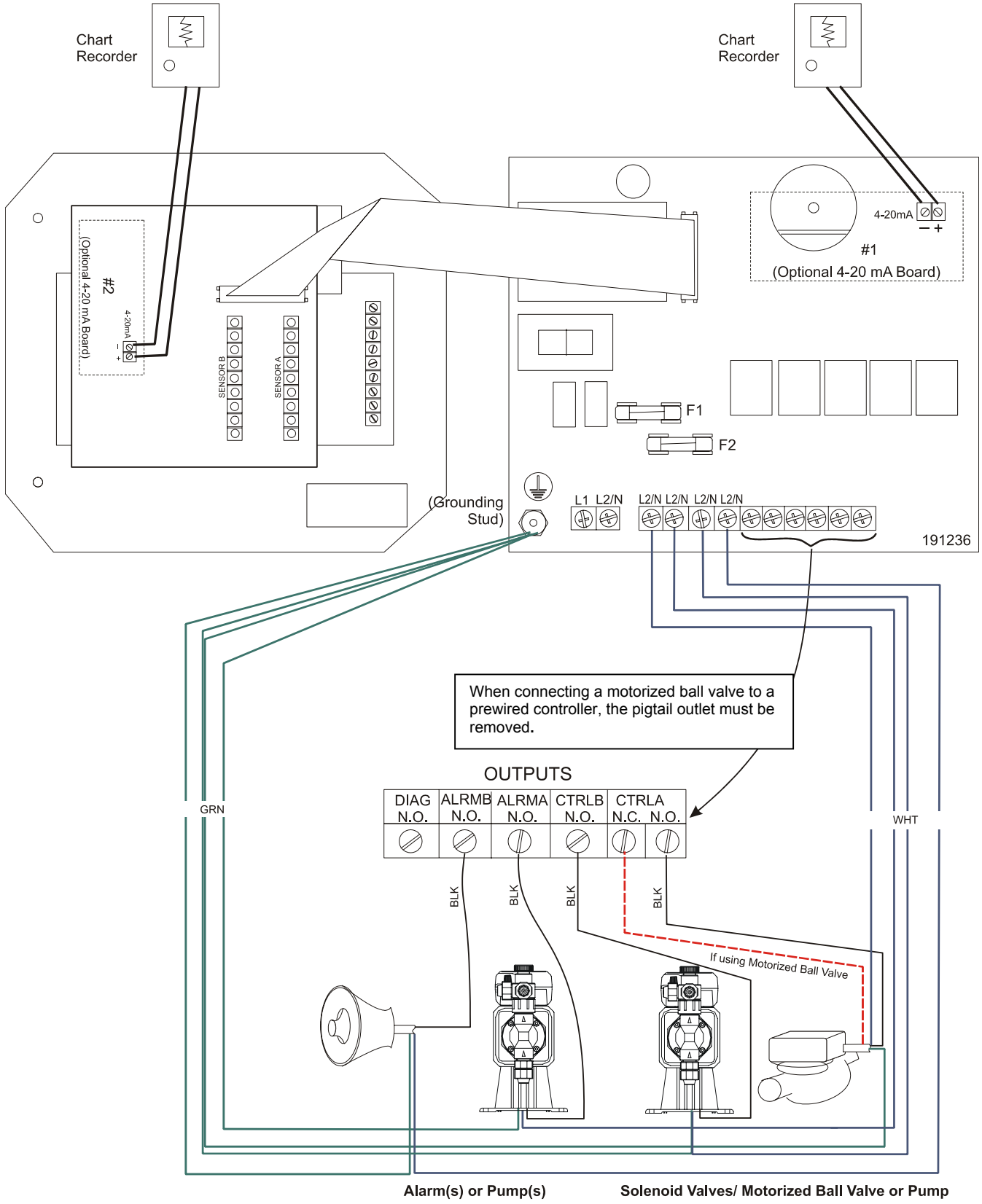


Figure 4 Outputs (for power relay board #191236)

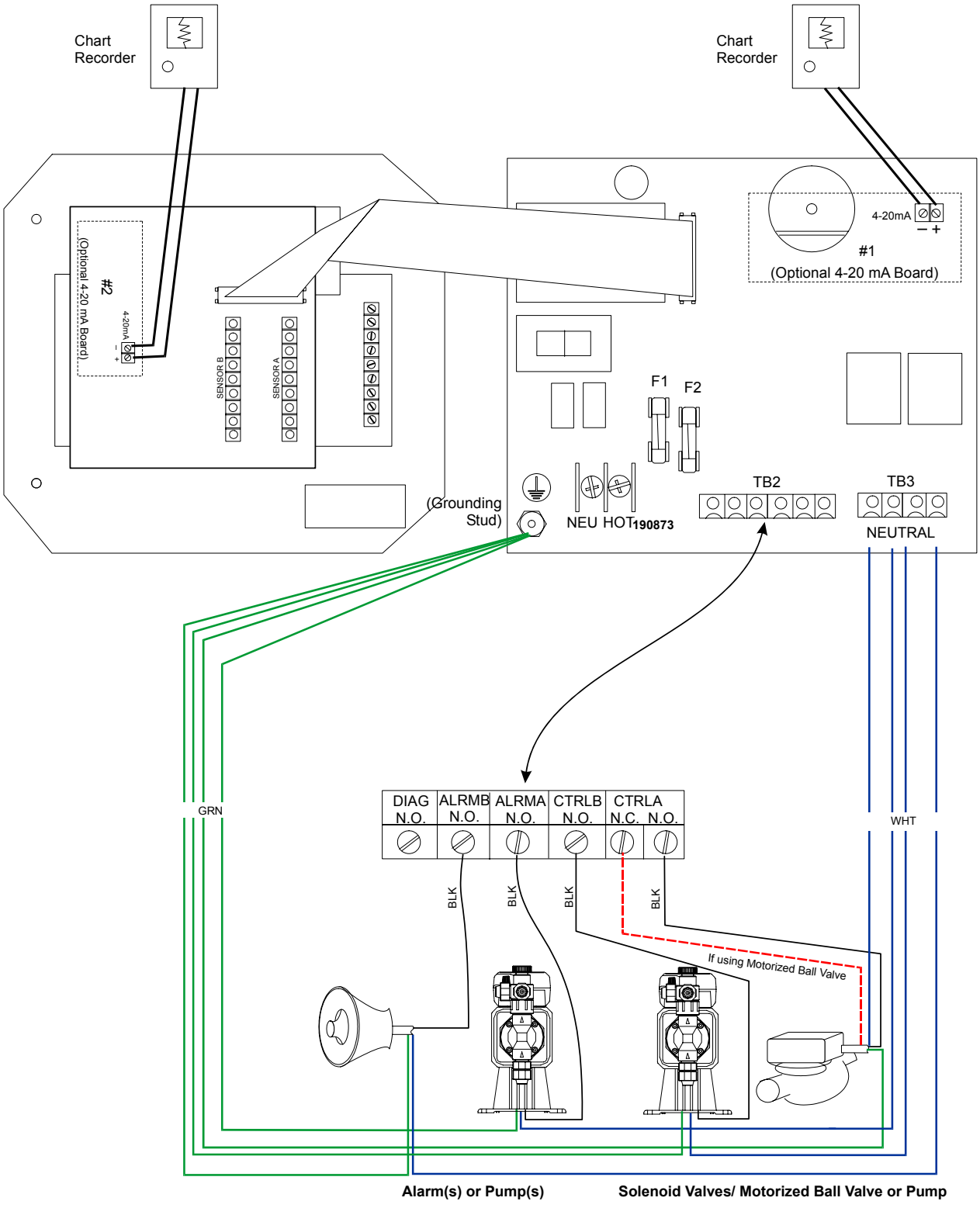


Figure 4a Outputs (for power relay board #190873)

4.0 FUNCTION OVERVIEW

4.1 Front Panel

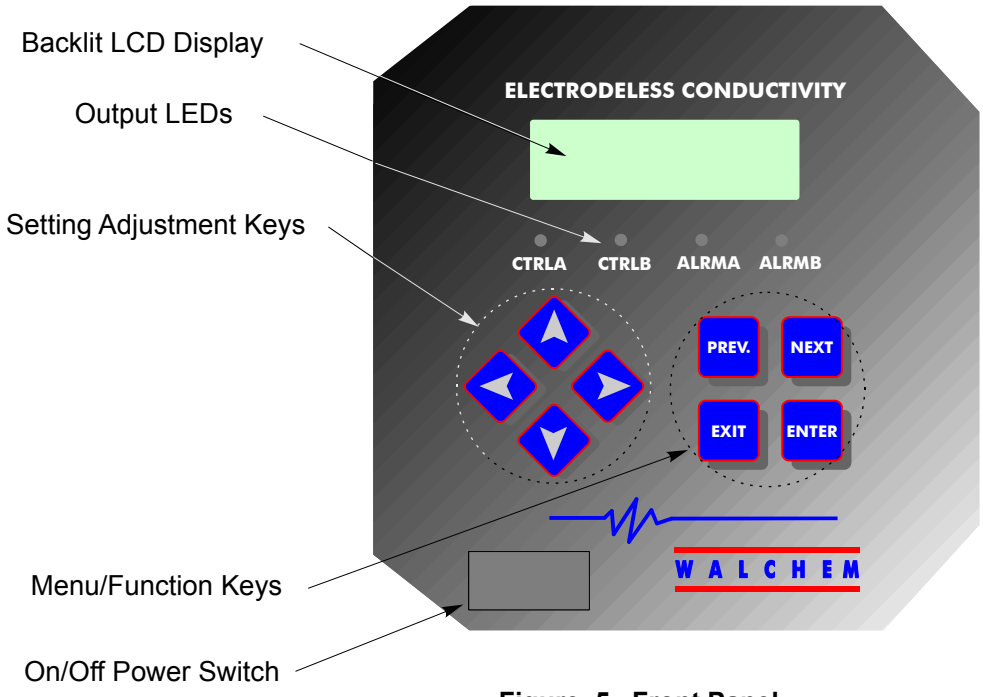


Figure 5 Front Panel

4.2 Display

A summary screen is displayed while the WEC controller is on. If you have a single sensor selected, this display will show a bar graph of the conductivity relative to the set point, the actual conductivity value or ppm or percent concentration, and current operating conditions. If you have selected dual sensors, the bar graph will be replaced by the other sensor's conductivity value.

The center of the bar graph is at the (S), which represents the set point. For each 1% increase in conductivity, a vertical bar appears and the bar graph will grow to the right. There are small breaks in the bars at each 5%. The bar graph is limited to displaying 20% above and below the set point. On the 1000µS scale, for example, if the set point is 850µS, a value of 680µS will be a single vertical bar at the left side. A value of 1020µS will be a full bar graph extending all the way to the right side.

The operating conditions that are displayed on the bottom line of this display are TemperatureA Err, TemperatureB Err, Overrange A, Overrange B, NO FLOW A, NO FLOW B, High Alarm A, High Alarm B, Low Alarm A, Low Alarm B, Output Timeout A, Output Timeout B, Range Alarm A, Range Alarm B, InRange Output A, InRange Output B, Output A ON, Output B ON and Normal. Normal just means there is nothing unusual to report.

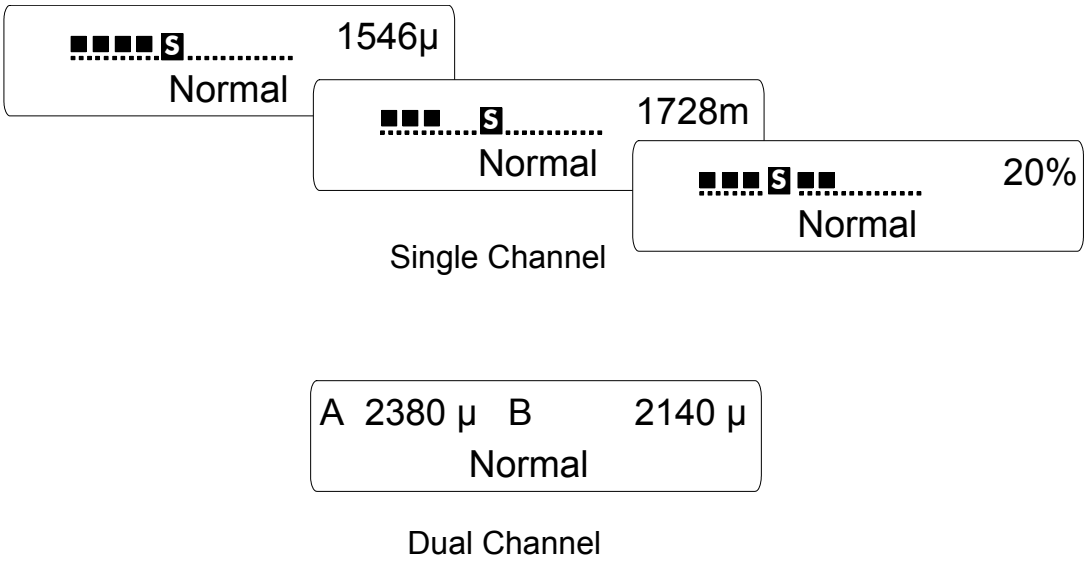
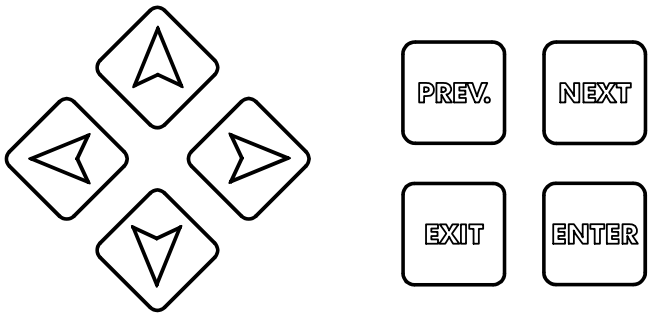


Figure 6 Summary Screen

4.3 Keypad

The keypad consists of 4 directional arrow keys and 4 function keys. The arrows are used to move the adjustment cursor and change settings, while the function keys are used to enter values, and navigate the various menu screens. The function keys are **ENTER**, **EXIT, NEXT**, and **PREV** (previous). **NEXT** and **PREV** scroll through the various menu choices. **ENTER** is used to enter a submenu and to enter a value. **EXIT** is used to back up one menu level. If you are at the main menu level, **EXIT** will return you to the Summary Display.



To change a value in a submenu, the left/right arrow keys move the cursor left and right to each digit or option that can be changed. The up/down arrows will change numeric values up or down, or scroll through option choices. Press **ENTER** only when you have finished making *all* of the changes for that menu screen.

4.4 Access Code

The WEC series controller is shipped with the access code disabled. If you wish to enable it, see Section 5.8 for operation. With the access code enabled, any user can view parameter settings, but not change them. Note that this provides protection only against casual tampering. Use a lock on the cover latch if you need more protection.

4.5 Startup

Initial Startup

After having mounted the enclosure and wired the unit, the controller is ready to be started.

Plug in the controller and turn on the power switch to supply power to the unit. The display will briefly show the WEC model number and then revert to the normal summary display. Scroll through the menus and calibrate the conductivity reading, temperature, and set the control parameters detailed in Section 5, Operation.

When programming the controller for the first time, you must follow the sequence listed below to insure an accurate calibration:

- Set the single/dual menu found in the Main Menu to match the number of sensors installed, see section 5.2.
- Set the sensor type for each sensor installed, see Section 5.3.
- Determine the correct conductivity range found in the Conductivity Menu as described in section 5.3.
- Set the desired units of measure in the Conductivity Menu as described in section 5.3.
- Calibrate the temperature in the Temperature Menu as described in section 5.4.
- Set the temperature compensation percentage in the Temperature Menu as described in section 5.4.
- Set the Zero Adjust to compensate for any offset introduced by the sensor or electronics. See Section 5.3.
- Calibrate the conductivity sensor in the Conductivity Menu as described in section 5.3. You may choose either the one point or the multi-point calibration if you have selected % concentration as your units of measure.
- Set the control mode type prior to setting the CTRLA or CTRLB set points. See Section 5.5.
- Set the alarm output type prior to setting the alarm control limits. See section 5.6.

To return to the summary display, press the **EXIT** key until you return to this screen. The controller will automatically return to this screen after 10 minutes.

Normal Startup

Startup is a simple process once your set points are in memory. Simply check your supply of chemicals, turn on the controller, calibrate it if necessary and it will start controlling.

4.6 Shut Down

To shut the WEC controller down, simply turn off the power. Programming remains in memory.

5.0 OPERATION

These units control continuously while power is applied. Programming is accomplished via the local keypad and display.

To view the top level menu, press any key. The menu structure is grouped by inputs and outputs. Each input has its own menu for calibration and unit selection as needed. Each output has its own setup menu including set points, timer values and operating modes as needed. After ten minutes of inactivity in the menu, the display will return to the summary display. Keep in mind that even while browsing through menus, the unit is still controlling.

5.1 Main Menu

The exact configuration of your WEC controller determines which menus are available as you scroll through the settings. Certain menus are only available when you select certain options, which may be hardware options (like the installation of a 4-20 mA output board) or software options (like choosing the units of measure as % concentration) or both (like adding a second sensor, then selecting dual input from the main menu). All settings are grouped under the following main menu items.

Conductivity Input Temperature Input Control Output Alarm Output	Duplicate versions appear if dual input is selected
4-20mA	Only appears if 4-20mA option(s) installed
Access Code	
Dual/Single Input menus	Selecting "Dual" will replicate the Cond, Temp, CTRL & Alarm

The **NEXT** key travels forward through this list while the **PREV** key travels backwards through the list. Pressing **ENTER** will Enter the lower level menu that is currently displayed.

Possible Status Screens

*Memory Failure
*Circuit Failure
*TemperatureA Err (or B)
*Overrange A (or B)
*NO FLOW A (or B)
High Alarm A (or B)
Low Alarm A (or B)
*Output Timeout A (or B)
Range Alarm A (or B)
In Range Output A (or B)
Output A ON (or B)
Normal
*

These status screens indicate that the diagnostic alarm relay is activated.

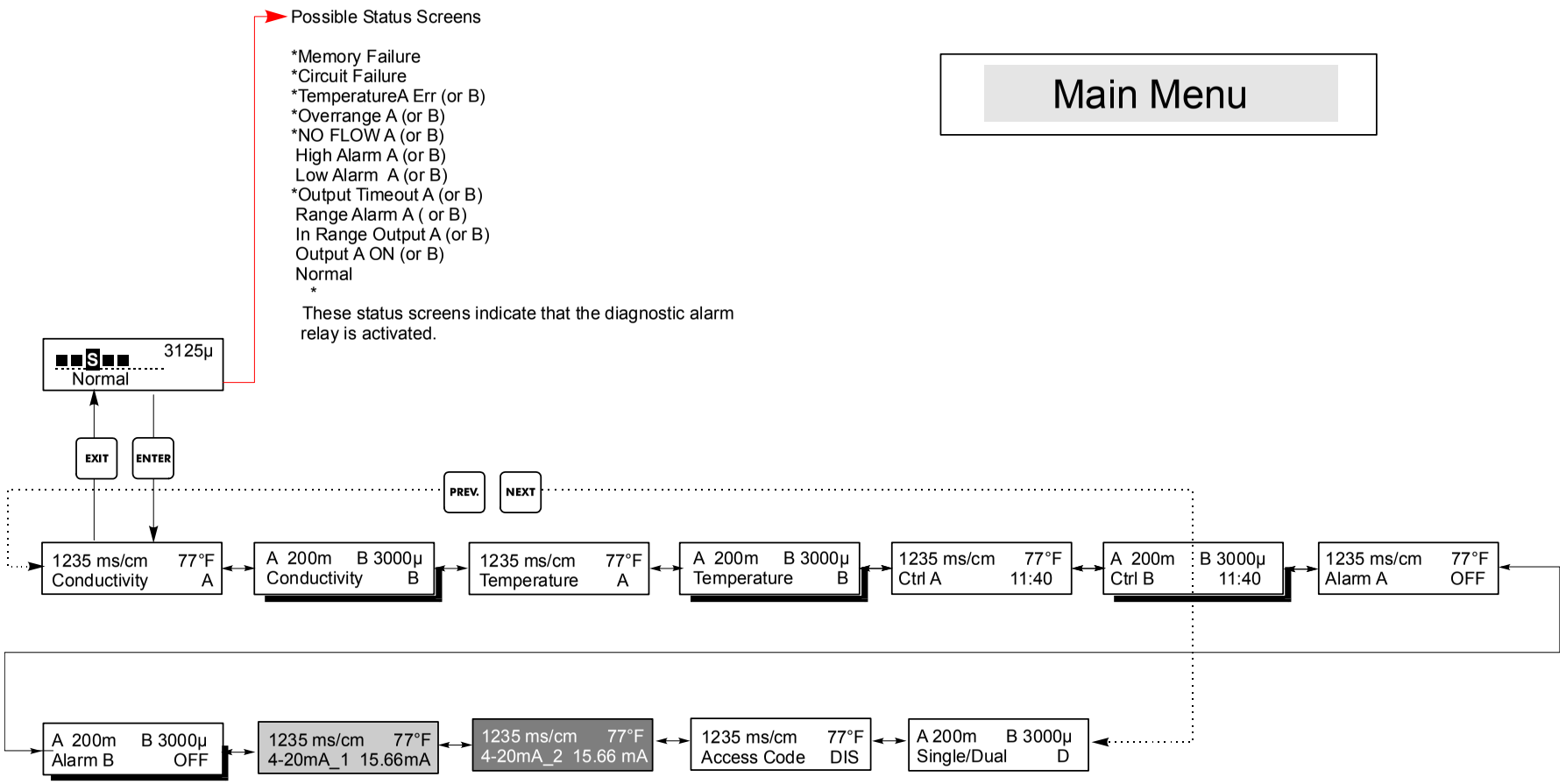


Figure 7 Main Menu

Legend

Dual mode only

Only present if 4-20mA option is installed.

Only present if second 4-20mA option is installed.

Operation

Press Enter key to enter menu or submenu.
Press Exit key to exit menu.
After 10 minutes of inactivity the controller will automatically return to the summary screen.

After ten minutes of inactivity, the controller will automatically return to the summary screen. The conductivity value will blink if it rises above range full scale value. An "Overrange" error will appear if the conductivity value rises above 150% of full scale range.

5.2 Single/Dual Menu

When programming the unit for the first time after adding a second sensor for control of two processes, you need to enter this menu and let the controller know that the second sensor has been installed.

Press **ENTER** to select single input or dual input. Use the up or down arrow keys to toggle between single and dual. Press **ENTER** again when the appropriate choice is displayed.

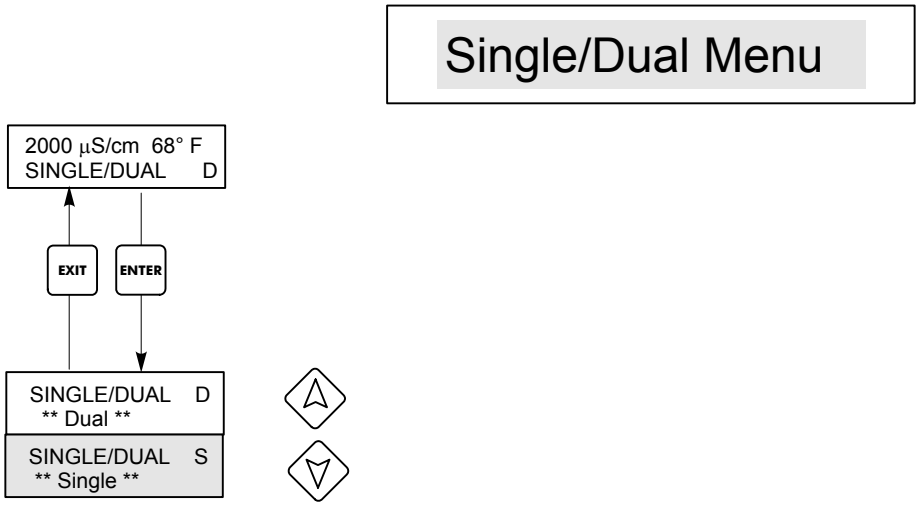


Figure 8 Single/Dual Menu

5.3 Conductivity A or B Menu

The conductivity menu provides the following settings: Range selection, Calibration, and Units of measure selection. Additional settings are also described below. Refer to figure 9, Conductivity Menu Chart.

Range

In order for the WEC310 to be accurate, the proper conductivity range must be selected prior to calibration or operation. Changing the range erases any previous calibrations!

If you know what the conductivity of your solution is, then select the full scale range that is just above that conductivity. For example, if your bath is 11,000 µS/cm, then you would choose the 100 mS/cm (100,000 µS/cm) range. The range is selected by pressing **ENTER** at the Range Menu, using the up or down arrow key to toggle between the choices, and pressing **ENTER** again when the appropriate range is displayed.

If you don't have any way of knowing the conductivity of your bath, then place the sensor in the working solution at its normal concentration and temperature. If the display reads "OVERRANGE", select the next highest range. Repeat this process until you get a valid conductivity reading. If this reading is flashing, then it is above the top of that range, and the next higher range should be selected.

1 Point Calibration

This menu is used to calibrate the sensor and controller to restore accuracy. There are a few options for how this can be accomplished:

For units of measure of conductivity or ppm

Using a calibration standard: Rinse off the sensor and place it in a calibration solution of a known conductivity or ppm that is close to the same as your process solution. If the temperature of the standard solution is much different from the working solution temperature, allow it to equalize. This may take as long as 15 minutes. Press **ENTER** at the 1 Point Cal screen. The display will show a conductivity or ppm reading. If this does not match the known conductivity or ppm, use the arrow keys to change the displayed value and press **ENTER**. This method will not be very accurate unless the container of standard solution closely approximates the process solution dimensions and materials.

Using a calibrated conductivity or TDS meter: Rinse off the sensor and place it in a sample of the process solution that has been measured with a previously calibrated conductivity or TDS meter. This may be the normal process installation location, if the conductivity is not changing quickly at the time. Press **ENTER** at the 1 Point Cal screen. The display will show a conductivity or ppm reading. If this does not match the known conductivity or ppm, use the arrow keys to change the displayed value and press **ENTER.**

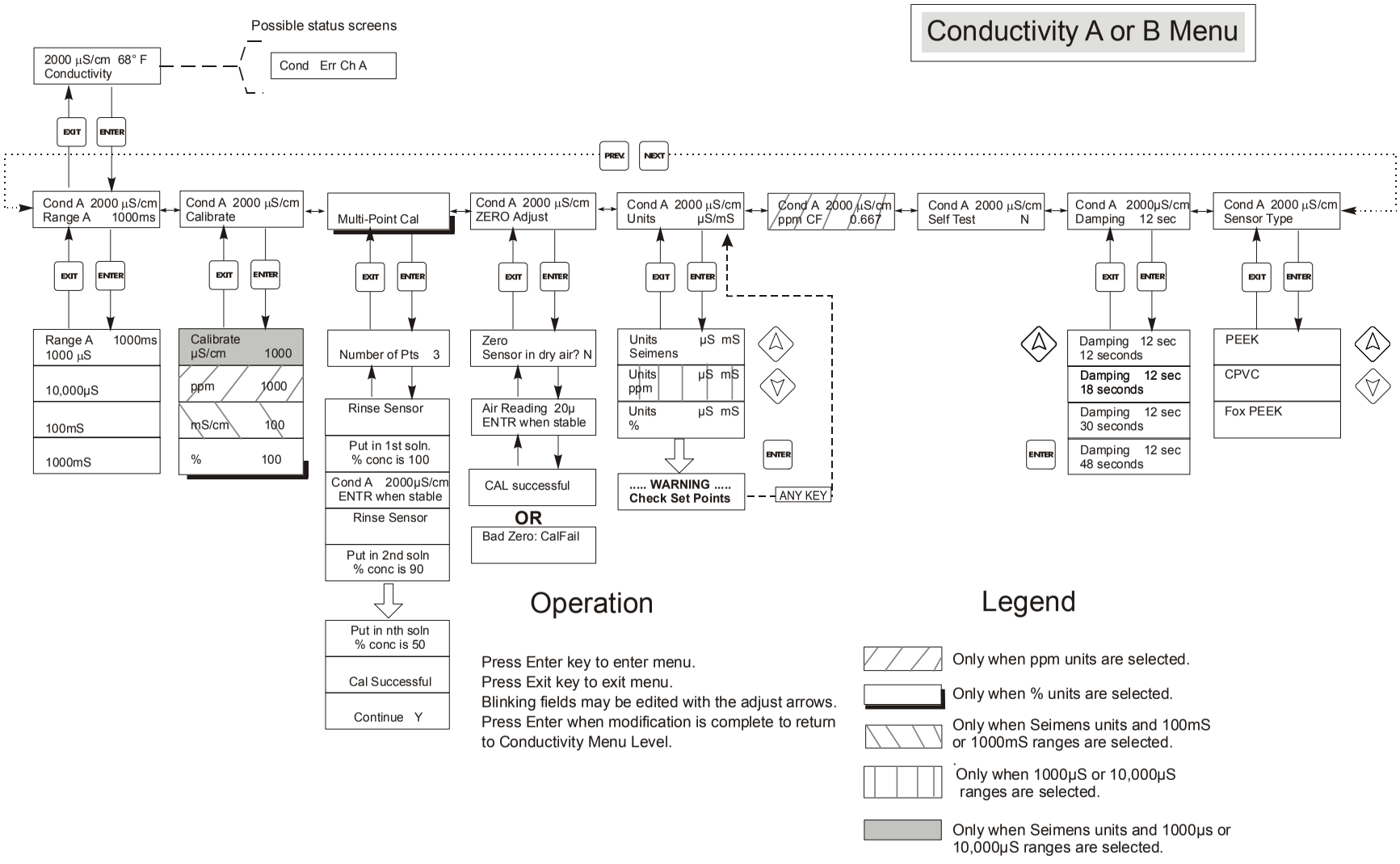


Figure 9 Conductivity Menu

NOTE: When doing a manual calibration, be sure to use a container large enough to insure that the sensor is surrounded by at least 2 inches of liquid on all sides. Suspend the sensor; do not let it rest on the bottom of the container.

WARNING! Do not attempt to perform a one point calibration with the sensor in free air. The range of calibration correction is 0.5 to 2.0. If the initial reading is not within this band, you will not be successful. Re-examine your connections and/or retest your sample liquid.

For units of measure of % concentration

The sensor calibration should be performed in the process solution at a time when the bath is not being used and is of a stable concentration. Leave the sensor in the process solution, at its normal operating concentration and temperature. Perform a laboratory analysis of the % concentration of the bath. Press **ENTER** at the 1 Point Cal screen. The display will show a % concentration reading. If this doesn't match the laboratory analysis, use the arrow keys to change the displayed value and press **ENTER** to update the calibration.

Multi-point Calibration

WARNING! If you enter the mulit-point calibration sequence and try to exit prematurely, the existing calibration constants will be erased. You will return to 100% as full scale.

A multi-point calibration menu will only appear if the controller has been set up to display units of measure of % concentration. Many chemicals do not have a linear relationship between conductivity and % concentration. If the % concentration will be controlled within a narrow range (±5% or so), then the 1 point calibration will be sufficient. If the accuracy experienced is not sufficient, then perform a multi-point calibration.

The multi-point calibration will create linear segments between each two data points that it is given. The more points used, the better the calibration will fit the actual curve.

Before performing a muli-point calibration, you will need to prepare as many calibration standards as you plan calibration points. These standards should be in containers large enough to hold the sensor with at least 2 inches around all sides, including top and bottom. You will also need a rinse bath of DI water.

To start the calibration press **ENTER** when Multi Point Cal is displayed on the bottom line in the Conductivity A or B menu.

Number of Pts

Use the arrow keys to set the desired number of calibration data points to use. As many as 5 data points may be programmed. Press **ENTER** to continue. You will need to prepare that number of samples, and perform laboratory analyses to determine the % concentration of each. At a minimum, you should use samples at the low end of the expected range, at the nominal value, and at the high end of the expected range. Selecting 0 or 1 data points will delete the existing mulit-point calibration table.

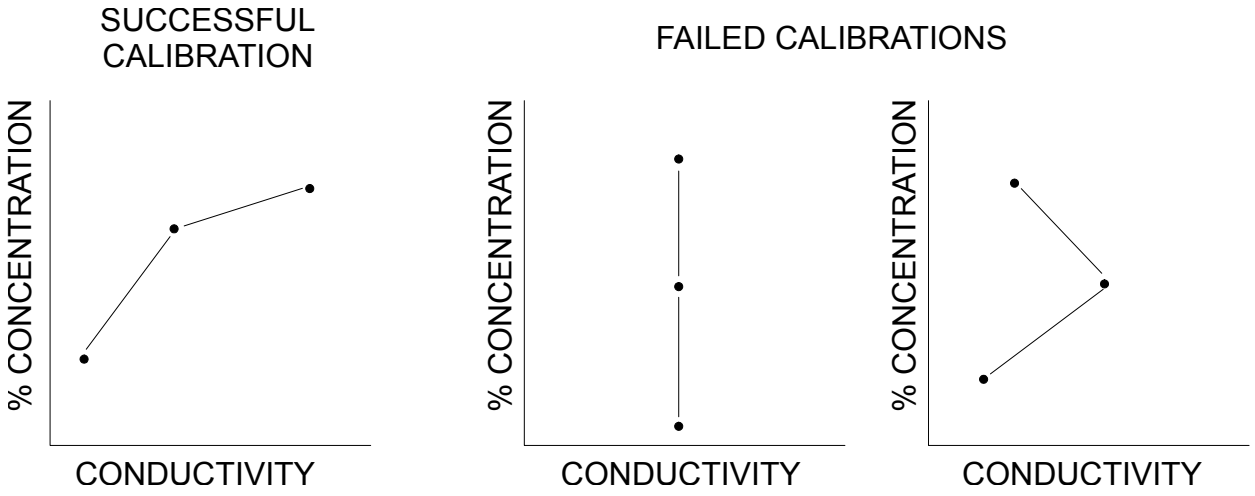


Figure 10 Graphs

The display will then prompt you to **Rinse Sensor**. Rinse the sensor in DI water and press **ENTER**.

Put in 1st soln, % conc is 100 will then be displayed. Use the arrow keys to change the % concentration to the value of the laboratory analysis, then press **ENTER.**

Cond A ####µS/cm, ENTR when stable will then be displayed. When the numbers that are on the top line stabilize, press **ENTER**. Allow at least 3 minutes to insure temperature stabilization of the sensor.

The display will prompt you again to Rinse Sensor. Rinse the sensor in DI water and press **ENTER.**

Repeat the above procedures for each additional data point.

After the last data point, the controller will either display **Cal Successful** or **Cal Failure**. A calibration will fail if there is no change in the readings for the various data points, or if the curve would result in the same reading applying to more than one data point.

If the calibration is successful, press **ENTER** and the display will read Continue Y. This gives you time to replace the sensor in its process location before control resumes. Once the sensor is back in place, press **ENTER** to resume control of the process.

WARNING! If you change scales, your calibration table will be deleted. Be sure you have selected the correct scale to cover the total range of your process liquid conductivity before entering your calibration values.

Zero Adjust

This menu is used to calibrate the sensor to read precisely zero when it is dry. It should be set at installation with dry sensor in air. This zero procedure should be repeated if the range is changed or a new sensor is installed.

Press **ENTER** to start the zero adjust procedure. When asked "Sensor in air?", remove the sensor from the process bath and dry it off. Use the arrow key to change the "N" to "Y" and press **ENTER**. You will be asked to press **ENTER** when the reading on the top line is stable. If the sensor offset was less than ±20% of full scale, the display will flash "Cal Successful" and return to the zero adjust display. You may now press **EXIT**.

If the message "BadZero: CalFail" appears, the offset was too large for the software to compensate. Check to see that the sensor is out of the bath and is dry and that all wiring connections are correct. If none of these corrects the problem, install a new sensor.

Units

This menu is used to select the desired units of measure. Which units of measure are available depends upon the range selected. For ranges less than 10,000 µS/cm, the choices are µS/cm, ppm, and % concentration. For ranges above 10,000 µS/cm, the choices are mS/cm and % concentration.

Press **ENTER** to change the units of measure. Use the up or down arrow keys to scroll through the available options. Press **ENTER** again when the desired choice is displayed. The controller will then display Warning, Check Set Points since all set points will still be the same value as they were before changing the units of measure. The controller does not convert the set points from the previous units to the current units of measure. Press **ENTER** again to clear this display warning.

ppm CF 0.667

This menu will only appear if the units of measure is selected to be ppm. Use the arrow keys to change the conversion factor to be used (to convert between µS/cm and ppm) so that it matches your process bath. The preset value of 0.667 is a good starting point. Press **ENTER** to accept the change.

Damping

This menu is used to set the desired amount of software damping of the conductivity sensor signal, in order to prevent rapid fluctuations in the reading. If you are seeing large changes in the conductivity reading, increase the damping until the reading is stable.

Press **ENTER** to change the damping. Use the UP or Down arrow keys to scroll through the available options. Press **ENTER** again when the desired choice is displayed.

Self Test

The controller will generate an input test conductivity and check the path of both channels. If the measured conductivity is not within acceptable limits, an error message will appear.

The controller will then generate an input test temperature and check the path of both channels. If the measured temperature is not within acceptable limits, an error message will appear. If either error message appears, return the controller to the factory for repair.

Sensor Type

The selection of the sensor type must be made before calibration, in order to set the gain of the circuitry to match the sensor being used. Press Enter to change the selection. Use the Up and Down Arrow keys to scroll between the choices. When the correct selection is displayed, press Enter to accept the new choice.

If you have a part number 190954 sensor (gray with a T-shaped hole), select CPVC. If you have a 191145 sensor (brown with a T-shaped hole) select PEEK. If you have a 102730 sensor (brown with a donut shaped hole) select Fox PEEK.

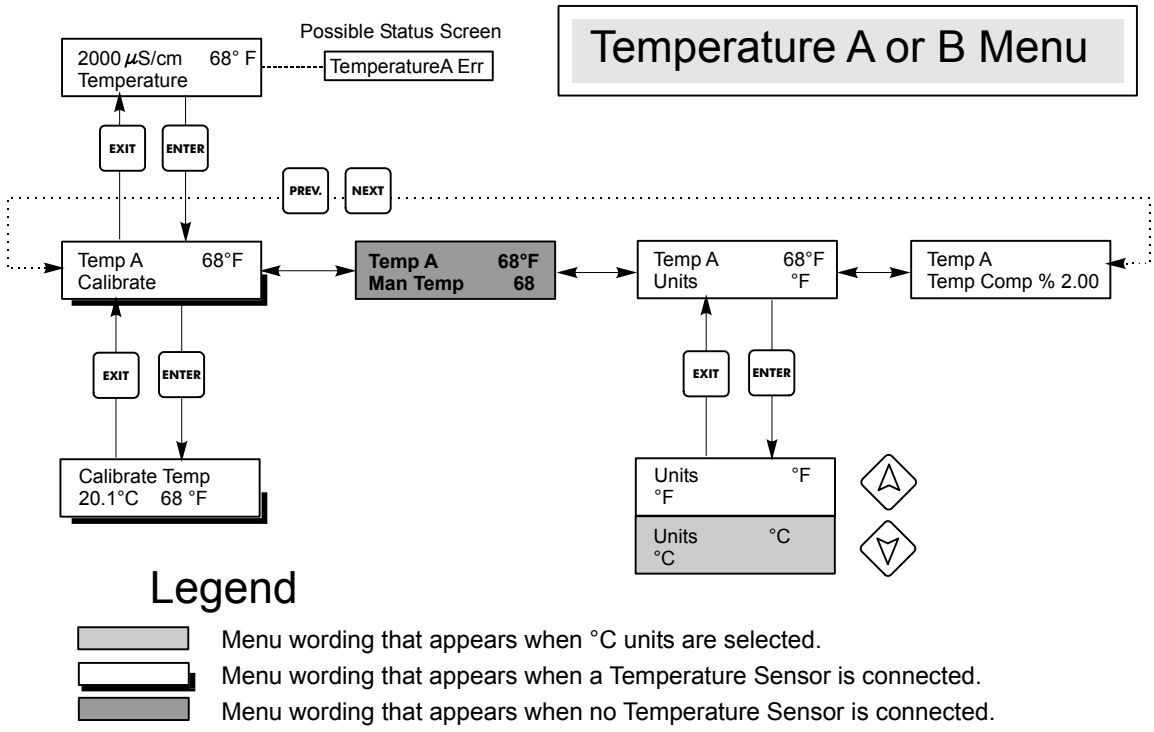


Figure 11 Temperature Menu

5.4 Temperature Menu

The Temperature menu contains the following settings: Calibration and Units (if the Temperature sensor is detected when the unit is powered on) or Manual Temp and Units (if no Temperature sensor is detected at power up). Refer to the Temperature Menu chart, figure 11.

If a "Temp Error" message appears or if the "Man Temp" menu appears after the unit is powered on, it indicates the temp element is not working properly. Refer to the Troubleshooting Section.

Calibrate

To Calibrate the Temperature, use a thermometer to measure the fluid temperature and adjust the WEC controller to match. Please note that it may take up to 15 minutes for the sensor to reach equilibrium with a new temperature. Once Calibrate is entered, the unit continuously displays temperature readings. Press the Up or Down arrow key to change the value displayed to match the thermometer. You must press **ENTER** to activate the new calibration. You must press the **EXIT** key to exit calibration.

Units

You may choose to display temperature in °C or °F. Press **ENTER** and the Up or Down Arrow keys to change the temperature units for display.

Temp Comp %

This menu is used to set the automatic temperature compensation factor. The normal value for water is 2% per degree C. Different chemicals will have different errors with changing temperature.

If you do not know what the temperature related error will be for your chemistry, follow this procedure to determine it:

Set theTemp Comp % menu item to 0.00%

NOTE: When doing a manual Temp Comp% measurement, be sure to use a container large enough to insure that the sensor is surrounded by at least 2 inches of liquid. Suspend the sensor; do not let it rest on the bottom of the container.

Take a sample of your operating solution at its normal concentration and 25°C (78°F). Measure the conductivity in the cool sample and note the temperature measured by the controller. Heat it to normal operating temperature, making sure to maintain the original volume by replacing any evaporated water. Allow 10 minutes for the sensor to reach the same temperature as the sample. Note the conductivity and measured temperature of the heated sample.

If the conductivity is no longer the same as it was at room temperature, then calculate the temperature compensation factor using this formula:

$$\text{Correction = in percent} \qquad \frac{(\text{Cond}_{AMB} - \text{Cond}_{OPR}) \times 100}{\text{Cond}_{OPR}\,(T_{AMB} - 25) - \text{Cond}_{AMB}\,(T_{OPR} - 25)}$$

where:

Cond_{AMB}	=	Conductivity at room temperature
Cond_{OPR}	=	Conductivity at operating temperature
T_{OPR}	=	Operating temperature
T_{AMB}	=	Room temperature

Note that in the equation denominator Cond_{OPR} s multiplied by T_{AMB} and Cond_{AMB} is multiplied by T_{OPR}.

Return to the Temperature menu, Temp Comp and use the arrow keys to enter this new value.

Ctrl A & B (On/Off) Menu

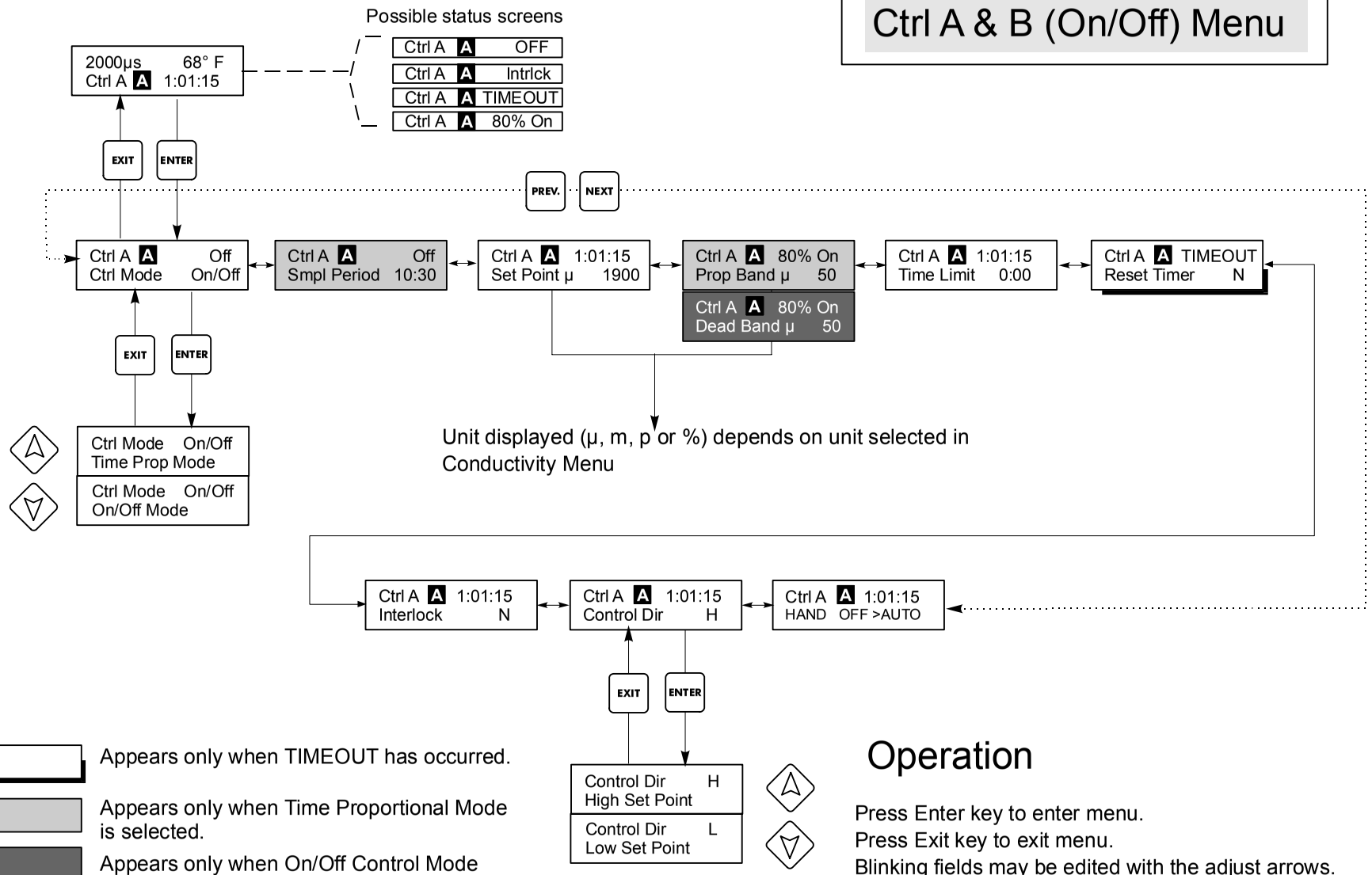


Figure 12 Control A or B Menu

Operation

Press Enter key to enter menu.
Press Exit key to exit menu.
Blinking fields may be edited with the adjust arrows.
Press Enter when modification is complete to return to Main Menu Level.

5.5 Control A and Control B Menus

The Control A and Control B menus are separate from each other but operate in exactly the same way. Each menu provides the following independent settings: Control Mode, Sample Period (Time Proportional Model only), Set Point, Dead Band (Proportional Band in TPC mode), Time Limit, Interlock, Control Direction, and HOA. The Control menus show a letter with inverted type H OA. This letter indicates the state of the control relay as follows:

= hand (relay has been turned on manually)
= off (relay is off regardless of system conductivity)
= automatic (software is in control)

In HAND mode, the output shuts off automatically after 10minutes.

The top level menu status line may display the following messages: Off, Intrlck, Timeout, or a time. “Off” indicates that the output is off. “Intrlck” indicates that a signal from a flow switch or level switch is stopping control and has disabled the control outputs. “Timeout” indicates that the output has been on for longer than the maximum time programmed by the user. The time shows that the output is on, and has been for that amount of time. "xx % ON" indicates the percent of the sample period that the output will be activated; only for TPC mode. Refer to the Control A & B menus on the following pages.

Control Mode

This menu item allows selection of the Control Mode; ON/OFF or Time Proportional. When in ON/OFF mode, the control relay will turn ON when the conductivity deviates from the set point in the programmed direction and turn OFF when the conductivity returns to the set point plus the Dead Band. In Time Proportional Mode, the farther away from the set point the system is, the longer the ON time. Refer to Figure 12a for an illustration of Time Proportional Mode.

Sample Period

This menu only appears if Time Proportional control mode is selected. It allows setting the sampling period from 0 to 30:00 minutes. This is the time that will elapse between checking the conductivity for deviation from set point. The amount of time that the relay remains on will be determined by the Proportional Band setting and how far the current conductivity is from the set point. Refer to Figure 12a.

The sample period should be set to approximately 1½ times the amount of time that it takes for the sensor to react to an addition of chemical. This can be determined by making a manual addition of chemical using the HOA menu and timing how long it takes for the controller to react.

Setting the sample period too low will result in a second addition being made before the first is detected and you will overshoot the set point. Setting too high will delay the next addition to the point that the set point may never be reached.

Set Point

This is the conductivity value at which the Ctrl relay is turned ON. Use the arrow keys to adjust the display to read the desired set point value. Press **ENTER** to accept the change.

Dead Band

This menu only appears if On/OFF control mode is selected.
This is the conductivity value that when combined with the set point determines when the Ctrl output turns OFF. Assuming that the control direction is set for normal operation (High Set Point), the Ctrl output will turn off when the conductivity drops below the set point minus the Dead Band.
For example: The set point is 1500 µS/cm and the Dead Band is 200 µS/cm. The Ctrl ouput turns ON when the conductivity reading is greater than 1500 but does not turn OFF until the conductivity reading drops below 1300.

Use the arrow keys to set the desired Dead Band, then press **ENTER**.

Proportional Band

This menu only appears if Time Proportional control mode is selected.
The proportional band menu sets the deviation from set point at which the control output will be on for the entire sampling period.

If using % concentration as the units of measure, this can be easily calculated by multiplying the pump flow rate by the sample period time to get the volume of chemical to be added (for example, 1 gal per minute flow rate x 2 min sample period = 2 gal of chemical added). Then calculate the effect on the % concentration of this addition (for example, if a 2 gal addition will raise the % concentration by 1%, then the proportional band should be set to 1%).

If using conductivity as a unit of measure, the proportional band will need to be determined experimentally.

If the proportional band is set too low, then the controller could overshoot the set point. If it is set too high, then the controller may never be able to reach the set point.

Figures 12a and 12b show an example of Time Proportional Mode with the following program parameters:

Control Mode	Time Proportional
Sample Period	10 minutes
Set point	300 mS
Proportional Band	50 mS
Control Direction	H

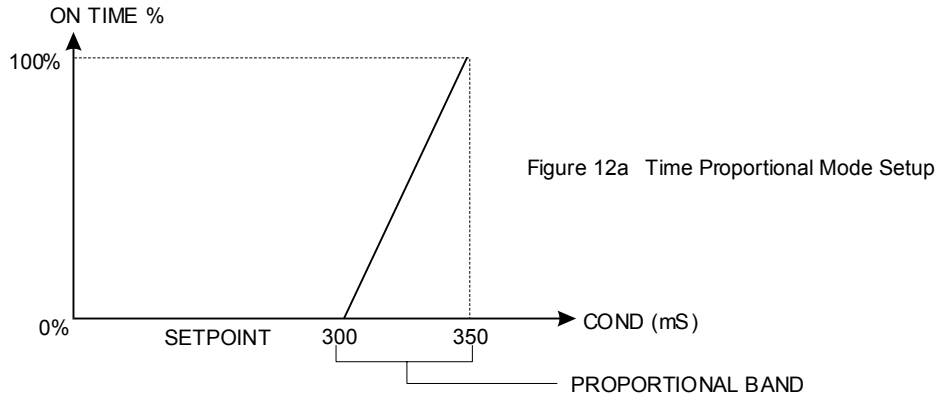


Figure 12a Time Proportional Mode Setup

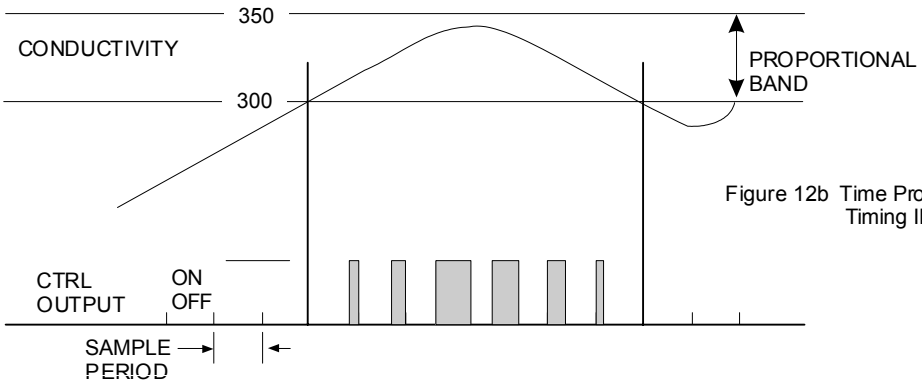


Figure 12b Time Proportional Mode Timing Illustration

In the example figures, the set point is 300 and the Proportional Band is 50. Note that when the conductivity goes above the set point, the control relay is ON for a short period of time. As the conductivity increases, the control relay is ON for a longer period of time. When the additive starts to effect the bath concentration and the conductivity is reduced, the control relay is ON for a shorter period of time. When the conductivity drops below the set point of 300, the control relay is OFF all the time.

Time Limit

Use the arrow keys to set the time limit for the output to be active, then press **ENTER**. If it is set for "0:00", no limit will be imposed, and the output could stay on forever. When a "OUTPUT TIMEOUT" occurs, an error message will be displayed and a new menu item will appear under Ctrl. This menu item will allow you to reset the timer and resume normal operation.

Reset Timer

This menu item will only appear when the Time Limit has been exceeded and the Control relay has been shut off. Change the "N" to "Y" using the arrow keys and press **ENTER** to reset the Control relay.

Interlock (No Flow)

Use the Up and Down arrows to toggle between Y(Yes) and N(No). Choosing Y means that the output will deactivate if the device attached to the flow switch input of the controller is open. For example, if the sensor is installed in a recirculating pipe line, a flow switch that is closed if flow is sufficient and open if flow is insufficient may be installed in the line, so that if flow past the sensor stops, the controller will not pump in chemicals based on a stagnant sample. Similarly, a level switch may be attached to prevent control of an empty tank.

Control Dir

Press **ENTER** to change the direction of control, then use the Up and Down arrows to toggle between High Set Point and Low Set Point, and press **ENTER** to make your choice. A high set point will turn on the relay when the process value goes over the set point value (to dilute the bath, or as a high alarm). A low set point will turn on the relay when the process value goes below the set point value (to add more chemical, or as a low alarm).

HOA

Use the Left and Right arrows to move between Hand, Off and Auto. In Hand (Manual) mode, the output will be turned on immediately for a maximum of 10 minutes. In the Off mode, the output will be turned off indefinitely. In the Auto mode, the output turns on and off in response to changes in the process value relative to the set point. The letter inside the block on the status screen indicates which mode the output is in.

5.6 Alarm A & B Menus

The Alarm relay may be configured to function in the following modes: Low Alarm, High Alarm, Out-of-range Alarm, or In-range Output and HOA.

The Alarm menu provides the following settings, some of which only appear if the appropriate output mode has been selected: Low Set Point, High Set Point, Dead Band and Output Mode. The Alarm menus show a letter with inverted type H O A. This letter indicates the state of the control relay as follows:

H = hand (relay has been turned on manually)
O = off (relay is off regardless of system conductivity)
A = automatic (software is in control)

***Note**: When programming the controller for the first time, press **PREV** twice upon entering the Alarm menu and set the output mode first.*

Output Mode

Press **ENTER** then use the Up and Down arrows to toggle between the various choices:

Low Alarm
Press **ENTER** when this is displayed if you want the Alarm relay to close if the process value goes below a certain value.

High Alarm
Press **ENTER** when this is displayed if you want the Alarm relay to close if the process value goes above a certain value.

Out Range Alarm
Press **ENTER** if you want the Alarm relay to close if the process value goes either above or below a set point range.

In Range Output
Press **ENTER** if you want the Alarm relay to close if the process value is between two values.

Lo Set Pt

Only appears if either the low alarm or in/out range mode has been selected

Use the arrow keys to adjust the process value below which the relay will close. (In the in-range mode, it is the process value ABOVE which the relay will close).

Hi Set Pt

Only appears if either the high alarm or in/out range mode has been selected.

Use the arrow keys to adjust the process value above which the relay will close (or in the in-range mode, the value BELOW which the relay will close).

HOA

Use the Left and Right arrows to move between Hand, Off and Auto. In Hand (Manual) mode, the output will be turned on immediately at the maximum programmed rate for a maximum of 10 minutes. In the Off mode, the output will be turned off indefinitely. In the Auto mode, the output turns on and off in response to changes in the process value relative to the set point. The letter inside the block on the status screen indicates which mode the output is in.

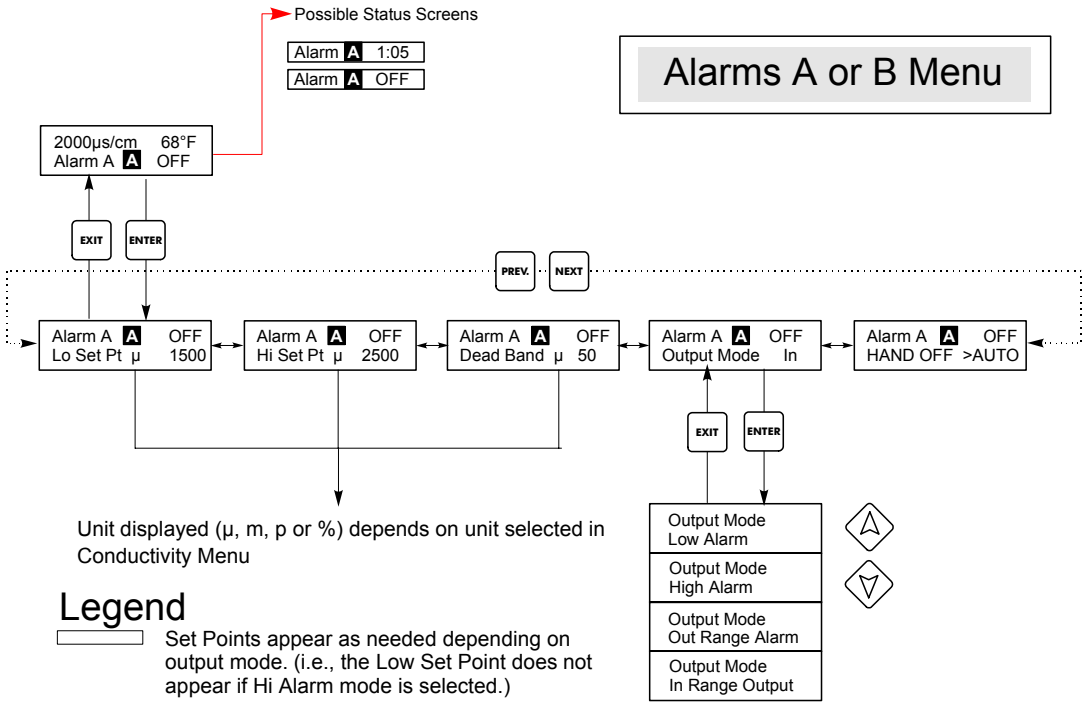


Figure 13 Alarm A & B

5.7 4-20mA

5.7.1 Installation

Note: If your WEC310 was ordered with one of the 4-20mA options, the boards will already be installed.

Caution! Disconnect main power to the controller before opening the front panel!

There are two possible locations for a 4-20mA board. One is on the power supply board (#1) and one is on the option board (#2). Refer to Figure 4 to identify these locations. If only one board is installed, it should be located on the power supply as board #1.

To install board #1, turn OFF controller power and disconnect the main connection. Orient the 10 pin connector and align the two white guide pins. Press in until the board clicks onto the guide pins. Connect the 4-20mA wire to the 10 pin connector using a straight blade screwdriver. Be careful to pay attention to polarity. Thread the wire through one of the cable clamps on the left side of the controller.

To install board #2, turn OFF controller power and disconnect the main connection. Board #2 is located on the option board, under the cover. Orient the 10 pin connector and align the two white guide pins. Press in unitl the board clicks onto the guide pins. Connect the 4-20mA wire to the two pin connector using a straight blade screwdriver. Be careful to pay attention to polarity. Thread the wire through one of the cable clamps on the left side of the controller.

5.7.2 4-20mA 1 or 2 Menu

This menu is only available if the 4-20mA output is installed in the controller. This menu provides for scaling and calibrating the output. The 4-20mA menu screen appears as follows:

4-20mA 9.20mA

This indicates that the current output of the 4-20mA card is 9.20 mA.

Set 4mA Pt

This conductivity setting will correspond to a 4 mA output from the controller.

Set 20mA Pt

This conductivity setting will correspond to a 20mA output from the controller.

Calibrate

This will provide fixed 4mA and fixed 20mA outputs to allow you to calibrate connected equipment.

Source

Press **ENTER** to change the source of the signal to be converted to 4-20 mA between Cond A, Cond B, Temp A and Temp B. Use the arrow keys to toggle between the four choices. Press **ENTER** when the appropriate source is displayed.

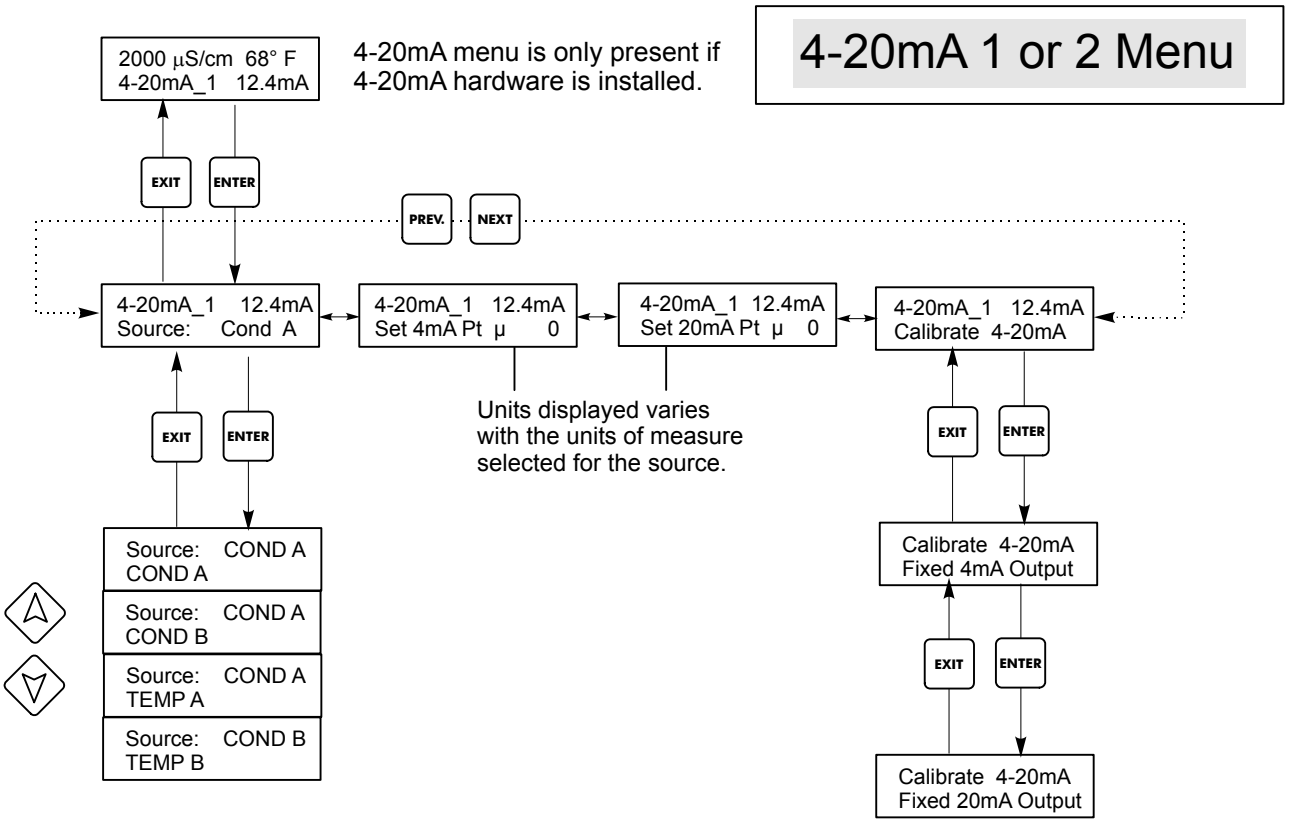


Figure 14 4-20mA Menu

5.8 Access Code Menu

This menu determines whether the access code feature of the controller is enabled or disabled and allows you to customize the access code to your own value. The access code controls whether or not you are allowed to change the parameters in the controller. With the access code disabled, any user may change any parameter. With the access code enabled, any user can view any parameter, but cannot change them. Once an attempt is made to change a parameter, the display will prompt the user to enter the access code. If the correct access code is entered, the parameters can be changed. If the wrong access code is entered the parameters cannot be changed. Once the access code has been correctly entered, it will remain valid until there is a period of 10 minutes without a key being pressed. The access code menu will appear as shown below:

Access Code DIS
Access Code REQ
Access Code OK

The first display indicates that the access code is disabled. No access code is required to change any setting. The second display indicates that the access code is required to alter settings. The last display indicates that the access code is required and has been entered correctly.

Enable N / Y

Press the Up or Down arrow key to change the N to Y and press **ENTER** to enable the access code feature. If the access code is enabled you must first enter the access code to disable it.

New Value

Press **ENTER** to display the current access code value and use the arrow keys to change it to any value between 0 and 9999. If the access code has been enabled, you will be prompted to enter the current access code before being allowed to change it. You must remember the access code if you enable it.

The Factory default Access code is 1995.

If you change the access code and can't remember it follow this procedure:
1. Turn off power to the controller.
2. Wait 10 seconds.
3. Press and Hold the UP and DOWN arrow keys while turning on the power.
4. Read the access code on the display.
5. Release the keys, and the access code will disappear.

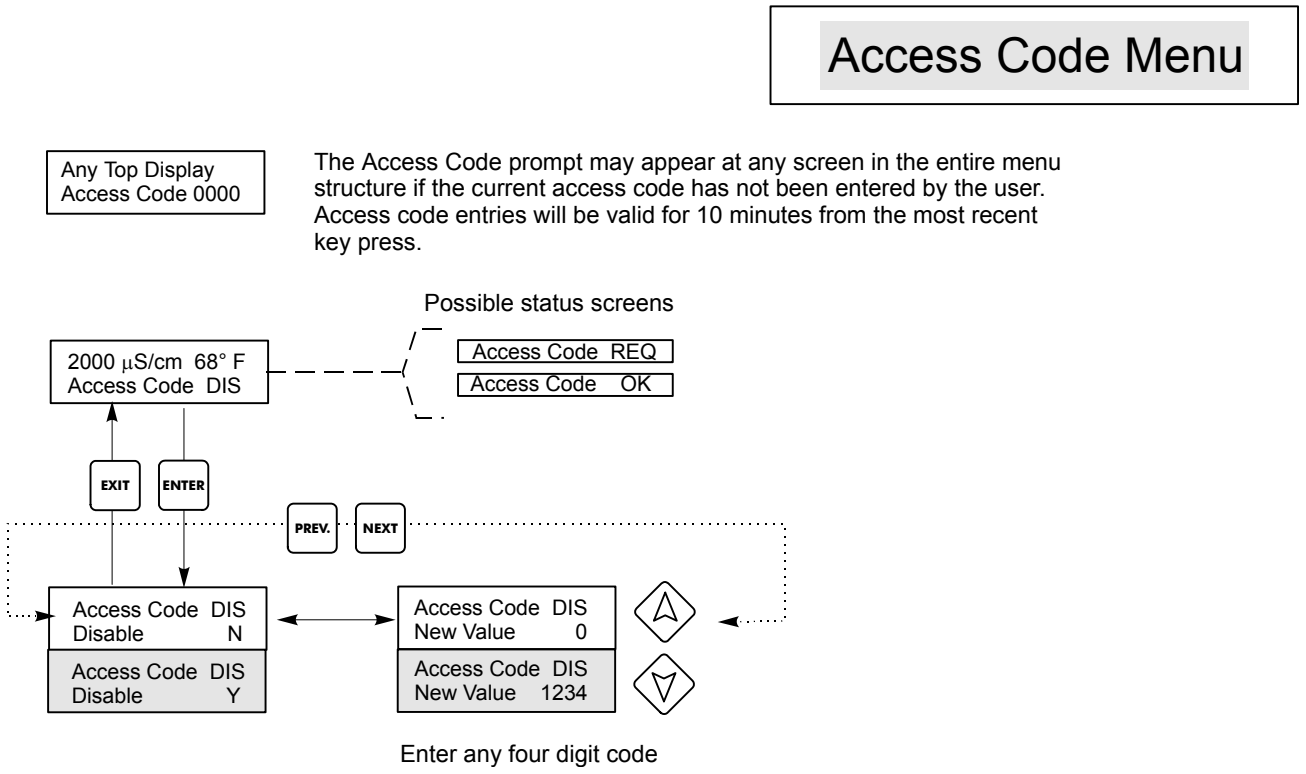


Figure 15 Access Code Menu

5.9 Diagnostic Relay

The diagnostic relay is used to indicate attention is required by the controller. It may be connected to an external light or bell. The relay contact supplies Mains voltage. The conditions that trigger the diagnostic output are Memory Failure, Temperature Error, Overrange Error, No Flow Error and Timeout Error. This list of conditions is fixed and not user selectable.

6.0 MAINTENANCE

The WEC controller itself requires very little maintenance. Wipe with a damp cloth. Do not spray down the controller unless the enclosure door is closed and latched.

6.1 Probe Cleaning

NOTE: The controller must be recalibrated after cleaning the probe.

Frequency

The probe should be cleaned periodically. The frequency required will vary by installation. In a new installation, it is recommended that the probe be cleaned after two weeks of service. To determine how often the probe must be cleaned, follow the procedure below.

1. Read and record the conductivity.
2. Remove, clean and replace the conductivity probe.
3. Read conductivity and compare with the reading in step 1 above.

If the variance in readings is greater than the accuracy you require, increase the frequency of probe cleaning. If it is less than the accuracy you require, the probe was not dirty and can be cleaned less often.

Cleaning Procedure

An accumulation of dirt or debris on the sensor can effect the accuracy and the thermal time constant. This accumulation should be removed periodically. This can be accomplished by scrubbing with a toothbrush or stiff bottle brush. Soap or hand cleaner may help. Harsh abrasives should be avoided. Rinse the sensor thoroughly before returning to service.

6.2 Replacing the Fuses

CAUTION: Disconnect power to the controller before opening front panel!

Locate the fuses on the circuit board at the back of the controller enclosure. (See figure 3.) Gently remove the old fuse from its retaining clip and discard. Press the new fuse into the clip, secure the front panel of the controller and return power to the unit.

Warning: Use of non-approved fuses can affect product safety approvals. Fuse ratings depend on controller power rating. Specifications are shown below. To insure product safety certifications are maintained, it is recommended that a Walchem fuse is used.

Controller Rating	F1	Walchem P/N	F2	Walchem P/N
120 VAC	5 x 20 mm, 0.125A, 250V	102369	5 x 20 mm, 10A, 125V	102432
240 VAC	5 x 20 mm, 0.063A, 250V	103363	5 x 20 mm, 5A, 250V	102370

7.0 TROUBLESHOOTING

CAUTION: Disconnect power to the controller before opening front panel!

Troubleshooting and repair of a malfunctioning controller should only be attempted by qualified personnel using caution to ensure safety and limit unnecessary further damage. Contact the factory.

The first step is to determine whether the problem is internal or external to the controller. Use the Self Test menu item (See Section 5.3). If the controller appears to function correctly, then concentrate on identifying the problem with the sensor and/or the other external elements.

Error messages will appear on the lower line of the display. The highest priority message will be visible. The alarm relays can be set to trigger on a high, low, in-bounds or out-of-bounds set point(s). The following list of possible causes will help in diagnosing problems.

7.1 Error Messages

Temp Error

This error condition will stop conductivity control. It indicates that the temperature signal from the conductivity sensor is no longer valid. This prevents controlling based upon an incorrect conductivity reading.

	Possible Causes	Corrective Action
1.	Sensor wire(s) disconnected	Reconnect.
2.	Faulty sensor	Replace sensor.

Perform self test. If "Pass," then the problem is in the external sensor. If "Fail Temp" message appears, replace the controller.

To test the sensor, measure the resistance between the brown and blue wires. Refer to the chart below for resistance values.

Temperature	Temperature Sensor Resistance
0° C	330 kΩ
25° C	100 kΩ
50° C	36 kΩ
100°C	6.8 kΩ

OVERRANGE ERROR

This error condition will stop conductivity control. It indicates that the conductivity signal from the sensor is no longer valid. This prevents controlling based upon an incorrect conductivity reading. This error will occur at 1.5 times the full scale range (i.e. on the 10,000µS scale, overrange error occurs at 15,000µS). The upper display line will show "OVER." The lower display line will show "overrange."

	Possible Causes	Corrective Action
1.	Sensor wire(s) disconnected	Reconnect.
2.	Too low a range selected	Increase range (see Section 5.3)
3.	Sensor coated with conductive substance	Clean sensor.
4.	Faulty sensor	Replace sensor.
5.	Faulty controller	Verify via failed self test.

NO FLOW

This error condition will stop all control. It indicates that the flow of sample past the sensor and flow switch is less than « gallon per minute. This prevents controlling based upon a stagnant sample.

	Possible Causes	Corrective Action
1.	No flow	Check piping for closed valves, blockage, etc. Check recirculation pump.
2.	Faulty flow switch	Check with ohmmeter.
3.	Faulty controller	Check by shorting flow switch input in controller.

OUTPUT TIMEOUT

This error condition will stop control. It is caused by the control output being activated for longer than the programmed time limit.

	Possible Causes	Corrective Action
1.	Programmed value too low for normal conditions	Increase time limit.
2.	Pumping problem	Check chemical supply. Check pump for prime. Check tubing for blockage or leaks. Verify pump is functional.
3.	Controller problem	Check output wiring. Check controller relay.

HIGH ALARM

This error message indicates that the conductivity is above the programmed high alarm set point. The conductivity will continue to be monitored, the control output will continue to be activated (if using a high set point), and the alarm relay will close.

	Possible Causes	Corrective Action
1.	Sensor coated with conductive substance	Clean sensor.
2.	Calibration problem	Check temp, conductivity calibration.

If using a low set point for control:

1.	Replenishment pump oversized	Reduce pump flow rate.
2.	Poor mixing of process solution	Improve mixing.
3.	Pump siphoning	Correct installation.
4.	Excessive evaporation	Maintain solution level

If using a high set point for control:

1.	No replenishment chemistry	Refill.
2.	Pump failure	Re-prime, repair pump.
3.	Pump not connected properly	Correct installation.
4.	Relay failure	Repair control module.

LOW ALARM

This error message indicates that the conductivity is below the programmed low alarm set point. The conductivity will continue to be monitored, the control output will continue to be activated (if using a low set point), and the alarm relay will close.

	Possible Causes	Corrective Action
1.	Sensor coated with non-conductive substance	Clean sensor.
2.	Calibration problem	Check temp, conductivity calibration.

If using a high set point for control:

1.	Replenishment pump oversized	Reduce pump flow rate.
2.	Poor mixing of process solution	Improve mixing.
3.	Pump siphoning	Correct installation.

If using a low set point for control:

1.	No replenishment chemistry	Refill.
2.	Pump failure	Re-prime, repair pump.
3.	Pump not connected properly	Check wiring.
4.	Relay failure	Repair control module.

RANGE ALARM

This error message only appears if the alarm relay has been set up as an out of range output. It indicates that the conductivity is either above or below the programmed set point range. The control output will still be activated (if applicable), and the alarm relay will close.

Determine if the conductivity is too low or too high, then follow the low alarm or high alarm troubleshooting sections.

IN RANGE OUTPUT

This error message only appears if the alarm relay has been set up as an in range output. It indicates that the conductivity is between the two programmed set points. Depending on how you use this alarm, it may indicate that the conductivity is normal.

7.2 Conductivity Readout Does Not Change

If the readout is stuck at or near zero:

	Possible Causes	Corrective Action
1.	Dry probe	Check for flow through system.
2.	Probe is disconnected.	Check wiring to probe. Go to self-test menu, as described in section 5.3 If it passes, the problem is with probe or connections. See section 7.3 If still at zero, problem is with the controller. Consult the factory.

If the readout is stuck at another number:

	Possible Causes	Corrective Action
1.	Dirty or faulty probe	Evaluate probe (section 7.3).
2.	Stagnant sample	Check system for proper flow or agitation.

7.3 Procedure for Evaluation of Conductivity Probe

Can be used for troubleshooting low conductivity, high conductivity, conductivity stuck at 0, and/or conductivity stuck at a number other than 0.

Try cleaning the probe first (refer to Sect. 6.1).

To find out if the probe or the controller is faulty, select the Self-Test menu, as described in section 5.3. If the problem is internal, an error message will appear on the lower line of the display.

To check the probe, check the probe connections to the terminal strip (refer to Figure 3). Make sure that the correct colors go to the correct terminals, and that the connections are tight. Make sure that you have not clamped on the insulation instead of the conductor. Restore power and see if the conductivity is back to normal.

If the message "BadZero: CalFail" appears during Zero Adjust, the offset was too large for the software to compensate. Check to see that the sensor is out of the bath and is dry. Check to see that all wiring connections are correct. If none of these corrects the problem, install a new sensor.

Test Resistor

Included with your controller is a resistor (4.32KΩ) with flexible leads. This can be used to test the controller and sensor. Select 1000µS scale. With the probe in open air, loop the wire through the sensor aperture and connect to the opposite end of the resistor. For a P/N 102730 sensor, the controller should stabilize at a reading of 500µS on the 1000µS scale. However, this value may range from 250-1000µS (the calibration has a range of 1/2X to 2X). For a P/N 190954 or 191145 sensor, the reading should be 800µS, but may range from 400-1600µS.

The previous calibration will effect this reading. This is a quick operability test. It is not a substitute for insitu calibration with a known liquid.

7.4 Procedure for checking relay outputs

If any prewired output is not activating the device (pump, valve, etc.) attached to it:

If the relay is internally powered, verify that the F2 fuse is OK by measuring the AC voltage between Neutral and both ends of the fuse.

Verify that the pump or valve is not faulty by plugging it directly into a wall socket. In some controllers, certain relays are NOT internally powered. Check the instruction manual to determine if the relay is a dry contact type. If so, make sure that external power (VAC) has been connected to the relay. In most cases, this will be a jumper wire from the large screw labeled "HOT" to one of the relay terminals.

Manually activate the relay using the hand-off-auto menu. Verify that the LED on the front panel lights up. If the device turns on, there must be a problem with the set points if the device doesn't turn on when it should.

With power removed, check the wiring of the pigtail to the terminal strips. Make sure that they are not loose, that they are not connected by the wire's jacket, and that they are connected to the correct terminal. Also check the removable terminal block where the black (hot) wires attach (TB2) to see if it has pulled loose. Restore power and manually activate the relay.

With power removed, remove the terminal block that has the black (hot) wires from all of the pigtails (TB2). This simply pulls up off some metal pins. Check these pins for corrosion. If they seem coated with anything, scrape off the coating by replacing and removing the terminal block several times. Restore power and manually activate the relay.

With power removed, remove the TB2 terminal block again, and attach one lead of a multimeter to the pin that lines up with the wire for the relay in question, and the other lead on the other side of the relay (this will be an adjacent pin for a dry contact relay, or neutral at TB3 for a powered relay). For a dry contact relay, set the meter to read resistance. Restore power and verify that the meter reads infinite ohms with the relay off (open) and very low ohms with the relay on (closed). If it always reads infinite ohms, the power supply board is faulty. For a powered relay, set the meter to read AC voltage. Restore power and verify that the meter reads <5 VAC with the relay off (open) and line voltage with the relay on (closed). If it always reads <5VAC, the power supply board is faulty.

7.5 Interference

The principle of operation involves a drive coil inducing a current in a receive coil. The liquid being tested is the coupling media. Calibration factors are determined when these coils are completely surrounded by this liquid. Should anything interfere with this coupling (i.e. buildup on the sensor, close proximity to the tank wall, any submerged object, like a tumbling barrel), the reading will be distorted.

If the interference is a conductive object, it will increase the reading. If the interference is a non-conductive object (which displaces the liquid), the reading will be reduced. Keep these principles in mind when placing the sensor as well as when troubleshooting.

8.0 SERVICE POLICY

The WEC series Conductivity Controller has a 2-year warranty on electronic components and a 1-year warranty on mechanical parts (keypad, terminal strip and relays).

We stock circuit boards for immediate exchange after we have isolated the cause of the problem.

Factory authorized repairs that are received by next-day-air will be returned within 24 hours. Normal priority for returns is two weeks.

Out of warranty repairs or circuit board exchanges are done on a flat fee basis after the warranty is expired.