

**WCM Series Condensate
Conductivity Monitor
Instruction Manual**

Notice

© 2006 WALCHEM Corporation
5 Boynton Road, Holliston, MA 01746 USA
(508) 429-1110
All Rights Reserved
Printed in USA

Proprietary Material

The information and descriptions contained herein are the property of WALCHEM Corporation. Such information and descriptions may not be copied or reproduced by any means, or disseminated or distributed without the express prior written permission of WALCHEM Corporation, 5 Boynton Road, Holliston, MA 01746.

This document is for information purposes only and is subject to change without notice.

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 electrodes 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.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER.

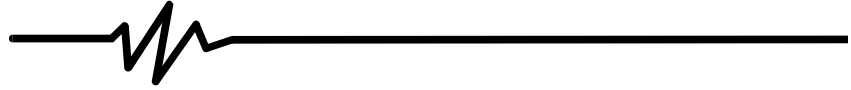
*Part Number 180093.K
Nov 2006*

TABLE OF CONTENTS



1.0	INTRODUCTION.....	2
2.0	SPECIFICATIONS	2
2.1	Measurement Performance	2
2.2	Electrical: Input/Output	2
2.3	Mechanical	3
3.0	UNPACKING & INSTALLATION	3
3.1	Unpacking the unit.....	3
3.2	Mounting the electronic enclosure	3
3.3	Installation	4
3.4	Icon Definitions.....	5
3.5	Electrical installation.....	5
4.0	FUNCTION OVERVIEW	11
4.1	Front Panel.....	11
4.2	Display	11
4.3	Keypad	12
4.4	Access Code	12
4.5	Startup.....	12
4.6	Shut Down.....	13
5.0	OPERATION	13
5.1	Main Menu.....	13
5.2	Conductivity Menu	14
5.3	Temperature Menu	16
5.4	Divert Menu	17
5.5	4-20mA Menu	19
5.6	Access Code Menu	20
6.0	MAINTENANCE	22
6.1	Electrode Cleaning	22
6.2	Replacing the Fuses.....	22
7.0	TROUBLESHOOTING	23
7.1	Conductivity Readout Does Not Change	23
7.2	Procedure for Evaluation of Conductivity Electrode	24
8.0	SERVICE POLICY	24

1.0 INTRODUCTION



The Walchem WCM300 Series monitors offer conductivity control of boiler condensate. If the conductivity rises above the set point, the controller will activate a diverter valve to prevent the contaminated condensate from returning to the boiler and/or set off an alarm.

The WCM series condensate monitors are supplied with a temperature compensated probe with a cell constant of 1.0. The monitors are microprocessor driven industrial type with on/off control outputs. An optional isolated 4-20 mA output that is proportional to the conductivity reading is available for all models.

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.

2.0 SPECIFICATIONS



2.1 Measurement Performance

Conductivity Range:	0 - 10,000 $\mu\text{S}/\text{cm}$ (microSiemens/centimeter)
Conductivity Resolution:	1 $\mu\text{S}/\text{cm}$
Conductivity Accuracy:	10 - 10,000 $\mu\text{S}/\text{cm} \pm 1\%$ of reading 0 - 10 $\mu\text{S}/\text{cm} \pm 20\%$ of reading
Temperature Range:	32 - 392°F (0 - 200°C)
Temperature Resolution:	0.1°C
Temperature Accuracy:	$\pm 1\%$ of reading

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:	@ 120 VAC	@ 240 VAC
	10 A resistive	6 A resistive
	1/8 HP	1/8 HP

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

Agency Approvals

UL	ANSI/UL 61010-1:2004, 2 nd Edition*
CAN/CSA	C22,2 No.61010-1:2004 2 nd Edition*
CE Safety	EN 61010-1 2 nd Edition (2001)*
CE EMC	EN 61326 :1998 Annex A*

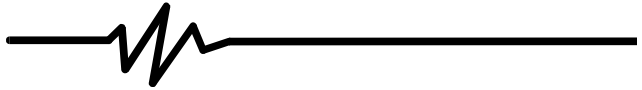
Note: For EN61000-4-6,-3 the controller met performance criteria B.

*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 to 122°F (0 to 50°C)
Storage Temperature:	-20 to 180°F (-29 to 80°C)

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 WCM300 series monitor and instruction manual. Any options or accessories will be incorporated as ordered.

3.2 Mounting the electronic enclosure

The WCM series monitor 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 32 to 122°F (0 to 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

The conductivity electrode should be placed as close to the monitor as possible, to a maximum distance of 500 ft. Under 25 ft is recommended. Over 25 ft, the cable may need to be shielded from background electrical noise. (The standard cable length is 10 feet. Should you require longer cable, consult factory.)

Locate the electrode tee where an active sample of condensate water is available and where the electrode can easily be removed for cleaning. It must be situated so that the tee is always full and the electrode is never subjected to a drop in water level resulting in dryness. Refer to Figure 1 for typical installation.

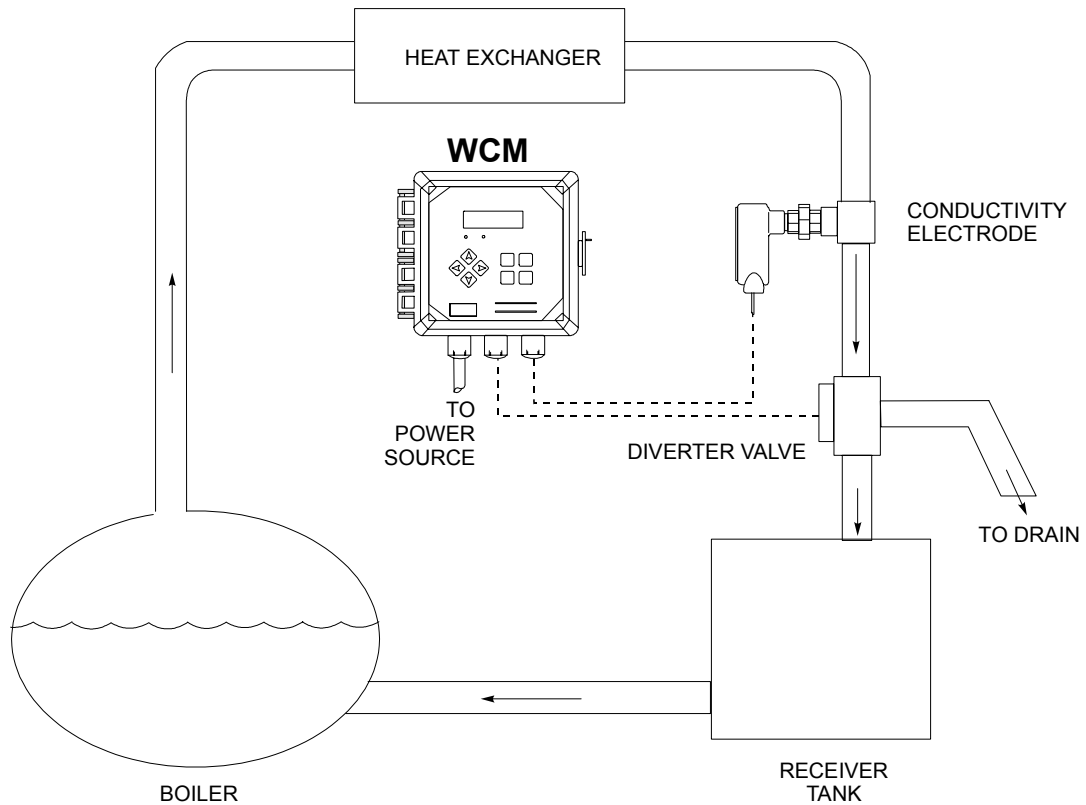







Figure 1 Typical Installation

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:

WCM300-1xx	120 VAC, 50/60 Hz
WCM300-4xx	120 VAC, 50/60 Hz
WCM300-5xx	240 VAC, 50/60 Hz

The various standard wiring options are shown in figure 2. Your WCM series monitor will arrive from the factory prewired or ready for hardwiring. Depending on your configuration of 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.



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.

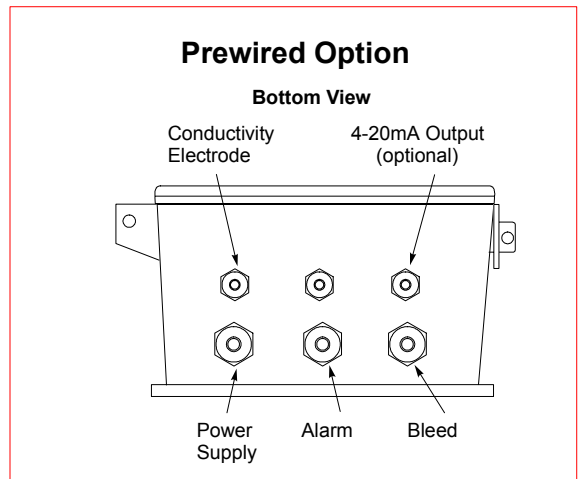
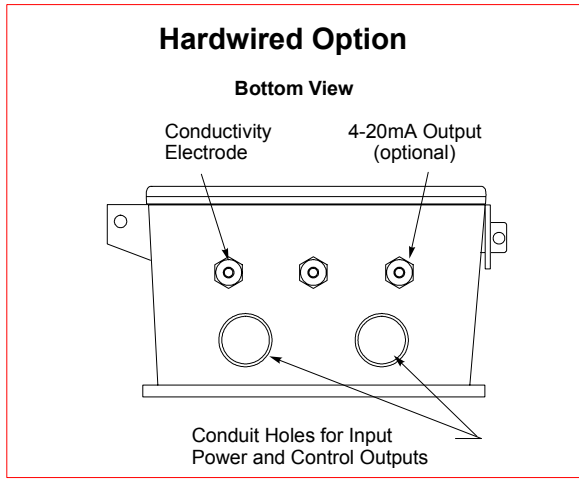


Figure 2 Conduit/Wiring Configuration

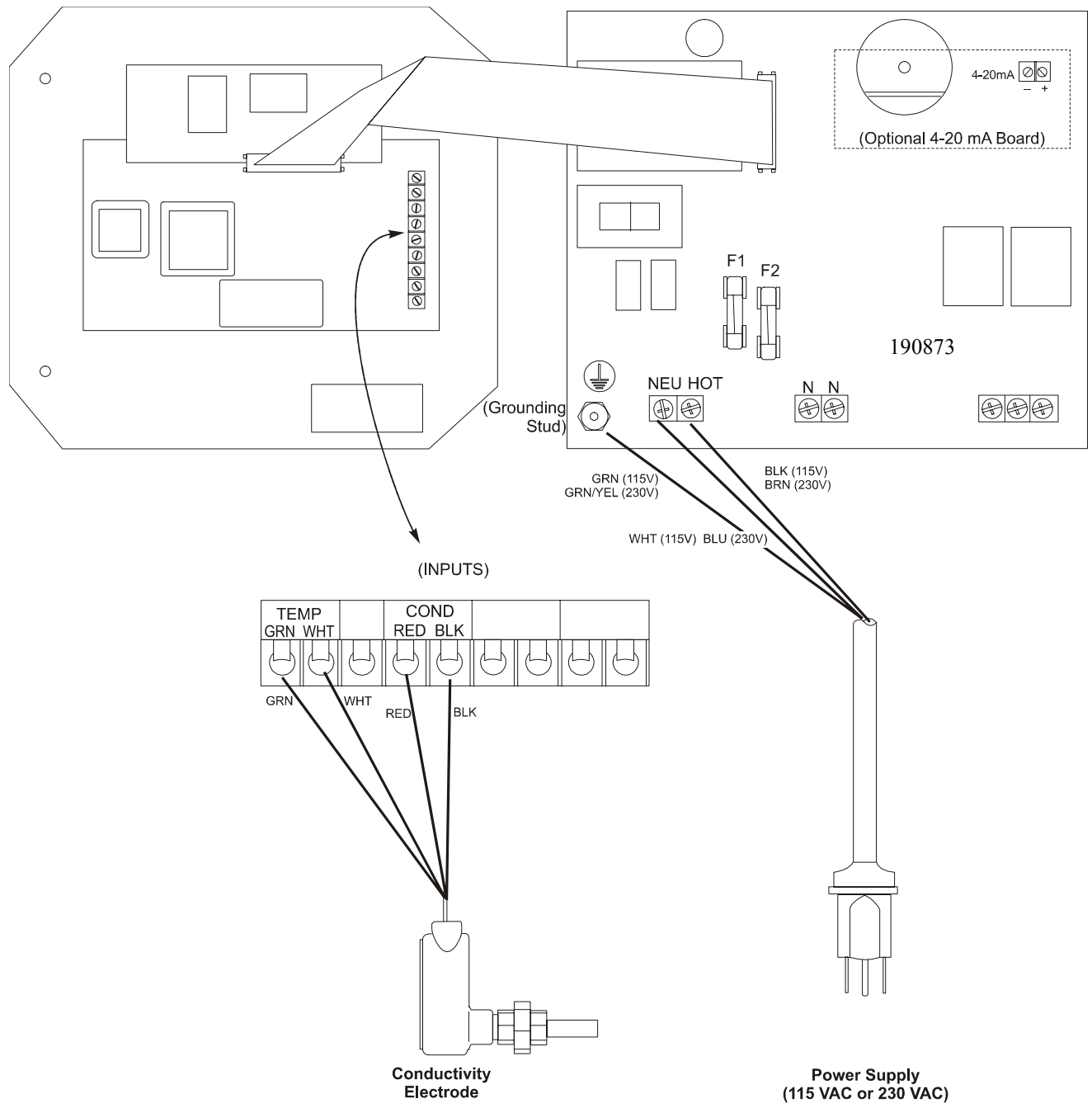


Figure 3 Inputs (for power relay board 190873)

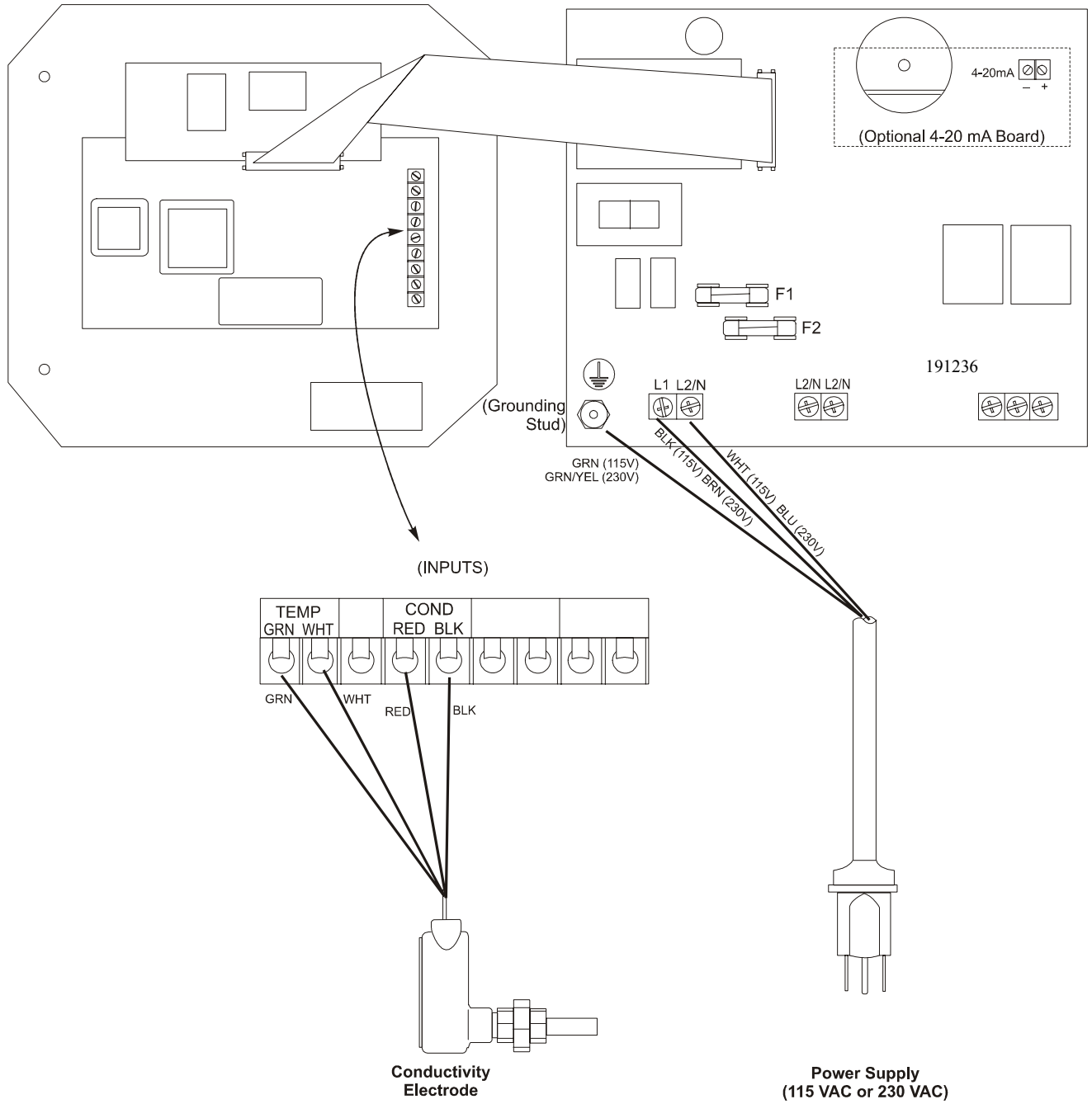


Figure 3a Inputs (for power relay board 191236)

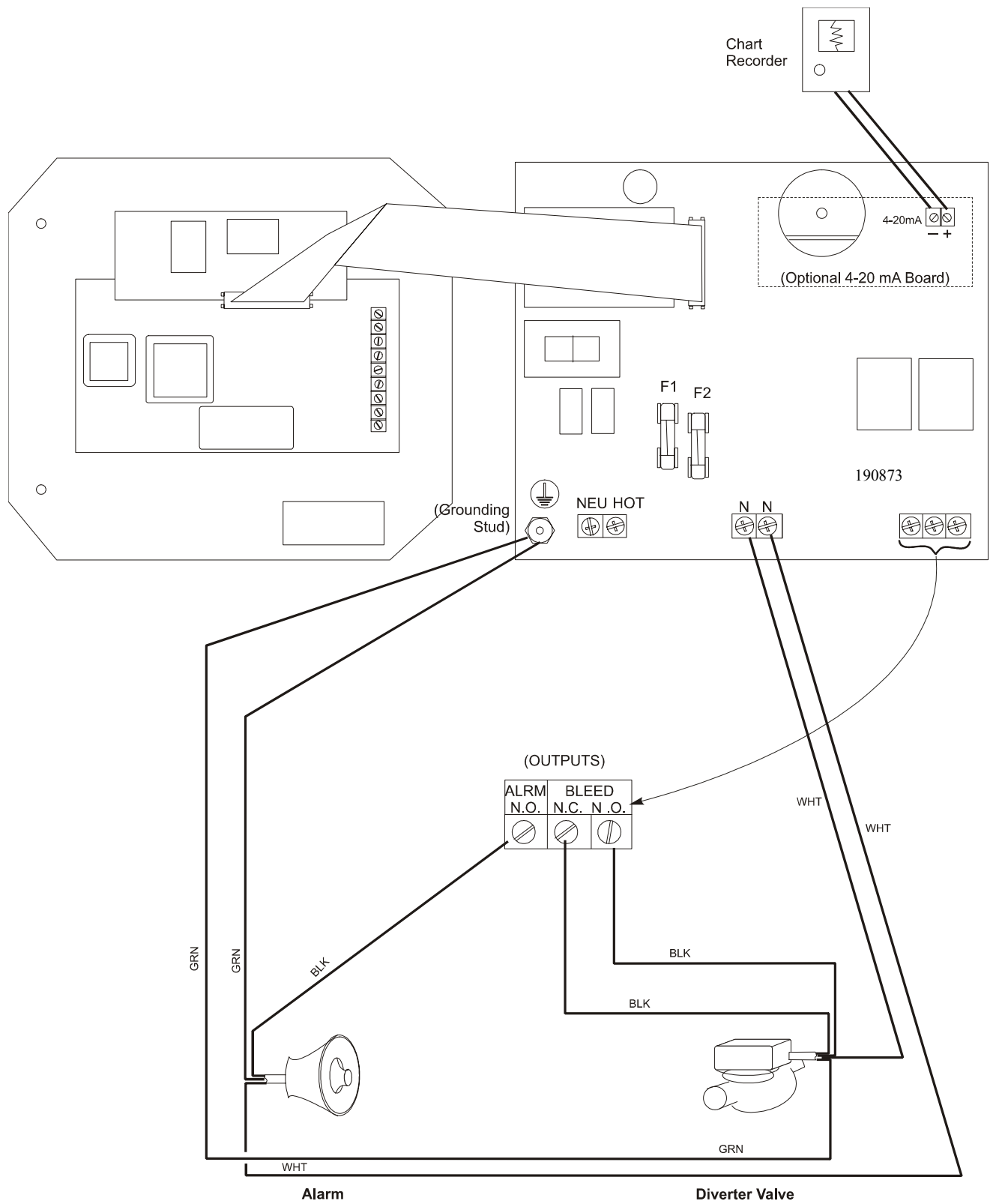


Figure 4 Outputs (for power relay board 190873)

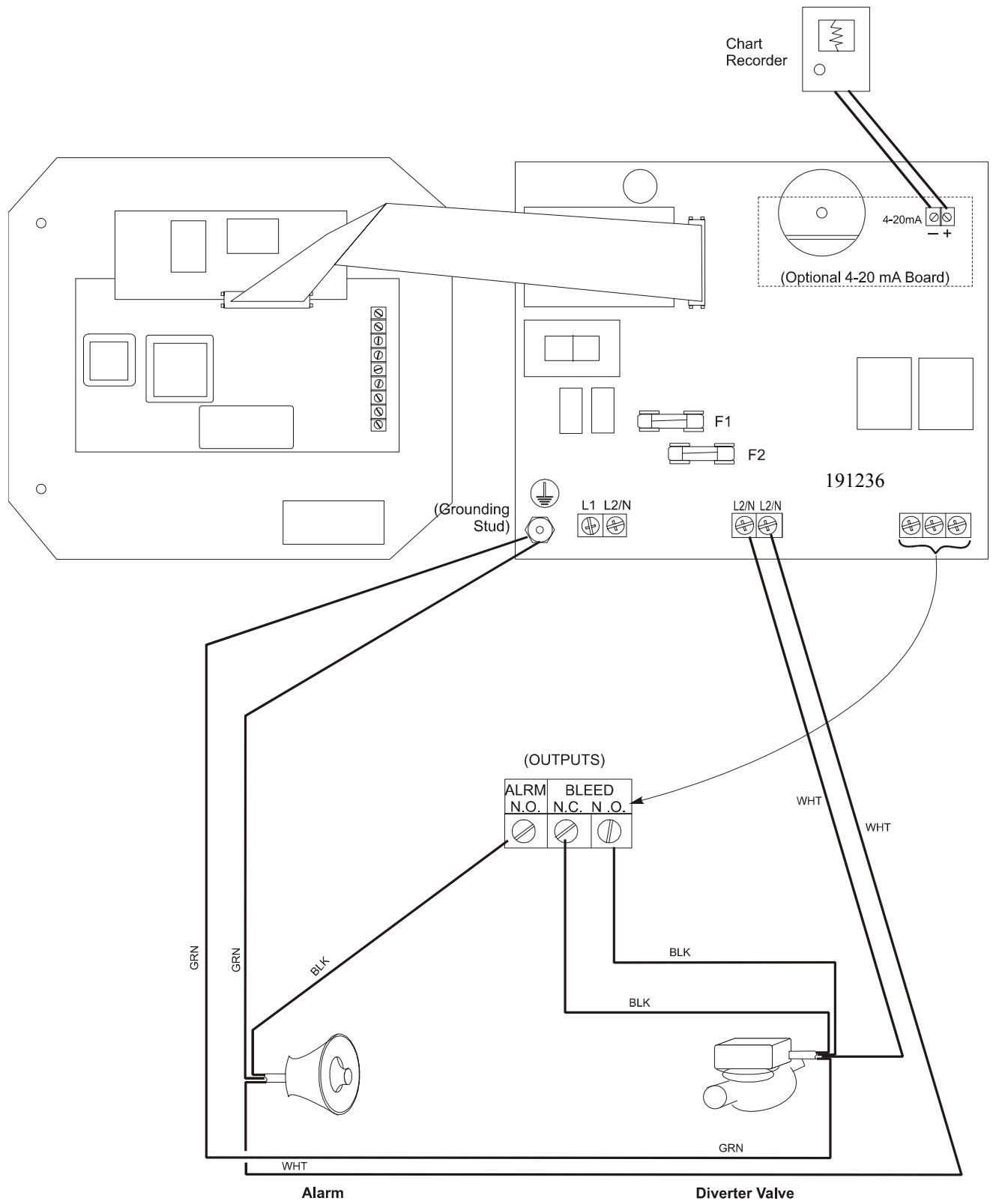


Figure 4a Outputs (for power relay board 191236)

4.0 FUNCTION OVERVIEW



4.1 Front Panel

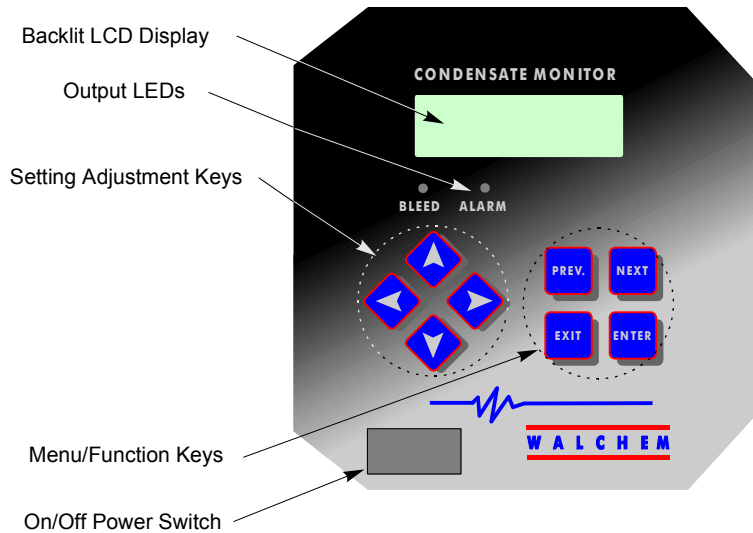


Figure 5 Front Panel

4.2 Display

A summary screen is displayed while the WCM monitor is on. This display shows a bar graph of the conductivity relative to the set point, the actual conductivity value, and current operating conditions. The center of the bar graph is at the (S), which represents the set point. For each 1% rise above the set point a vertical bar appears to the right of the (S). For each 1% drop below the set point a vertical bar appears to the left of the (S). There are small breaks in the bars at each 5%. The bar graph is limited to displaying 20% above or below the set point. The operating conditions that are displayed on the bottom line of this display are Alarm, Sensor Error, Alarm Timeout and Normal. Normal just means there is nothing unusual to report.

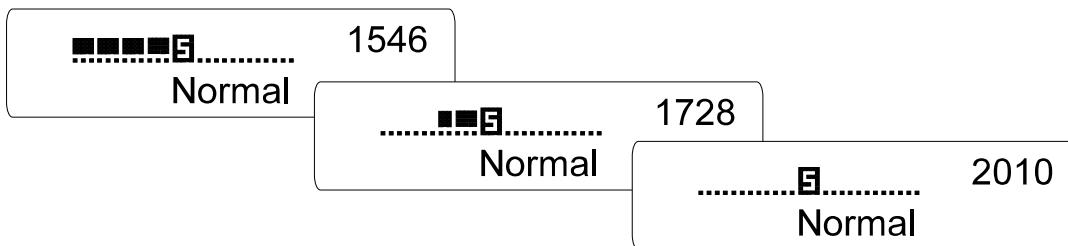
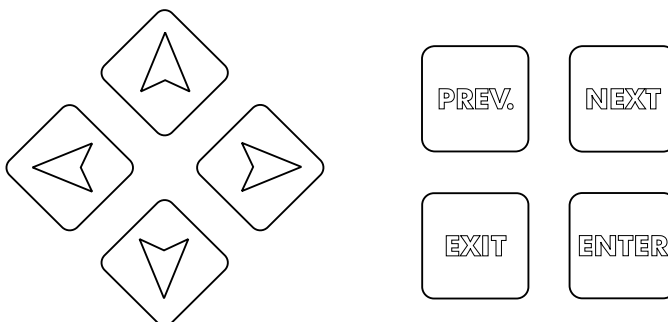


Figure 6 Summary Screen

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 WCM series monitor is shipped with the access code disabled. If you wish to enable it, see Section 5.6 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 monitor is ready to be started.

Plug in the monitor and turn on the power switch to supply power to the unit. The display will briefly show the WCM 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.

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.

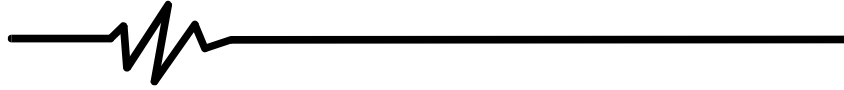
Normal Startup

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

4.6 Shut Down

To shut the WCM monitor 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 WCM monitor determines which menus are available as you scroll through the settings. Certain menus are only available if you select certain options. All settings are grouped under the following main menu items.

Conductivity
Temperature
Divert
4-20mA (Only if 4-20mA option installed)
Access Code

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.

5.2 Conductivity Menu

The conductivity menu provides the following settings: Calibration, Self Test, and Unit selection. Additional settings are also discussed below. Refer to figure 7, Conductivity Menu Chart.

Calibrate

To Calibrate the conductivity, use either a hand held meter, or a buffer solution, and adjust the WCM monitor to match. Once Calibrate is entered, the unit continuously displays conductivity readings. Press an arrow key to change the value displayed to match the hand held meter or the buffer solution. You must press **ENTER** to activate the new calibration. You must press the **EXIT** key to exit calibration.

Self Test

Press **ENTER** to begin self test. Press any key to stop. Self Test internally simulates a conductivity sensor and should *always* give the reading $1000 \mu\text{S}/\text{cm} \pm 20 \mu\text{S}$. If it does not, disconnect the sensor and repeat the self test. If the reading is still not in the 1000 ± 20 range, there is a problem with the electronics and the unit should be serviced. If the self test is in the expected range and you have a problem calibrating, then the sensor or its wiring is at fault.

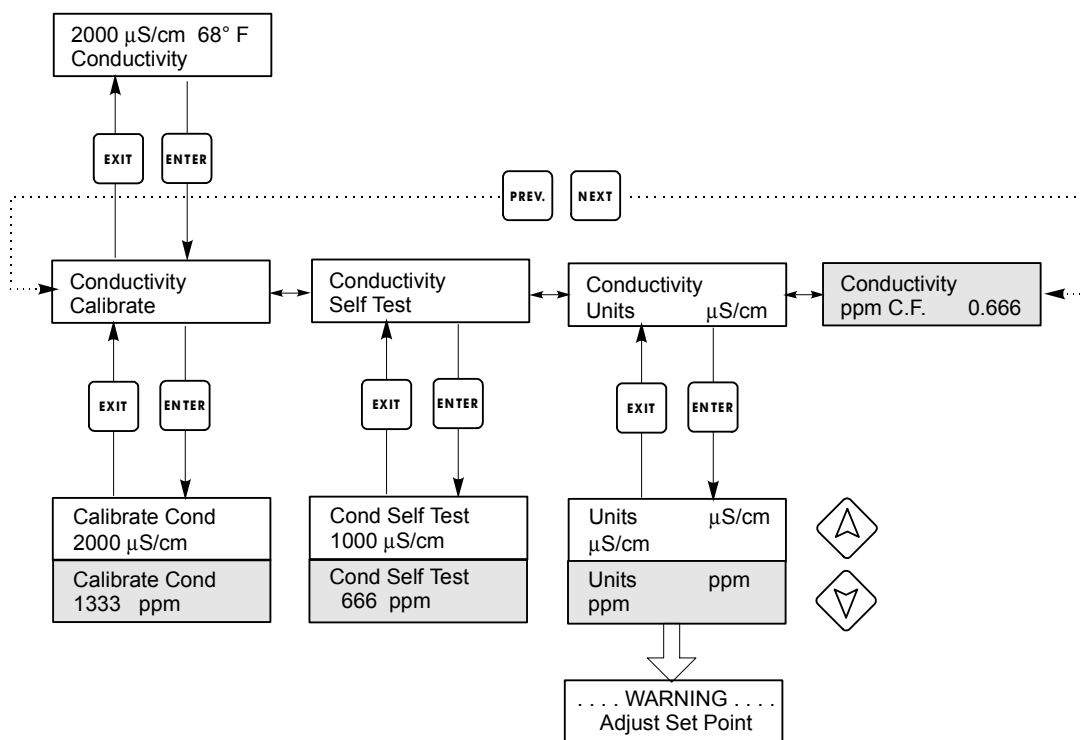
Units

You may choose to display conductivity in $\mu\text{S}/\text{cm}$ or in ppm. Press **ENTER** and then use the Up and Down arrows to change the units. If you change the units, you will be warned to check your settings. This is important. Set points are not automatically translated from $\mu\text{S}/\text{cm}$ to ppm. If you change the units you will need to change your Alarm settings.

ppm C.F.

This is the ppm Conversion Factor (or multiplier). This is typically 0.666 but can be changed to accommodate various requirements.

Conductivity Menu



Legend

Menu choices that appear when ppm units are selected.

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 Conductivity Menu Level.

Figure 7 Conductivity Menu

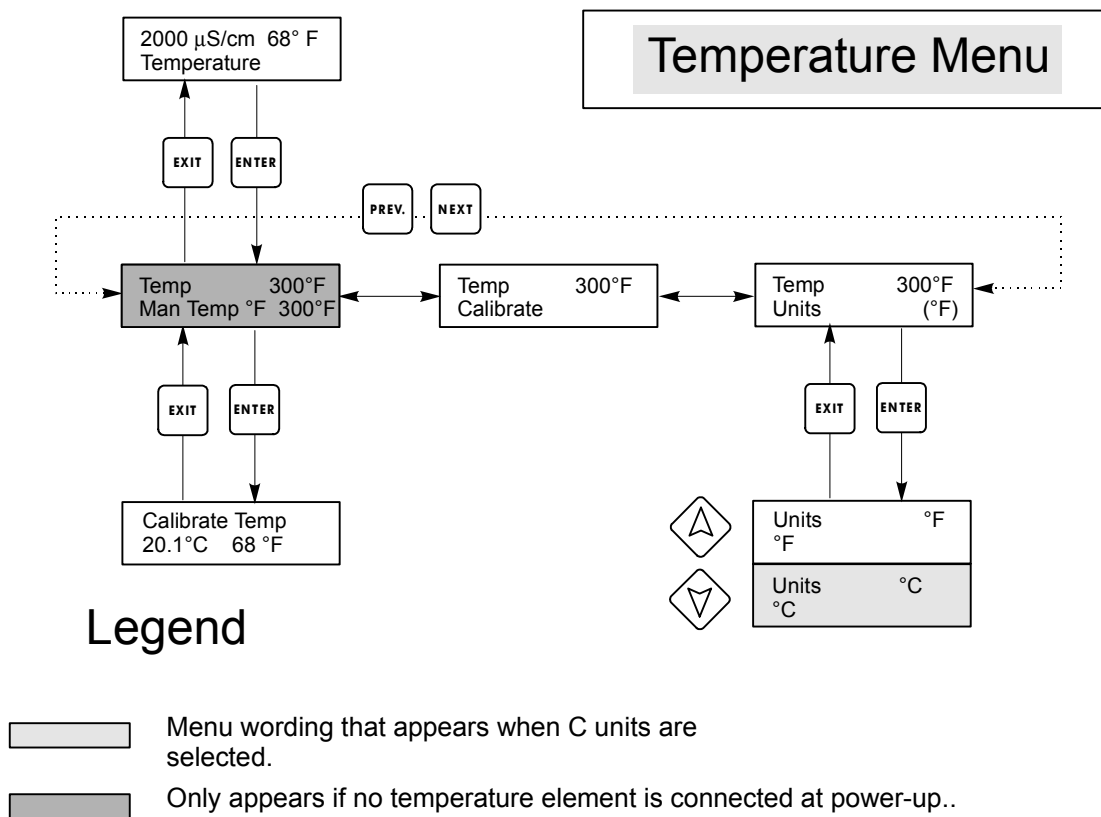


Figure 8 Temperature Menu

5.3 Temperature Menu

The Temperature menu provides the following settings: Calibration, Unit selection. The Temperature menu will be indicated on the display by one of the following:

Temperature Temp 70°F Temp Error

The first two displays are “normal” operation. The third display indicates that there is a problem with the temperature input. See figure 8.

Calibrate

To Calibrate the Temperature, use a thermometer to measure the fluid temperature and adjust the WCM monitor to match. 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.

Man Temp

This menu appears only if no temperature element is connected at power-up. Use the arrow keys to adjust the temperature displayed to match that of the boiler water.

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.

5.4 Divert Menu

The Divert Menu provides the following settings: Set Point, Dead Band, Control Direction, HOA. The Divert menu will be indicated on the display by one of the following:

Divert A OFF
Divert A 10:00

The first display indicates that the alarm output is currently OFF. The second display indicates the length of time that the alarm output has been ON.
The 'A' indicates that the output is being controlled automatically.

Set Point

This is the conductivity value at which the diverter valve and alarm output are turned ON. The factory default setting for the WCM monitor is for the alarm output to turn on when the conductivity is higher than the set point. This may be changed at the Control Direction screen.

Dead Band

This is the conductivity value that when combined with the set point determines when the alarm outputs turn OFF. Assuming that the control direction is set for normal operation (High Set Point) the alarm outputs will turn off when the conductivity drops below the set point minus the Dead Band. For example: The set point is 25 $\mu\text{S}/\text{cm}$ and the Dead Band is 5 $\mu\text{S}/\text{cm}$. The alarm outputs turn ON when the conductivity reading is greater than 25 but does not turn OFF until the conductivity drops below 20.

Time Limit

This menu allows you to set a maximum amount of time for the alarm. The limit time is programmed in hours and minutes and can be set between 1 minute and 10 hours. If the time limit is set to zero, then the valve may be open indefinitely. If the maximum time is exceeded, the diverter valve will close and will not re-open until the "Reset Timer" menu is reset by an operator.

Reset Total

Only appears if the time limit above has been exceeded. Use the up or down arrow to change "N" to "Y", then press **ENTER**.

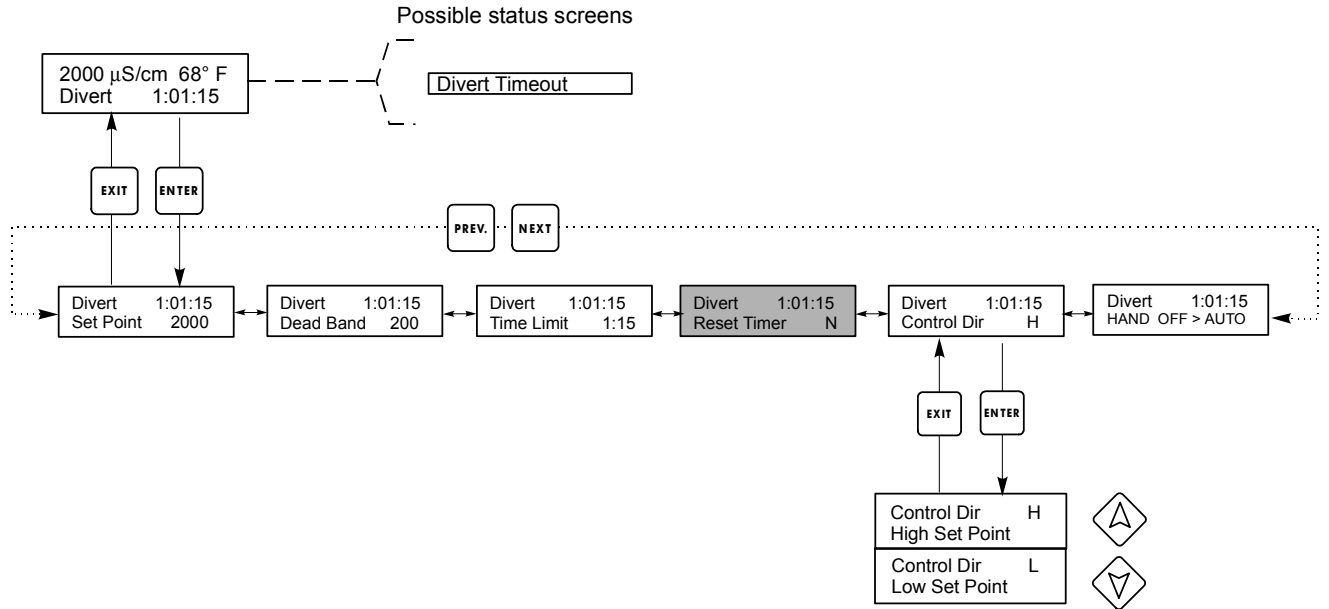
Control Dir H / L

This allows you to set the Normal (High Set Point) or Inverse (Low Set Point) operation of the outputs. When set to High, the outputs turn on when the conductivity is *higher* than the set point. When set to Low, the outputs turn on when the conductivity is *lower* than the set point.

H O A

The "Hand Off Auto" screen allows you to select the operating mode of the alarm outputs. In Hand (manual) mode, the output is turned on immediately for a maximum of 10 minutes. If you walk away the output will return to Auto mode at the end of that time. In Off mode the output will stay Off indefinitely. In Auto mode the output will respond to changes in conductivity based on the set point. The HOA mode of the alarm output is indicated on the alarm status lines.

Divert Menu



Legend

Appears only if limit timer has expired.

Figure 9 Divert Menu

5.5 4-20mA Menu

This menu is only available if the 4-20mA output is installed in the monitor. 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 monitor.

Set 20mA Pt

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

Calibrate

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

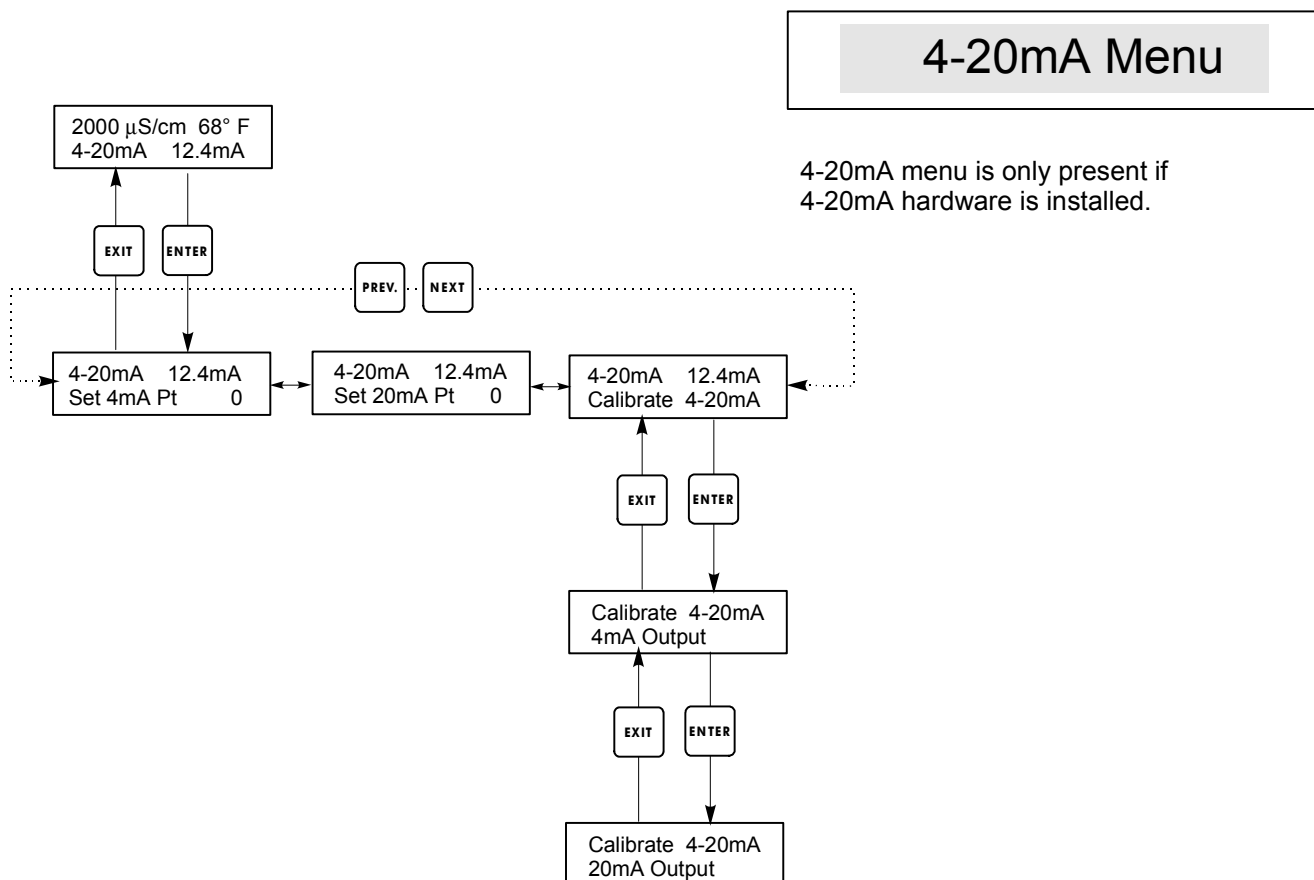


Figure 10 4-20 mA Menu

5.6 Access Code Menu

This menu determines whether the access code feature of the monitor 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 monitor. 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.

Access Code Menu

Any Top Display
Access Code 0000

The Access Code prompt may appear at any screen in the entire menu structure if the current access code has not been entered by the user. Access code entries will be valid for 10 minutes from the most recent key press.

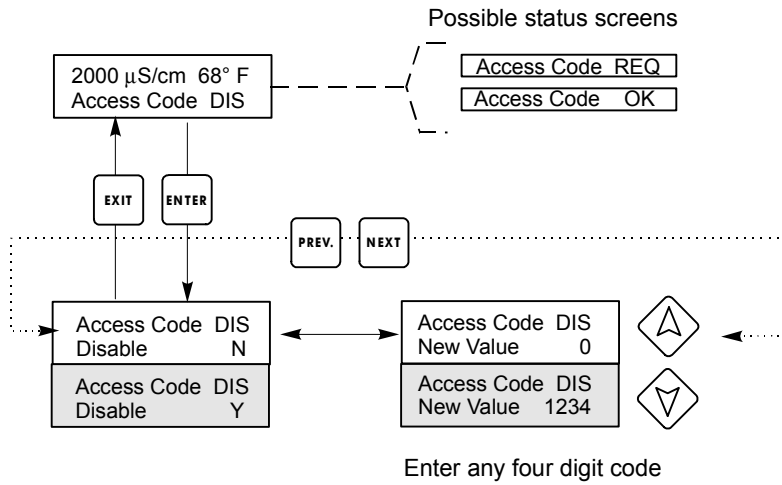


Figure 11 Access Code Menu

6.0 MAINTENANCE



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

6.1 Electrode Cleaning

NOTE: The monitor must be recalibrated after cleaning the electrode.

Frequency

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

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

If the variance in readings is greater than 5%, increase the frequency of electrode cleaning. If there is less than 5% change in the reading, the electrode was not dirty and can be cleaned less often.

Cleaning Procedure

The electrode can normally be cleaned using a cloth or paper towel and a mild cleaning solution such as 409® cleanser. Occasionally an electrode may become coated with various substances which require a more vigorous cleaning procedure. Usually the coating will be visible, but not always.

6.2 Replacing the Fuses

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

Locate the fuses on the circuit board at the back of the monitor 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 monitor 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 be used.

Controller Rating	Fuse 1 (F1)	Walchem P/N	Fuse 2 (F2)	Walchem P/N
120 VAC	5 x 20 mm, 0.125 A, 250 V	102369	5 x 20 mm, 10A, 125 V	102432
240 VAC	5 x 20 mm, 0.063 A, 250 V	103363	5 x 20 mm, 5 A, 250 V	102370

7.0 TROUBLESHOOTING



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

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

7.1 Conductivity Readout Does Not Change

If the readout is stuck at or near zero:

	Possible Causes	Corrective Action
1.	Dry electrode	Check for flow through system.
2.	Electrode is disconnected.	Check wiring to electrode. Go to self-test menu, as described in section 5.2 If readout changes to 1000 ± 20 , the problem is with electrode or connections. See section 7.2 If still at zero, problem is with the monitor. Consult the factory.
3.	Electrode is coated.	Clean off non-conductive coating with a suitable solvent.

If the readout is stuck at another number:

	Possible Causes	Corrective Action
1.	Dirty or faulty electrode	Evaluate electrode (section 7.2).
2.	Stagnant sample	Check system for proper flow.

7.2 Procedure for Evaluation of Conductivity Electrode

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 electrode first (refer to Sect. 6.1).

To find out if the electrode or the monitor is faulty, step through the Self-Test menu, as described in section 5.2. The display should read $1000 \pm 20 \mu\text{S}/\text{cm}$ if the electrode cable is 10 feet long. If the cable has been extended, the self test value will drop by 1 for each additional foot of cable. For example, if the cable has been extended 100 feet, then the self test should read 900 ± 20 . This indicates that the monitor is OK and the problem is in the electrode or its connections. If the conductivity reading is not within this range, return the control module for repair.

To check the electrode, check the electrode 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. Restore power and see if the conductivity is back to normal. If not, replace the electrode.

8.0 SERVICE POLICY



The WCM series Condensate Monitor 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.