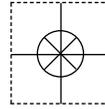


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# User's Guide



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# PHUCN600 Multi-parameter Controller & Analyzer



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.

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## ***Introduction***

The PHUCN600 series multi-parameter controller is a microprocessor based controller capable of measuring one of the following parameters, pH, ORP or conductivity.

When shipped from the factory, the PHUCN600 series is not set to measure any one parameter. When the PHUCN600 series is powered up for the first time, it will display the meter selection screen where the meter type must be selected. (refer to section 4.6 Meter Selection)

This meter selection screen will only be displayed when the unit is powered up for the first time.

After the user selects a meter type the PHUCN600 series will remain set to that meter type until it is changed with the meter selection menu function in the Utilities menu.

To return the PHUCN600 series to its factory settings, the user must re-select the current meter type from the meter selection menu function. This will override all set-points and return all settings back to the factory settings.

The PHUCN600 User's menu has been divided into five main categories

- Calibration, used to calibrate the PHUCN600 series with the selected sensor
- Utilities, Used to manually control or override the outputs.
- Setup, used to configure the PHUCN600 series' many options
- Diagnostics, used to troubleshoot any problems with the PHUCN600 series
- Outputs, used to configure the PHUCN600 series' outputs.

There are two displays on the PHUCN600 series. A bright LED numeric display with bar graph on the outside front panel, and a 2-line, 16-character LCD display on the inside. The LED readout on the outside panel can be seen several yards away. The distinctive, color-coded bar graph will immediately indicate if you are within the process parameters that you set (green), if the control relays are on (yellow) and if you are in alarm condition (red). This makes diagnosing pump and alarm malfunctions easy. All configuration and control functions are performed on the LCD menu on the inside front panel.

A universal mounting kit is included for surface, panel and pipe-mount applications. The 1/4 DIN enclosure makes panel-mount cutouts and engineering simple.

PHUCN600 series is packaged in a rugged NEMA 4X polycarbonate enclosure making it ideally suited for heavy-duty applications such as industrial wastewater neutralization, municipal water and wastewater, pulp and paper, and process control.

# Section I - Specifications

	pH	ORP	Conductivity																		
<b>Display</b>	Front Panel: 4 x 7 segment 1/2" LED display, 1 LED indicator On-line, 7 LED Bar Graph Inside Panel: 2 x 16 alpha-numeric LCD display																				
<b>Power Requirements</b>	120Vac (±10%) 50/60Hz (less than 12VA) or 240Vac (±10%) 50/60Hz (less than 12VA)																				
<b>Measuring Range</b>	pH: 0.01 to 14.00  Temp: 0 to 100°C or 32° to +212°F	ORP: -1999 to +1999mV (Dependent on sensor) Temp: 0 to 100°C or 32° to +212°F	<table border="1"> <tr> <td>MΩ/cm<sup>3</sup></td> <td>0 to 19.99</td> <td>0.01</td> </tr> <tr> <td rowspan="4">uS/cm<sup>3</sup></td> <td>0 to 2.000</td> <td>0.01</td> </tr> <tr> <td>0 to 20.00</td> <td>0.1</td> </tr> <tr> <td>0 to 200.0</td> <td>0.1</td> </tr> <tr> <td>0 to 2000</td> <td>1.0</td> </tr> <tr> <td rowspan="2">mS/cm<sup>3</sup></td> <td>0 to 20.00</td> <td>10</td> </tr> <tr> <td>0 to 200.0</td> <td>50</td> </tr> </table>	MΩ/cm <sup>3</sup>	0 to 19.99	0.01	uS/cm <sup>3</sup>	0 to 2.000	0.01	0 to 20.00	0.1	0 to 200.0	0.1	0 to 2000	1.0	mS/cm <sup>3</sup>	0 to 20.00	10	0 to 200.0	50	Temp: 0 to 100°C or 32° to +212°F
MΩ/cm <sup>3</sup>	0 to 19.99	0.01																			
uS/cm <sup>3</sup>	0 to 2.000	0.01																			
	0 to 20.00	0.1																			
	0 to 200.0	0.1																			
	0 to 2000	1.0																			
mS/cm <sup>3</sup>	0 to 20.00	10																			
	0 to 200.0	50																			
<b>Temperature Compensation</b>	Automatic or Manual 0 to 100°C (32° to +212°F)	Not required	Automatic or Manual User selectable temperature compensation slope 0.0 to 10.0%/°C. 0 to 100°C (32° to +212°F)																		
<b>Temperature Unit</b>	°C or °F																				
<b>Temperature Sensor</b>	User selectable: 300Ω NTC Thermistor, 3000Ω NTC Thermistor or Pt. 1000 RTD																				
<b>Calibration Modes</b>	Auto-Calibration Manual Calibration Temperature Calibration	Manual Calibration Temperature Calibration	Dry Calibration Sample Calibration Temperature Calibration																		
<b>Ambient Conditions</b>	Temperature: -20°C to +60°C or -4°F to +140°F Humidity: 0 to 90% RH (non-condensing)																				
<b>Menu Access Front Panel</b>	Auto-Calibration, Manual Calibration, Temperature Display	Manual-Calibration, Temperature Display	Manual Calibration Temperature Display																		
<b>Menu Access Inside Panel</b>	Full Access to all parameters of operations menu																				
<b>Sensor to PHUCN600 Distance</b>	Differential Sensor: 3000 ft (914 m) Combination Sensor: 10 ft (3 m)		300 ft (91.4 m)																		
<b>Relay Outputs</b>	Two Control Relays, 10A / NO, 5A / NC @ 240VAC or 28VDC. Mode: Process control, Adjustable parameters: process direction, (rising or falling) on-set-point, off set-point, (0 to 100% of full scale), cycle timer (on / off, 0 to 600 seconds), failsafe (on / off). One Alarm Relay, 10A / NO, 5A / NC @ 240VAC or 28VDC. Mode: High / Low Alarm, Adjustable parameters: Low on / Low off set-point (0 to 100% of full scale, low on must be less than low off), High On / High Off set-point (0 to 100% of full scale, High on must be greater than High off).																				
<b>Analog Outputs</b>	4 to 20mA Channel 1 Isolated Output, Range expand 0 - 100% of full scale (min segment 10% of full scale), max. load 800Ω 4 to 20mA Channel 2 Isolated Output, Range expand 0 - 100% of full scale (min segment 10% of full scale), max. load 800Ω Can be set to track temperature if sensor is equipped with a temperature sensor																				
<b>Memory Back-up</b>	All user settings are retained indefinitely in memory (EEPROM)																				
<b>Mechanical</b>	Enclosure: NEMA 4X, 1/4 DIN, polycarbonate enclosure with four 1/2" conduit holes Mounting: Universal Mounting kit for surface, pipe and panel mount, is included																				
<b>Sensor Input</b>	Probe: -600 to +600mV Temp. Sensor: 0 to 9999Ω	Probe: -1999 to +1999mV Temp. Sensor: 0 to 9999Ω	Cell: 0 to 9999Ω Temp. Sensor: 0 to 9999Ω																		
<b>Invalid Entries</b>	Invalid entries cannot be stored																				
<b>Manual Test Mode</b>	Process value can be simulated with arrow keys to verify correct setup of outputs																				
<b>Manual Relay Override</b>	Relays can be set to on / off / auto, to verify correct wiring of auxiliary devices, or to manually adjust process																				
<b>Output Hold</b>	All outputs are placed on hold when PHUCN600 is in Menu mode																				
<b>Calibration Data</b>	Recall data from last calibration, calibration mode, 1st & 2nd accepted buffer value and probe mV output, calibration temperature, calibration slope, and probe efficiency		Recall data from last calibration, calibration buffer accepted value, and cell resistance, calibration temperature																		
<b>Auto Return</b>	User selectable auto return if unit is left in menu mode or if relays are left in manual override mode for more than 10 min.																				
<b>Display Damping</b>	User can select rate at which the PHUCN600 updates display. Enables display damping of unstable process																				
<b>Net Weight</b>	2.2lbs (1kg)																				

## Section 2 - Installation

### 2.1 Unpacking

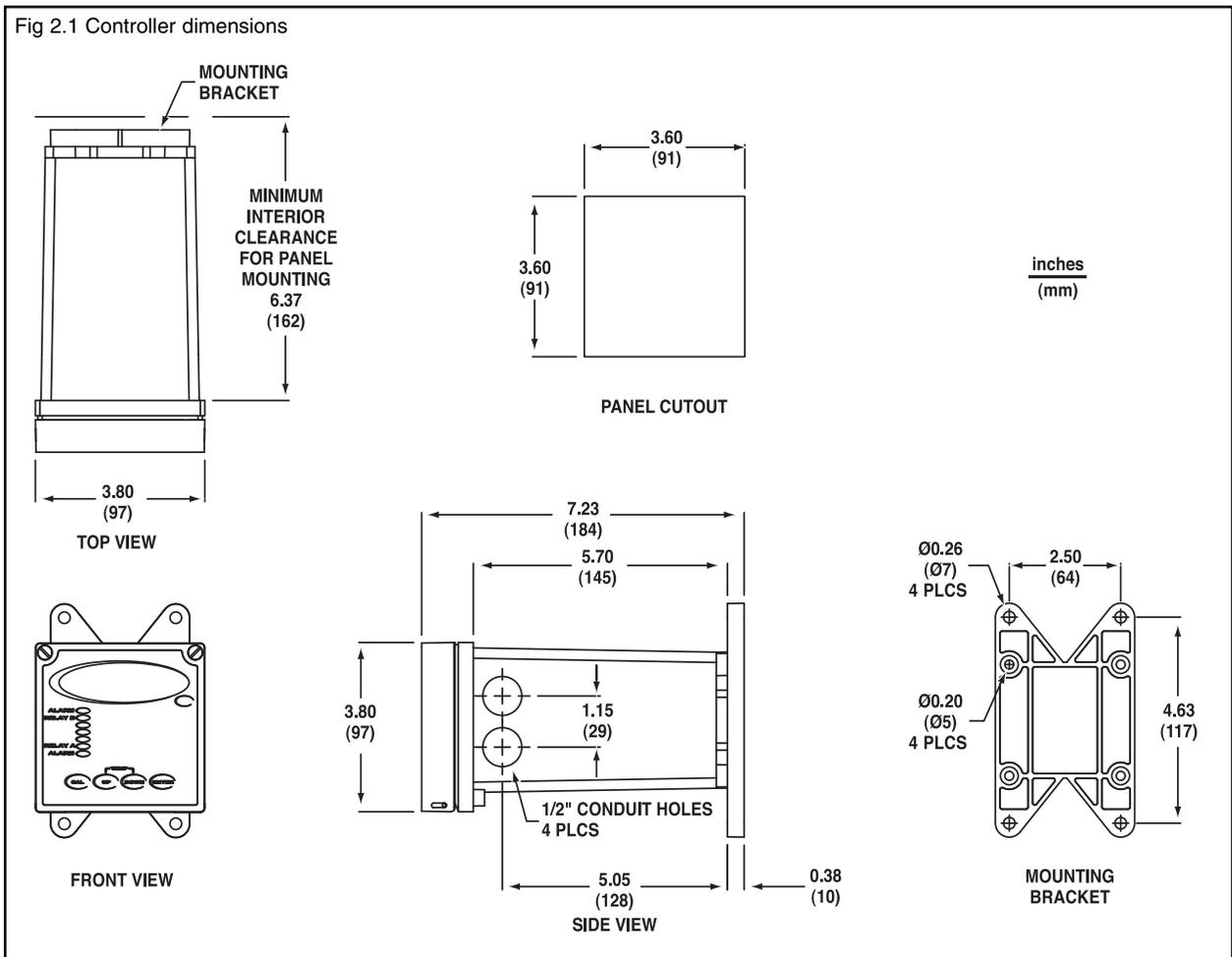
Save the shipping carton and packing material in case the instrument needs to be stored or returned. Inspect the instrument and packing material for shipping damage and report any problems immediately.

### 2.2 Location

Locate the controller/analyzer close to the sensor. The list below gives typical maximum distances for various sensors. Refer to the sensor specifications for exact information.

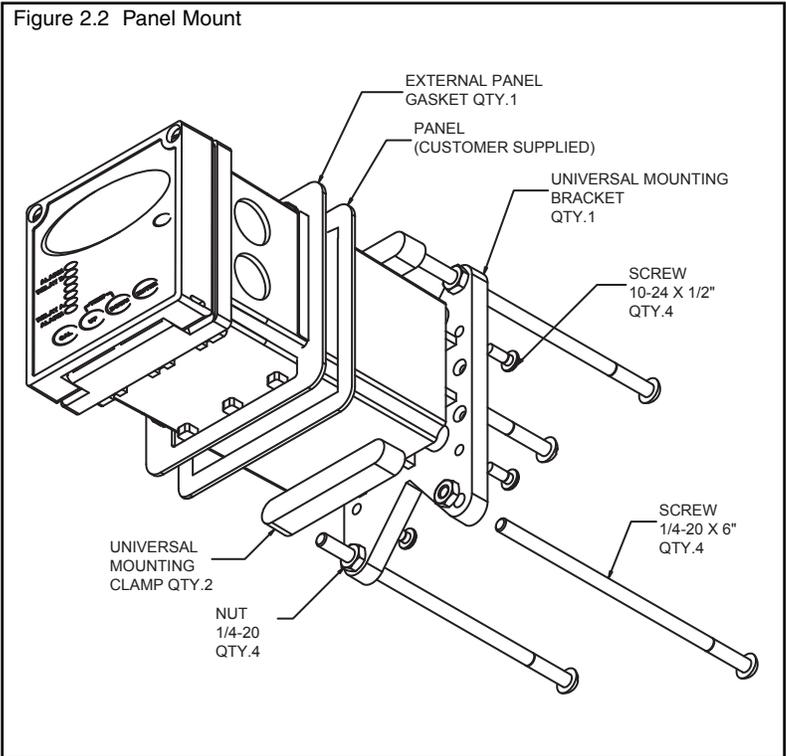
- |                                             |                      |
|---------------------------------------------|----------------------|
| • PHE-600/610 Series Differential pH Probe  | 3000 ft (914 meters) |
| • ORE-600/610 Series Differential ORP Probe | 3000 ft (914 meters) |
| • CDE-600 Series Conductivity Probe         | 300 ft (91 meters)   |

### 2.3 Mounting



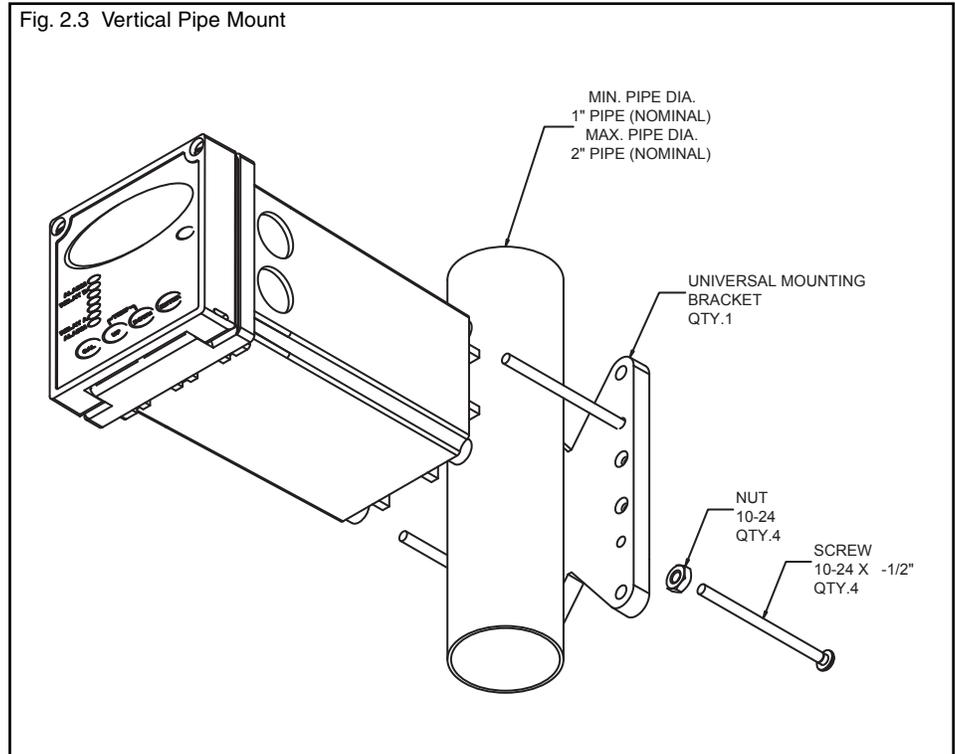
## Section 2 - Installation

Panel Mount – The PHUCN600 series can be panel mounted to a panel using the hardware kit provided. The panel cutout dimensions are shown in fig. 2.1.



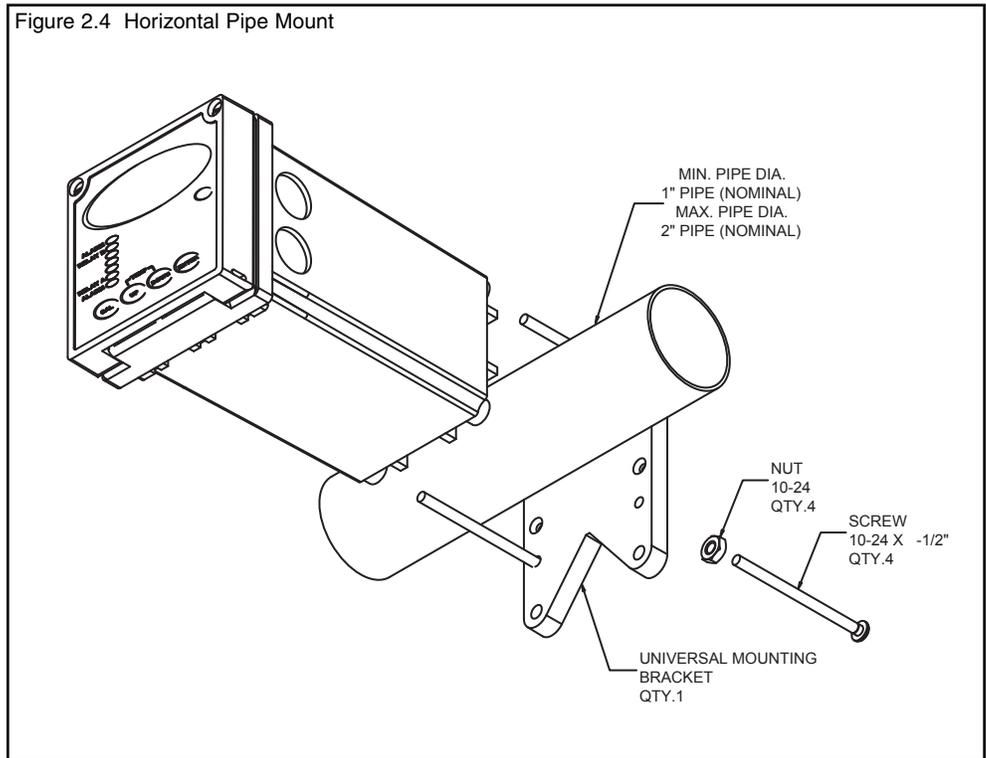
Pipe Mount – The PHUCN600 series can also be mounted to a horizontal or vertical pipe with:

- a minimum outside diameter of 1.30" (33mm) (for example 1" CPVC pipe)
- and a maximum of 2.375" (60mm) (for example 2" CPVC pipe)



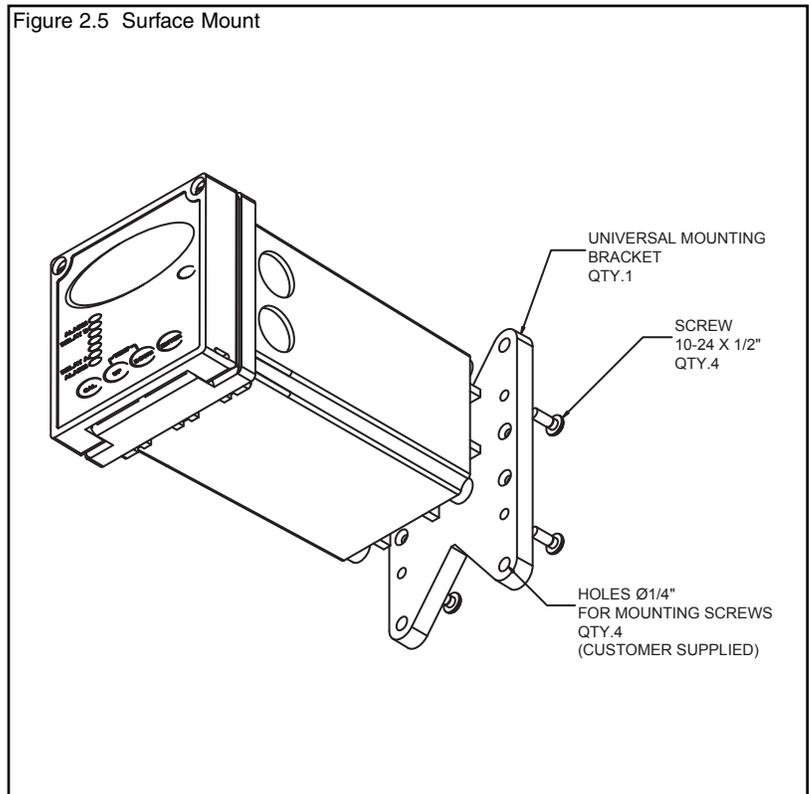
## Section 2 - Installation

Figure 2.4 Horizontal Pipe Mount



Surface Mount – The PHUCN600 series can be surface mounted using the hardware kit provided with the unit.

Figure 2.5 Surface Mount



---

## Section 3 - Electrical Connections and Setup

### 3.1 Conduit Connections

The PHUCN600 series has four 1/2" conduit holes, 2 on each side of the enclosure as shown on fig. 2.1. The unit is shipped with these holes plugged with liquid tight conduit seals. These must be left in unused holes to maintain the NEMA 4X integrity. Use approved conduit hubs to connect the conduit, connect these to the conduit before connecting to the enclosure.

Wire Specification: Size and fuse wire according to local electrical code. Maximum current not to exceed 10A when used to power auxillary devices powered via internal connections.

### 3.2 A.C. Power Connections

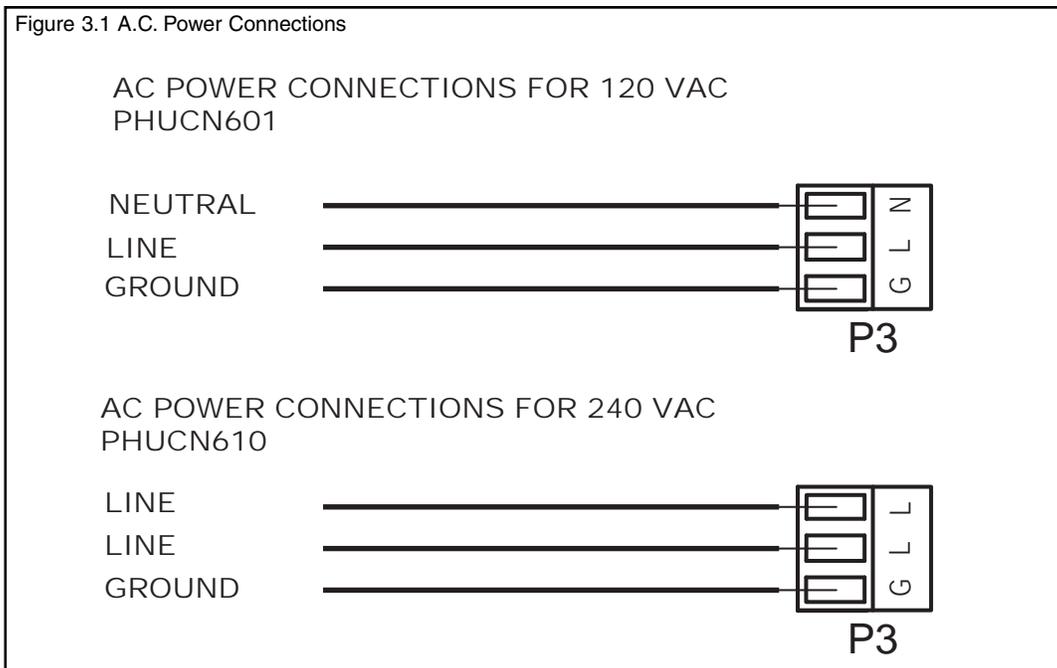
**Caution: This instrument uses 120 or 240 50/60 Hz AC power. Opening the enclosure door exposes you to potentially hazardous line power voltage which might be present on the terminals of plug P3 and P4. Always remove line power before working in this area. If the relay contacts on P4 are powered from a seperate source from the line power on P3, be sure to disconnect that power before proceeding. The PHUCN600 flip out door contains only low voltage and is safe to handle.**

The PHUCN600 series is available in two power models.

The PHUCN610 is designed to operate at 240 VAC.

The PHUCN601 is designed to operate at 120 VAC.

To connect power to the PHUCN600, remove the terminal block plug P3 and connect the wiring as shown below.



## Section 3 - Electrical Connections and Setup

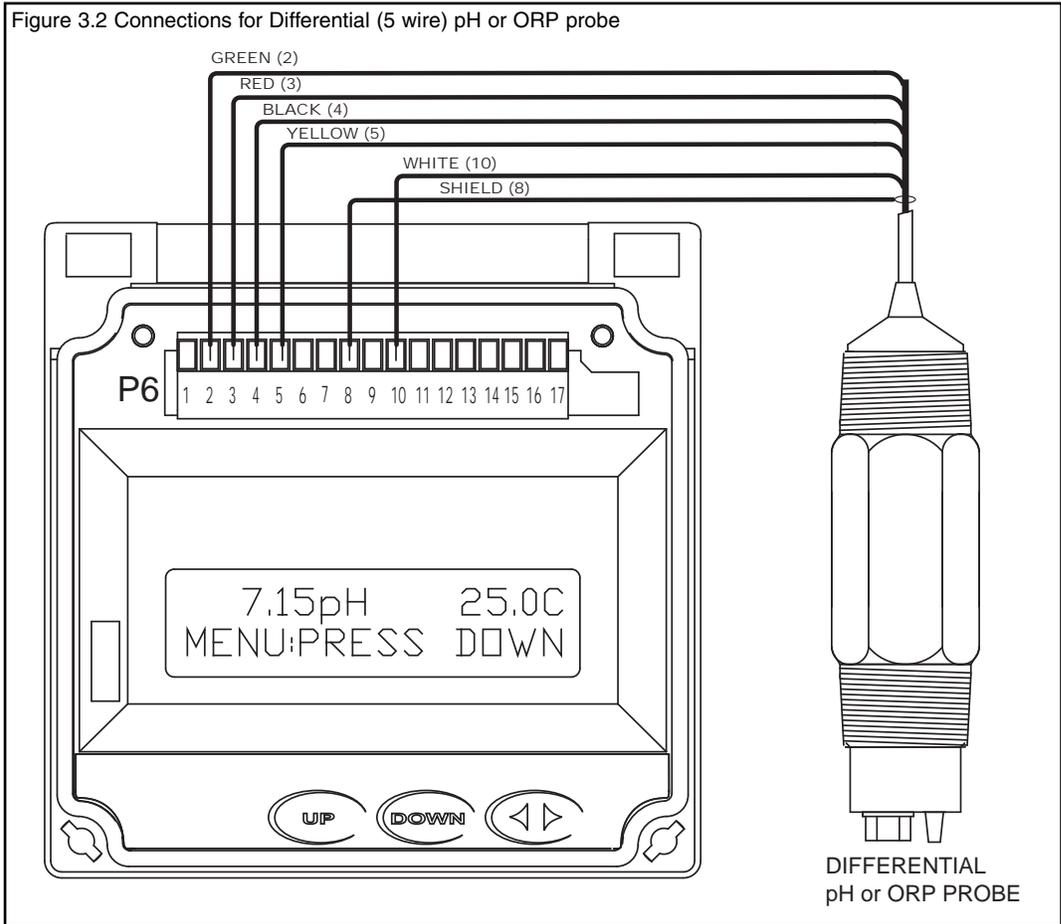
### 3.3 pH and ORP Differential Probe connections and setup

The drawing shows the connections for the 5-wire Differential probes. The cable should be run in a conduit separate from AC power wires, and via a separate conduit hole.

**Note:** Leave 4" to 6" slack for all wires connected to the terminals of P6. Slack required so that wires do not interfere with opening or closing of the front door.

If the cable of the differential probe is cut, the blue wire is not used.

**CAUTION:**  
Always remove line power before unplugging or plugging in the P6 connector



Once connected, step through the LCD menus to select the probe in the order shown. The first two steps may be skipped if the meter is already configured for pH or ORP and a Differential Probe. When using a pH probe, it is important to ensure that the PHUCN600 is reading the probe temperature correctly for accurate temperature compensation. The ORP probe does not require temperature compensation, although the PHUCN600 can display process temperature measured by the probe. The factory temperature calibration is usually accurate enough that no adjustments are necessary.

METER SELECTION	SELECT pH SEC. 4.6 or ORP SEC. 5.5 (IF NECESSARY)
PROBE SELECT	SELECT DIFFERENTIAL PROBE pH SEC. 4.7 or ORP SEC. 5.6 (IF NECESSARY)
MANUAL CAL PH	MANUAL CALIBRATE pH PROBE SEC. 4.1 or ORP PROBE SEC. 5.1
7.15pH 25.0C	RUN MODE

## Section 3 - Electrical Connections and Setup

### 3.4 pH or ORP Combination Probe connections and setup

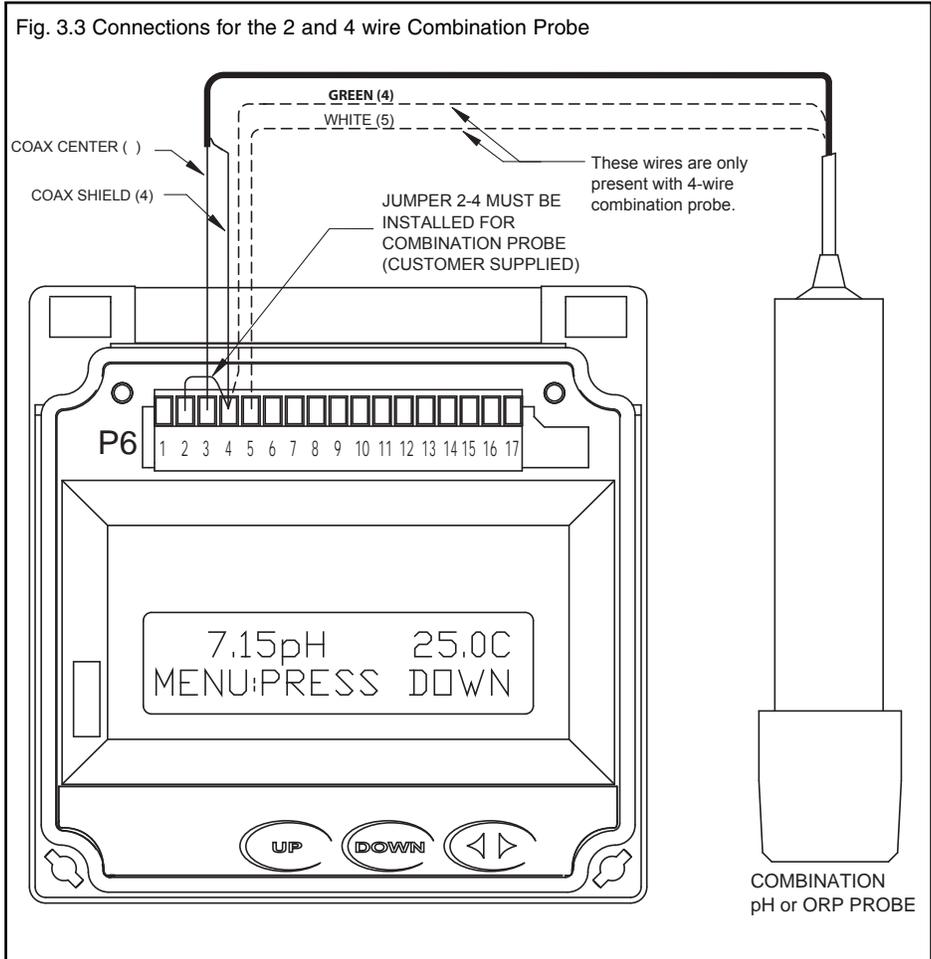
The drawing shows the connections for the Combination style probes. The cable should be run in a conduit separate from AC power wires, and via a separate conduit hole. The cable length should not exceed 10 feet (3 meters).

The **2 wire** version has no temperature sensor and is connected via a coaxial wire. **In a pH meter**, the user should set the **T COMP OVERRIDE** menu to **ON** (Section 4.11) and adjust the temperature setting to the actual probe temperature. **In an ORP meter**, the user should set the **T.DISP OVERRIDE** to **ON** (Section 5.10) to blank the temperature reading on the display.

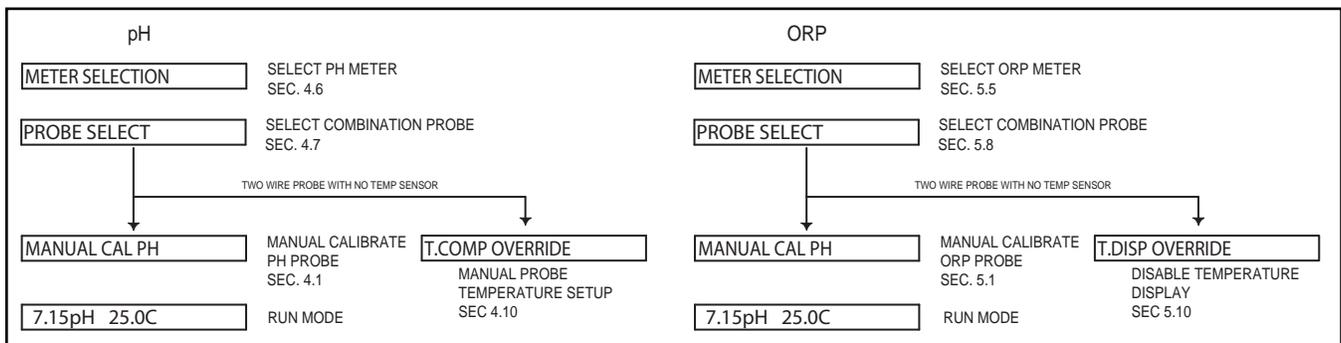
The **4 wire** version has two additional wires for the probe internal temperature sensor. Ensure that the **T COMP OVERRIDE** or **T.DISP OVERRIDE** is **OFF**.

**Note:** Leave 4" to 6" slack for all wires connected to the terminals of P6. Slack required so wires do not interfere with opening/closing of front door.

**CAUTION:**  
Always remove line power before unplugging or plugging in the P6 connector



Once connected, step through the LCD menus to select the probe in the order shown. The first two steps may be skipped if the meter is already configured for a Combination Probe. If a two wire pH probe is used, which has no temperature sensor, ensure that the Temp. Comp. Override is set to same temperature as the buffer before calibrating. If a two wire ORP probe is used, you can blank the Temp display with the T DISP OVERRIDE menu.



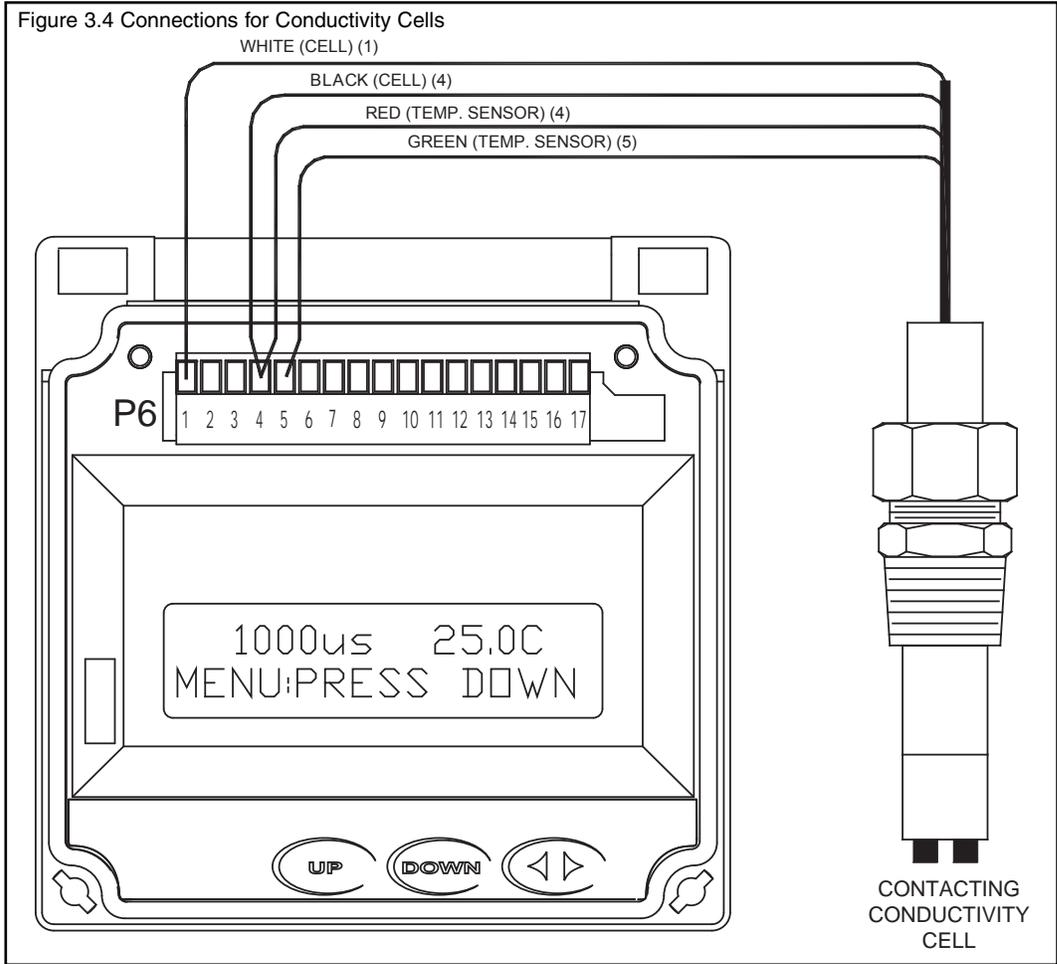
## Section 3 - Electrical Connections and Setup

### 3.5 Conductivity Cell (Contacting style) connections and setup

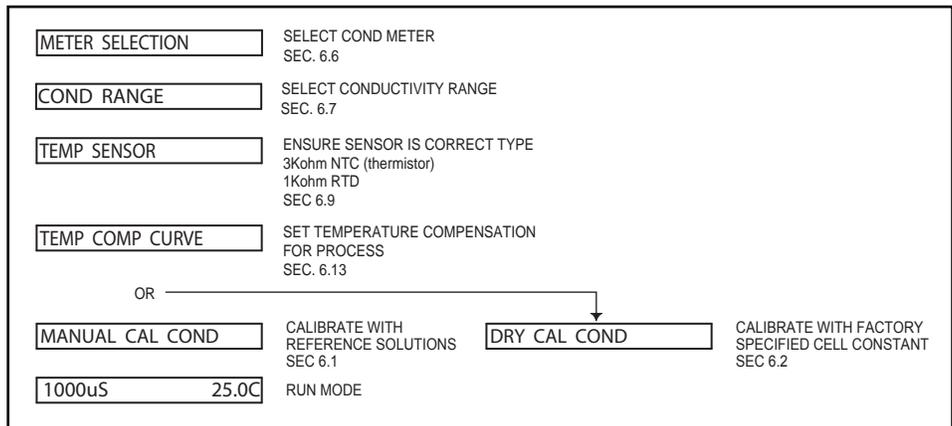
The drawing shows the connections for the Conductivity Cells (Contacting style). The cable should be run in a conduit separate from the AC power wires, and via a separate conduit hole. The cell cable length should not exceed 300ft. (91 meters).

**Note:** Leave 4" to 6" slack for all wires connected to the terminals of P6. Slack required so that wires do not interfere with opening or closing of the front door.

**CAUTION:**  
Always remove line power before unplugging or plugging in the P6 connector



Once connected, step through the LCD menus to select the cell in the order shown. The TEMP COMP CURVE setup default is 1.8%/deg C. This is acceptable for most process applications. If your process is significantly different from this, change the setting in the TEMP COMP CURVE menu.



## Section 3 - Electrical Connections and Setup

### 3.7 Relay connections

The PHUCN600 series controller has three internal relays. Relays A and B are for control, the Alarm Relay can be configured for alarm functions or as an additional control relay.

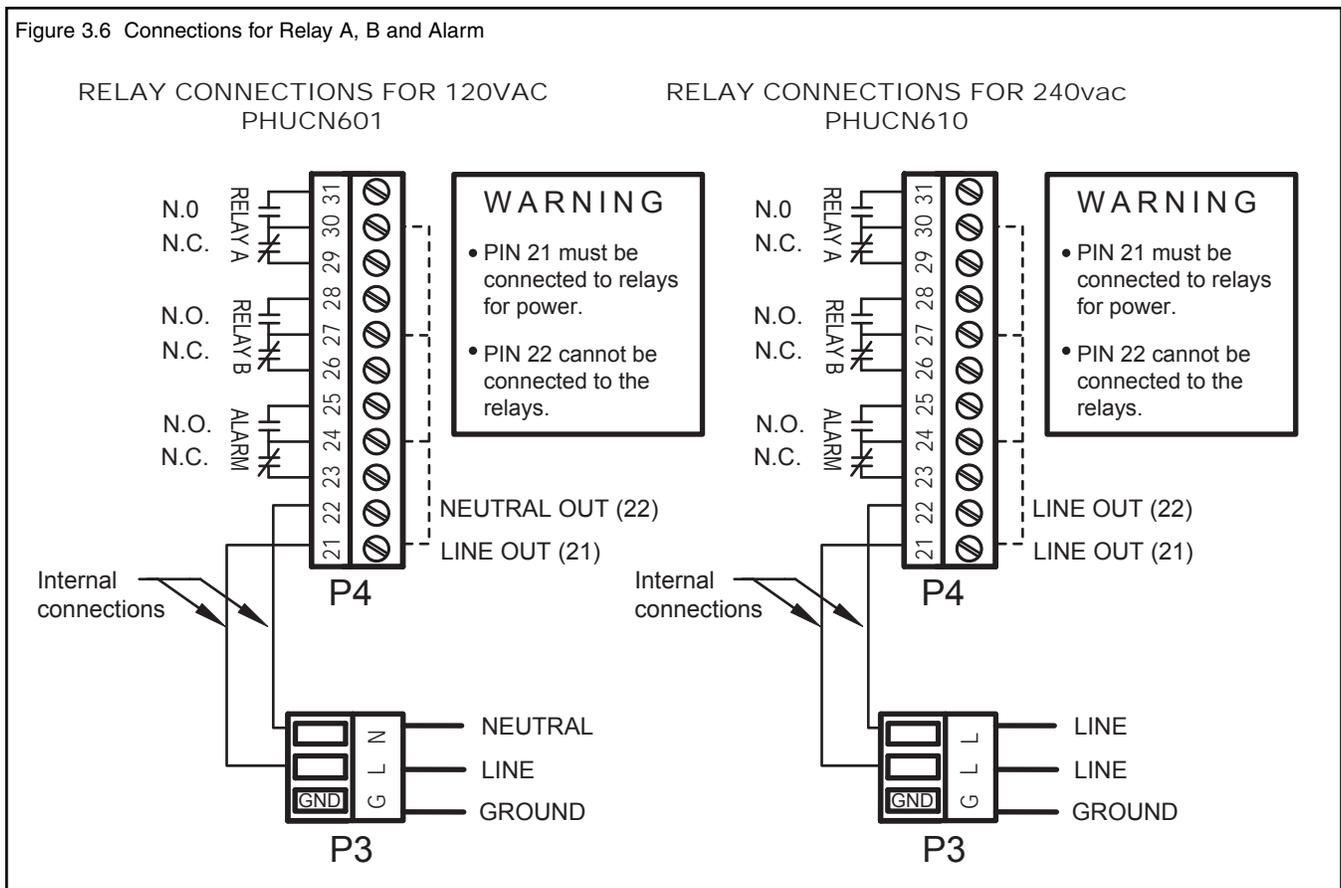
The connections to the relays are shown in the drawing. Note that the AC power is internally connected to the relay terminal plug P4. This is used to provide 120V or 240V AC power for the relay contacts.

**WARNING**

DISCONNECT POWER FROM  
CONTROLLER AND LOADS WHILE  
CONNECTING TO THE RELAY  
OUTPUT TERMINAL PLUG.

Wire Specification: Size and fuse wire according to local electrical code. Wire size not to exceed 14 AWG.

Figure 3.6 Connections for Relay A, B and Alarm



**Caution:**

The contacts are rated at 10 amp N.O. and 5 amp N.C. Do not exceed this rating. When switching larger currents, use an auxiliary relay switched by the controller relay to extend the controller relay life. If the relays are controlling an inductive load, use appropriate transient suppression at the load.

---

## Section 3 - Electrical Connections and Setup

### 3.8 RELAY A and B Setup

(LCD MENU SECTIONS - pH: 4.18 & 4.19, ORP: 5.17 & 5.18, Conductivity: 6.18 & 6.19)

Relay A & Relay B on the PHUCN600 series are SPDT dry contact relays. They are configurable to operate in response to rising or falling process values. Each relay has independently adjustable on and off set-points, cycle times, and fail-safe options.

The operator would use the control relays if the device to be controlled is a simple on/off device. For example a pump, solenoid valve, fan, or an indicating light.

The control relays have 6 user configurable settings:

**DIRECTION:** The relay can be set to control either a rising or falling process. If for example the relay is set to control a falling process, the ON set-point must be set lower than the OFF set-point. If the relay is set to control a rising process, the PHUCN600 will not allow the RELAY OFF set point to be set lower than the RELAY ON set-point. This rule will also apply to a rising process.

**RELAY ON set-point:** This is the process value at which the relay will energize. This value can be set anywhere between 0-100% of the range.

**RELAY OFF set-point:** This is the process value at which the relay will de-energize. Depending on the direction for which the relay is configured, the RELAY OFF set-point will only be settable in a limited range.

**CYCLE ON time:** To obtain a tighter process control, and limit over-shoot, the control relay can be set with the cycling feature. This feature, if enabled, will cause the control relay to cycle when the process is between the RELAY ON set-point and RELAY OFF set-point. The cycle on time is the amount of time in seconds that the relay will be energized. It can be set between 0 and 600 seconds.

**CYCLE OFF time:** The CYCLE OFF time is the amount of time in seconds that the relay will be de-energized, it can be set between 0 and 600 seconds. To disable the cycling feature set the cycle off time to 0.

**OVERFEED TIMER:** The overfeed timer is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the overfeed timer will time out if the control RELAY OFF set point is not reached inside the overfeed time out. The control relays will de-energize, the alarm relay will energize and an LED will flash at the front.

**FAILSAFE:** The FAILSAFE feature is designed to reverse the normal action of the control relay.

When the relay is set to FAILSAFE OFF the relay will operate as a normal relay. When the relay is de-energized the NO contacts are open and the NC contacts are closed. Thus the device connected via the NO contacts will be off. When the relay becomes energized the device will be on.

When the relay is set to FAILSAFE ON, the normal action of the relay is reversed. Thus the NO contacts act as the NC contact and the NC act as the NO. The device connected to the NC contacts will be energized when the RELAY ON set-point is reached. The relay will be de-energized but because it is acting in reverse the device will be energized. When the RELAY OFF set-point is reached the relay will energize and the device connected to the NC contact will de-energize.

The purpose of the Fail Safe option is to have the device turned on in the event of a power interruption.

**The factory default for FAILSAFE is OFF.**

---

## Section 3 - Electrical Connections and Setup

### 3.9 ALARM RELAY Setup

(LCD MENU SECTIONS - pH: 4.20, ORP: 5.19, Conductivity: 6.20)

The third relay (Relay C) is used as an alarm relay. The alarm relay on the PHUCN600 is a SPDT dry contact relay.

This relay will respond to both a rising and falling process. The alarm relay will act as a low alarm (falling process) and a high alarm (rising process). Both relays will have independently adjustable on and off set-points. The ALARM ON set-points will always be set before the ALARM OFF set-points. The controller will not let the user input a value below the ALARM ON set-point. The same rule holds true for the high alarm.

The control relays have 5 user configurable settings:

ALARM LOW ON set-point: This is the low process value that will cause the relay to energize. This value can be set anywhere between 0-100% of the range.

ALARM LOW OFF set-point: This is the value that the process must reach in order to de-energize the alarm relay after it has dropped below the ALARM LOW ON set-point. This value must be higher than the ALARM LOW ON set-point.

ALARM HIGH ON set-point: This is the process value that will cause the relay to energize. This value can be set anywhere between 0-100% of the range.

ALARM HIGH OFF set-point: This is the value that the process must reach in order to de-energize the alarm relay after it has increased over the ALARM HIGH ON set-point. This value must be lower than the ALARM HIGH ON set-point.

FAILSAFE: This option can be turned on or off. It reverses the normal action of the relay. (see description under control relay)

ALARM SET-POINT ERROR: If the ALARM LOW ON set-point is set higher than the factory default ALARM LOW OFF set-point, when the user advances from the ALARM LOW ON set-point to the ALARM LOW OFF set-point the shark will adjust the ALARM LOW OFF set-point to be equal to the ALARM LOW ON set-point. If the user then tries to decrease the ALARM LOW OFF set-point the controller will display the ALARM LOW ALARM setup error screen.

This screen will be displayed for 10 seconds, then return back to the setup screen that was previously displayed. If the user presses the down key again the error message will be displayed again for 10 seconds. The user must accept the LOW OFF set-point, equal to, or greater than the LOW ON set-point.

The same conditions apply to the ALARM HIGH set-points. Except the ALARM HIGH OFF set-point must be lower than the ALARM HIGH ON set-point. If the user tries to increase the ALARM HIGH OFF set-point higher than the ALARM HIGH ON set-point the High Alarm setup error screen will be displayed.

ALARM RELAY DISABLE: If the user sets the ALARM LOW ON set-point and the ALARM LOW OFF set-point equal to 0% of the range. It will disable the low alarm relay.

If the user sets the ALARM HIGH ON set-point and the ALARM HIGH OFF set-point equal to 100% of the range. It will disable the high alarm relay.

---

## **Section 3 - Electrical Connections and Setup**

### **3.10 MANUAL TEST MODE**

(LCD MENU SECTIONS - pH: 4.4, ORP: 5.3, Conductivity: 6.4)

Once the relays are configured, the setup can be tested using Manual Test Mode to simulate process changes.

MANUAL TEST MODE is used to simulate a process reading in order to verify the correct response of the outputs. When in the MANUAL TEST MODE, the relays and outputs are no longer placed on hold as they are when in the rest of the menu. The relays and outputs will react to the simulated change in process as if the controller was in RUN MODE.

Note that when the user exits the MANUAL TEST MODE, the relays and outputs will remain in the MANUAL TEST MODE state until the user enters RUN MODE.

### **3.11 RELAY OVERRIDE**

(LCD MENU SECTION - pH: 4.5, ORP: 5.4, Conductivity: 6.5)

Relay Override is used to manually override the state of the relays. The user is able to set the operating mode of the relay as AUTO/ON/OFF (the default and RUN MODE states are AUTO).

This feature can be used to energize or de-energize the relays to manually correct the process, or to shut down an ancillary device to perform maintenance. When in the RELAY OVERRIDE mode, the relays are no longer placed on hold as they are when in the other menus.

Note that if the RELAY AUTO RETURN is set to "ON", the controller will place all the relay settings back to AUTO 10 minutes after the controller returns to the run mode..

## Section 3 - Electrical Connections and Setup

### 3.12 4-20 mA Isolated Outputs Channel 1 and Channel 2

(LCD MENU SECTIONS - pH: 4.21 & 4.22, ORP: 5.20 & 5.21, Conductivity: 6.21 & 6.22)

The PHUCN600 Series Controller has two 4 to 20mA outputs, electrically isolated from each other and ground. Either output can source current into a maximum of 800 ohms.

Channel 1 (the primary output) is located on the flip out door, terminal plug P6. Channel 1 is dedicated to track the process and has fully independent and fully adjustable 4 & 20 mA output setpoints. This will enable the operator to span the output over the desired range.

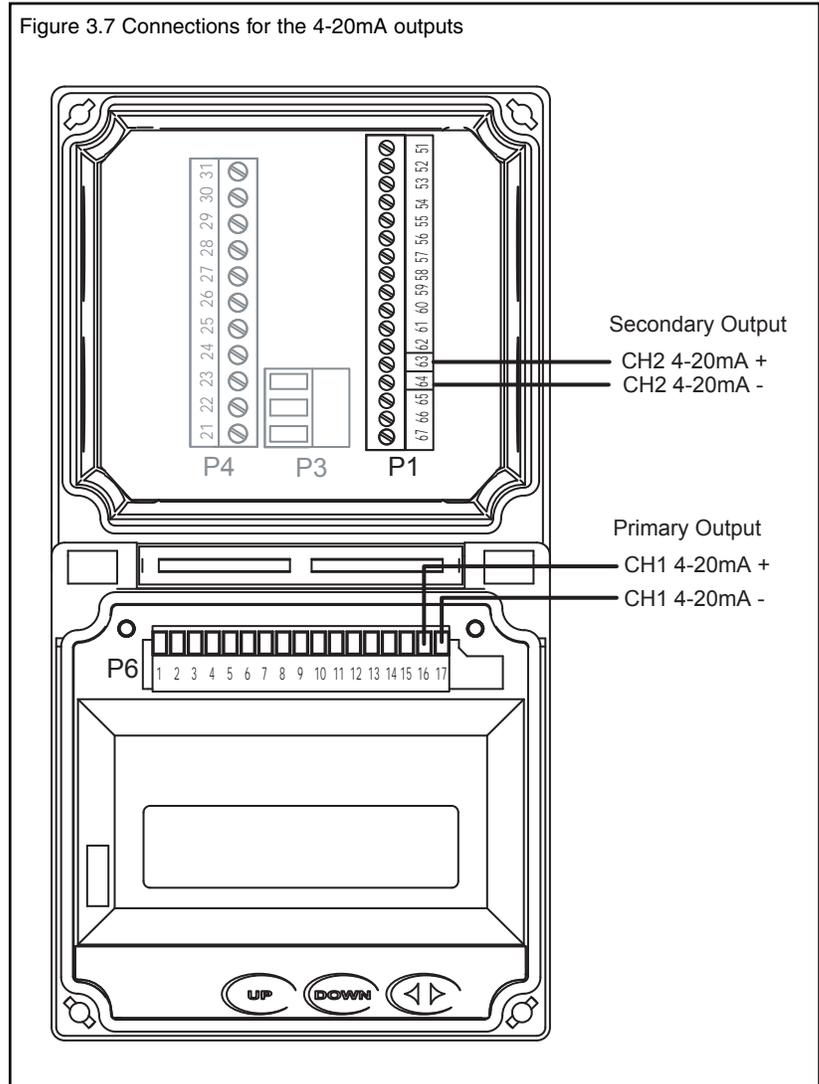
Channel 2 (the secondary output) is located in the enclosure terminal plug P1. Channel 2 can be selected to track the process value or temperature and has fully independent and adjustable 4 & 20 mA output setpoints.

Both Channel 1 and 2 can be precisely trimmed through the LCD menu for precision applications.

The drawing shows the connections for both outputs.

Wire Specification: 22 AWG 7/30, insulation 0.010"

Figure 3.7 Connections for the 4-20mA outputs



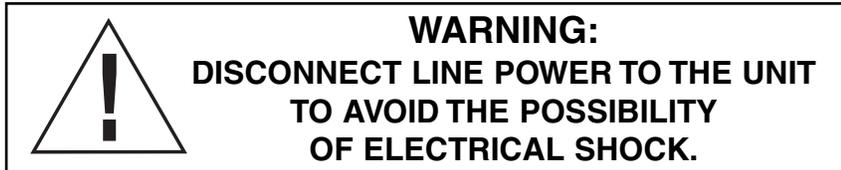
**Note:** Leave 4" to 6" slack for all wires connected to the terminals of P6. Slack required so that wires do not interfere with opening or closing of the front door.

## Section 3 - Electrical Connections and Setup

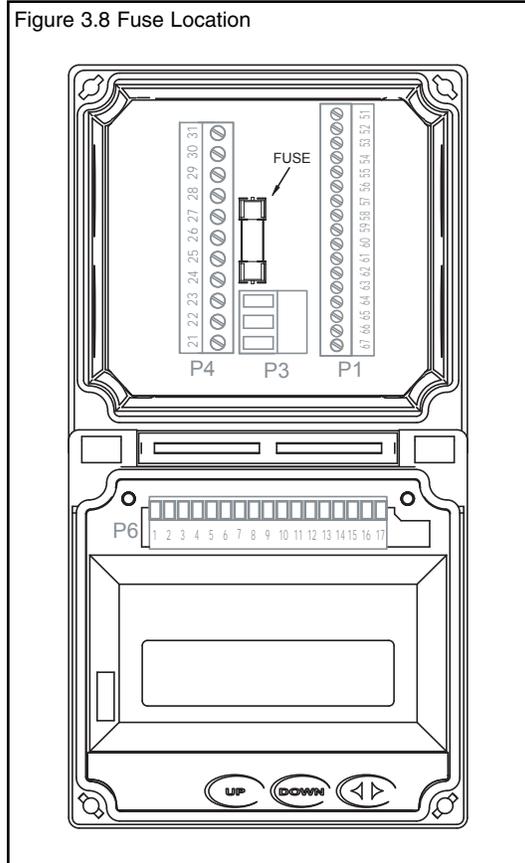
### 3.13 Service

**PHUCN600 SERVICE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY.**

### 3.14 Fuse Replacement



1. Proceed **after** disconnecting line power from the instrument.
2. Open the front panel by rotating the quarter-turn fasteners, using a flat blade screwdriver, to expose the relay board.
3. The fuse, F1, is located in the middle of the relay board, directly above the three terminal connectors.
4. Remove the open fuse and replace it only with a fuse of the same type and rating. REFER TO THE FUSE RATING TABLES BELOW.
5. Close the front panel and secure using the quarter-turn fasteners.
6. Restore power to the unit.



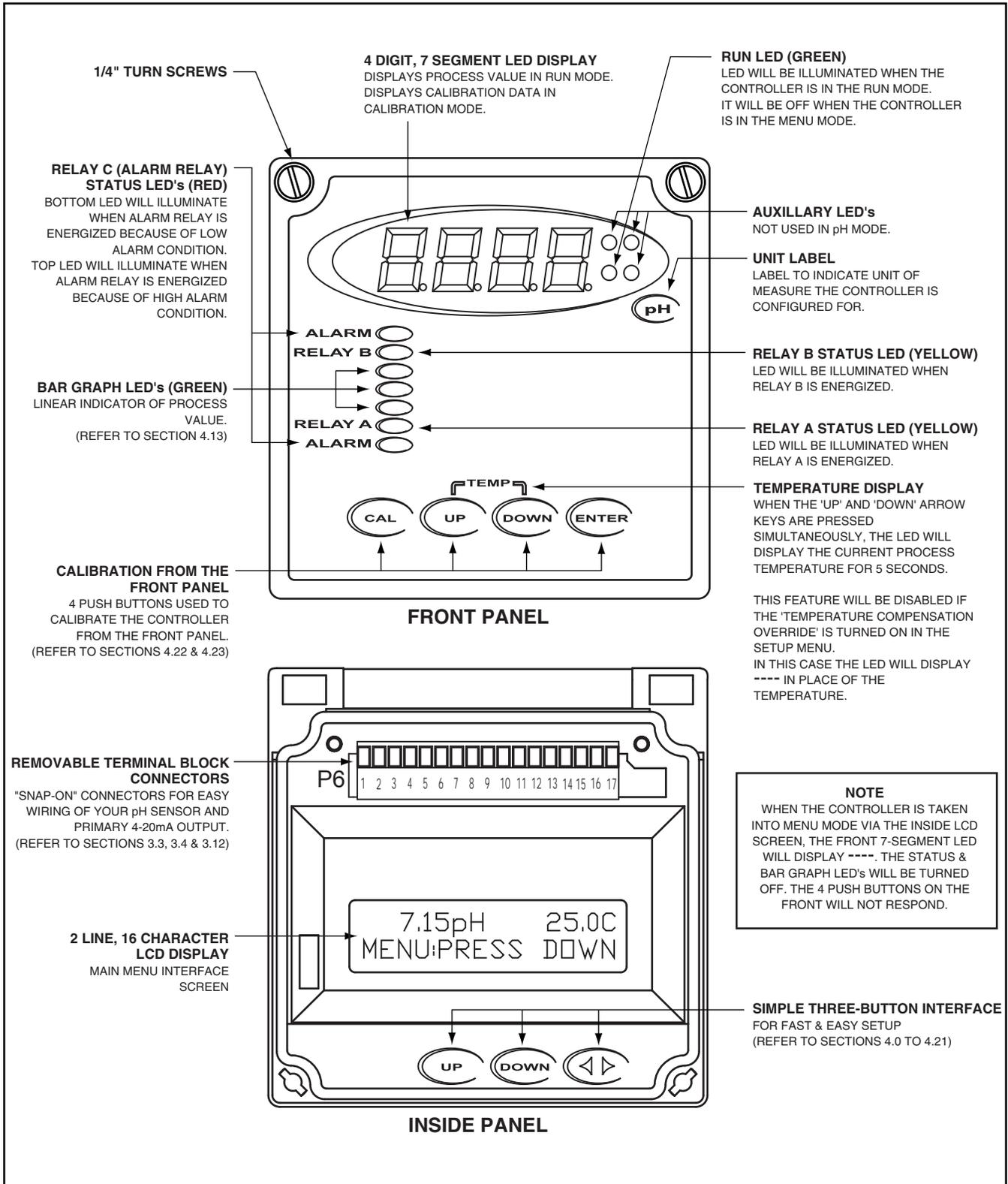
Fuse Rating Table for **120** volt operation

Fuse Type: Slo-Blo fuse 5 x 20mm	Fuse Ratings: 250 VAC, 100mA
----------------------------------	------------------------------

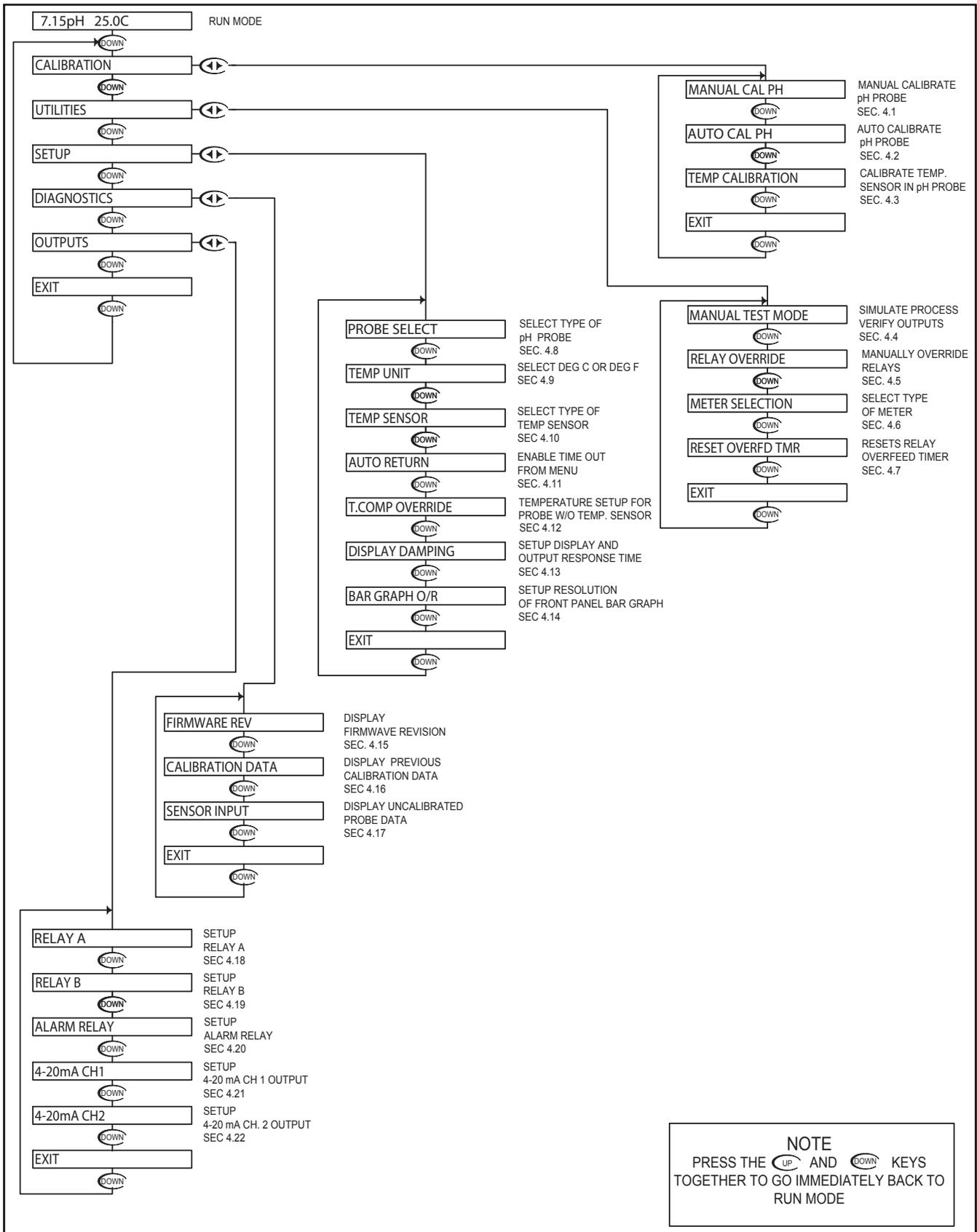
Fuse Rating Table for **240** volt operation

Fuse Type: Slo-Blo fuse 5 x 20mm	Fuse Ratings: 250 VAC, 50mA
----------------------------------	-----------------------------

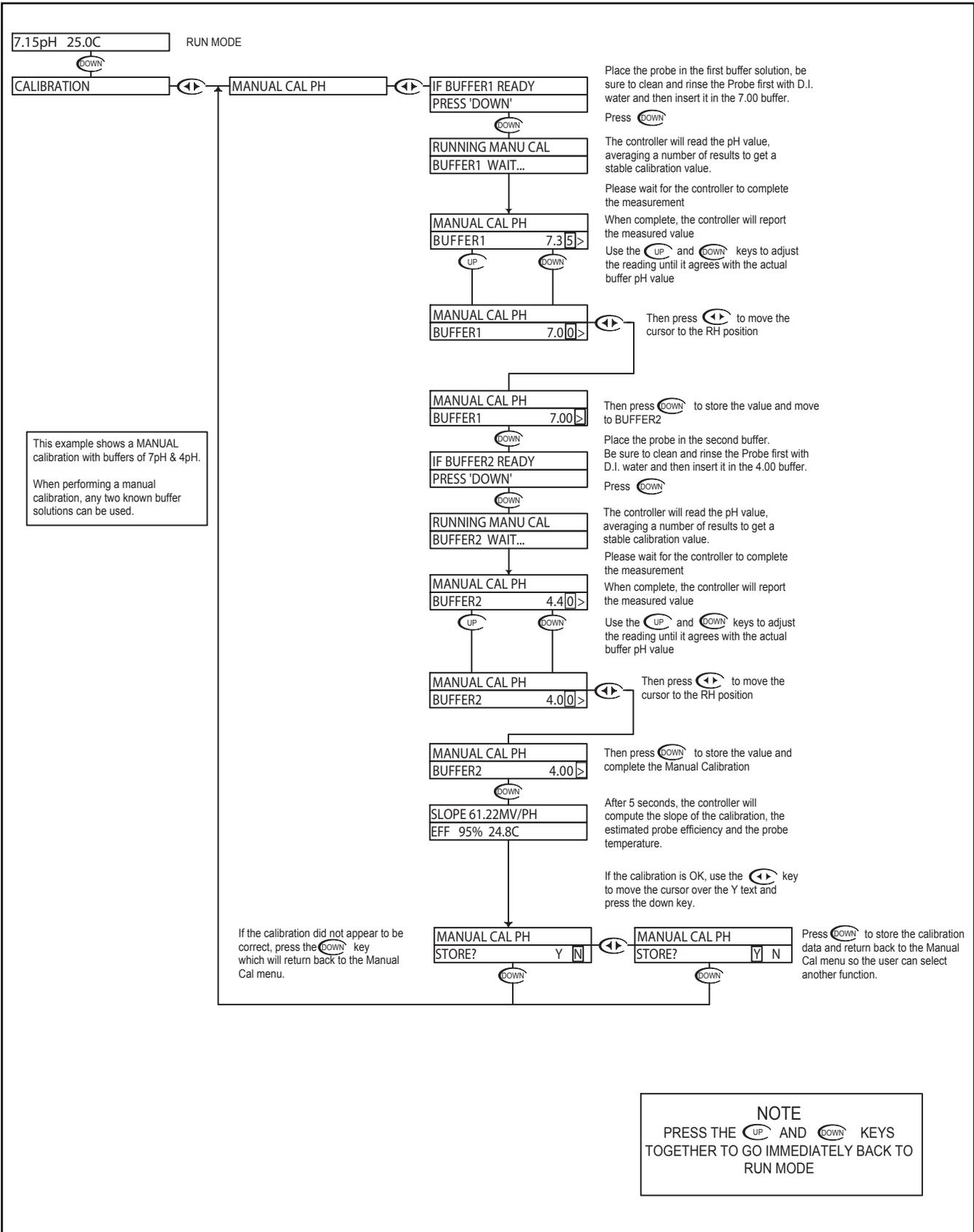
# Section 4 - Using the PHUCN600 in pH Mode



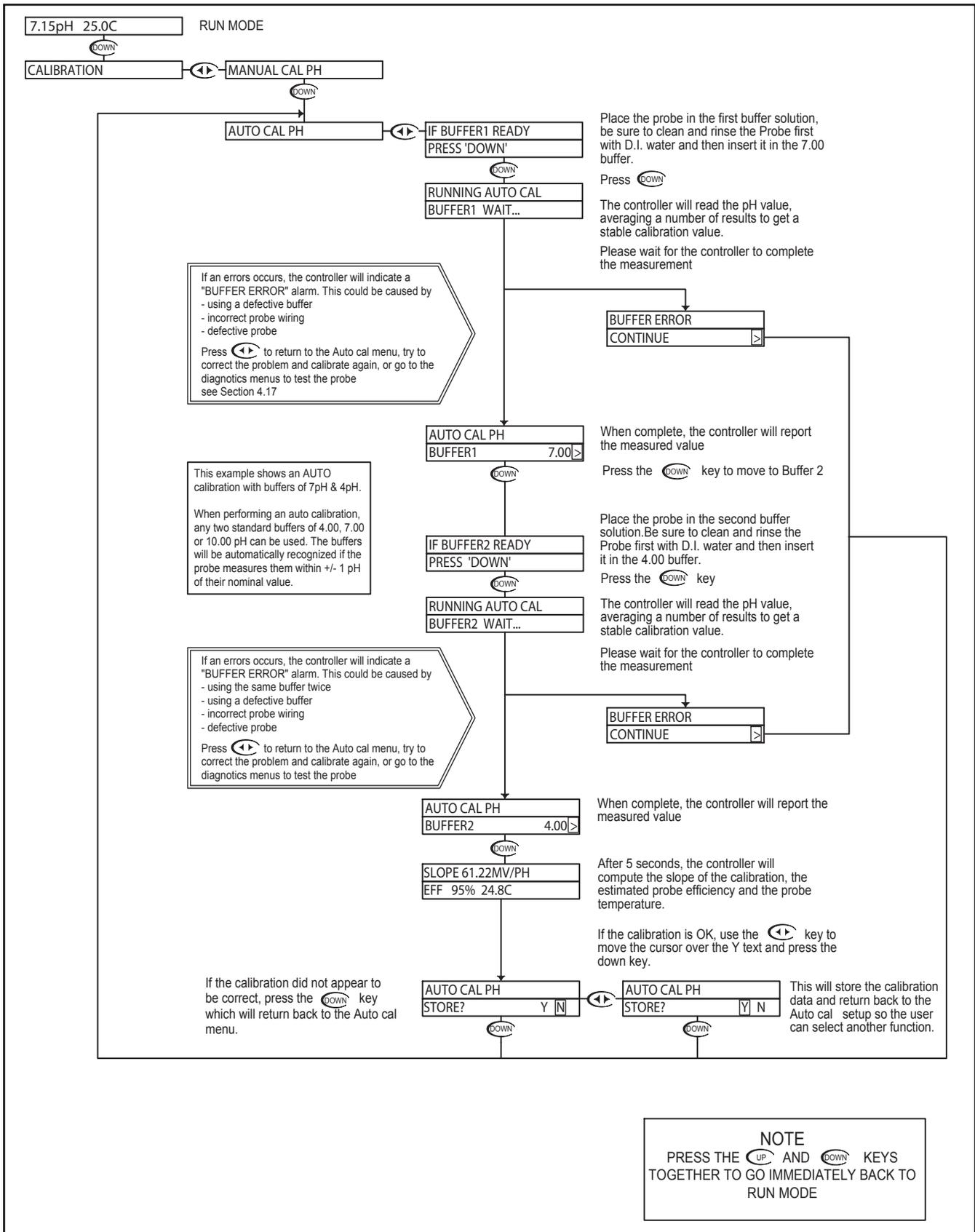
# pH - Menu Overview 4.0



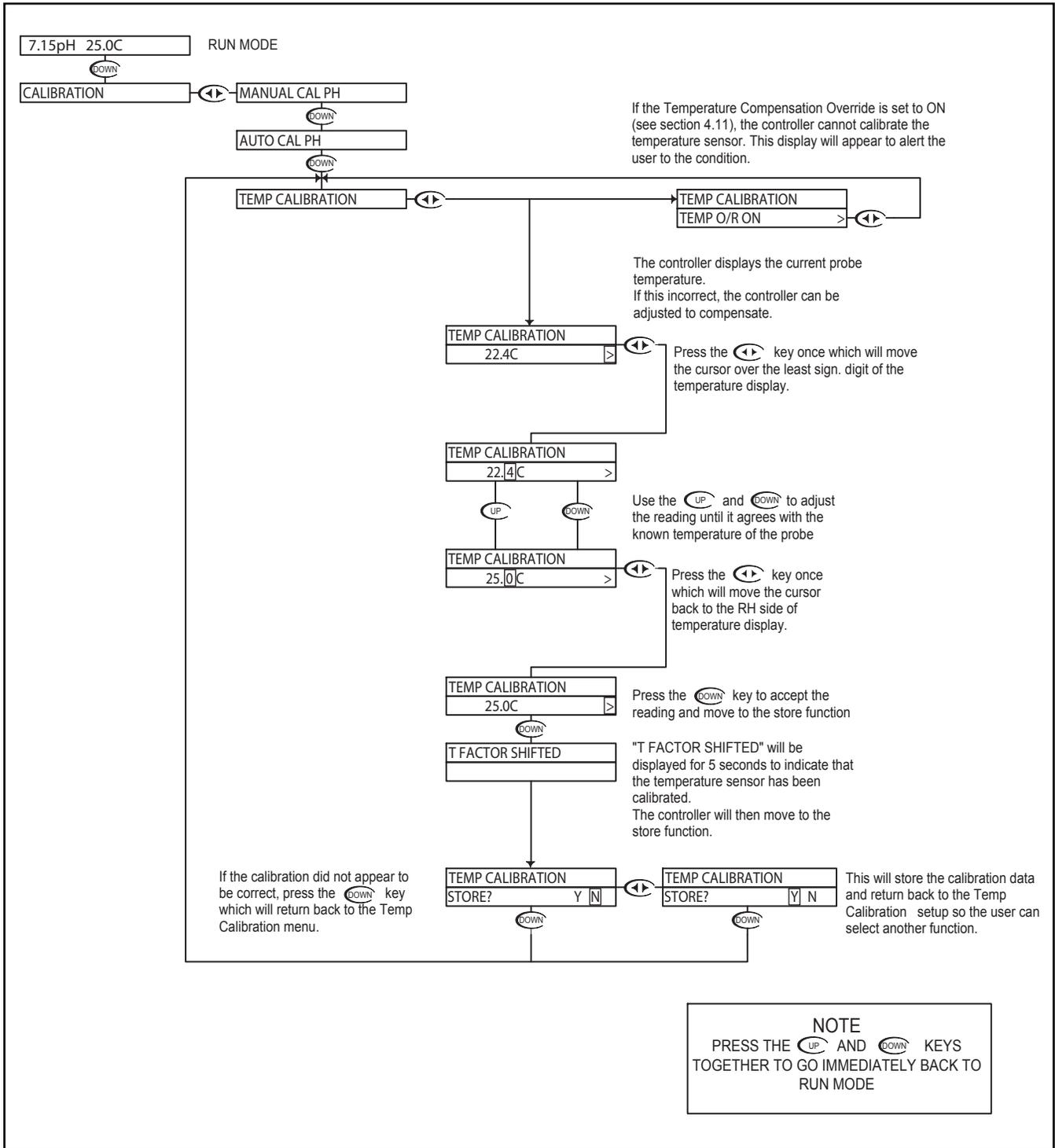
# pH - Calibration Menu - Manual Calibrate 4.1



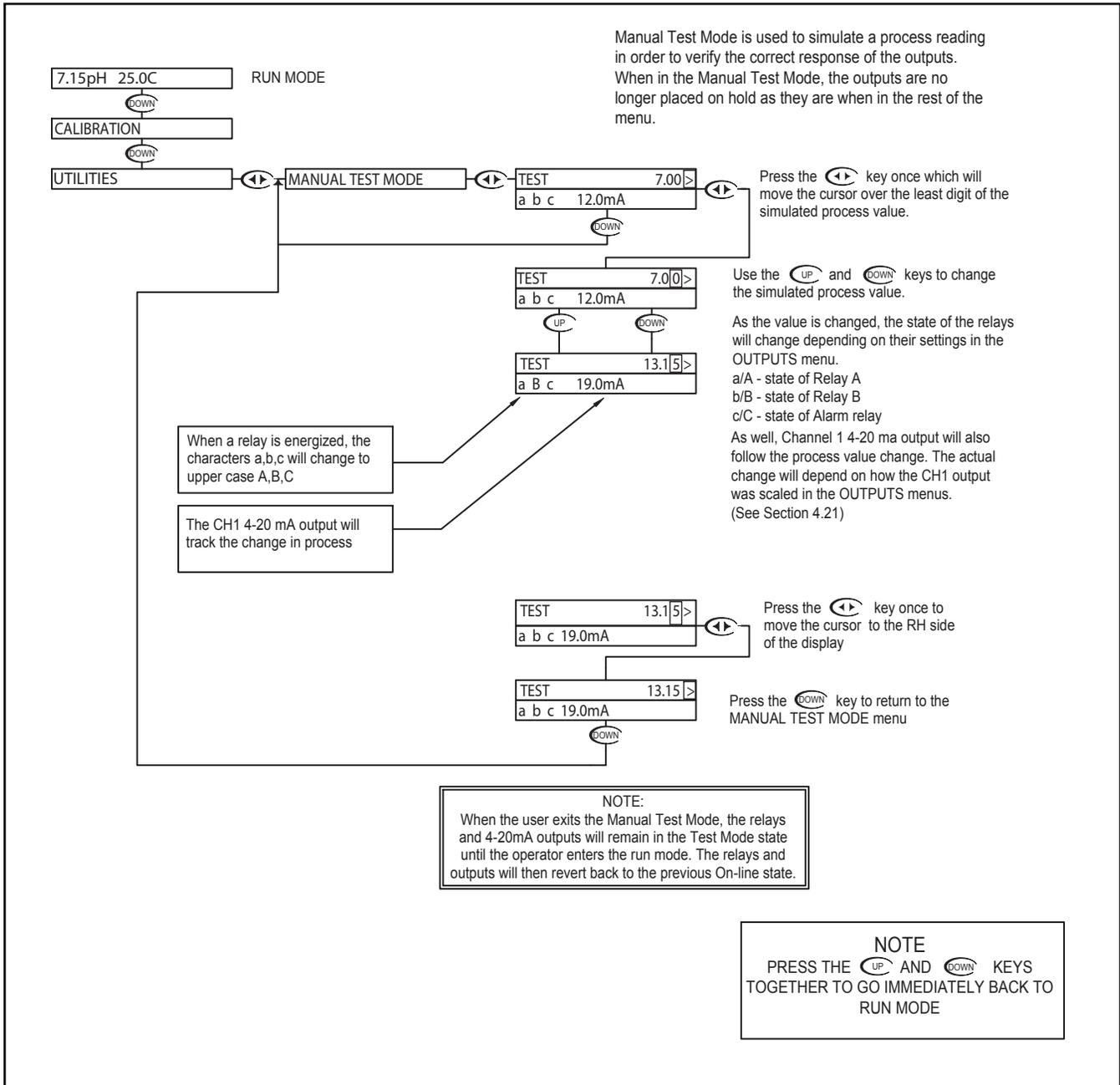
# pH - Calibration Menu - Auto Calibrate 4.2



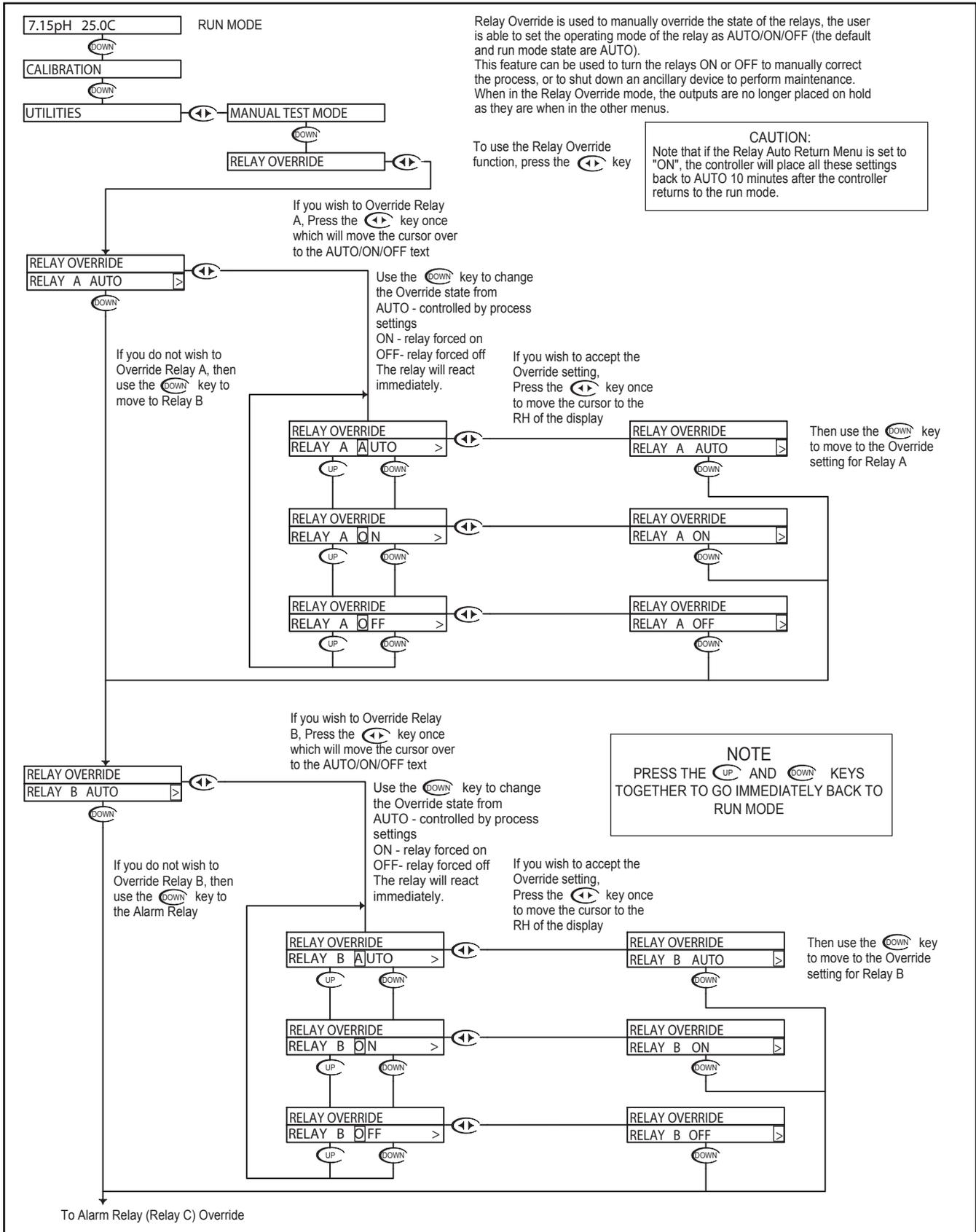
# pH - Calibration Menu - Temperature Calibration 4.3



# pH - Utilities Menu - Manual Test Mode 4.4

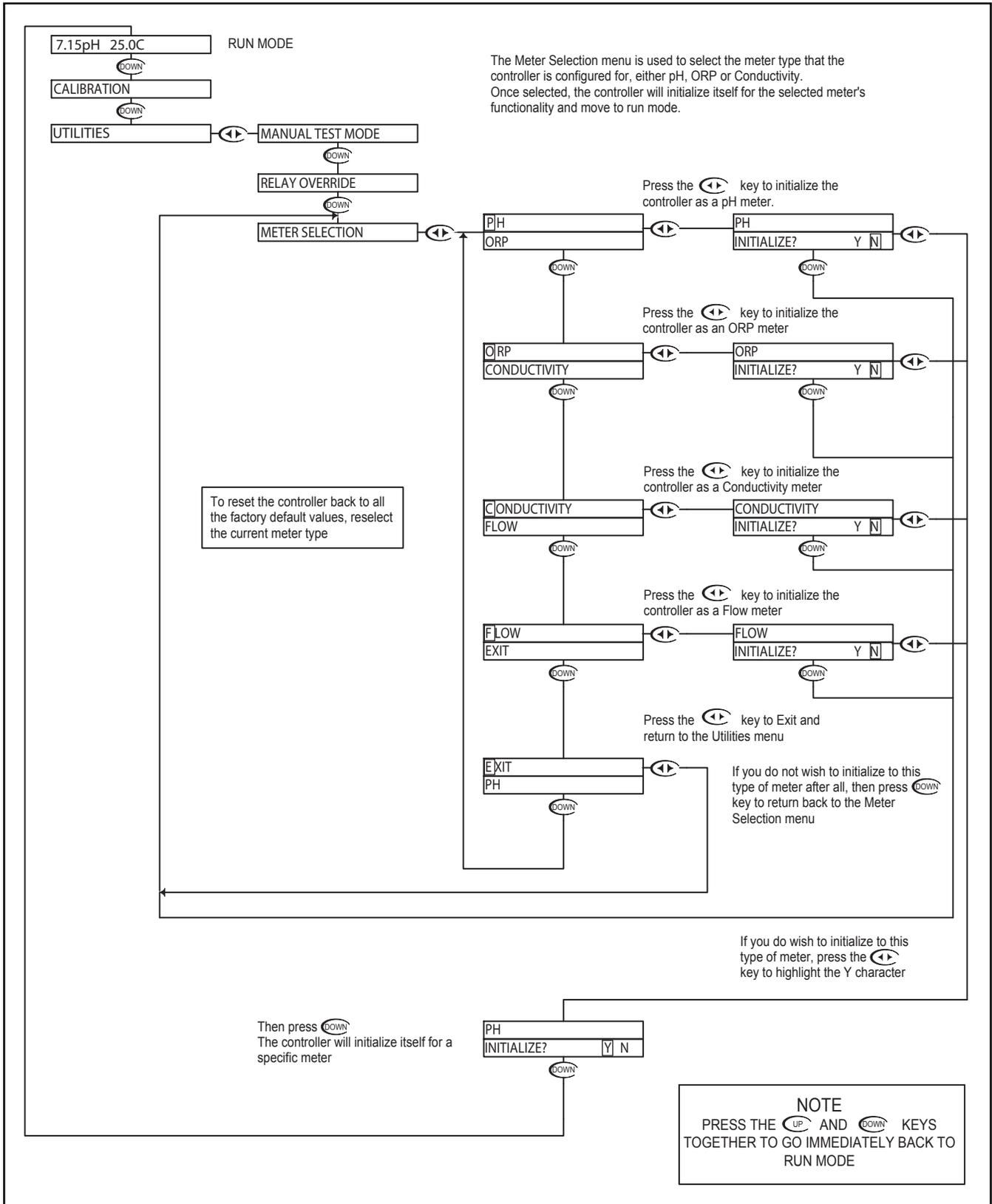


# pH - Utilities Menu - Relay Override 4.5

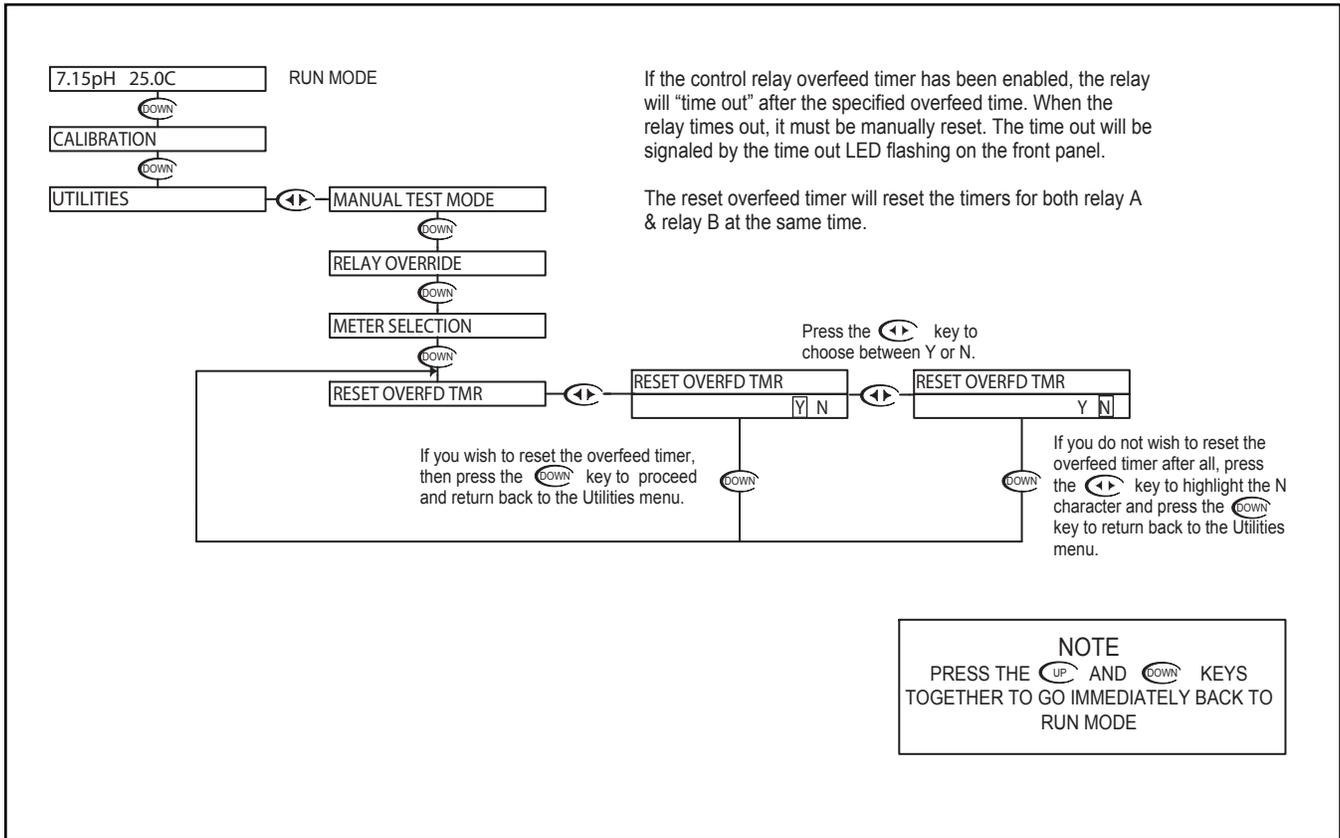




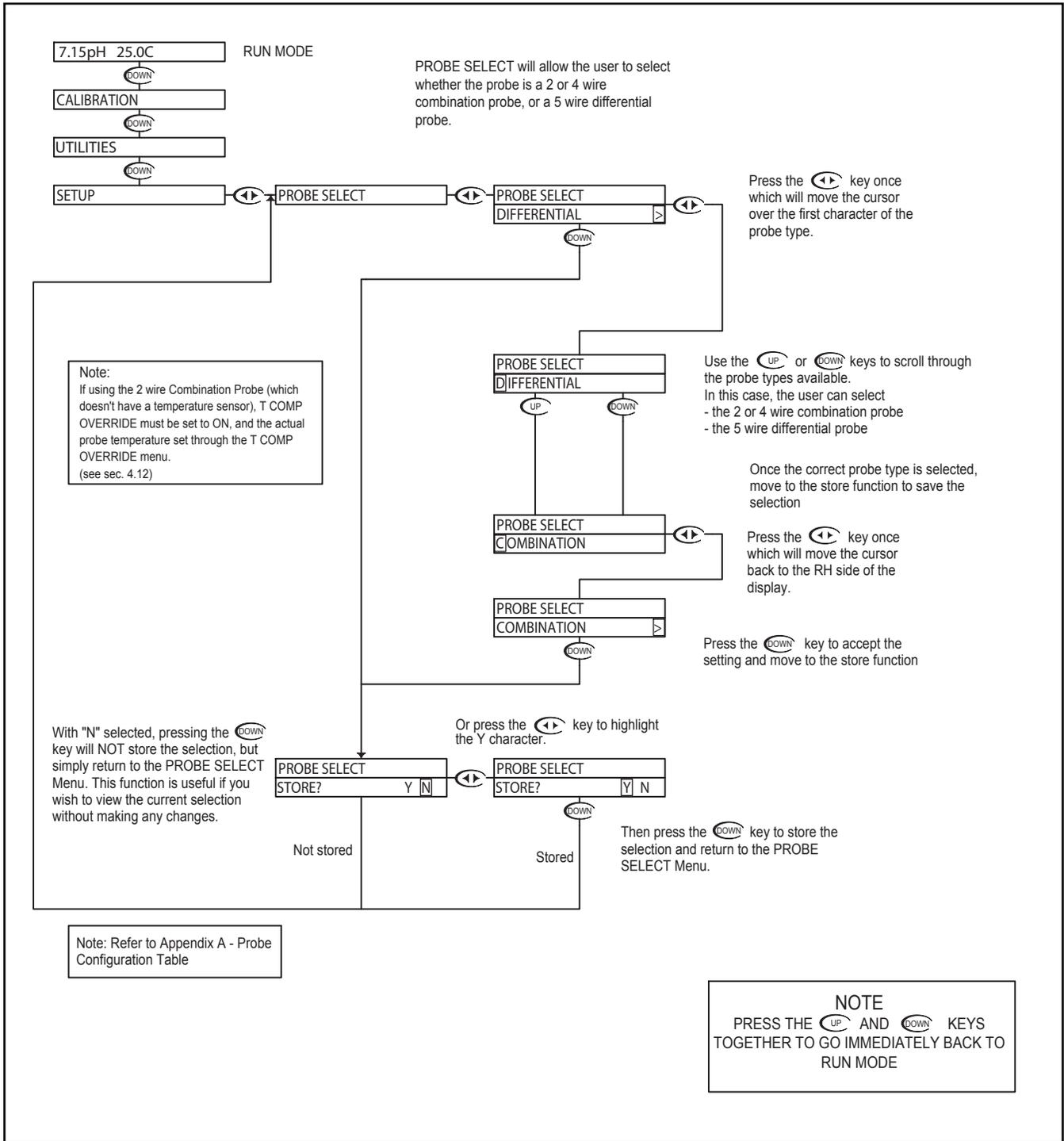
# pH - Utilities Menu - Meter Selection 4.6



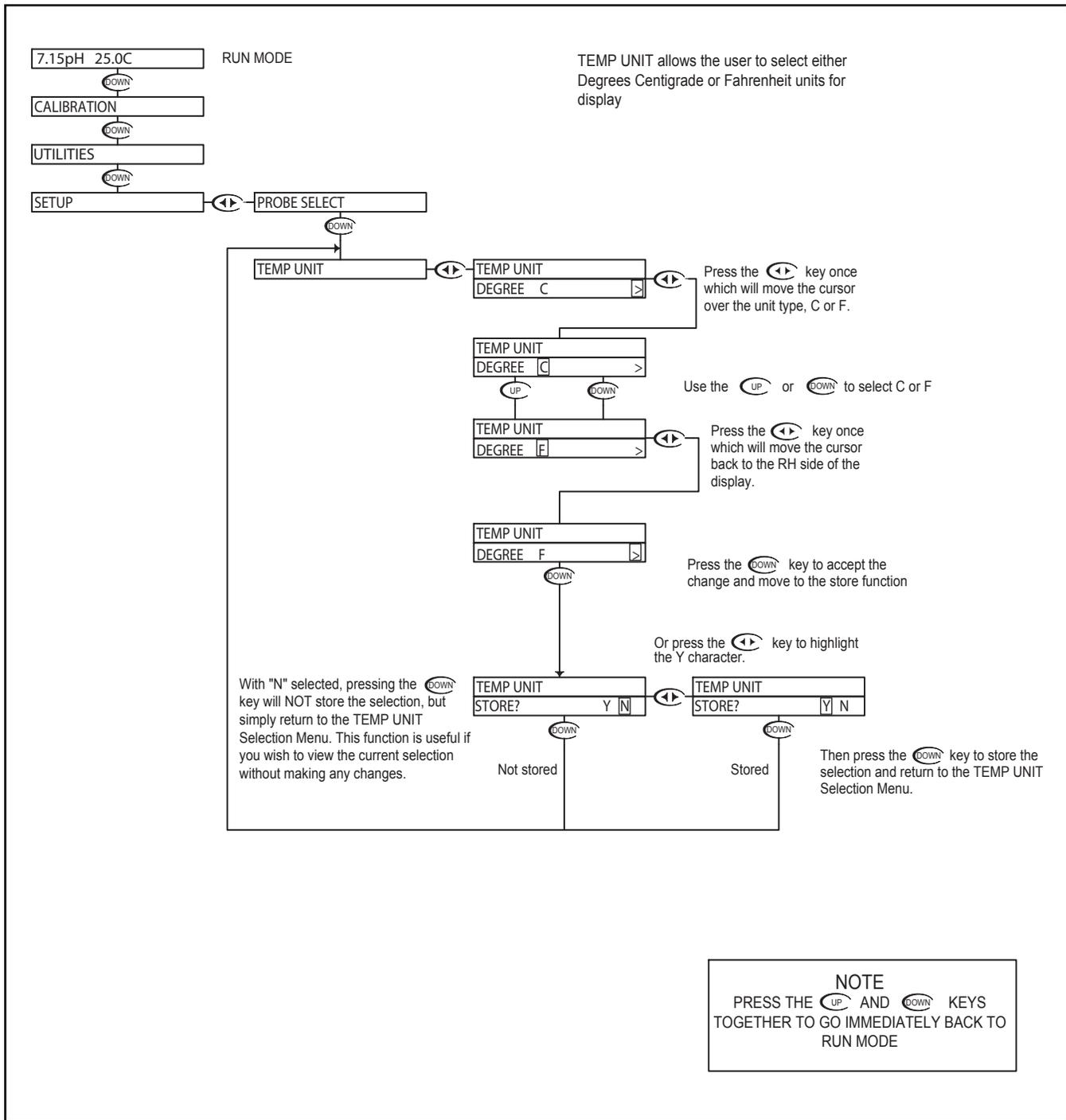
# pH - Utilities Menu - Overfeed Timer Reset 4.7



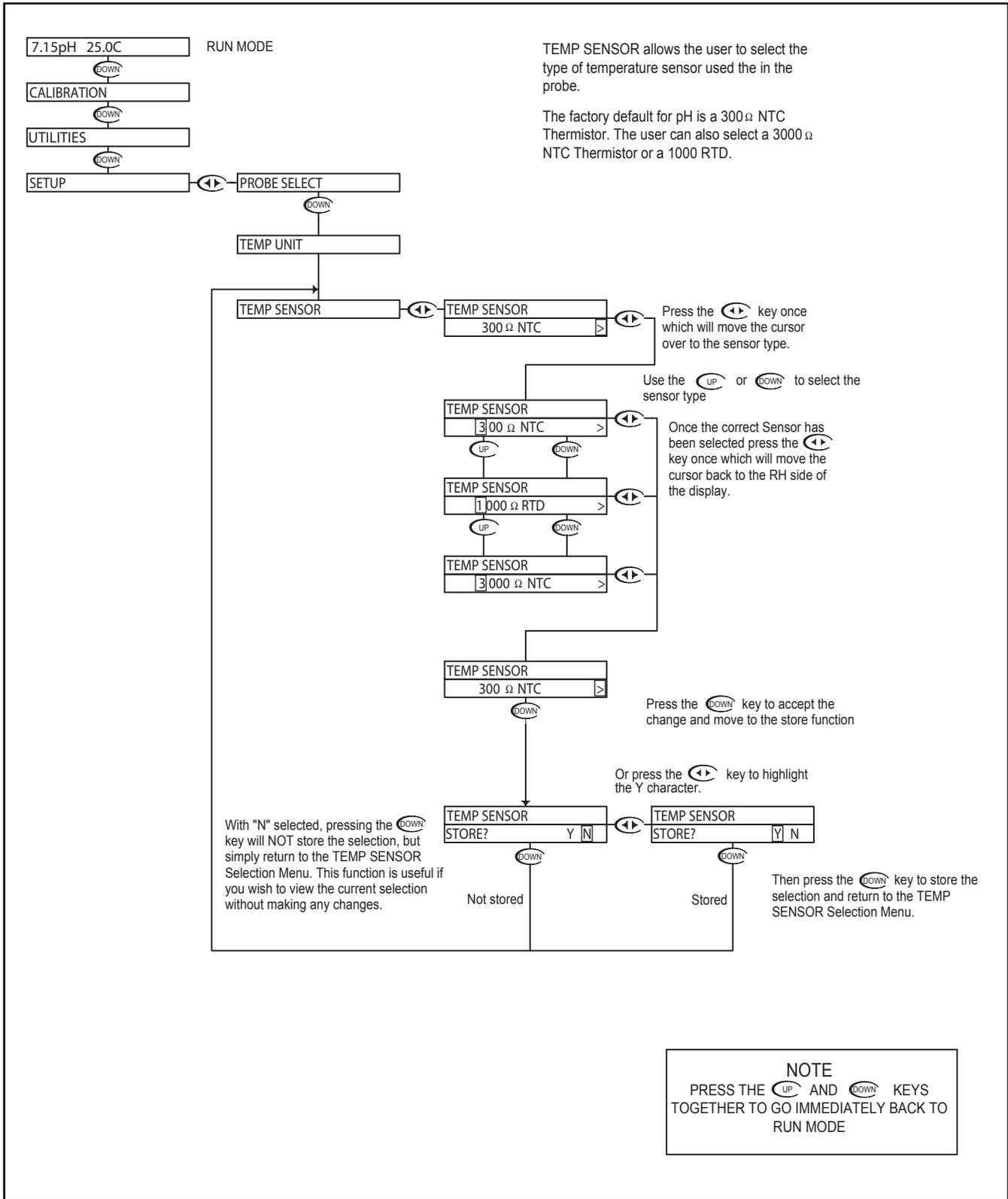
# pH - Setup Menu - Probe Select 4.8



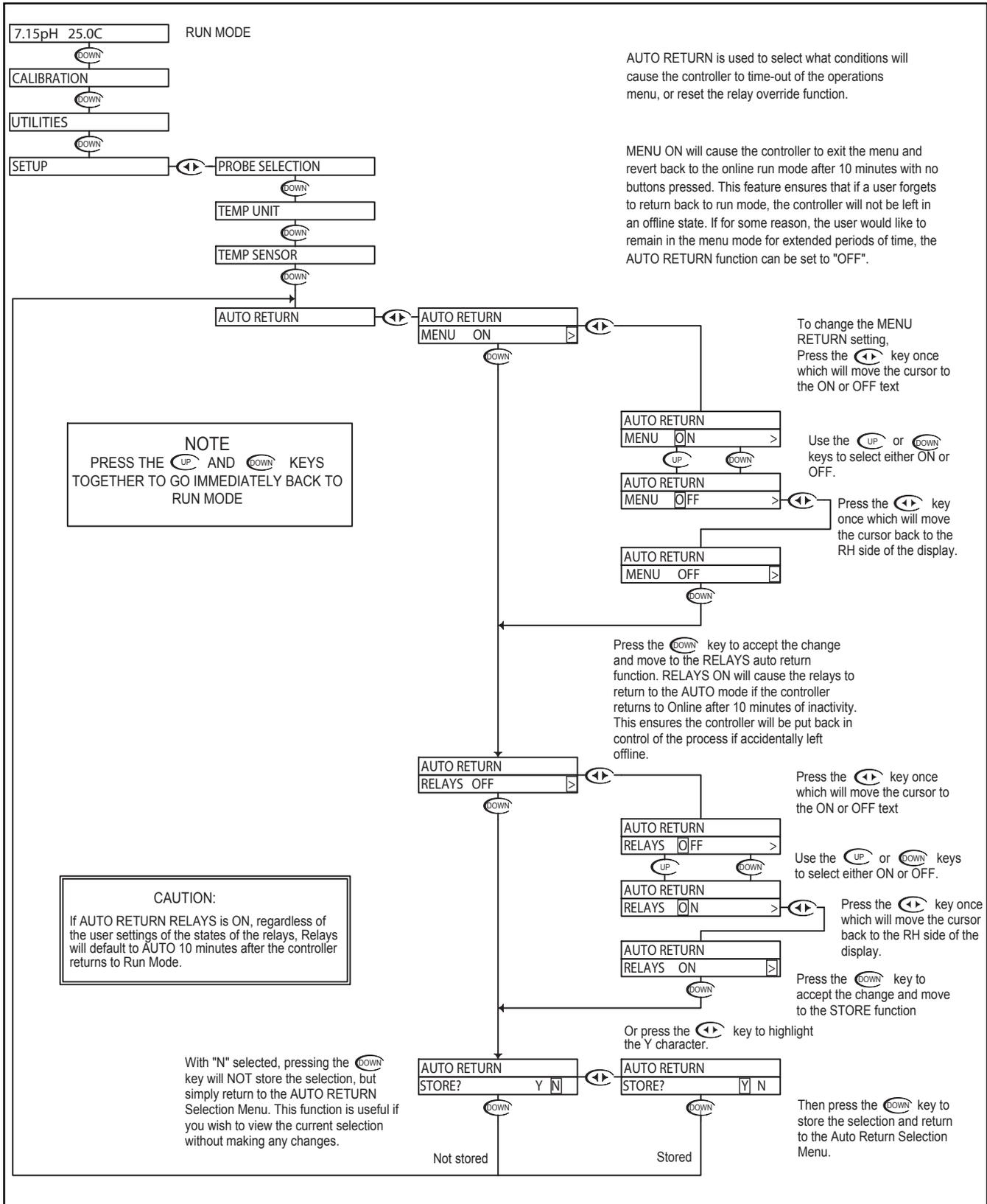
# pH - Setup Menu -Temp Unit 4.9



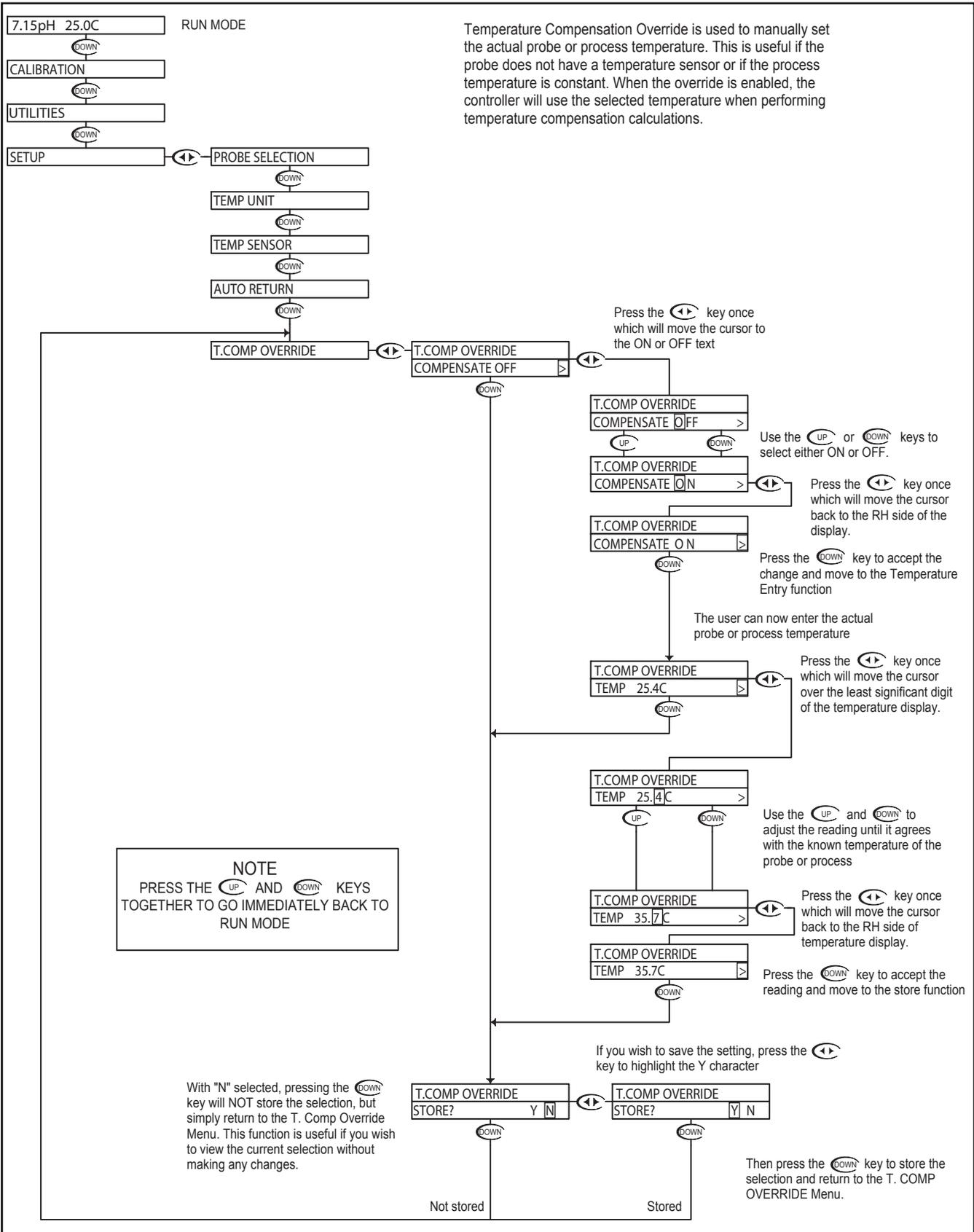
# pH - Setup Menu - Temp. Sensor 4.10



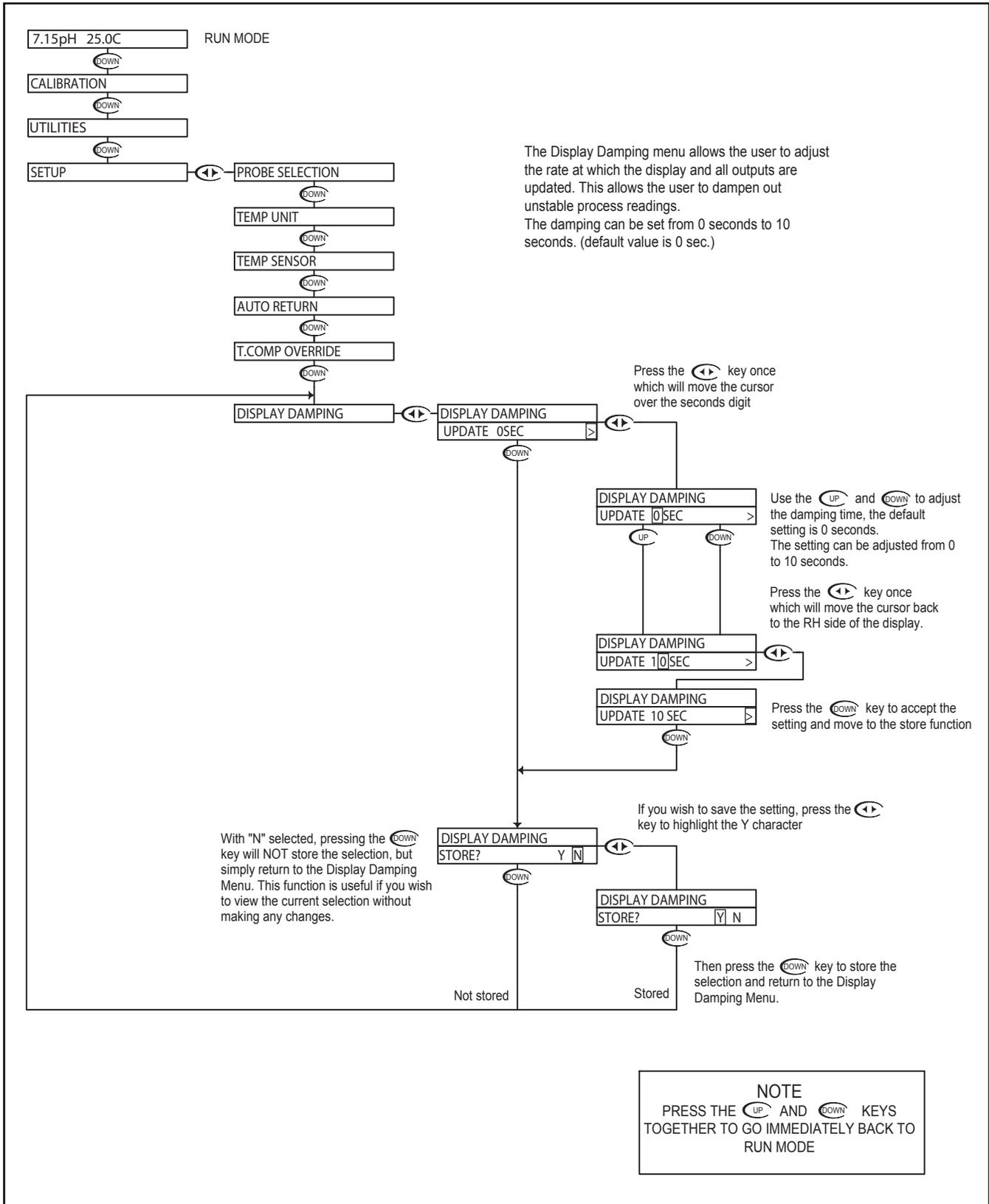
# pH - Setup Menu - Auto Return 4.11



# pH - Setup Menu - T.Comp Override 4.12



# pH - Setup Menu - Display Damping 4.13



# pH - Setup Menu - Bar Graph O/R 4.14

7.15pH 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

PROBE SELECTION

TEMP UNIT

TEMP SENSOR

AUTO RETURN

T.COMP OVERRIDE

DISPLAY DAMPING

BAR GRAPH O/R

The BAR GRAPH O/R menu allows the user control over the resolution of the bar graph on the front panel of the controller. The factory default for this function is "OFF" which means the 3 green LEDs are set to operate between the ON set points of Relay A and B. This may not always be acceptable, and this function allows the user to override these settings.

Press the **←** key once which will move the cursor over the first character

BAR GRAPH O/R  
OVERRIDE OFF >

Use the **↑** and **↓** to select the override either ON or OFF.

BAR GRAPH O/R  
OVERRIDE OFF >

BAR GRAPH O/R  
OVERRIDE ON >

Press the **←** key once which will move the cursor back to the RH side of the display.

BAR GRAPH O/R  
OVERRIDE ON >

Press the **↓** key to adjust the resolution setting. If OFF was selected, the menu will move to the store function directly.

BAR GRAPH O/R  
LOW GRN 0.00 >

Press the **←** key once which will move the cursor over the least sign. digit.

BAR GRAPH O/R  
LOW GRN 0.00 >

Use the **↑** and **↓** to adjust the setting for the Low Green Led.

BAR GRAPH O/R  
LOW GRN 2.50 >

Press the **←** key once which will move the cursor back to the RH side.

BAR GRAPH O/R  
LOW GRN 2.50 >

Press the **↓** key to accept the reading and move to the High Green Led setting.

BAR GRAPH O/R  
HIGH GRN 14.00 >

The controller displays the current setting for the highest green Led of the bar graph.

BAR GRAPH O/R  
HIGH GRN 14.00 >

Press the **←** key once which will move the cursor over the least sign. digit.

BAR GRAPH O/R  
HIGH GRN 14.00 >

Use the **↑** and **↓** to adjust the setting for the High Green Led.

BAR GRAPH O/R  
HIGH GRN 10.80 >

Press the **←** key once which will move the cursor back to the RH side.

BAR GRAPH O/R  
HIGH GRN 10.80 >

Press the **↓** key to accept the reading and move to the store function.

If you wish to save the setting, press the **←** key to highlight the Y character

BAR GRAPH O/R  
STORE? Y N

BAR GRAPH O/R  
STORE? Y N

Then press the **↓** key to store the selection and return to the Bar Graph O/R Menu.

Not stored

Stored

The controller displays the current setting for the lowest green led of the bar graph.

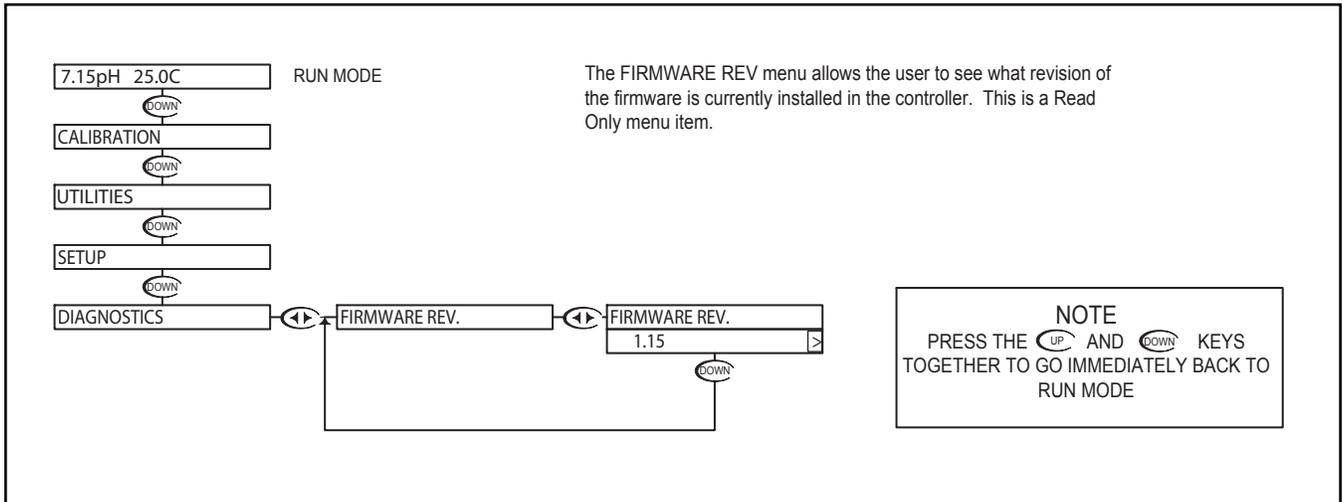
Press the **↓** key skip the setting for the Low Green Led and move to the setting for the High Green Led.

Press the **↓** key skip the setting for the High Green Led and move to store function.

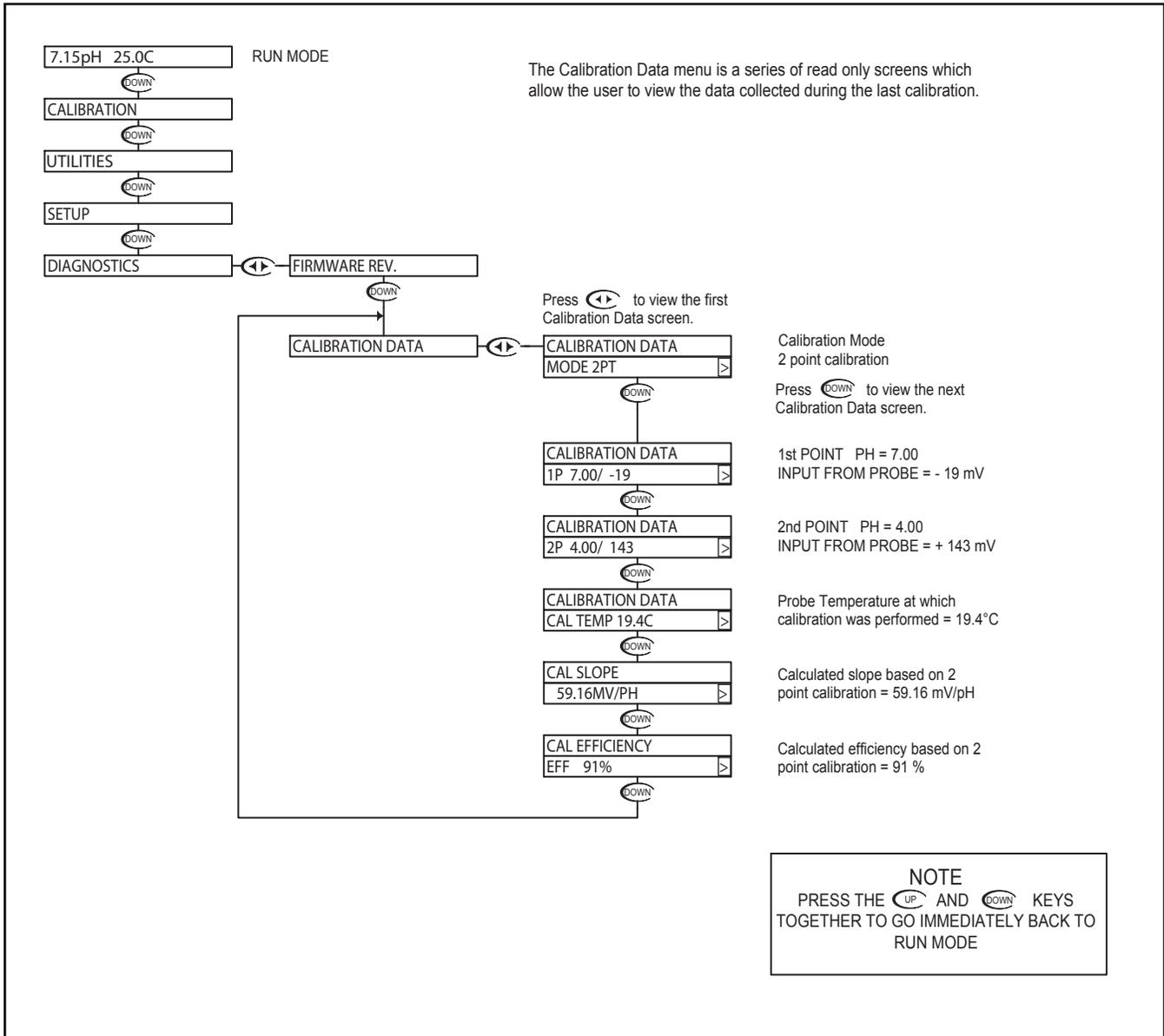
**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

With "N" selected, pressing the **↓** key will NOT store the selection, but simply return to the Bar Graph O/R Menu. This function is useful if you wish to view the current selection without making any changes.

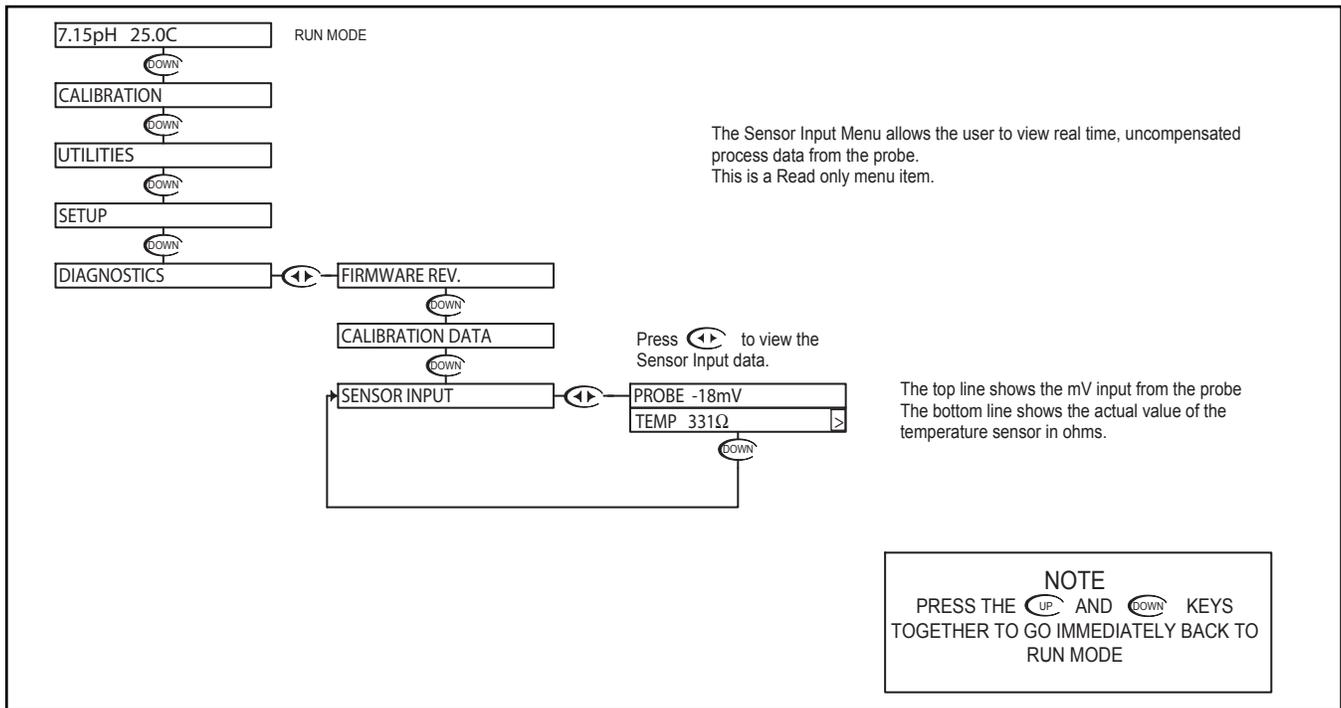
# pH - Diagnostics Menu - Firmware Rev 4.15



# pH - Diagnostics Menu - Calibration Data 4.16



## pH - Diagnostics Menu - Sensor Input 4.17



### Troubleshooting a pH probe using the sensor input

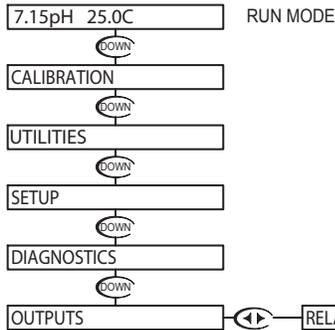
Sensor input displays the uncompensated sensor input data. The pH probe values are displayed in mV (millivolts). The temperature sensor value is displayed in  $\Omega$  (ohm).

Connect the pH probe as per Probe Configuration Table below.

- Place the probe in buffer 7pH (allow temperature to stabilize)
  - Probe should read 0mV [ $\pm 50$ mV]
  - Temperature should read 300 $\Omega$  [ $\pm 50\Omega$ ] @ 25°C
  - Record both of these numbers.
- Place the probe in buffer 4pH
  - Probe should read +160mV more than probe value at 7pH
  - Temperature should read the same as in 7pH
- Place the probe in buffer 10pH
  - Probe should read -160mV less than probe value at 7pH
  - Temperature should read the same as in 7pH

Model#	Probe Select	Temp. Sensor	Model#	Probe Select	Temp. Sensor
PHE-610	DIFFERENTIAL	300 $\Omega$	ORE-610	DIFFERENTIAL	300 $\Omega$
PHE-620	DIFFERENTIAL	300 $\Omega$	ORE-620	DIFFERENTIAL	300 $\Omega$
PHE-600	DIFFERENTIAL	300 $\Omega$	ORE-600	DIFFERENTIAL	300 $\Omega$

# pH - Outputs Menu - Relay A 4.18



Relay A can be configured for the following operations

- Response to rising or falling process values
- Adjustable on and off set-points
- Cycle on and off times
- Failsafe operation

The relay can be set to control either a RISING or FALLING process.

In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point.

In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere between 0-100% of the range.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the On setting.

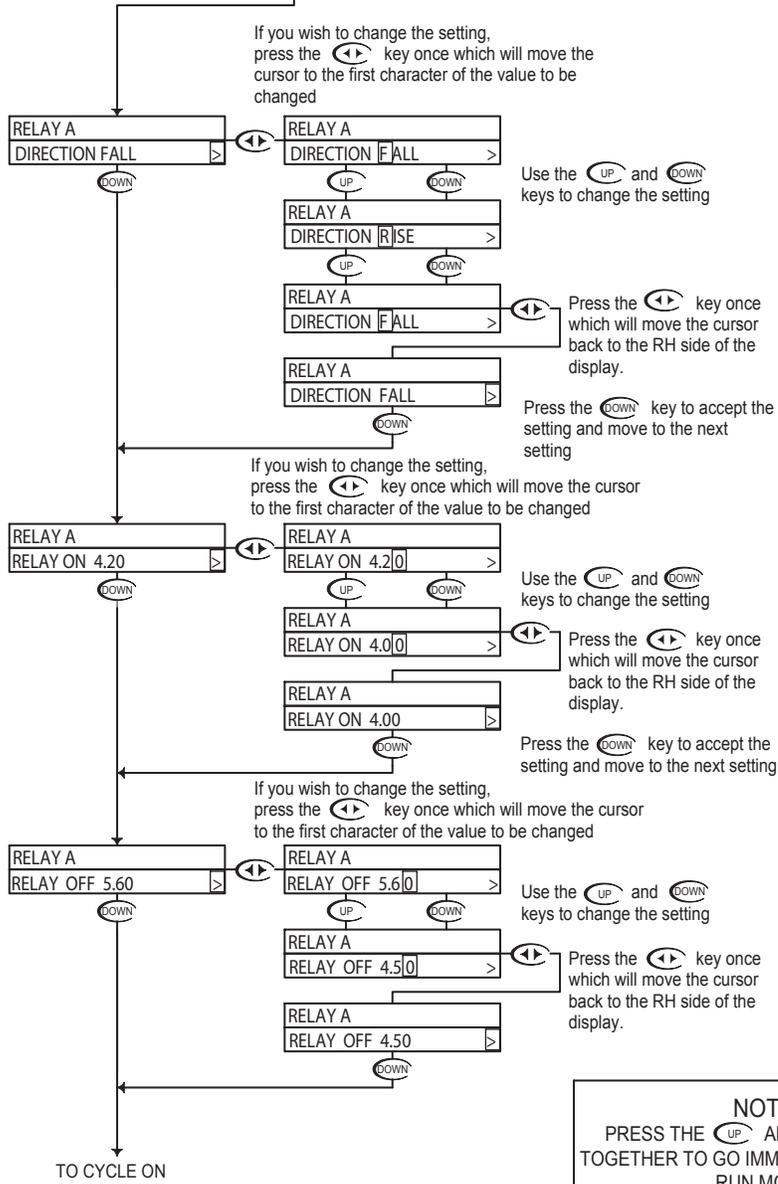
The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.



**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# pH - Outputs Menu - Relay A 4.18

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds. The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

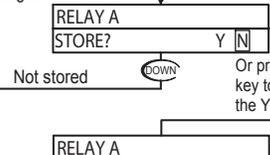
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

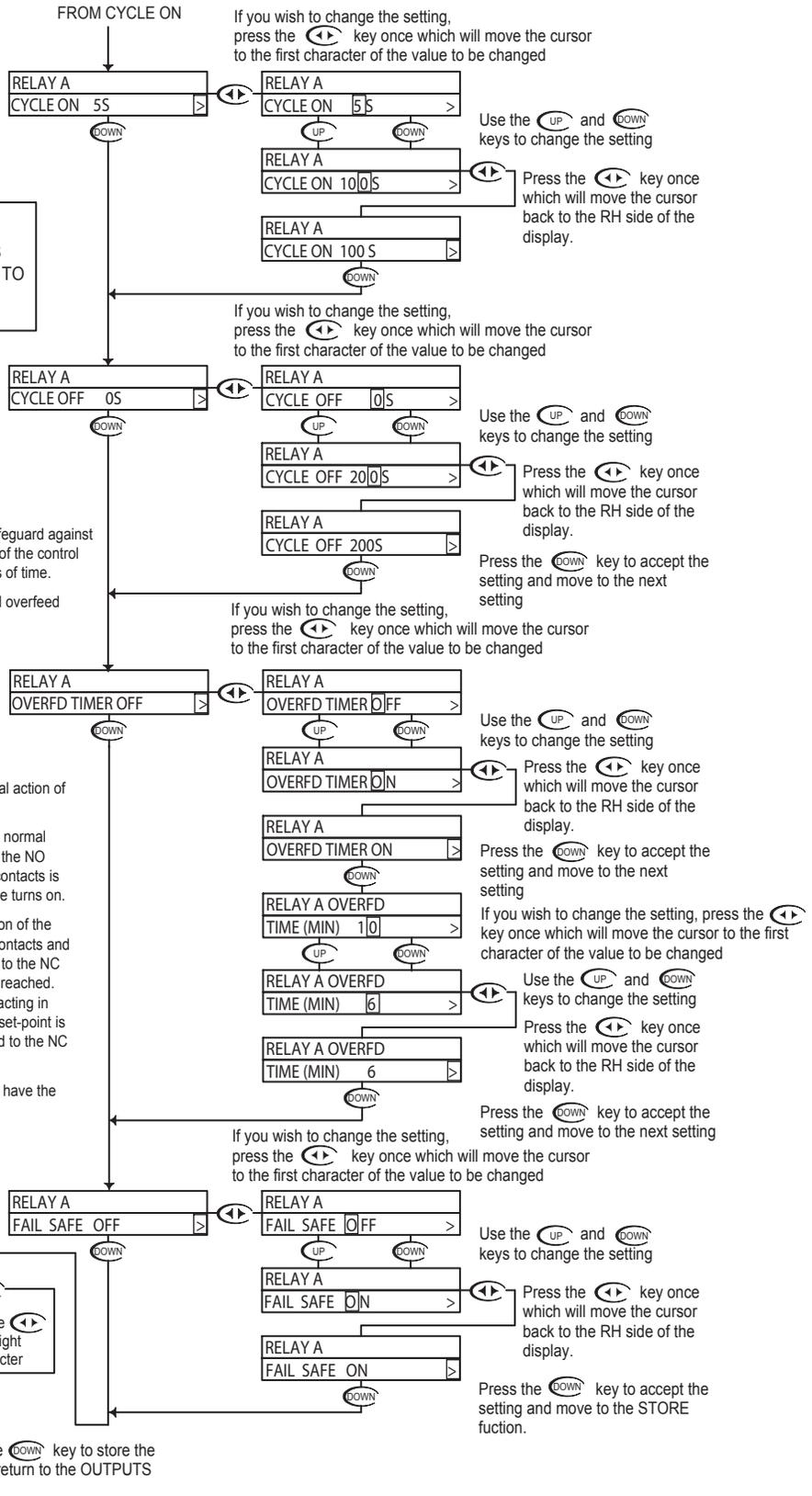
The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.

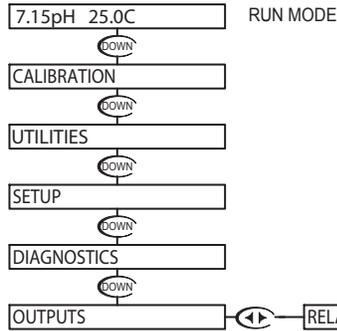


Then press the **DOWN** key to store the selection and return to the OUTPUTS menu

TO OUTPUTS MENU



# pH - Outputs Menu - Relay B 4.19



Relay B can be configured for the following operations

- Response to rising or falling process values
- Adjustable on and off set-points
- Cycle on and off times
- Failsafe operation

Each function will be explained below

The relay can be set to control either a RISING or FALLING process.

In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.

In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere between 0-100% of the range.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the ON setting.

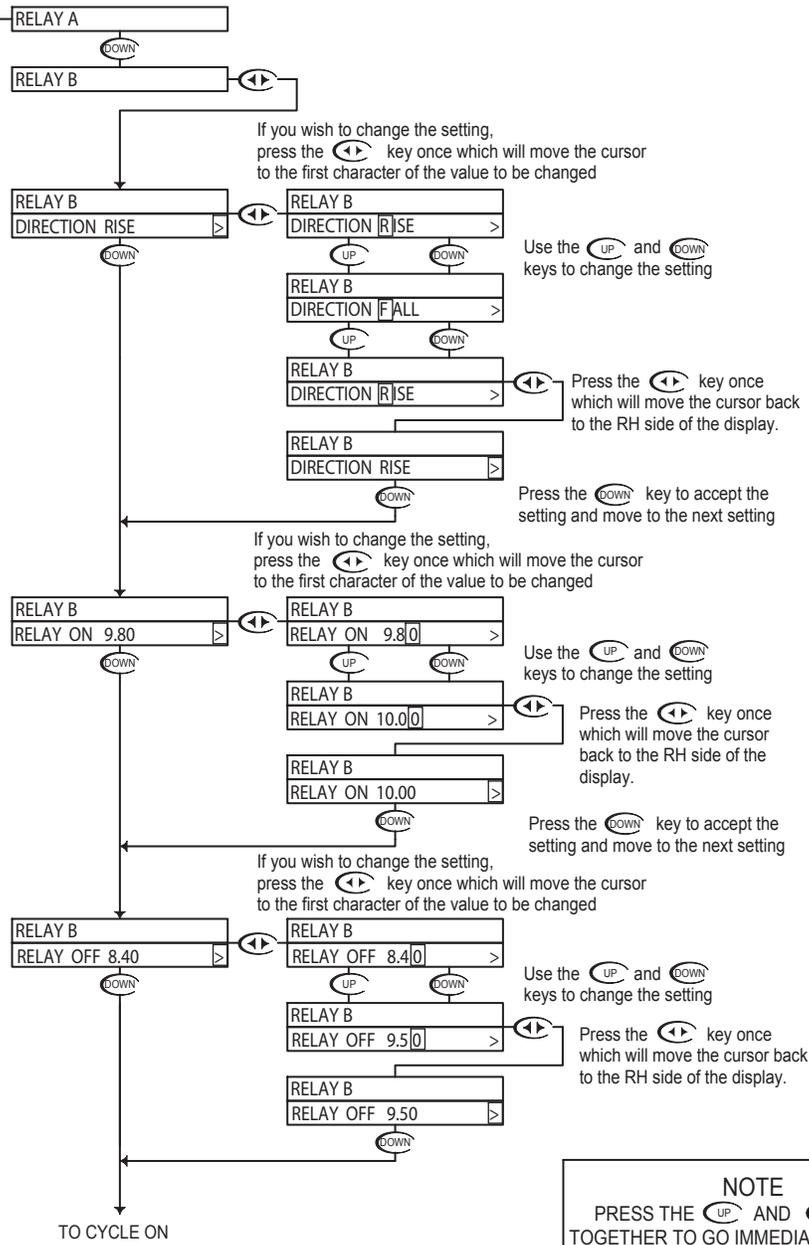
The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.



**NOTE**  
PRESS THE UP AND DOWN KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# pH - Outputs Menu - Relay B 4.19

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds. The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

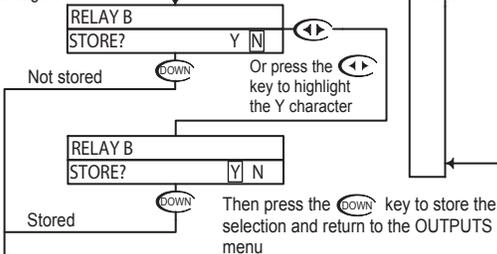
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

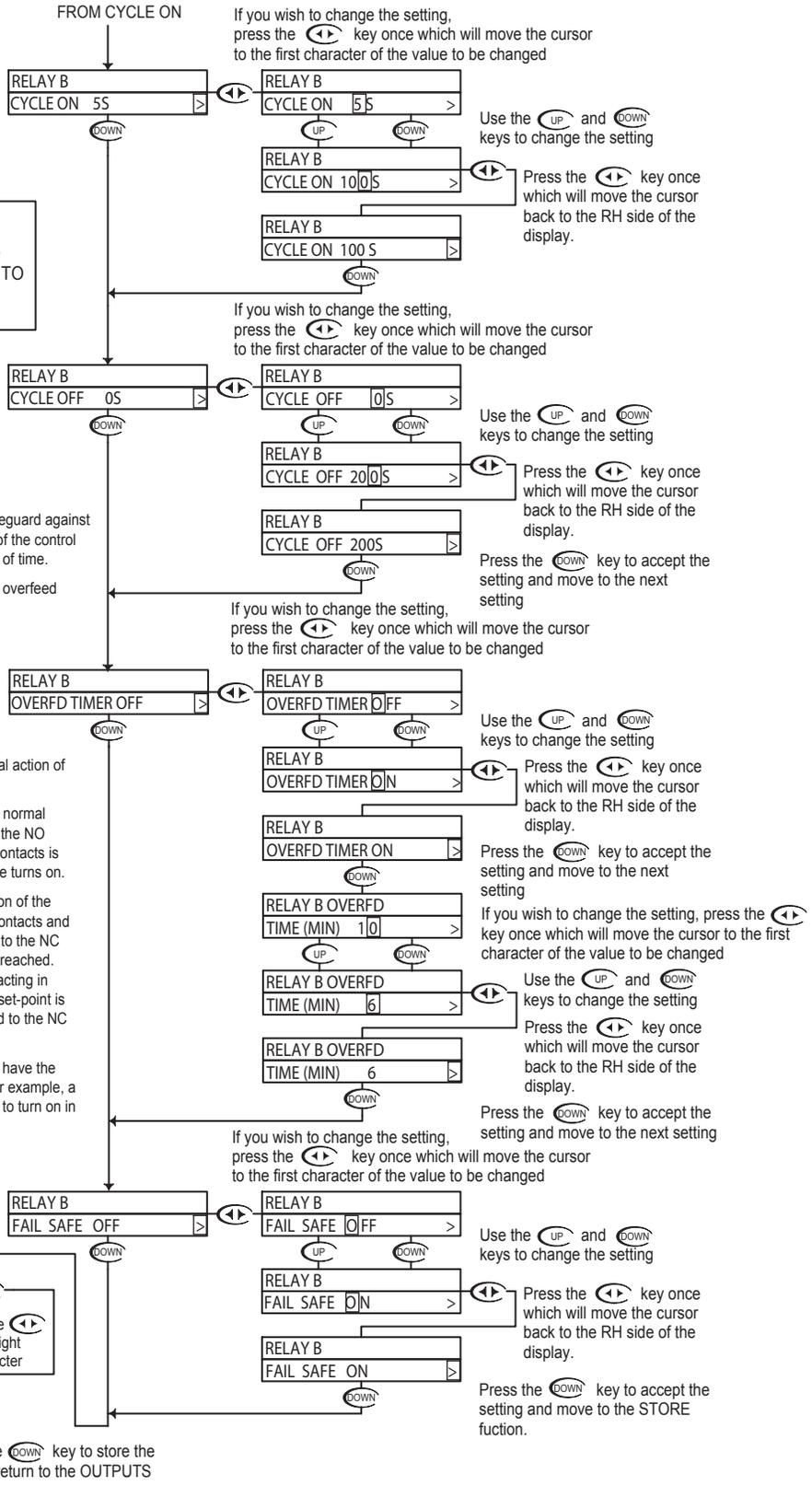
When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption. For example, a process that needs a constant feed, would want a pump to turn on in the event of a controller power failure.

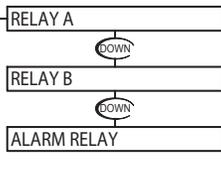
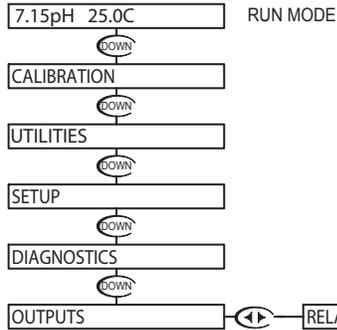
With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



TO OUTPUTS MENU



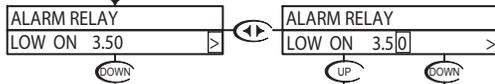
# pH - Outputs Menu - Alarm Relay 4.20



The ALARM RELAY will respond to both a rising and falling process. The ALARM RELAY will act as a low alarm (falling process) and a high alarm (rising process). Both relay bands will have independently adjustable on and off set-points. If a low alarm set-point is set at a value 3.00pH for example, the off set-point must be set higher. The controller will not let the user input a value below 3.00pH. The same rule holds true for the high alarm.

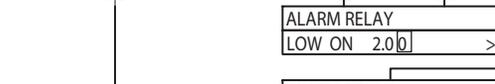
- The Alarm Relay can be configured for the following operations
- LOW ON Set-point
  - LOW OFF Set-point
  - HIGH ON Set-point
  - HIGH OFF Set-point
  - Failsafe

The LOW ON set point is the low process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.

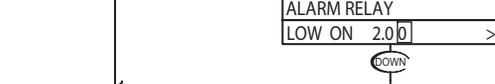


If you wish to change the setting, press the **←** key once which will move the cursor to the first character of the value to be changed

Use the **UP** and **DOWN** keys to change the setting

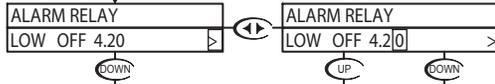


Press the **←** key once which will move the cursor back to the RH side of the display.



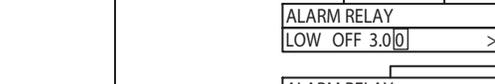
Press the **DOWN** key to accept the setting and move to the next setting

The LOW OFF set point is the value that the process must reach in order to de-energize the alarm relay after it has tripped the LOW ON set-point. This value must be higher than the LOW ON Set-point.



If you wish to change the setting, press the **←** key once which will move the cursor to the first character of the value to be changed

Use the **UP** and **DOWN** keys to change the setting

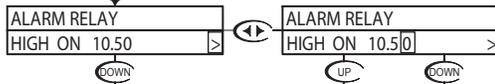


Press the **←** key once which will move the cursor back to the RH side of the display.



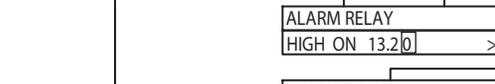
Press the **DOWN** key to accept the setting and move to the next setting

The HIGH ON set-point is the high process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.

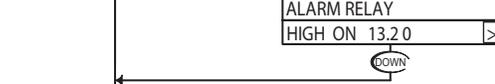


If you wish to change the setting, press the **←** key once which will move the cursor to the first character of the value to be changed

Use the **UP** and **DOWN** keys to change the setting



Press the **←** key once which will move the cursor back to the RH side of the display.



TO HIGH OFF

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# pH - Outputs Menu - Alarm Relay 4.20

The HIGH OFF set-point is the value that the must reach in order to de-energize the alarm relay after it has increased over and tripped the HIGH ON set-point. This value must be lower than the HIGH ON Set-point.

The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption.

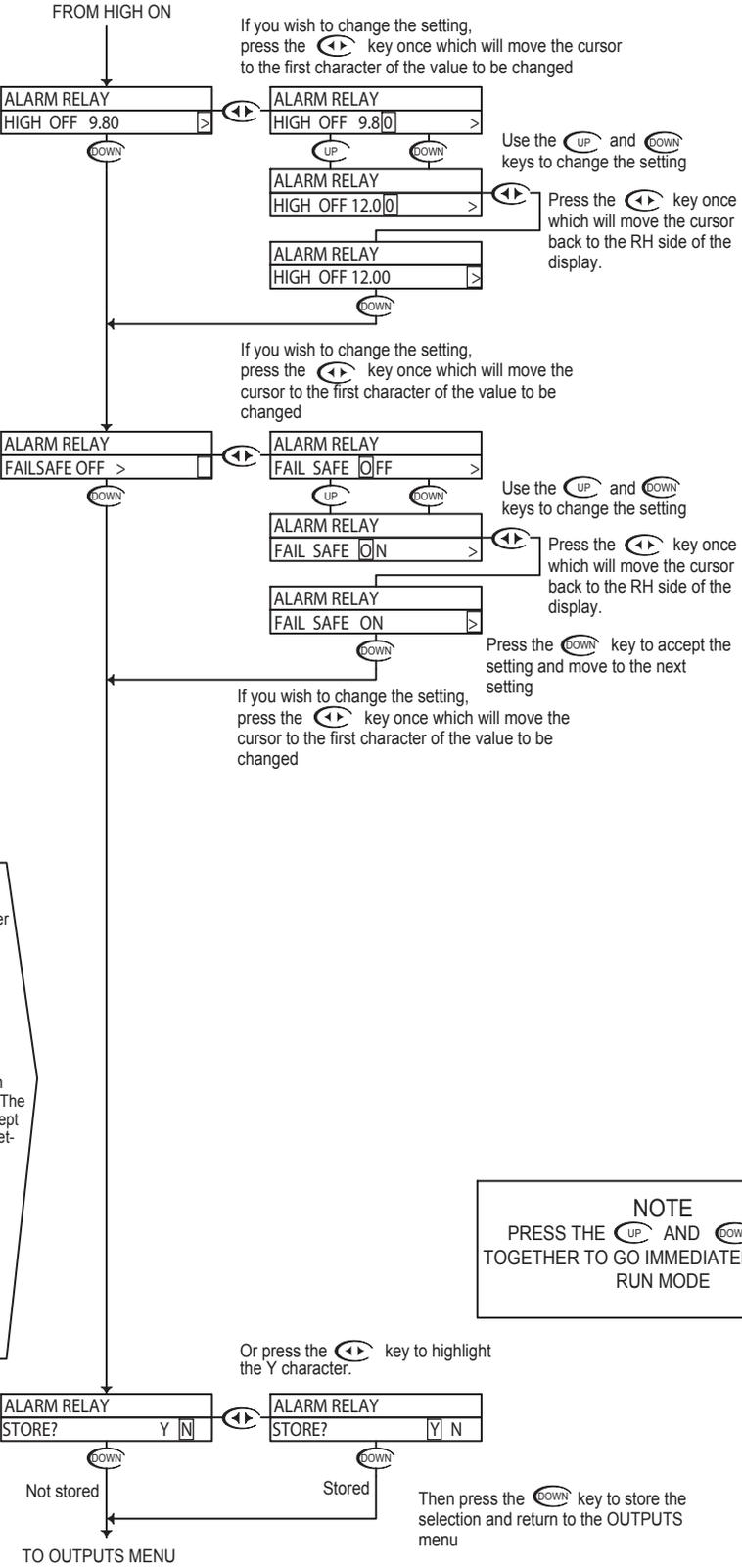
If the Low On set-point is set higher than the factory default Low Off set-point, when the user advances from the low on set-point to the Low Off set-point the controller will adjust the Low Off set-point to be equal to the Low On set-point. If the user then tries to decrease the Low Off set-point the Controller will display the Low Alarm setup error screen.

LOW ALARM  
ON SPT < OFF SPT

This screen will be displayed for 10 seconds, then return back to the setup screen that was previously displayed. The same conditions apply to the High alarm set-points. Except the High Off set-point must be lower than the High On set-point. If the user tries to increase the High Off set-point higher than the High On set-point the High Alarm setup error screen will be displayed.

HIGH ALARM  
ON SPT > OFF SPT

If the user sets the low on set-point and the low off set-point equal to 0, it will disable the Low Alarm relay. Similarly, setting the High On set-point and the HIGH OFF set-point to 0 will disable the High Alarm.



**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# pH - Outputs Menu - 4-20mA CH1 Output 4.21

7.15pH 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

DIAGNOSTICS

OUTPUTS

RELAY A

RELAY B

ALARM RELAY

4-20mA CH1

The Controller has 2 4-20mA outputs, electrically isolated from each other and ground. Either output can source current into a maximum of 800 ohms. See Section 3.12 for wiring diagram. Channel 1 (the primary output) is located on the flip out door, terminal plug P6. Channel 1 is dedicated to track the process and has fully independent and fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

The example below shows the 4-20 mA set to 4mA = 7.00pH and 20mA = 14pH. The output would then span 4 to 20 mA for a pH swing of 7.0 to 14.0. Note that the span can be reversed, in that 4 mA can be set to a high pH value, and 20 mA can be set to a low pH value, effectively reversing the control direction.

**NOTE**  
PRESS THE UP AND DOWN KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The TUNE function allows the user to precisely adjust the 4-20 mA output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary.

To make the adjustment, place an accurate current meter in series with the 4-20 mA output, with the appropriate loads connected. When the TUNE menu is selected, the controller puts 20 mA out the terminals. Use the UP or DOWN keys to adjust the 20mA output to get exactly 20.

The TUNE value can be adjusted over the range from 0 to 1000, these are unitless numbers used for tuning purposes only.

With "N" selected, pressing the DOWN key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.

4-20mA CH1 PROC  
STORE? Y N

Not stored

Stored

Or press the key to highlight the Y character

4-20mA CH1 PROC  
STORE? Y N

Then press the DOWN key to store the selection and return to the OUTPUTS menu

If you wish to change the setting, press the key once which will move the cursor to the first character of the value to be changed

4-20mA CH1 PROC  
4mA OUT 0.00

4-20mA CH1 PROC  
4mA OUT 0.0|0

Use the UP and DOWN keys to change the setting

4-20mA CH1 PROC  
4mA OUT 7.0|0

Press the key once which will move the cursor back to the RH side of the display.

4-20mA CH1 PROC  
4mA OUT 7.00

Press the DOWN key to accept the setting and move to the next setting

4-20mA CH1 PROC  
20mA OUT 14.00

4-20mA CH1 PROC  
20mA OUT 14.0|0

Use the UP and DOWN keys to change the setting

4-20mA CH1 PROC  
20mA OUT 14.0|0

Press the key once which will move the cursor back to the RH side of the display.

4-20mA CH1 PROC  
20mA OUT 14.00

Press the DOWN key to accept the setting and move to the next setting

4-20mA CH1 PROC  
20mA TUNE 512

4-20mA CH1 PROC  
20mA TUNE 51|2

Use the UP and DOWN keys to change the setting

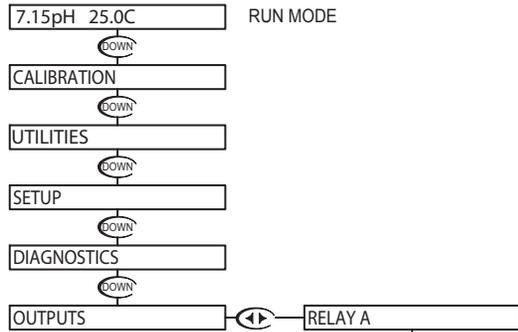
4-20mA CH1 PROC  
20mA TUNE 54|0

Press the key once which will move the cursor back to the RH side of the display.

4-20mA CH1 PROC  
20mA TUNE 54.0

Press the DOWN key to accept the setting and move to the next setting

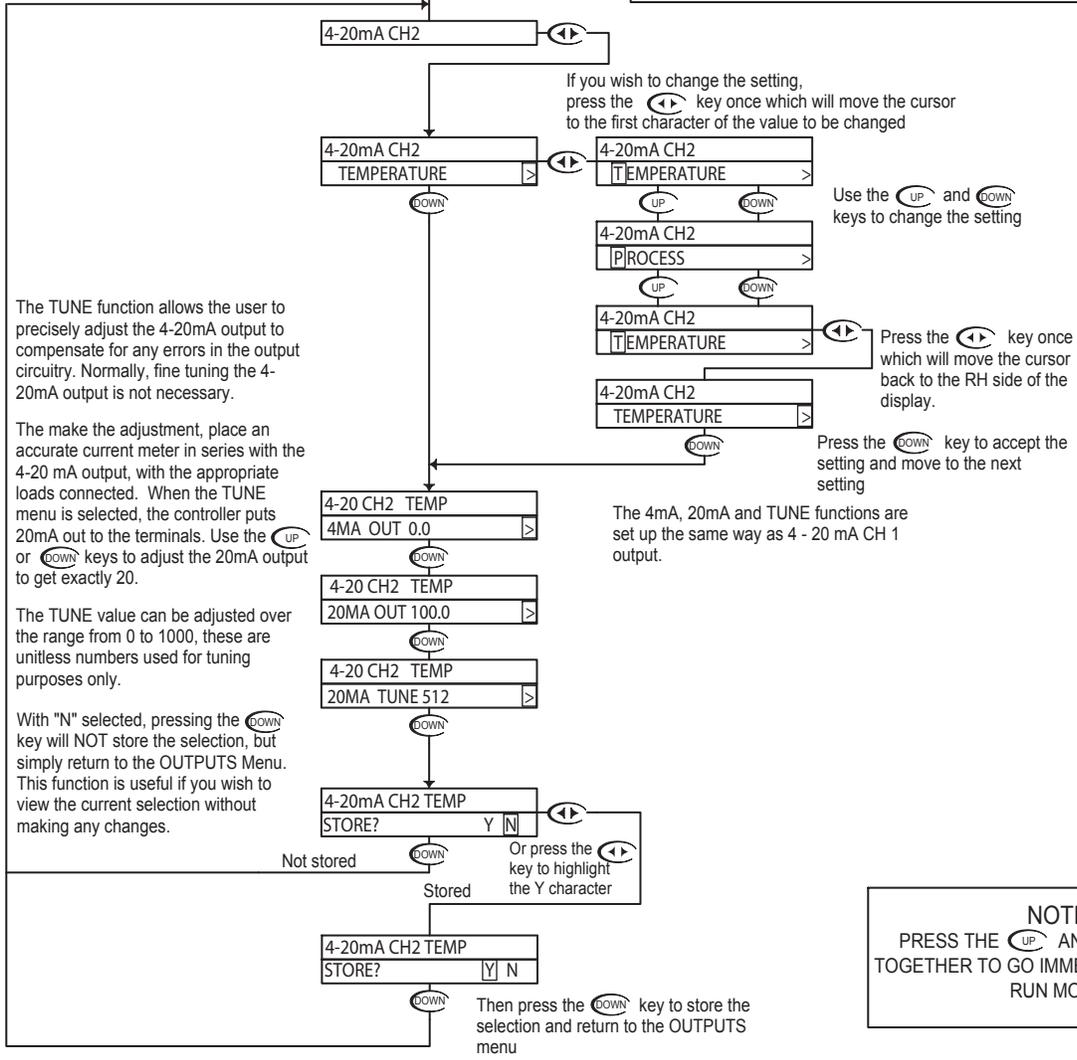
# pH - Outputs Menu - 4-20mA CH2 Output 4.22



The Controller has 2 4-20mA outputs, electrically isolated from each other and ground. Either output can source current into a maximum of 800 ohms. Channel 2 can be selected to track the process or temperature. Channel 2 has fully independent and fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

Note that if the T COMP OVERRIDE is ON and Channel 2 output is set to track temperature, the output will not change, but hold at a value representing the temperature set in the T COMP OVERRIDE.

The example below shows the 4-20 mA set to 4mA = 0°C and 20mA = 100°C. The output would then span 4 to 20 mA for a temperature swing of 0°C to 100°C. Note that the span can be reversed, in that 4 mA can be set to a high process value, and 20 mA can be set to a low process value, effectively reversing the control direction.



The TUNE function allows the user to precisely adjust the 4-20mA output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary.

To make the adjustment, place an accurate current meter in series with the 4-20 mA output, with the appropriate loads connected. When the TUNE menu is selected, the controller puts 20mA out to the terminals. Use the UP or DOWN keys to adjust the 20mA output to get exactly 20.

The TUNE value can be adjusted over the range from 0 to 1000, these are unitless numbers used for tuning purposes only.

With "N" selected, pressing the DOWN key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.

If you wish to change the setting, press the LEFT key once which will move the cursor to the first character of the value to be changed

Use the UP and DOWN keys to change the setting

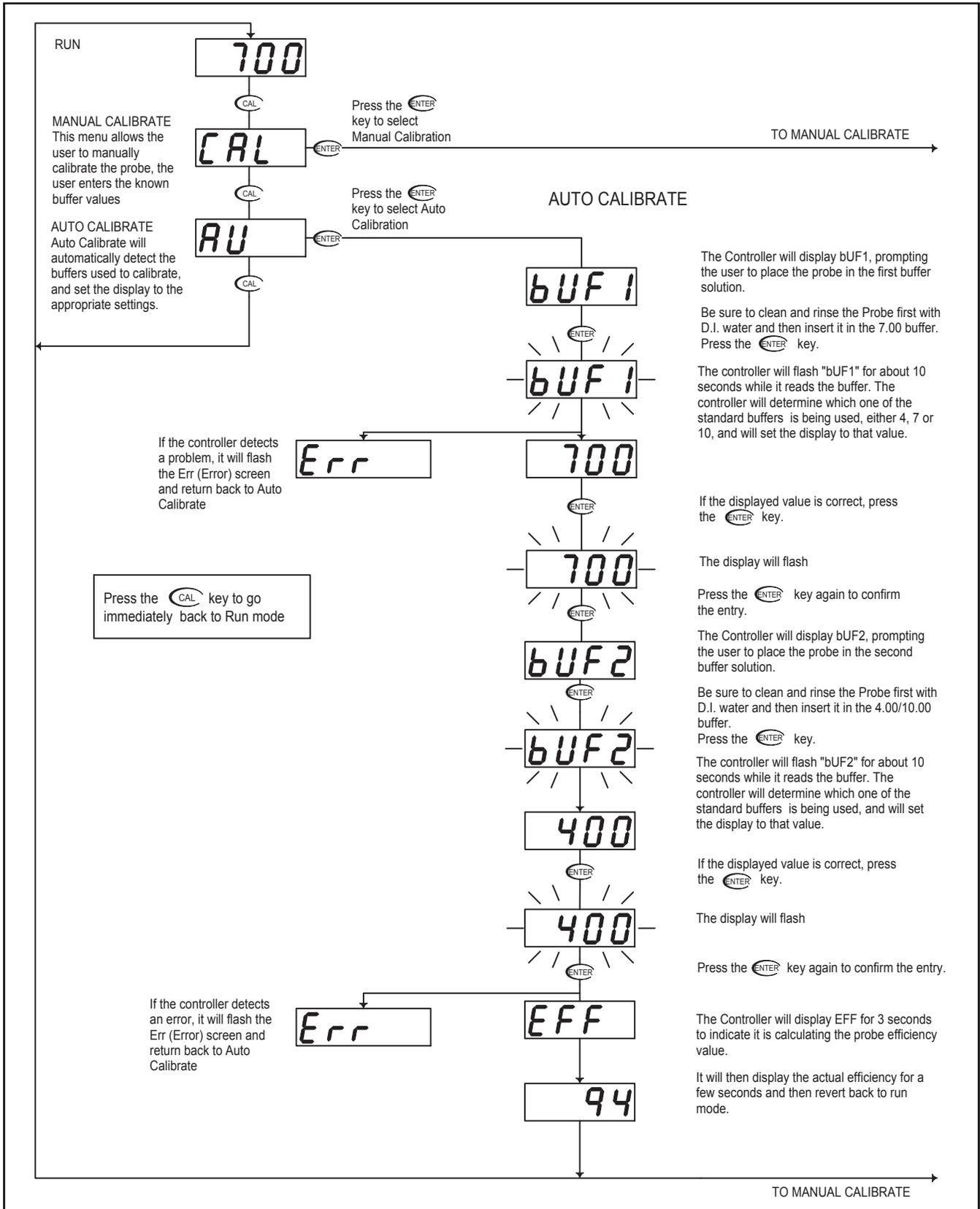
Press the LEFT key once which will move the cursor back to the RH side of the display.

Press the DOWN key to accept the setting and move to the next setting

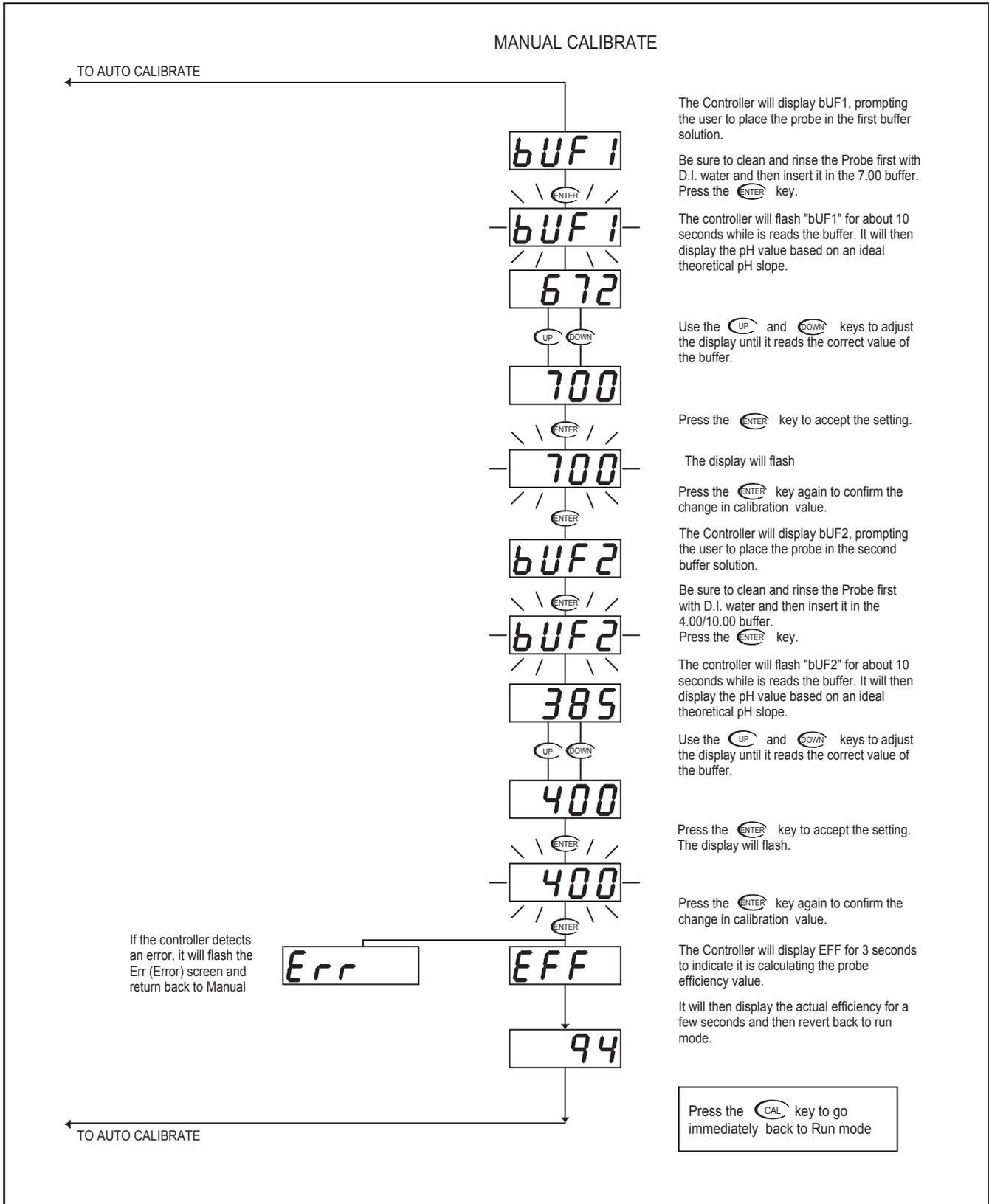
The 4mA, 20mA and TUNE functions are set up the same way as 4 - 20 mA CH 1 output.

**NOTE**  
PRESS THE UP AND DOWN KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

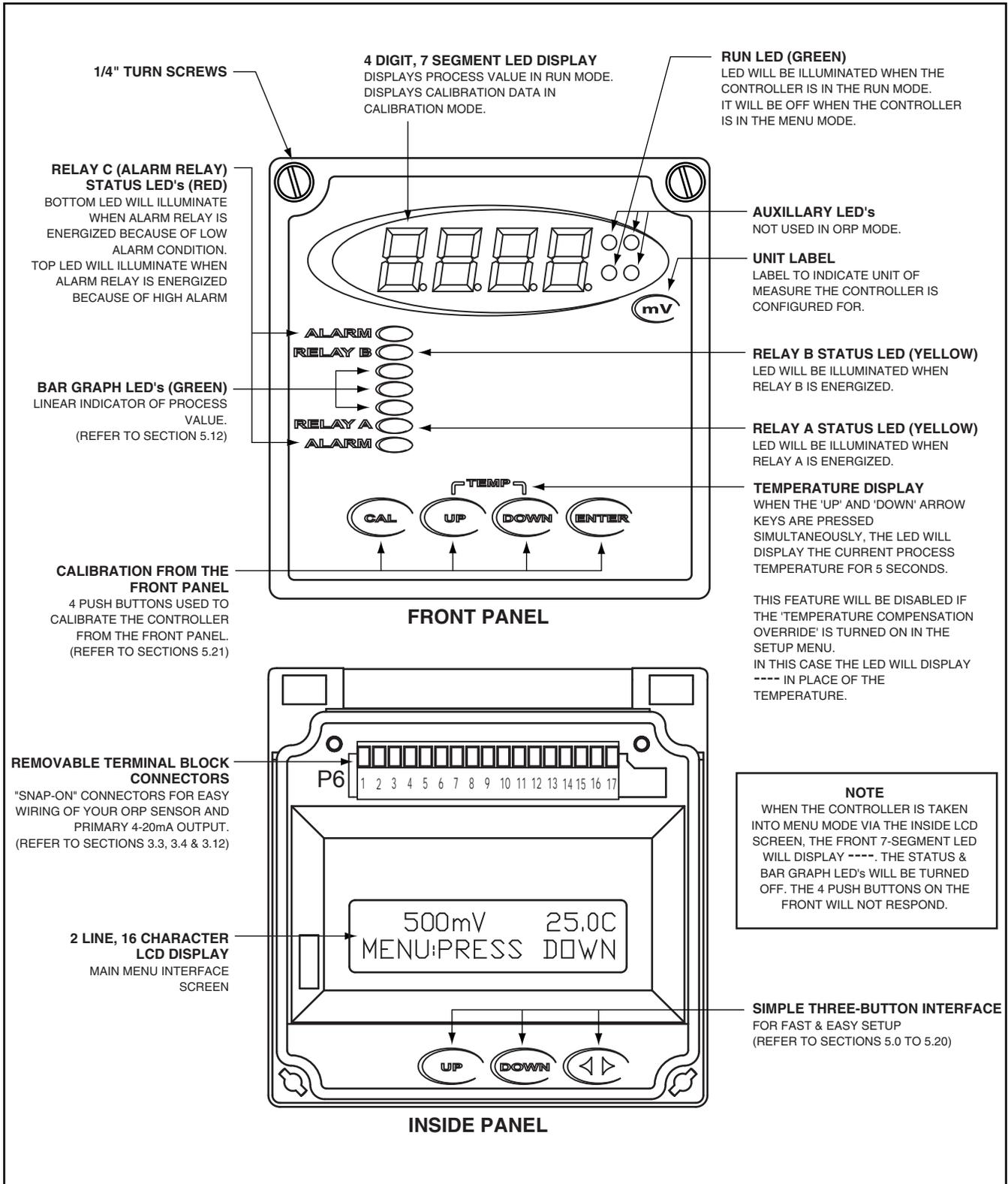
# pH - LED Display Menu - pH Auto Calibrate 4.23



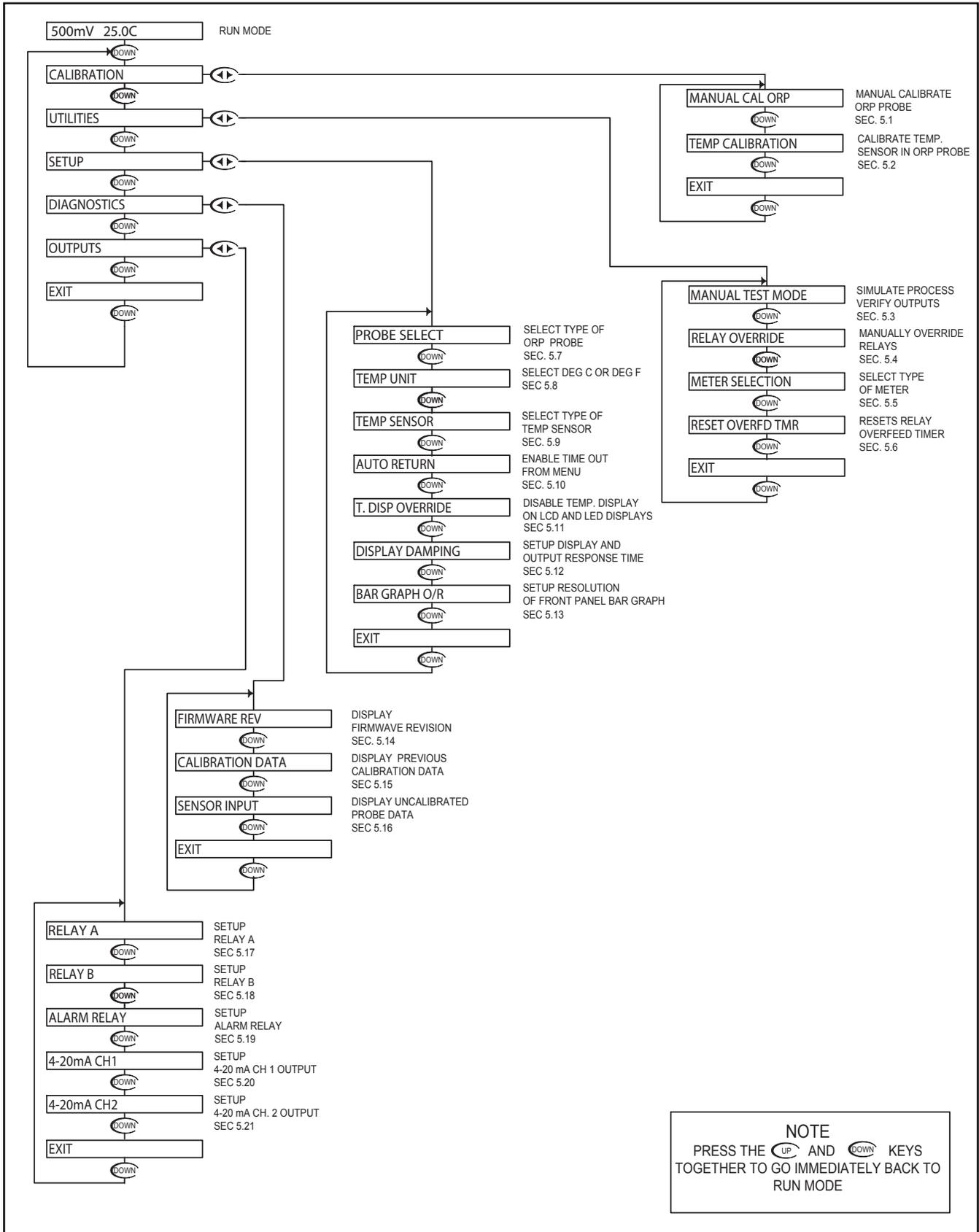
# pH - LED Display Menu - pH Manual Calibrate 4.24



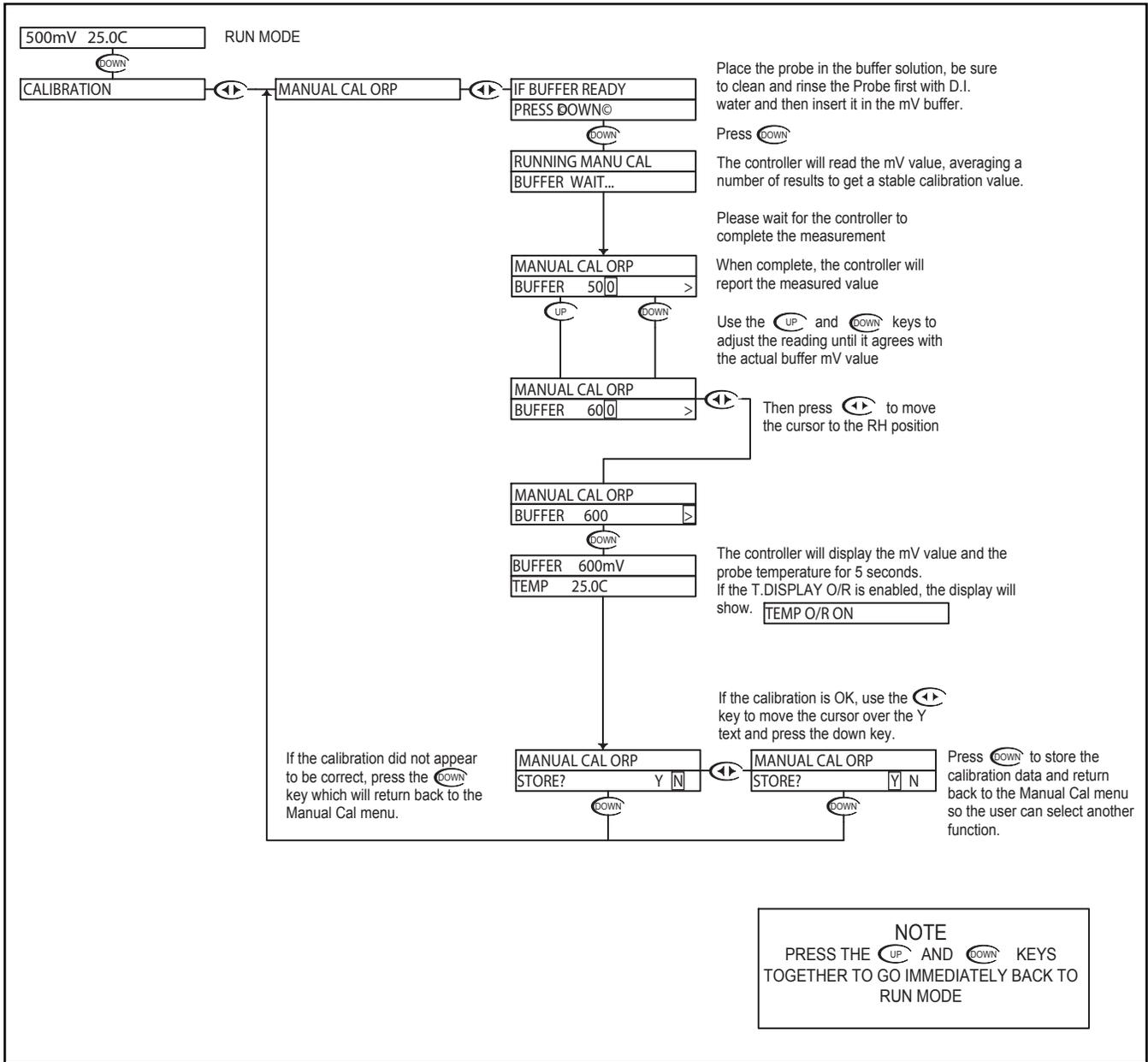
# Section 5 - Using the PHUCN600 in ORP Mode



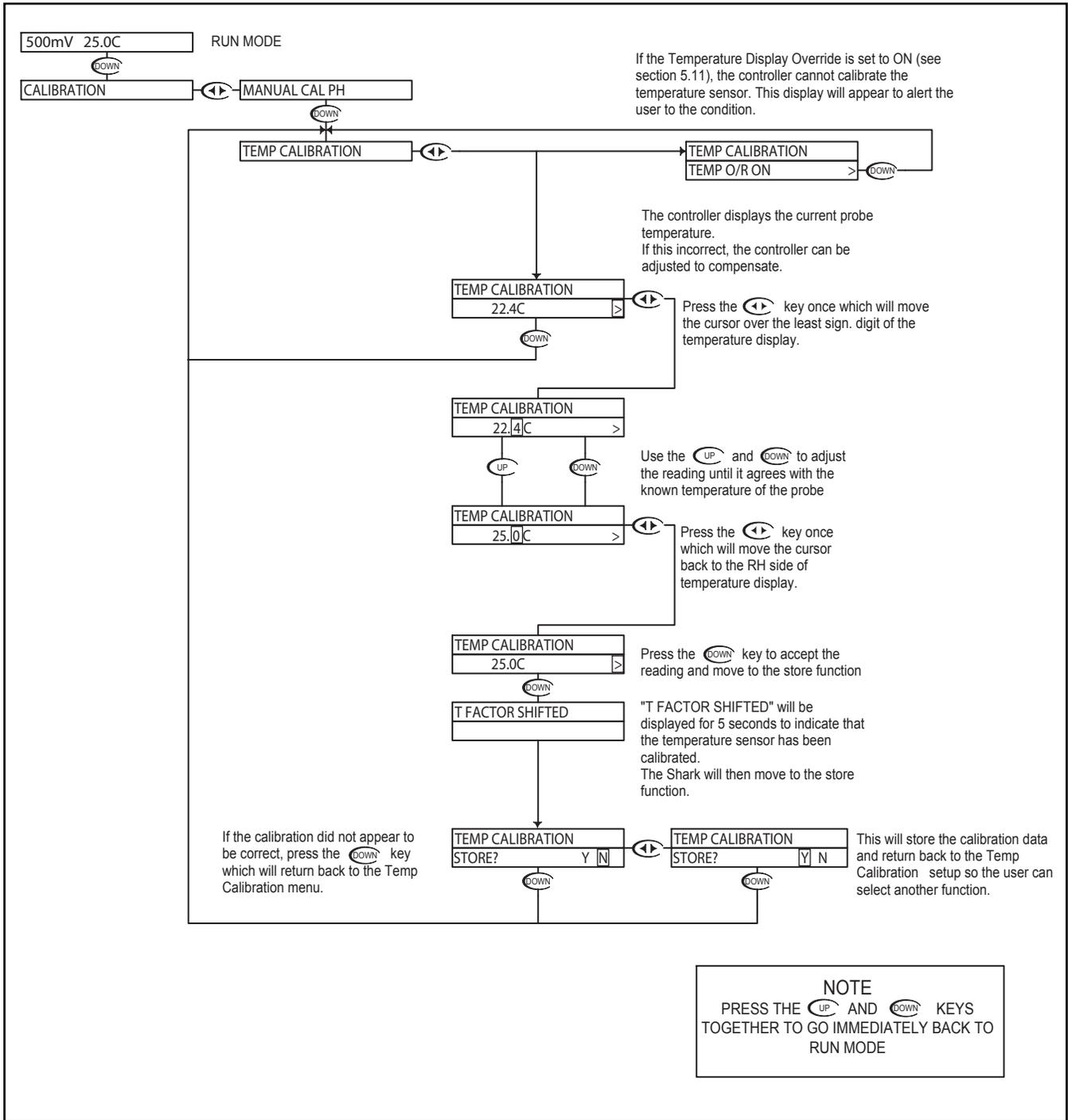
# ORP - Menu Overview 5.0



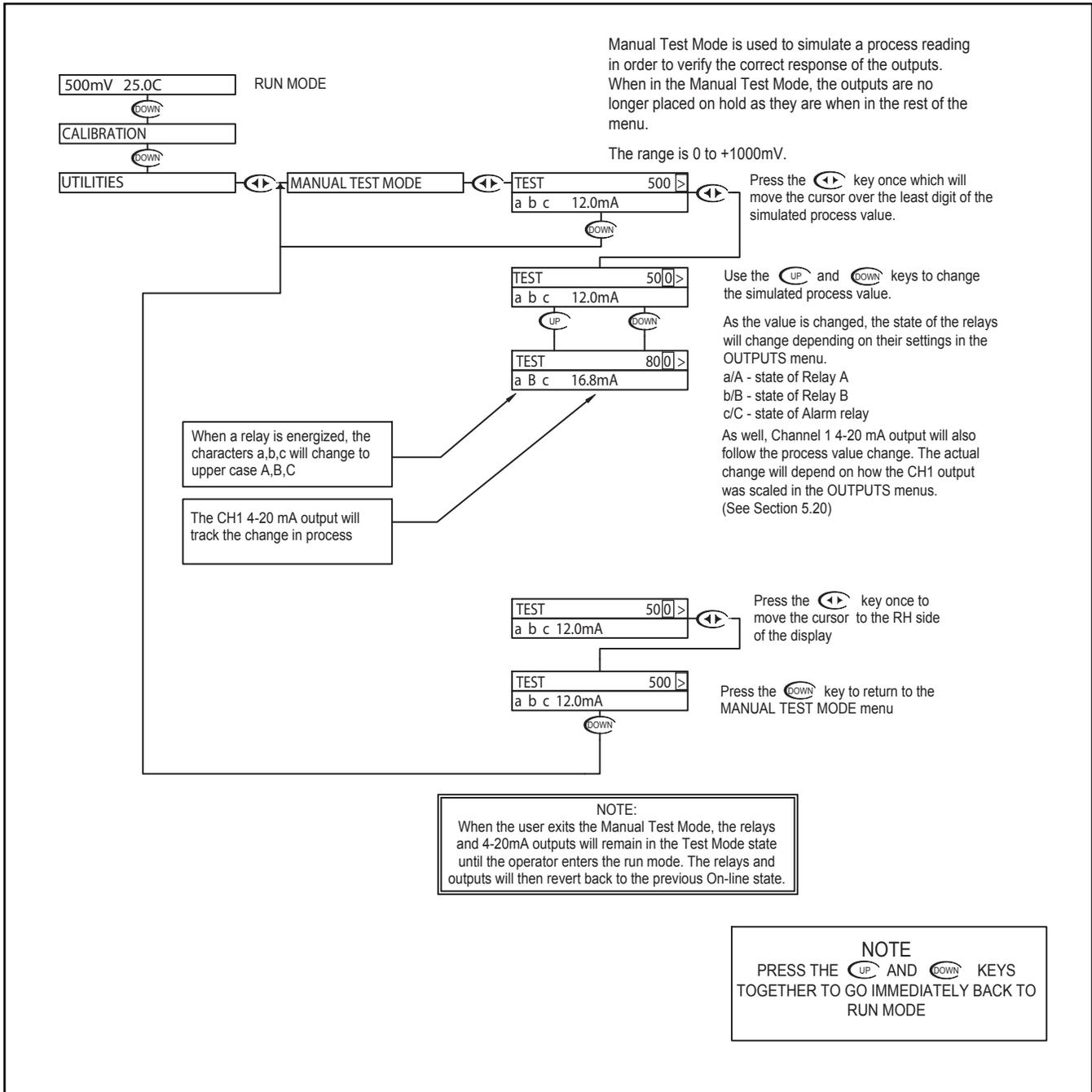
# ORP - Calibration Menu - Manual Calibrate 5.1



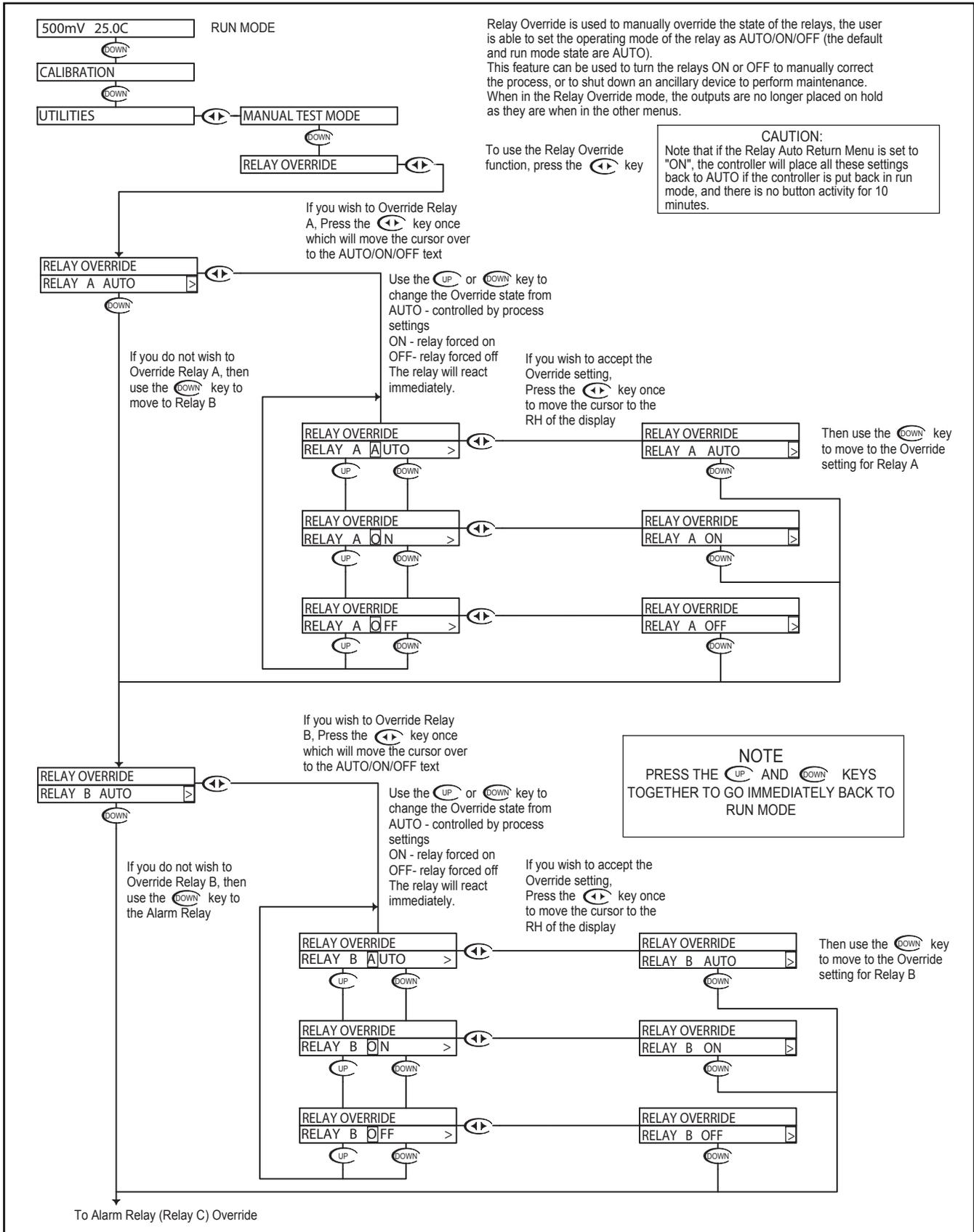
# ORP - Calibration Menu - Temp. Calibration 5.2



# ORP - Utilities Menu - Manual Test Mode 5.3

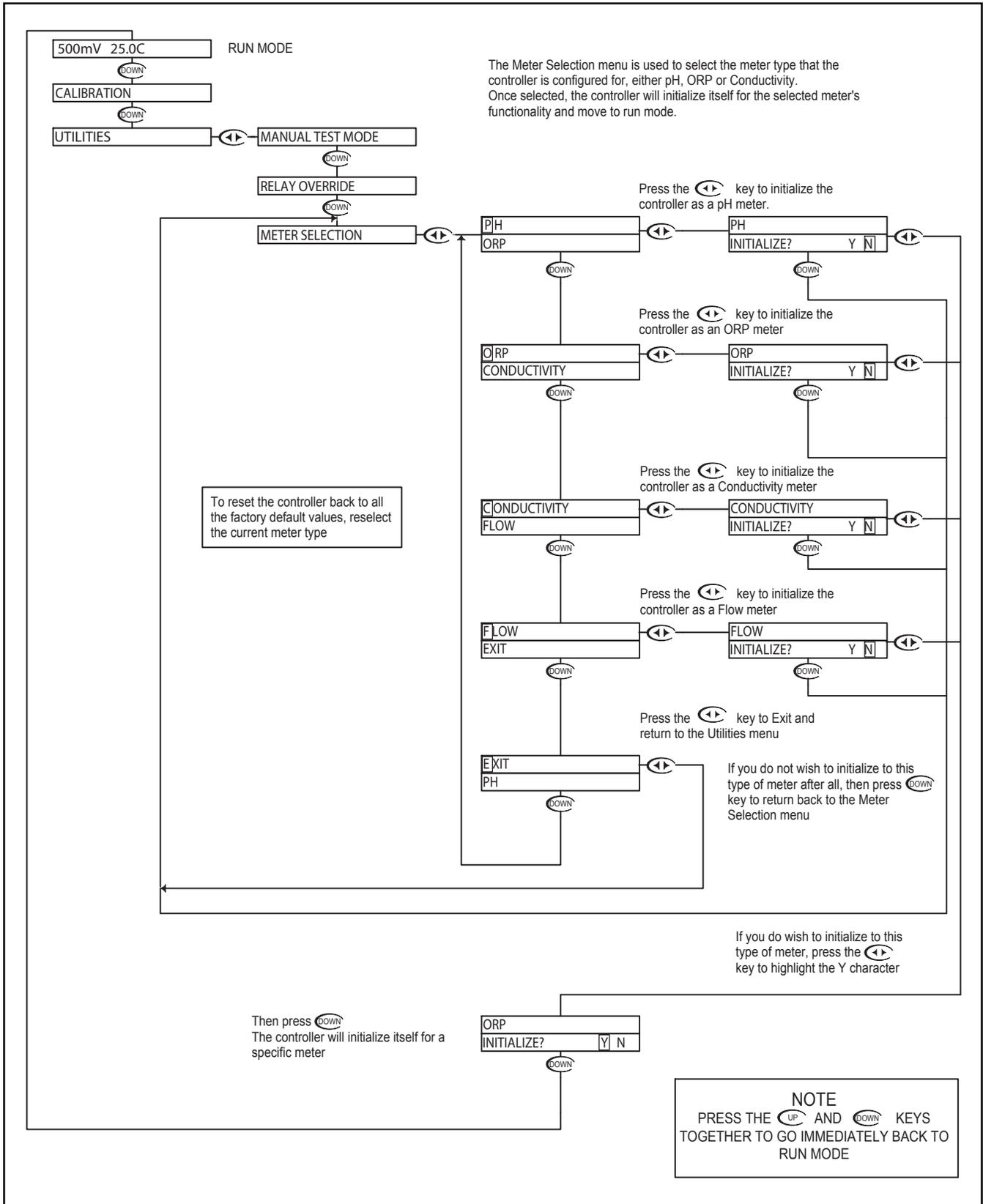


# ORP - Utilities Menu - Relay Override 5.4

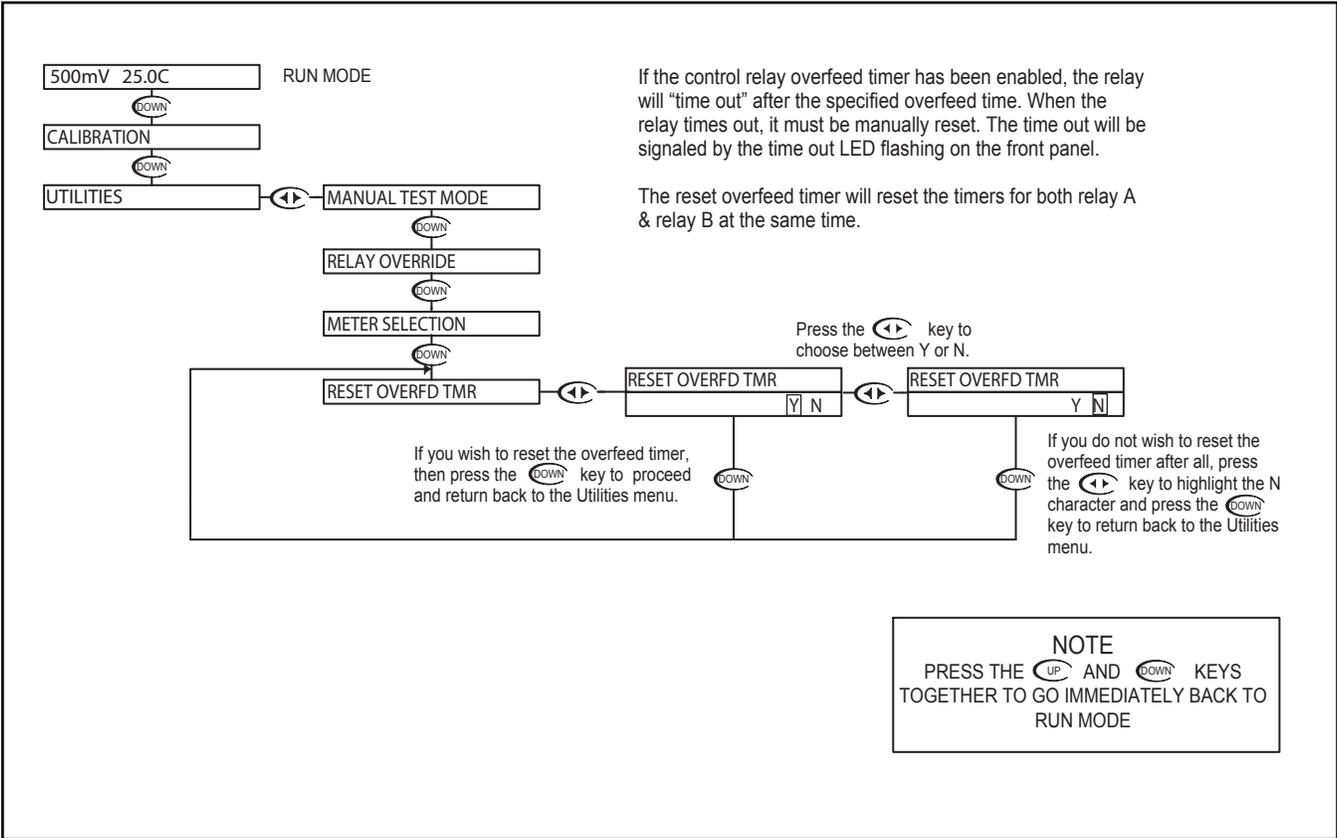




# ORP - Utilities Menu - Meter Selection 5.5



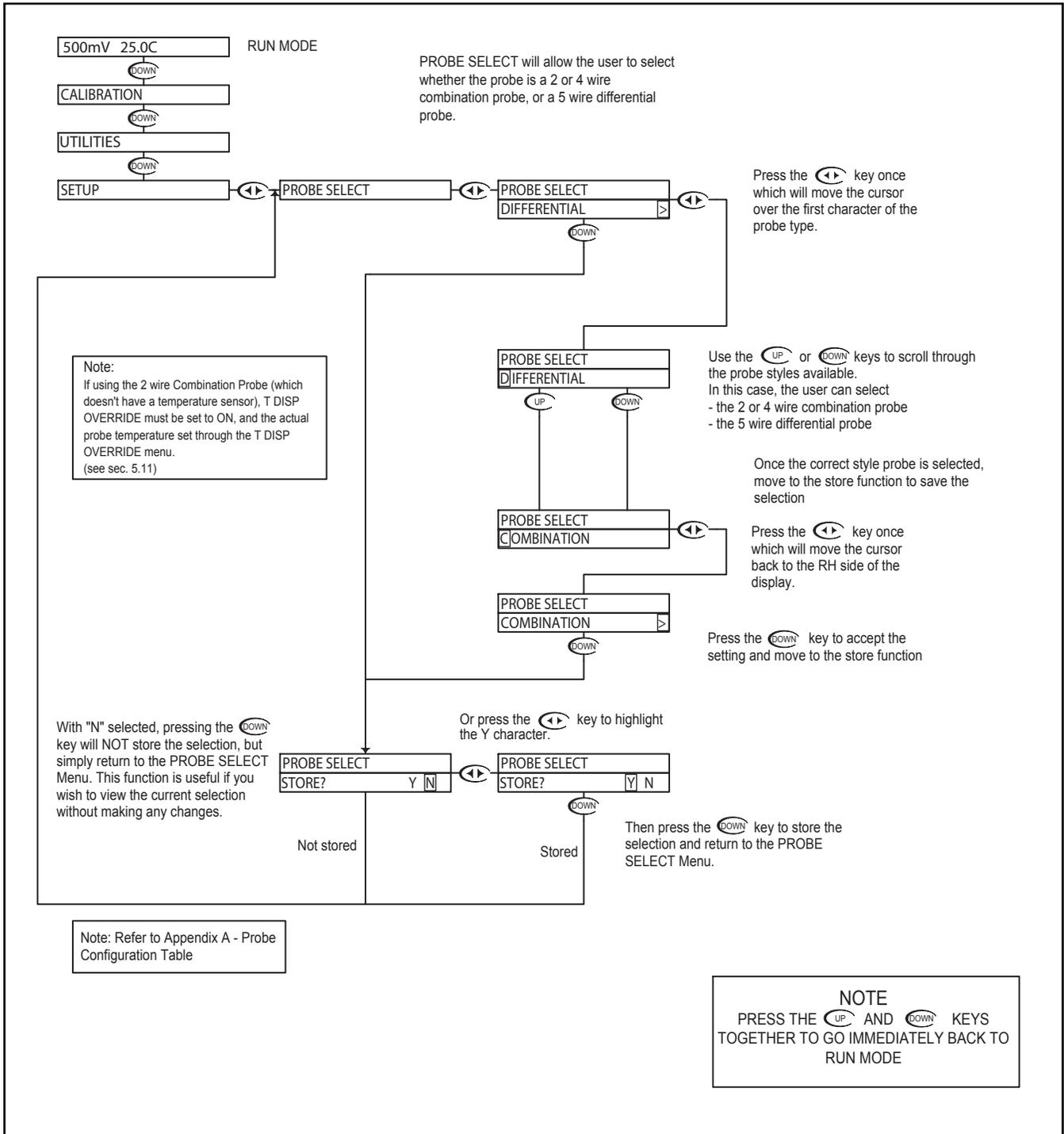
# ORP - Utilities Menu - Overfeed Timer Reset 5.6



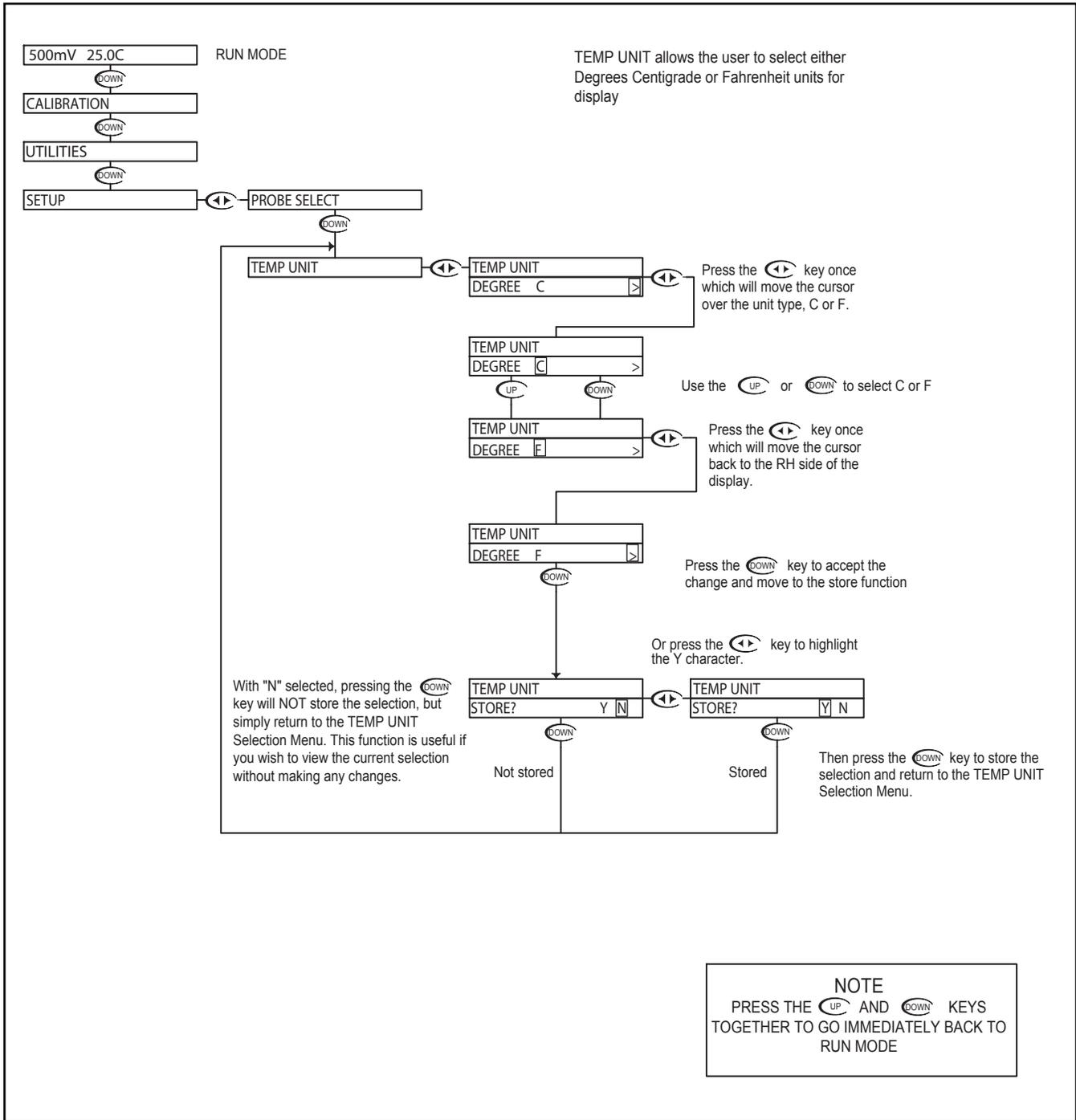
If the control relay overfeed timer has been enabled, the relay will "time out" after the specified overfeed time. When the relay times out, it must be manually reset. The time out will be signaled by the time out LED flashing on the front panel.

The reset overfeed timer will reset the timers for both relay A & relay B at the same time.

# ORP - Setup Menu - Probe Select 5.7

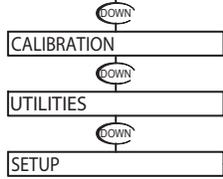


# ORP - Setup Menu - Temp. Unit 5.8



# ORP - Setup Menu - Temp. Sensor 5.9

500mV 25.0C RUN MODE



PROBE SELECT

TEMP UNIT

TEMP SENSOR

TEMP SENSOR  
300 NTC

TEMP SENSOR  
300 Ω NTC

TEMP SENSOR  
1000 Ω RTD

TEMP SENSOR  
3000 Ω NTC

TEMP SENSOR  
300 NTC

TEMP SENSOR  
STORE? Y N

Press the **←** key once which will move the cursor over to the sensor type.

Use the **↑** or **↓** to select the sensor type

Once the correct Sensor has been selected press the **→** key once which will move the cursor back to the RH side of the display.

Press the **↓** key to accept the change and move to the store function

Or press the **←** key to highlight the Y character.

With "N" selected, pressing the **↓** key will NOT store the selection, but simply return to the TEMP SENSOR Selection Menu. This function is useful if you wish to view the current selection without making any changes.

Not stored

TEMP SENSOR  
STORE? Y N

Stored

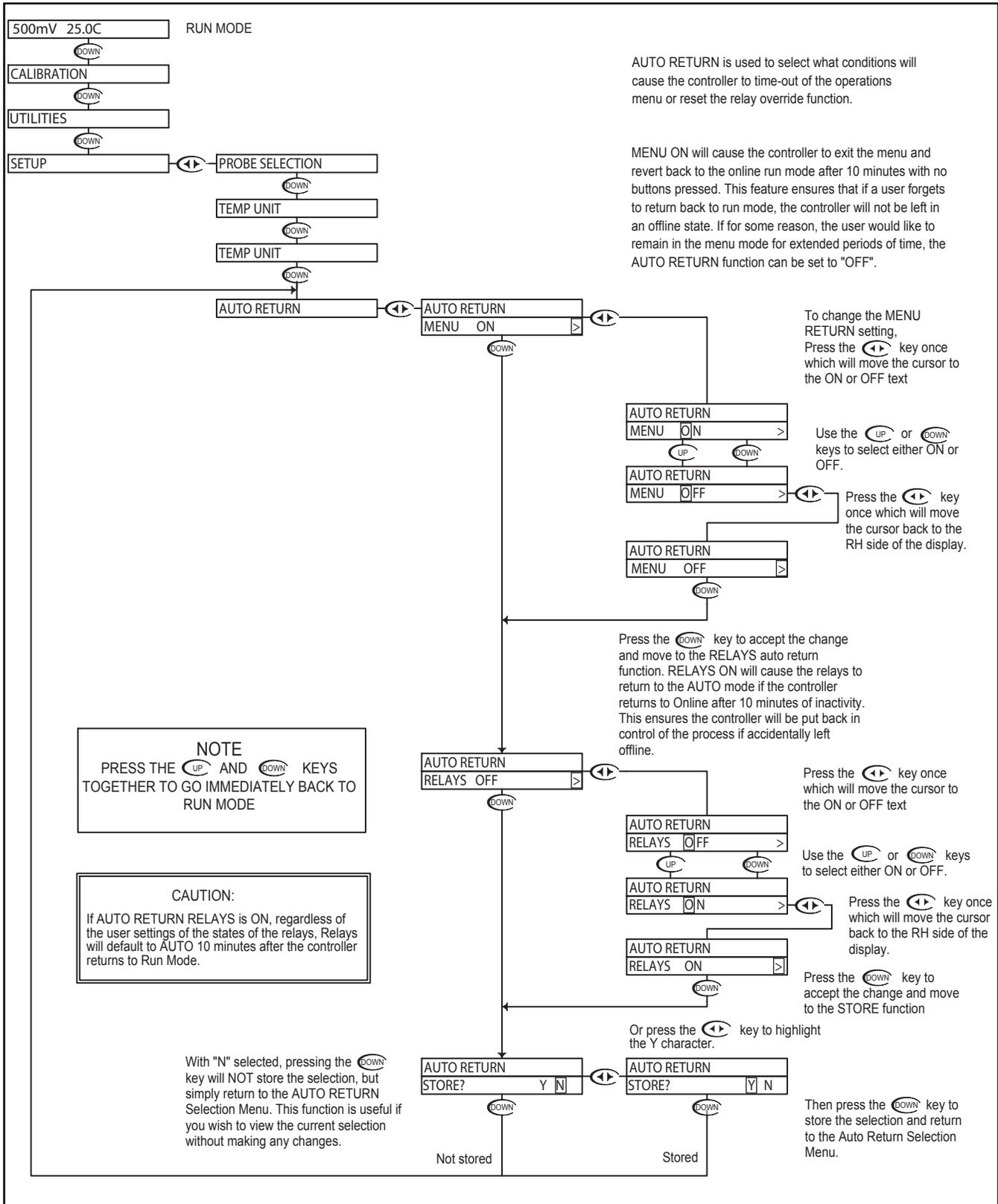
Then press the **↓** key to store the selection and return to the TEMP SENSOR Selection Menu.

TEMP SENSOR allows the user to select the type of temperature sensor used in the probe.

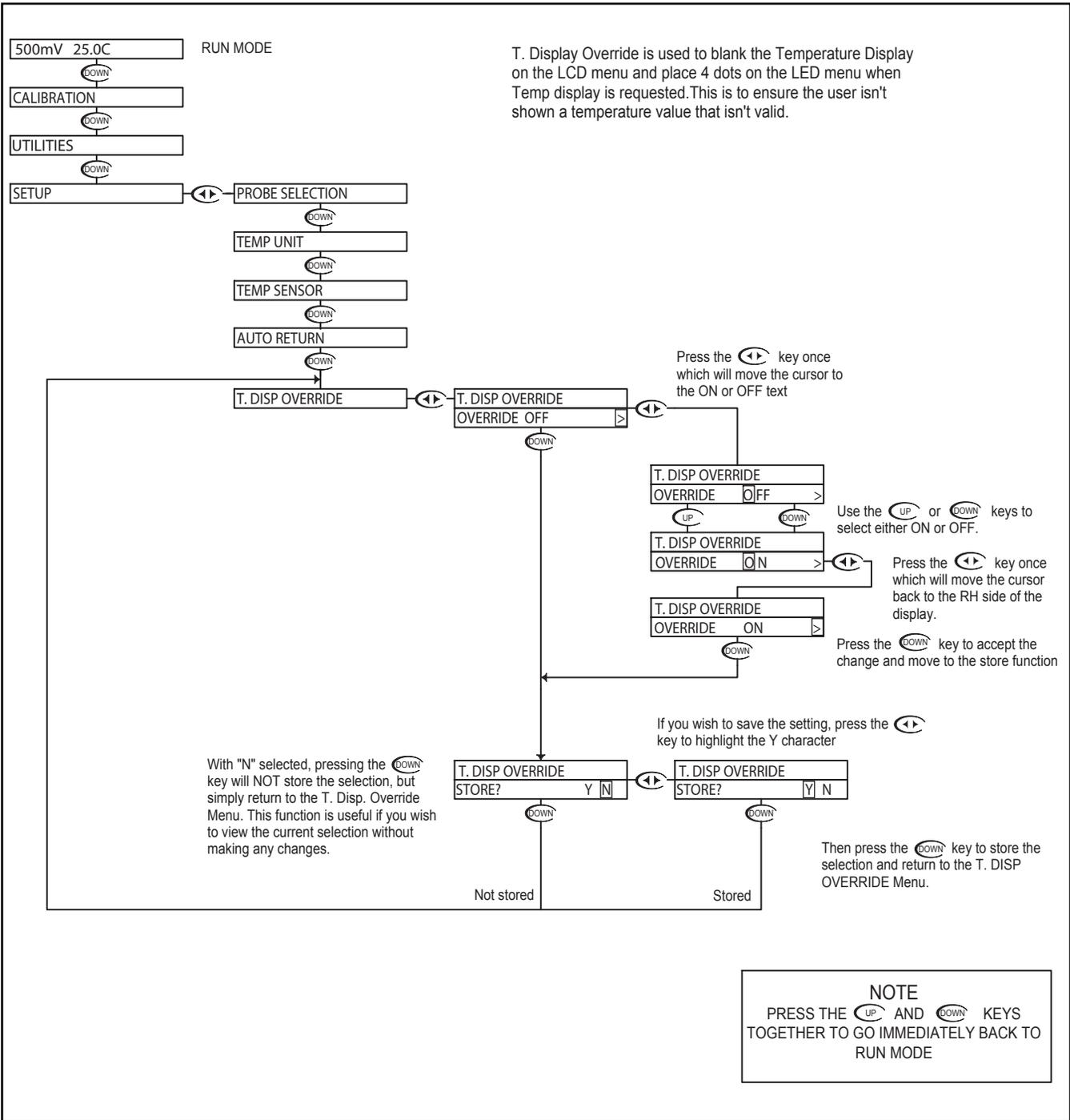
The factory default for ORP is a 300 NTC Thermistor. The user can also select a 3000 NTC Thermistor or a 1000 RTD.

**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

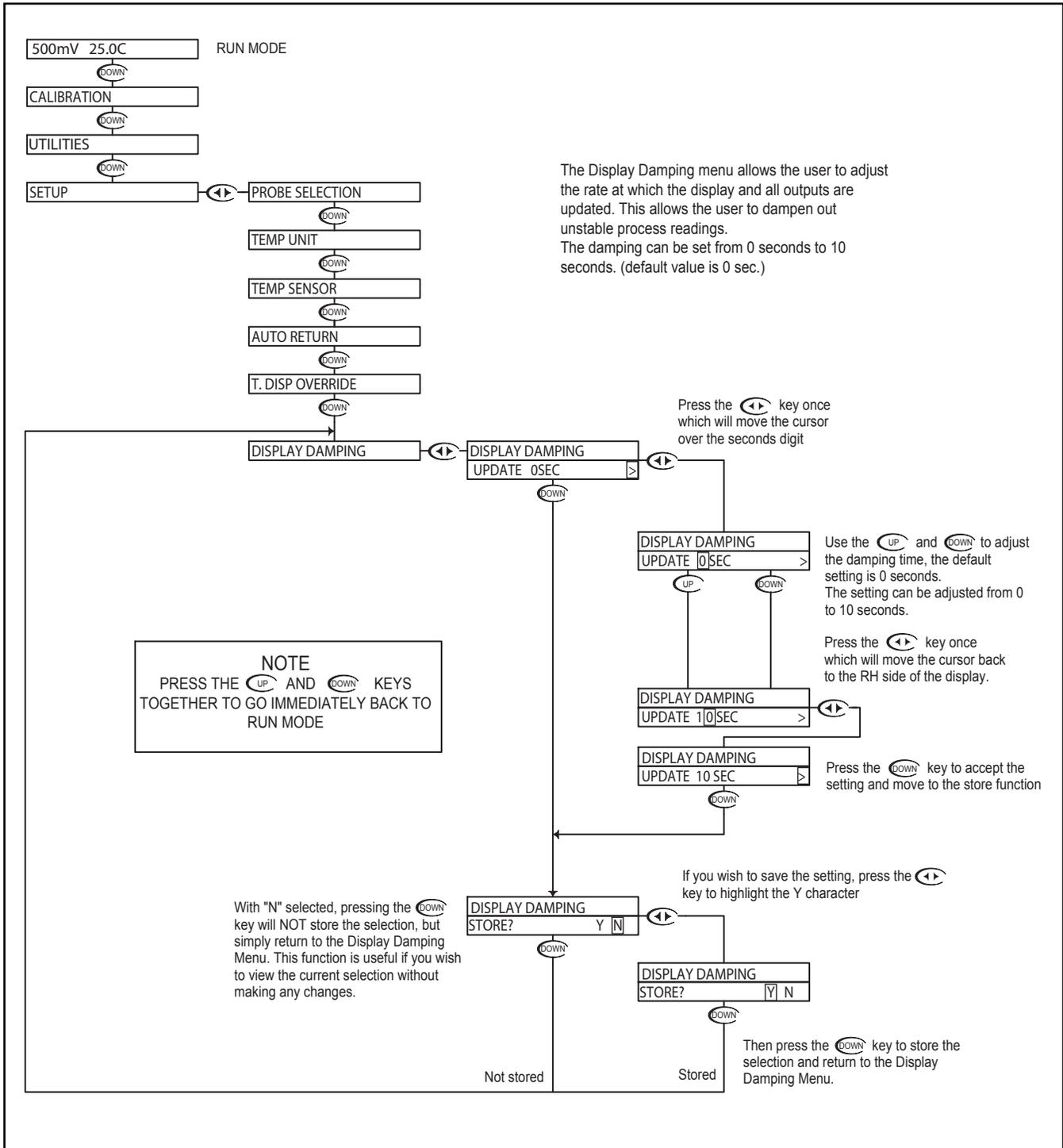
# ORP - Setup Menu - Auto Return 5.10



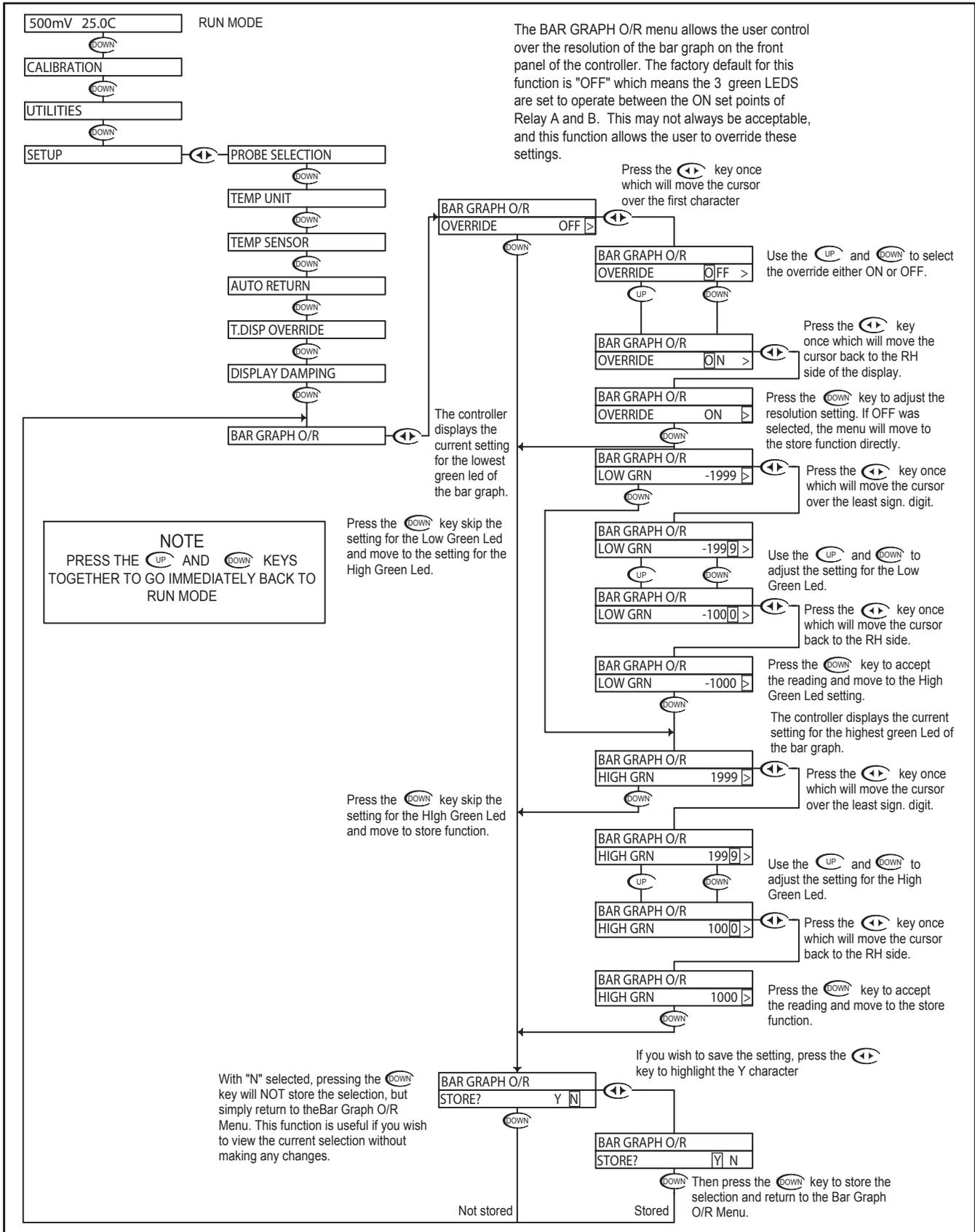
# ORP - Setup Menu - Temp. Display Override 5.11



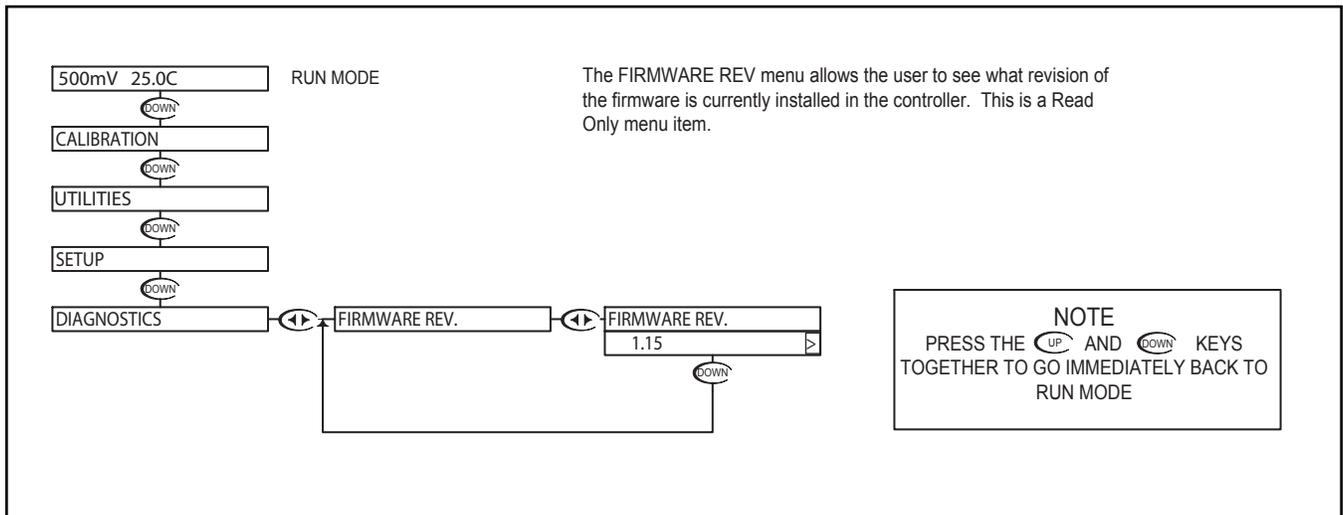
# ORP - Setup Menu - Display Damping 5.12



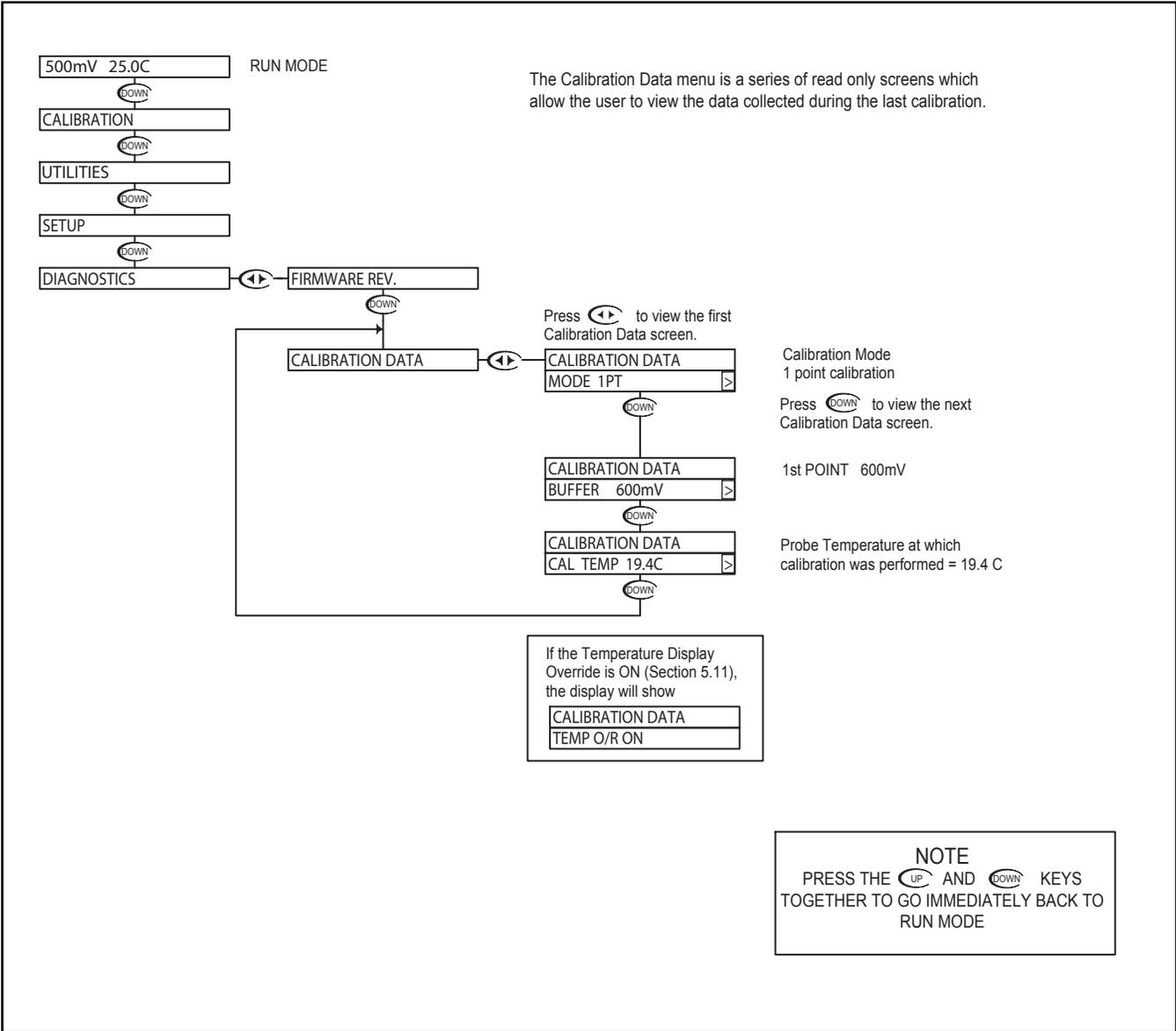
# ORP - Setup Menu - Bar Graph O/R 5.13



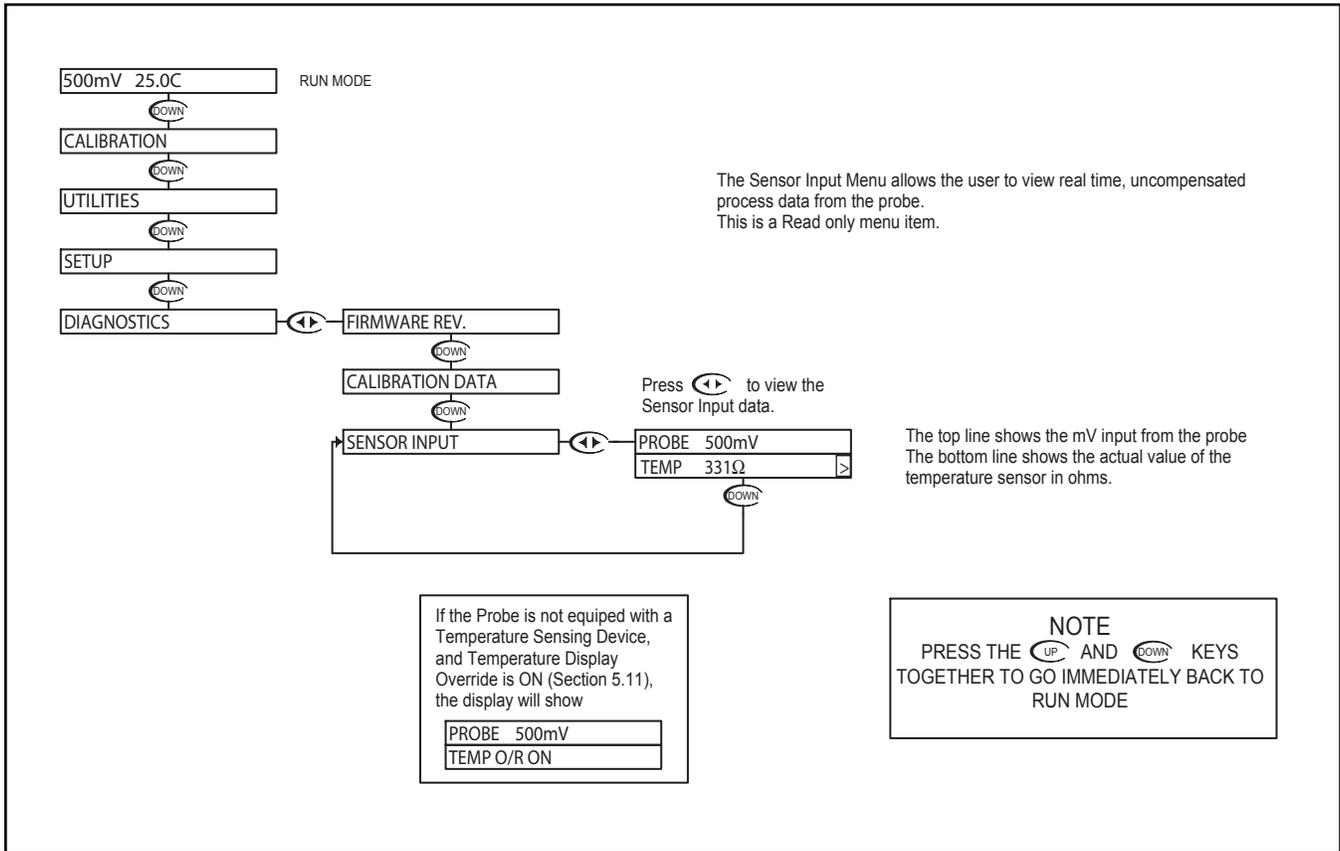
## ORP - Diagnostics Menu - Firmware Rev 5.14



# ORP - Diagnostics Menu - Calibration Data 5.15



# ORP - Diagnostics Menu - Sensor Input 5.16



# ORP - Outputs Menu - Relay A 5.17

500mV 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

DIAGNOSTICS

OUTPUTS

RELAY A

- Relay A can be configured for the following operations
- Response to rising or falling process values
  - Adjustable on and off set-points
  - Cycle on and off times
  - Failsafe operation

The relay can be set to control either a RISING or FALLING process.

In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point.

In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere between 0-100% of the range.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the On setting.

The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.

RELAY A  
DIRECTION FALL >

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY A  
DIRECTION F|ALL >

Use the **UP** and **DOWN** keys to change the setting

RELAY A  
DIRECTION R|ISE >

RELAY A  
DIRECTION F|ALL >

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY A  
DIRECTION FALL >

Press the **DOWN** key to accept the setting and move to the next setting

RELAY A  
RELAY ON 300 >

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY A  
RELAY ON 30|0 >

Use the **UP** and **DOWN** keys to change the setting

RELAY A  
RELAY ON 35|0 >

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY A  
RELAY ON 350 >

Press the **DOWN** key to accept the setting and move to the next setting

RELAY A  
RELAY OFF 400 >

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY A  
RELAY OFF 40|0 >

Use the **UP** and **DOWN** keys to change the setting

RELAY A  
RELAY OFF 45|0 >

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY A  
RELAY OFF 450 >

TO CYCLE ON

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# ORP - Outputs Menu - Relay A 5.17

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds. The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

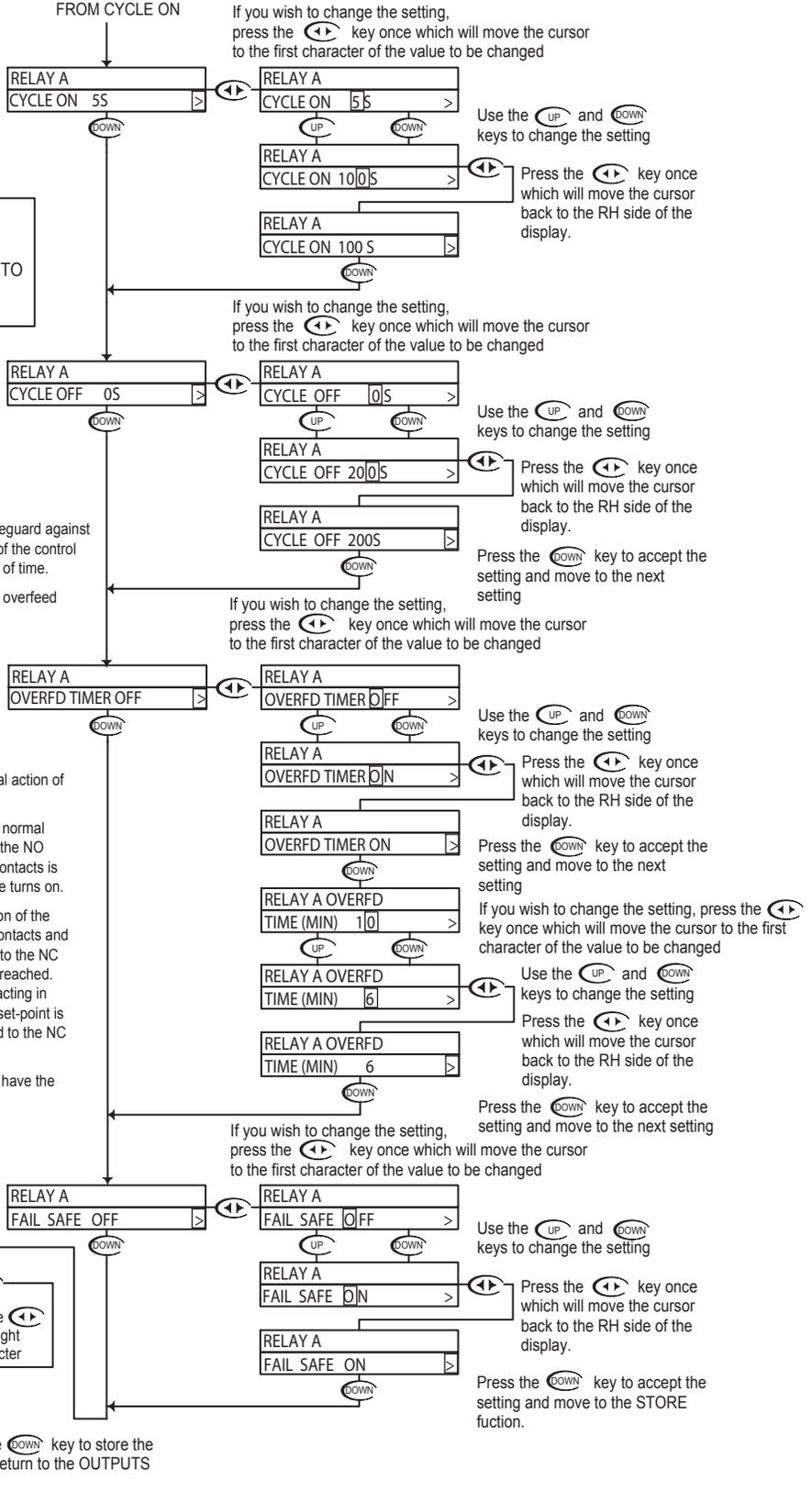
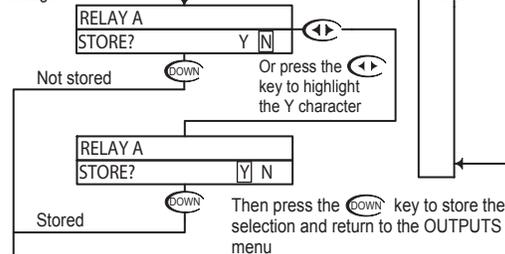
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



# ORP - Outputs Menu - Relay B 5.18

500mV 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

DIAGNOSTICS

OUTPUTS

RELAY A

RELAY B

RELAY B  
DIRECTION RISE

Relay B can be configured for the following operations

- Response to rising or falling process values
- Adjustable on and off set-points
- Cycle on and off times
- Failsafe operation

Each function will be explained below

The relay can be set to control either a RISING or FALLING process.

In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.

In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere between 0-100% of the range.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the ON setting.

The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY B  
DIRECTION RISE

RELAY B  
DIRECTION RISE

Use the **↑** and **↓** keys to change the setting

RELAY B  
DIRECTION FALL

RELAY B  
DIRECTION RISE

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY B  
DIRECTION RISE

RELAY B  
DIRECTION RISE

Press the **↓** key to accept the setting and move to the next setting

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY B  
RELAY ON 700

RELAY B  
RELAY ON 700

Use the **↑** and **↓** keys to change the setting

RELAY B  
RELAY ON 800

RELAY B  
RELAY ON 800

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY B  
RELAY ON 800

RELAY B  
RELAY ON 800

Press the **↓** key to accept the setting and move to the next setting

If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

RELAY B  
RELAY OFF 600

RELAY B  
RELAY OFF 600

Use the **↑** and **↓** keys to change the setting

RELAY B  
RELAY OFF 750

RELAY B  
RELAY OFF 750

Press the **←→** key once which will move the cursor back to the RH side of the display.

RELAY B  
RELAY OFF 750

RELAY B  
RELAY OFF 750

**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

TO CYCLE ON

# ORP - Outputs Menu - Relay B 5.18

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds. The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

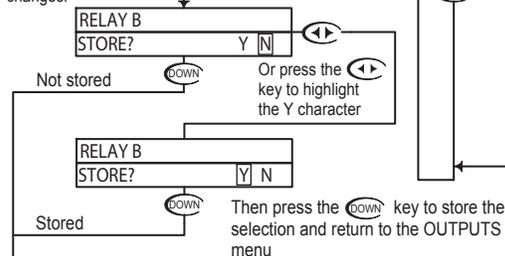
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

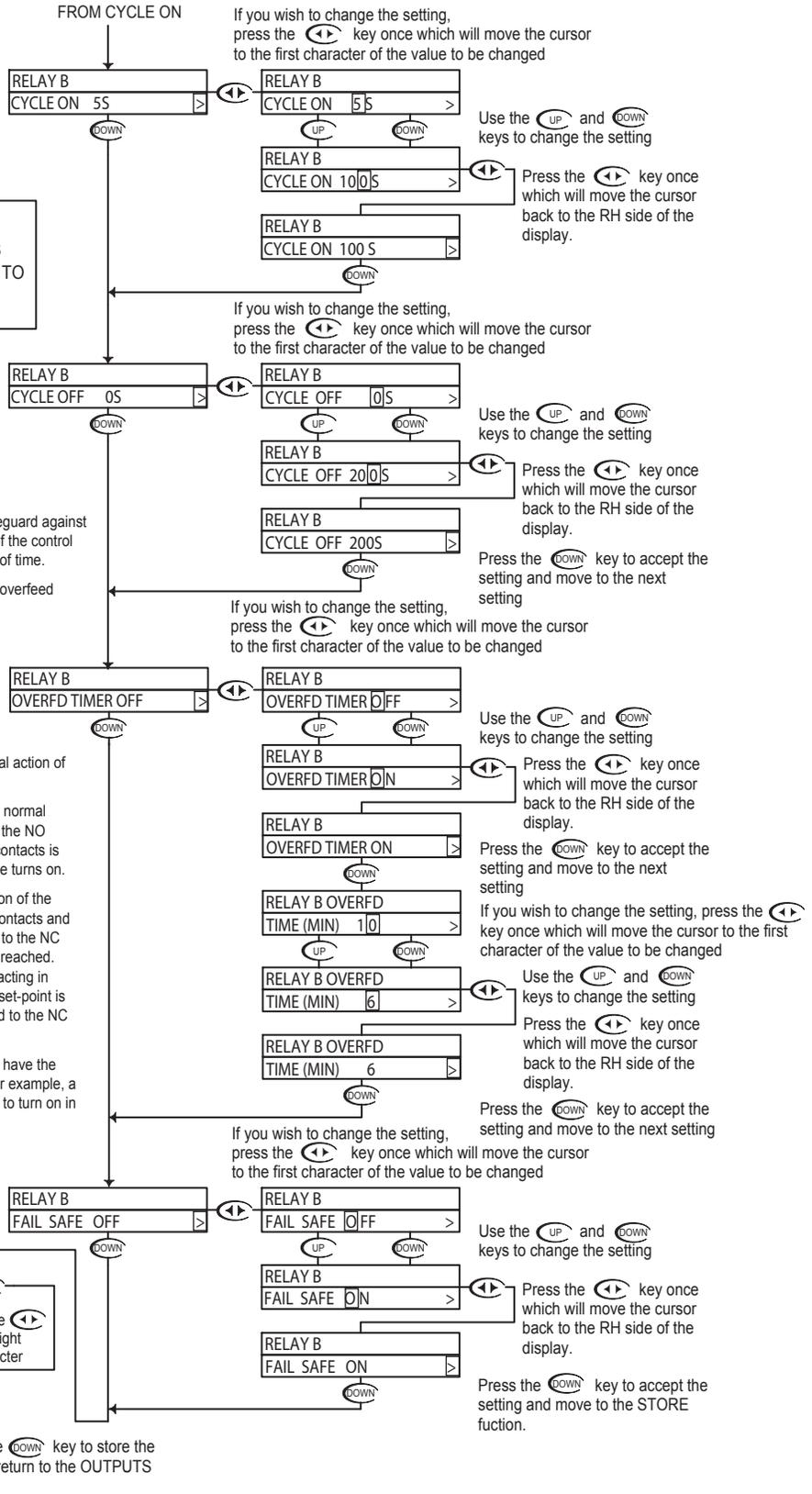
When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption. For example, a process that needs a constant feed, would want a pump to turn on in the event of a controller power failure.

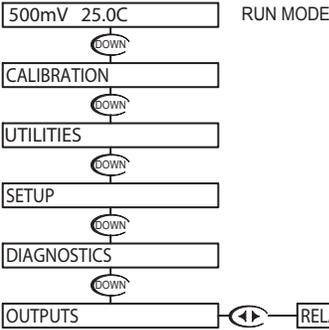
With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



TO OUTPUTS MENU



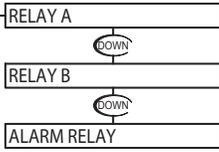
# ORP - Outputs Menu - Alarm Relay 5.19



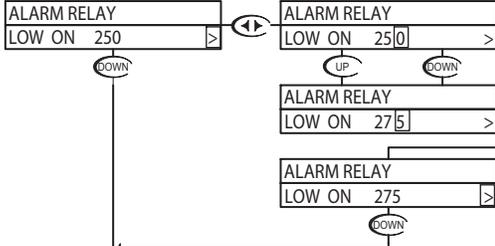
The ALARM RELAY will respond to both a rising and falling process. The ALARM RELAY will act as a low alarm (falling process) and a high alarm (rising process). Both relay bands will have independently adjustable on and off set-points. If a low alarm set-point is set at a value 800mV for example, the off set-point must be set higher. The controller will not let the user input a value below 800mV. The same rule holds true for the high alarm.

- The Alarm Relay can be configured for the following operations
- LOW ON Set-point
  - LOW OFF Set-point
  - HIGH ON Set-point
  - HIGH OFF Set-point
  - Failsafe

The LOW ON set point is the low process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.



If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed

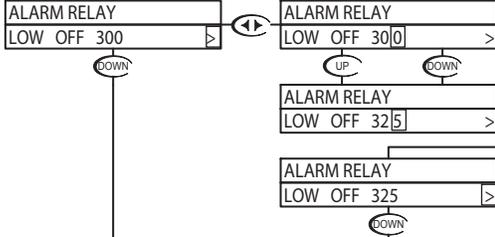


Use the **UP** and **DOWN** keys to change the setting

Press the **←→** key once which will move the cursor back to the RH side of the display.

Press the **DOWN** key to accept the setting and move to the next setting

The LOW OFF set point is the value that the process must reach in order to de-energize the alarm relay after it has tripped the LOW ON set-point. This value must be higher than the LOW ON Set-point.

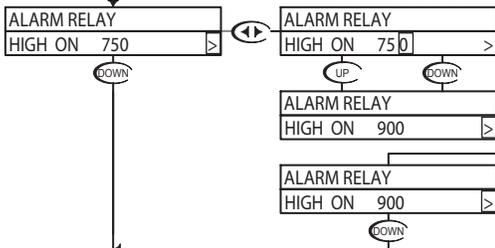


Use the **UP** and **DOWN** keys to change the setting

Press the **←→** key once which will move the cursor back to the RH side of the display.

Press the **DOWN** key to accept the setting and move to the next setting

The HIGH ON set-point is the high process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.



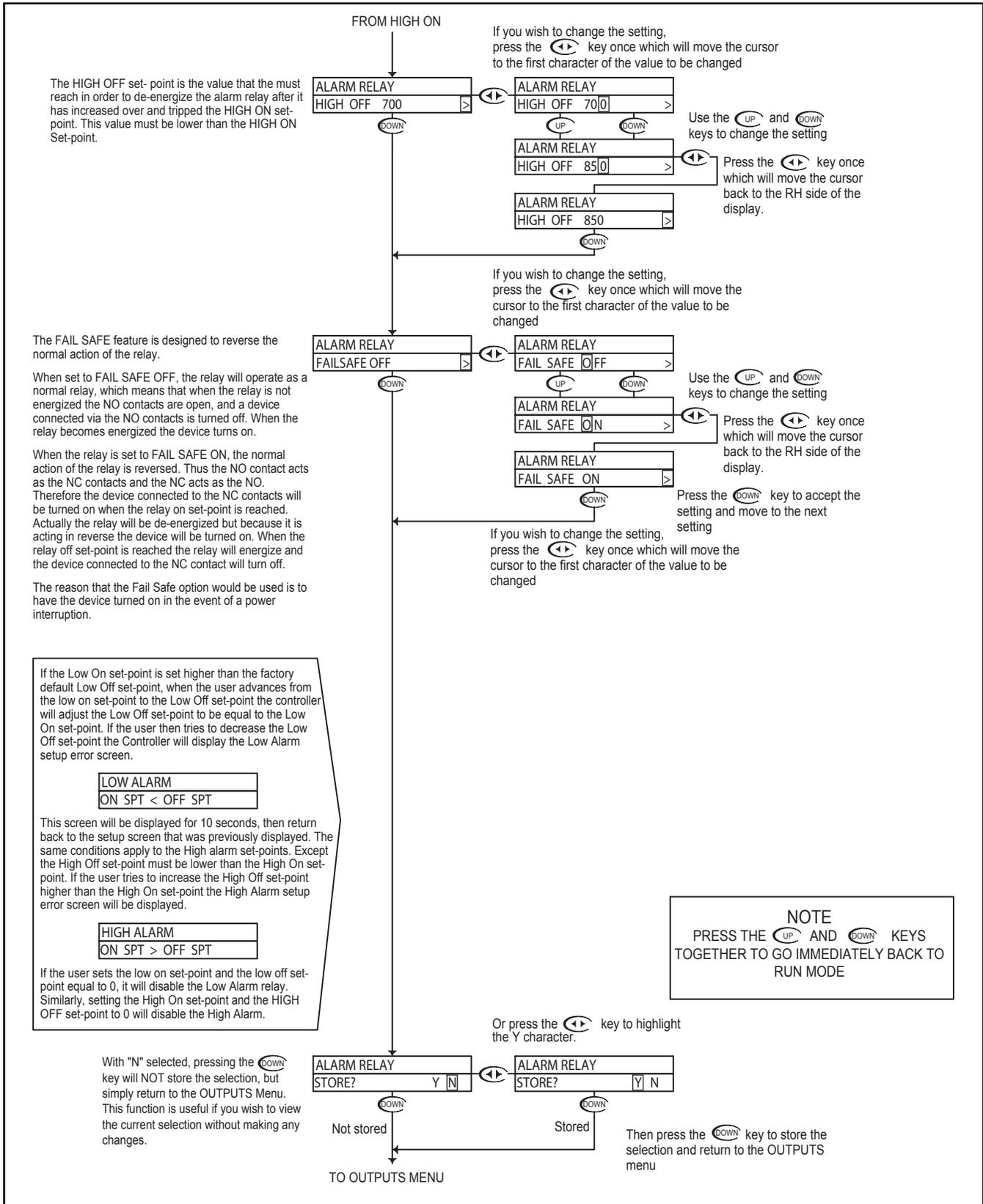
Use the **UP** and **DOWN** keys to change the setting

Press the **←→** key once which will move the cursor back to the RH side of the display.

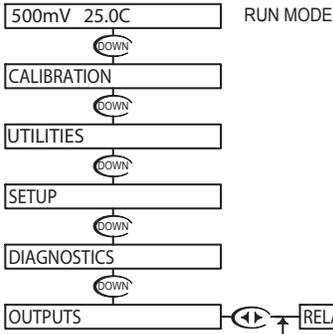
TO HIGH OFF

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# ORP - Outputs Menu - Alarm Relay 5.19



# ORP - Outputs Menu - 4-20mA CH1 Output 5.20



The Controller has 2 4-20mA outputs, electrically isolated from each other and ground. Either output can source current into a maximum of 800 ohms. See Section 3.12 for wiring diagram. Channel 1 (the primary output) is located on the flip out door, terminal plug P6. Channel 1 is dedicated to track the process and has fully independent and fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

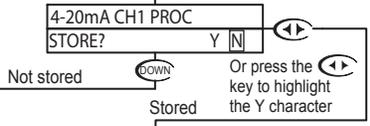
The example below shows the 4-20 mA set to 4mA =200mV and 20mA = 800mV. The output would then span 4 to 20 mA for a mV swing of 200mV to 800mV. Note that the span can be reversed, in that 4 mA can be set to a high mV value, and 20 mA can be set to a low mV value, effectively reversing the control direction.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

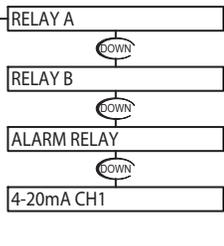
The TUNE function allows the user to precisely adjust the 4-20 mA output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary. To make the adjustment, place an accurate current meter in series with the 4-20 mA output, with the appropriate loads connected. When the TUNE menu is selected, the controller puts 20 mA out the terminals. Use the **UP** or **DOWN** keys to adjust the 20mA output to get exactly 20.

The TUNE value can be adjusted over the range from 0 to 1000, these are unitless numbers used for tuning purposes only.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



Then press the **DOWN** key to store the selection and return to the OUTPUTS menu

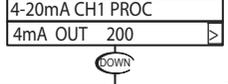


If you wish to change the setting, press the **LEFT** key once which will move the cursor to the first character of the value to be changed



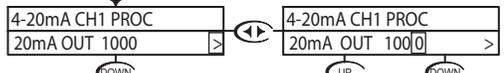
Use the **UP** and **DOWN** keys to change the setting

Press the **LEFT** key once which will move the cursor back to the RH side of the display.



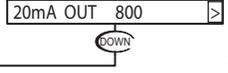
Press the **DOWN** key to accept the setting and move to the next setting

If you wish to change the setting, press the **LEFT** key once which will move the cursor to the first character of the value to be changed



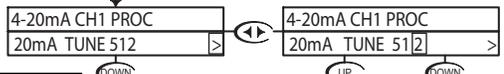
Use the **UP** and **DOWN** keys to change the setting

Press the **LEFT** key once which will move the cursor back to the RH side of the display.



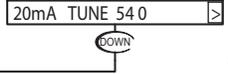
Press the **DOWN** key to accept the setting and move to the next setting

If you wish to change the setting, press the **LEFT** key once which will move the cursor to the first character of the value to be changed



Use the **UP** and **DOWN** keys to change the setting

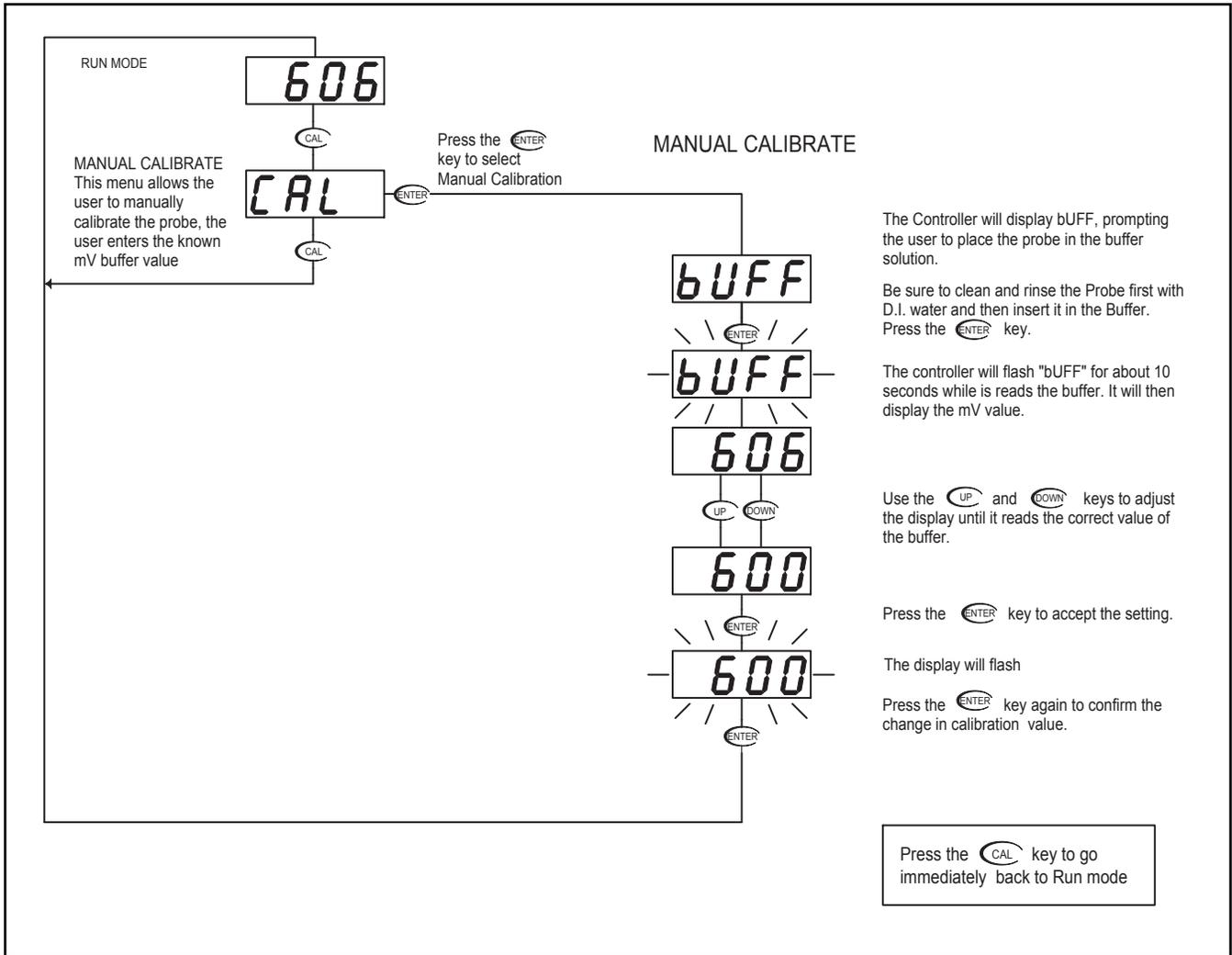
Press the **LEFT** key once which will move the cursor back to the RH side of the display.



Press the **DOWN** key to accept the setting and move to the next setting

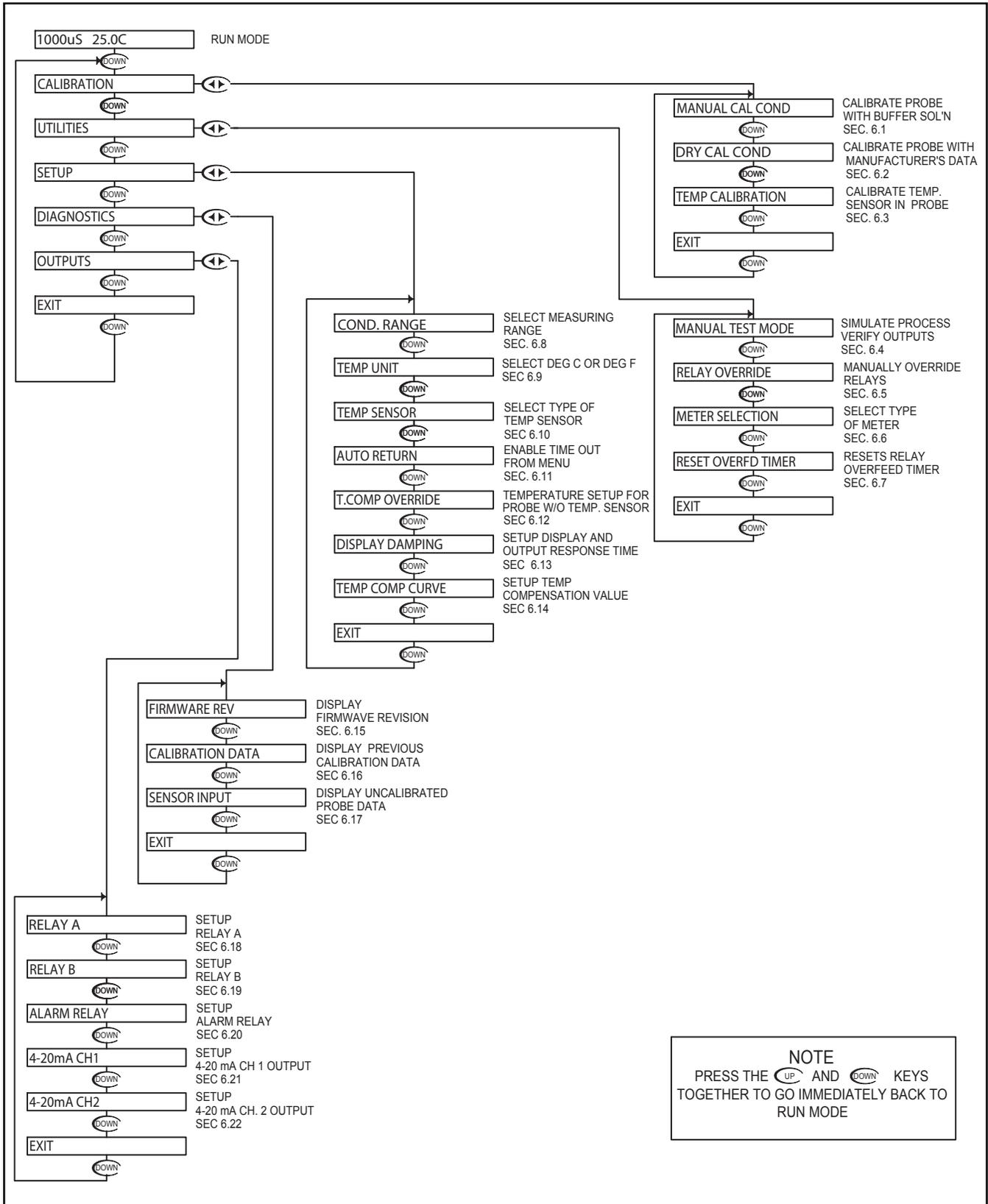


# ORP - LED Display Menu - ORP Manual Calibrate 5.22





# Conductivity - Menu Overview 6.0



# Conductivity - Calibration Menu - Manual Calibrate 6.1

Manual Calibration is used to "wet calibrate the cell". This can be done with the cell installed in the process, or with the cell suspended in a known buffer solution.  
 When calibrated "In Process", the actual conductivity is determined with a grab sample or a hand held meter, and the value entered in the display.  
 When calibrated with buffers, the cell is placed in a known buffer solution, and the value of the buffer entered on the display.  
 In both cases, make sure the cell has time to stabilize both in temperature and conductivity before entering any data.

1000uS 25.0C RUN MODE

CALIBRATION

MANUAL CAL COND

MANUAL CAL COND

967 uS

MANUAL CAL COND

967 uS

MANUAL CAL COND

1000 uS

MANUAL CAL COND

1000 uS

MANUAL CAL COND

STORE? Y N

MANUAL CAL COND

STORE? Y N

If the calibration did not appear to be correct, press the DOWN key which will return back to the Manual Cal Cond menu.

If the calibration is OK, use the RIGHT key to move the cursor over the Y text and press the down key.

Press DOWN to store the calibration data and return back to the Manual Cal Cond menu so the user can select another function.

Place the cell in the buffer solution  
 The controller will read the Conductivity value, averaging a number of results to get a stable calibration value.

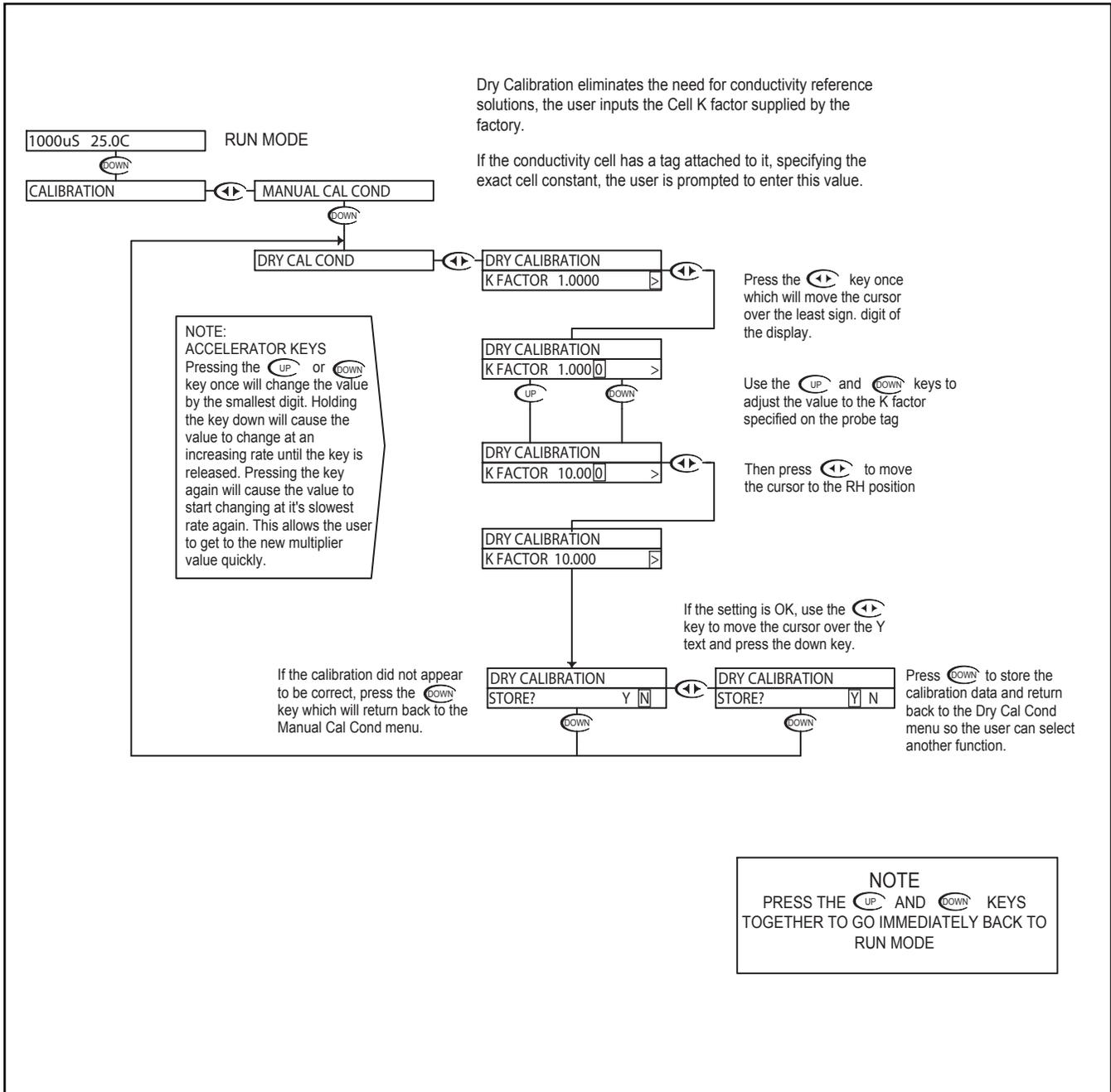
Press the LEFT key once which will move the cursor over the least sign. digit of the display.

Use the UP and DOWN keys to adjust the reading until it agrees with the actual buffer conductivity value

Then press LEFT to move the cursor to the RH position

**NOTE**  
 PRESS THE UP AND DOWN KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Calibration Menu - Dry Cal Cond 6.2



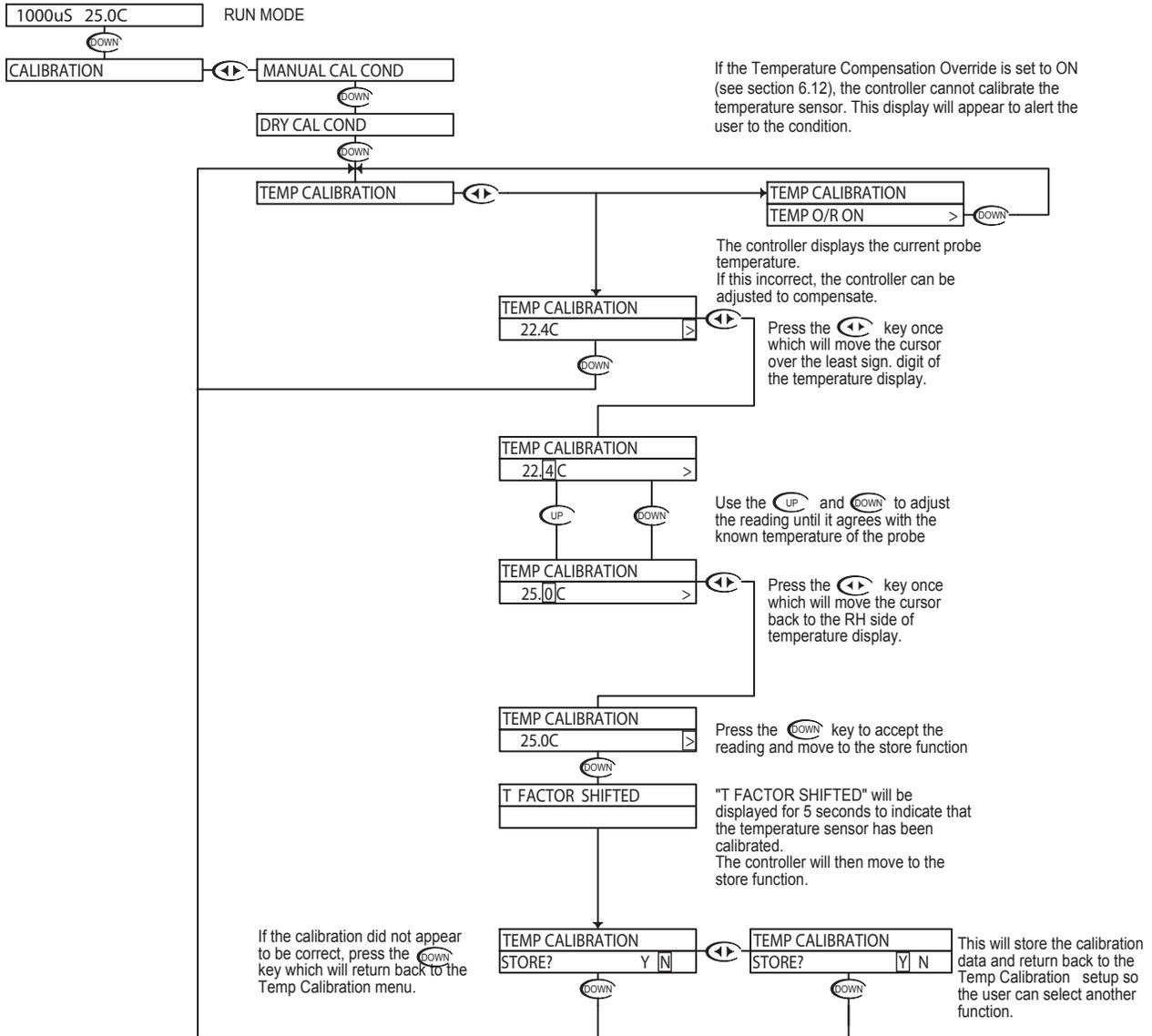
# Conductivity - Calibration Menu - Temp. Calibration 6.3

## Temperature Calibration

In most cases, the factor temperature calibration is accurate enough to ensure correct temperature readings. However, in some circumstances, the user may wish to ensure the temperature sensor is calibrated accurately, especially when operating at the extreme end of the conductivity cell temperature operating range, or where the temperature compensation is critical to correct process readings. This menu allows to user to calibrate the temperature anywhere within it's range.

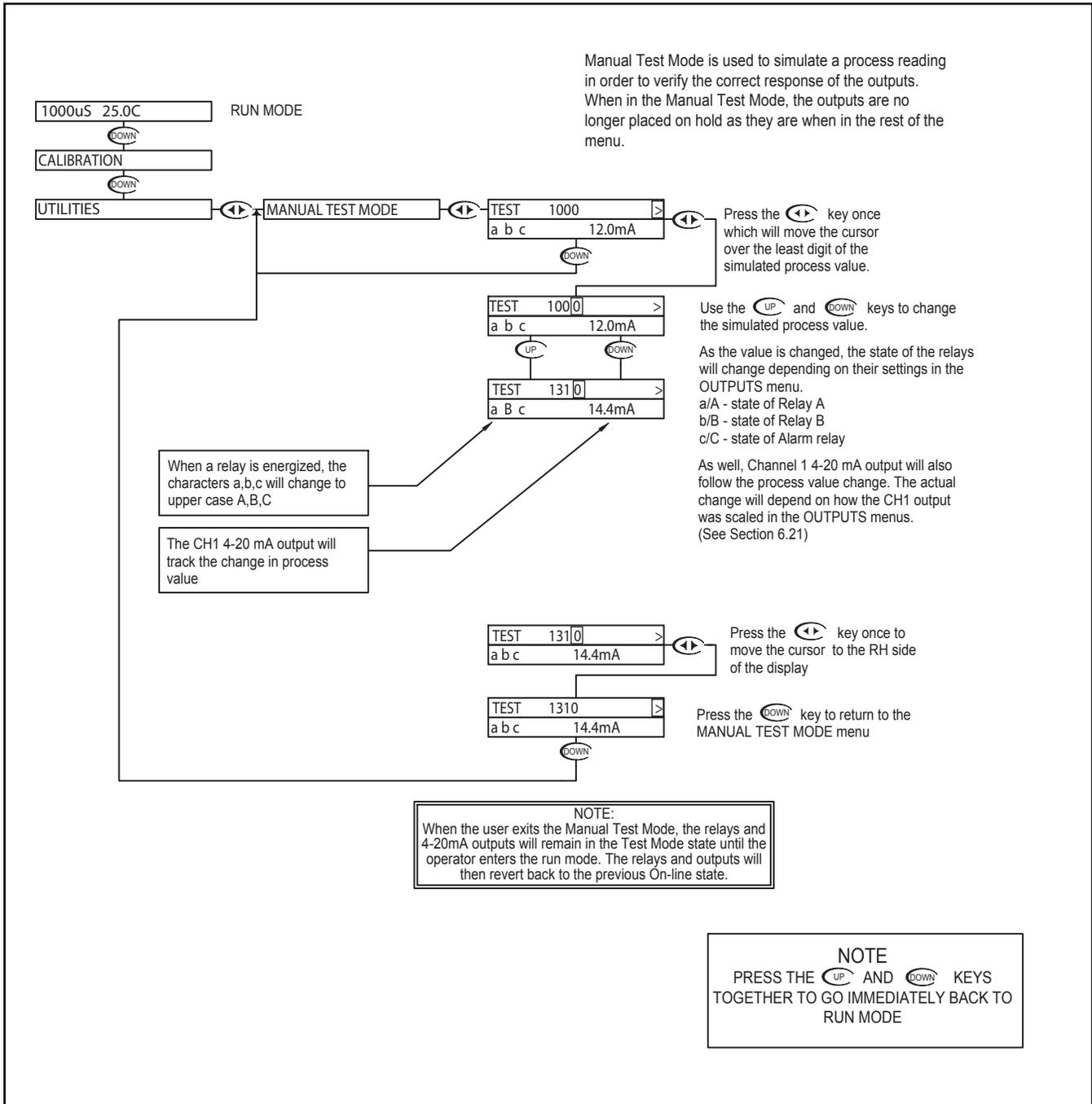
Be aware, that the conductivity reading is affected by the temperature reading (due to the temperature compensation) so accurate temperature calibration is vital to obtaining accurate conductivity readings. If the user is unsure of the calibration test fixture, then it would be best to leave the temperature calibration at it's factory setting.

Be sure to allow the temperature of the cell to stabilize before attempting to calibrate the temperature sensor, this may take a significant amount of time as the sensor is buried behind a protective layer of epoxy which will cause some delay.

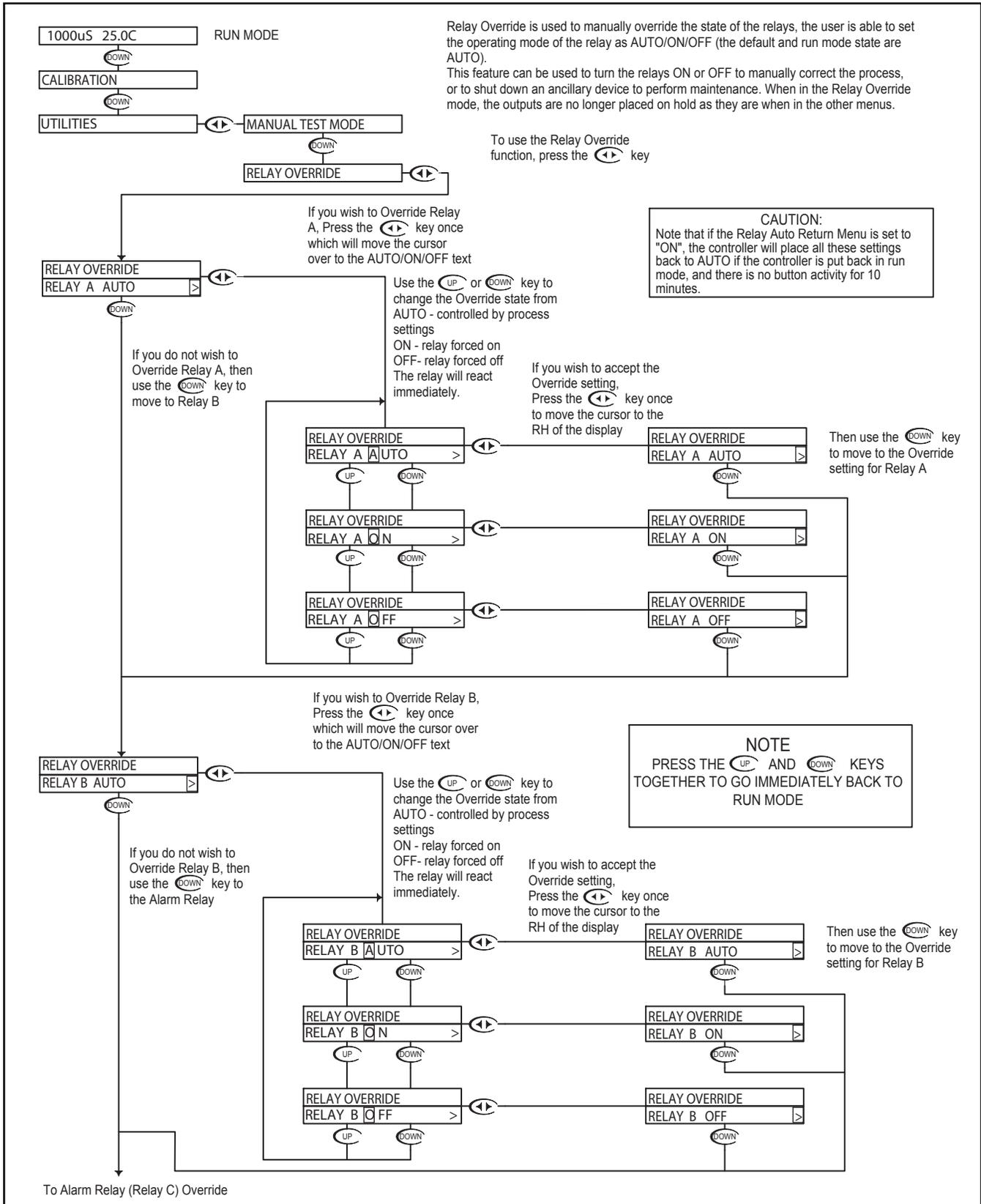


**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

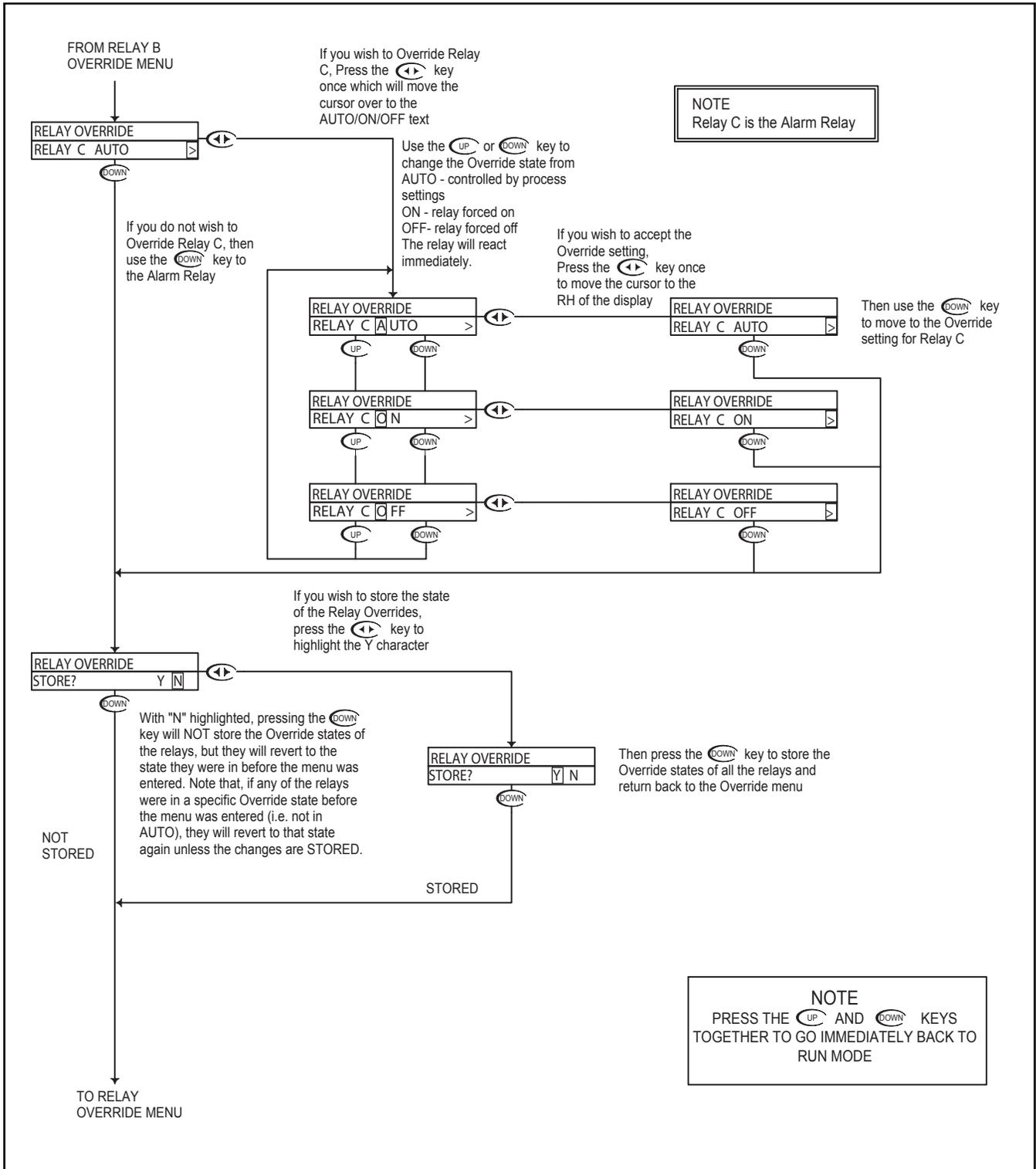
# Conductivity - Utilities Menu - Manual Test Mode 6.4



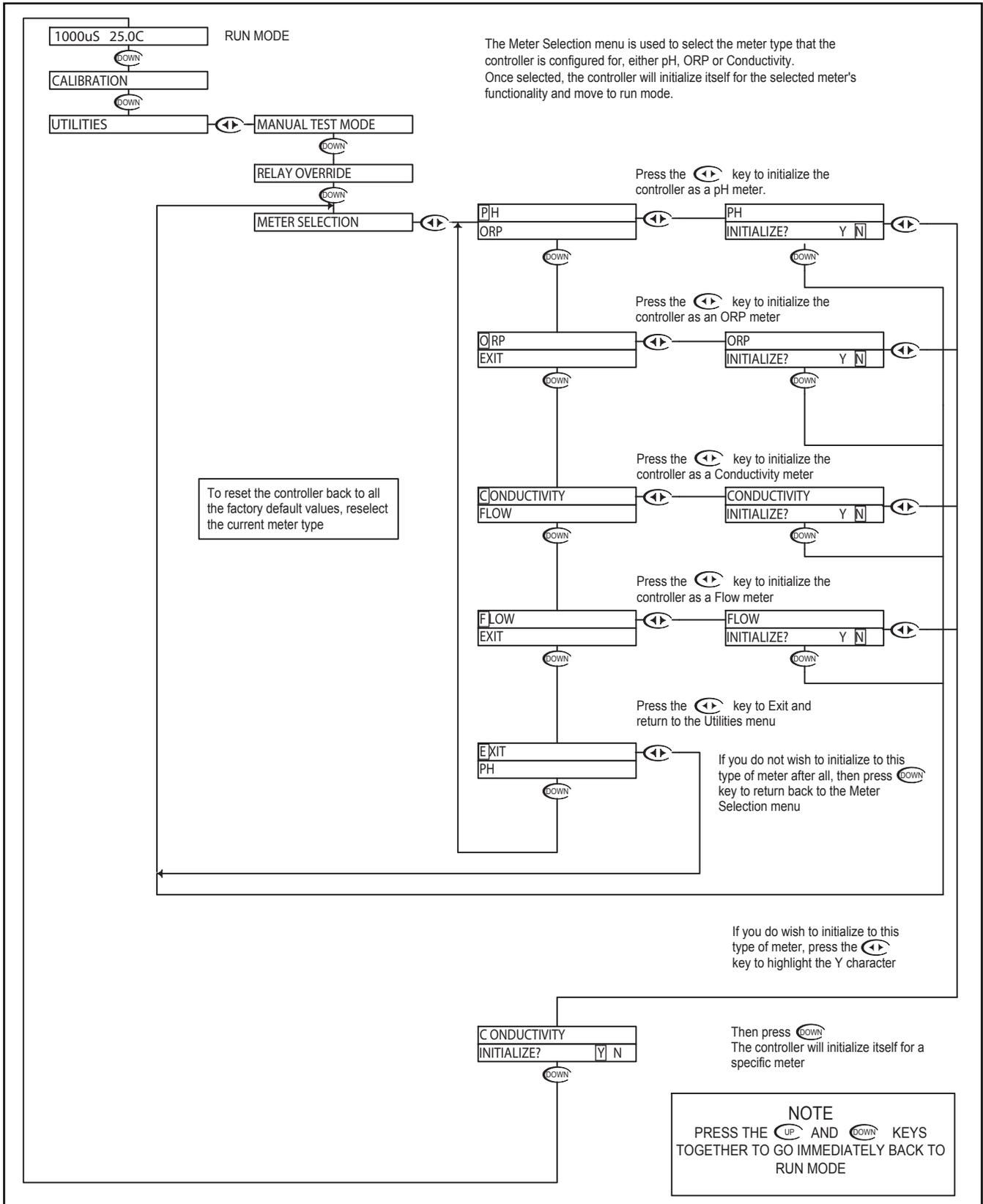
# Conductivity - Utilities Menu - Relay Override 6.5



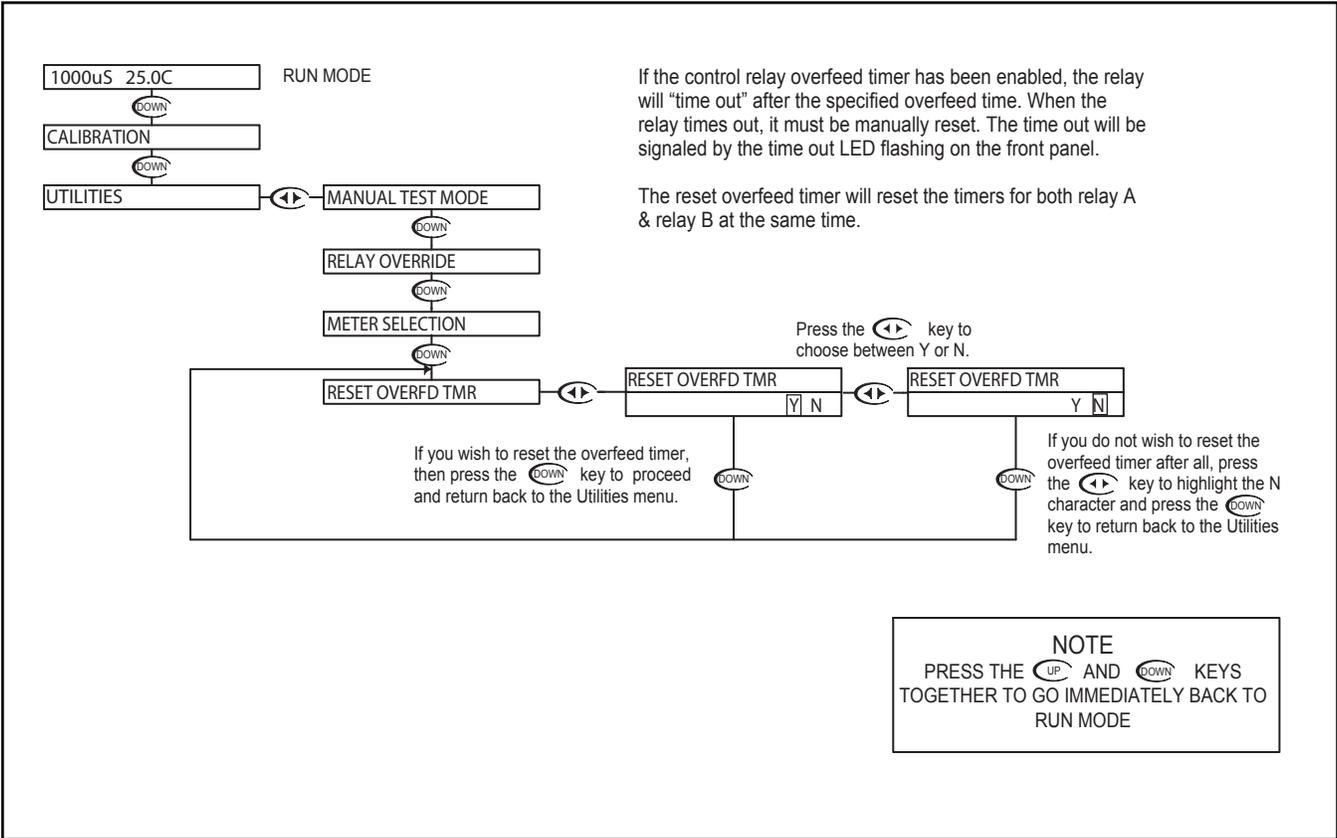
# Conductivity - Utilities Menu - Relay Override 6.5



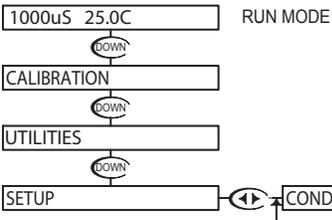
# Conductivity - Utilities Menu - Meter Selection 6.6



# Conductivity - Utilities Menu - Overfeed Timer Reset 6.7



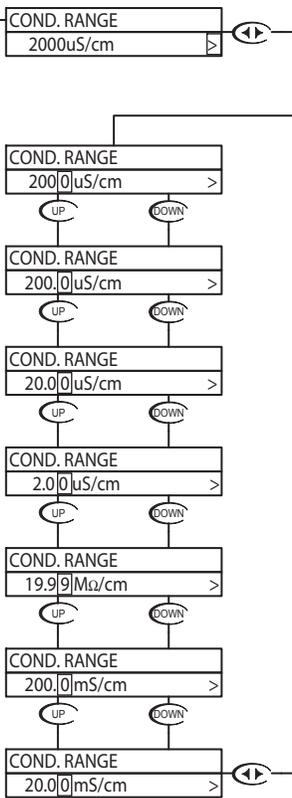
# Conductivity - Setup Menu - Conductivity Range 6.8



Conductivity Range will allow the user to select the measuring range of the instrument.  
 The ranges can be selected from any of the following:  
 200 mS/cm - cell constant 50  
 20 mS/cm - cell constant 10  
 2000 uS/cm - cell constant 1  
 200 uS/cm - cell constant 0.1  
 20 uS/cm - cell constant 0.1  
 2 uS/cm - cell constant 0.01  
 19.99 MΩ - cell constant 0.01

Press the key once which will move the cursor over the last character of the range.

Use the or keys to scroll through the available ranges



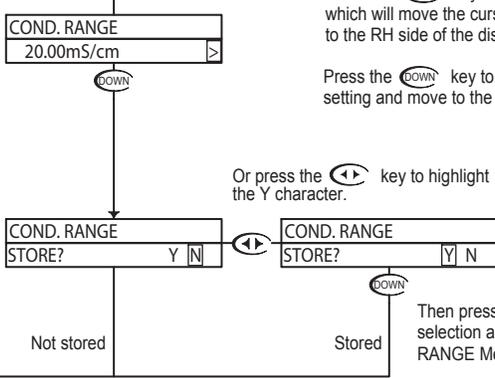
Once the correct range is selected, move to the store function to save the selection

Press the key once which will move the cursor back to the RH side of the display.

Press the key to accept the setting and move to the store function

With "N" selected, pressing the key will NOT store the selection, but simply return to the COND RANGE Menu. This function is useful if you wish to view the current selection without making any changes.

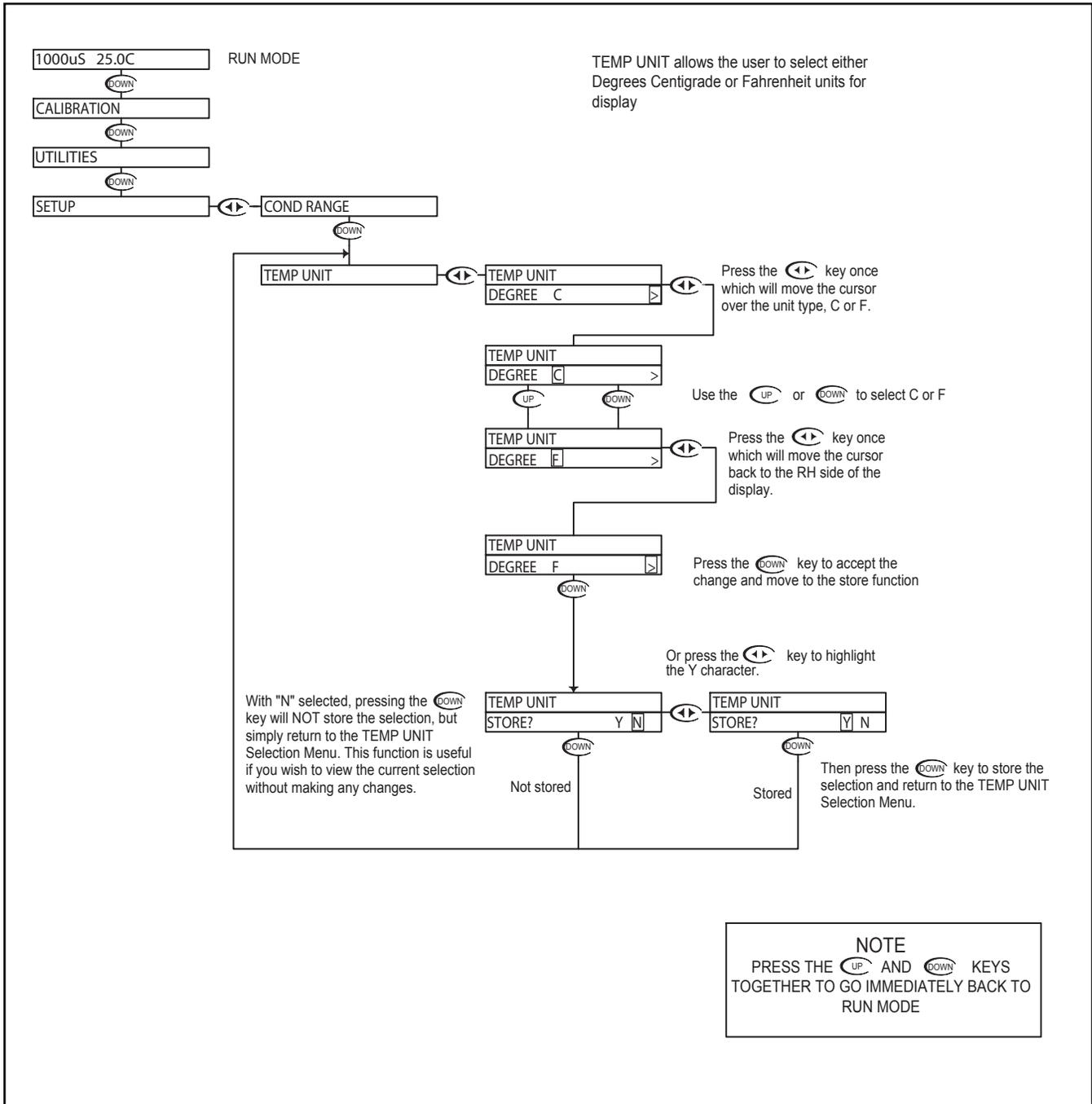
Or press the key to highlight the Y character.



Then press the key to store the selection and return to the COND RANGE Menu.

**NOTE**  
 PRESS THE AND KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Setup Menu - Temp. Unit 6.9



# Conductivity - Setup Menu - Temp. Sensor 6.10

1000uS 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

COND RANGE

TEMP UNIT

TEMP SENSOR

TEMP SENSOR  
3000 Ω NTC

TEMP SENSOR  
3000 Ω NTC

TEMP SENSOR  
300 Ω NTC

TEMP SENSOR  
1000 Ω RTD

TEMP SENSOR  
3000 Ω NTC

TEMP SENSOR  
STORE? Y N

Press the **RIGHT** key once which will move the cursor over to the sensor type.

Use the **UP** or **DOWN** to select the sensor type

Once the correct Sensor has been selected press the **RIGHT** key once which will move the cursor back to the RH side of the display.

Press the **DOWN** key to accept the change and move to the store function

Or press the **RIGHT** key to highlight the Y character.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the TEMP SENSOR Selection Menu. This function is useful if you wish to view the current selection without making any changes.

Not stored

Stored

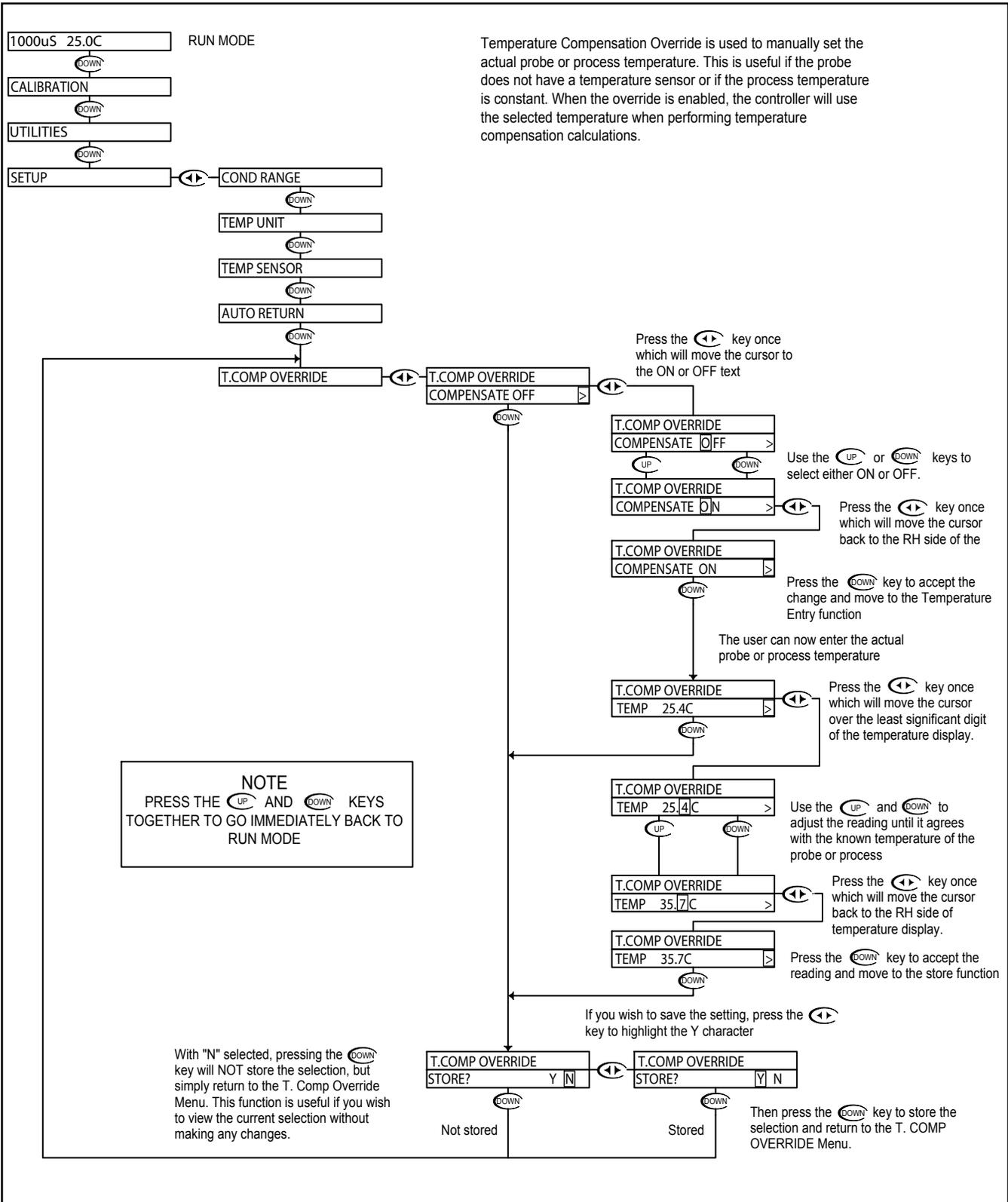
Then press the **DOWN** key to store the selection and return to the TEMP SENSOR Selection Menu.

TEMP SENSOR allows the user to select the type of temperature sensor used in the probe. The factory default for Conductivity is a 3000 Ω NTC thermistor. The user can also select a 300 Ω NTC thermistor or a Pt. 1000 RTD.

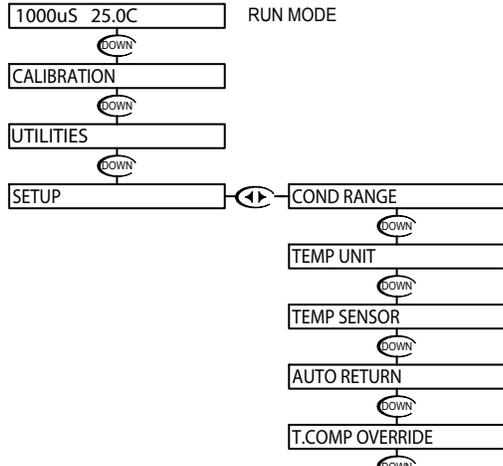
**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE



# Conductivity - Setup Menu - T. Comp Override 6.12

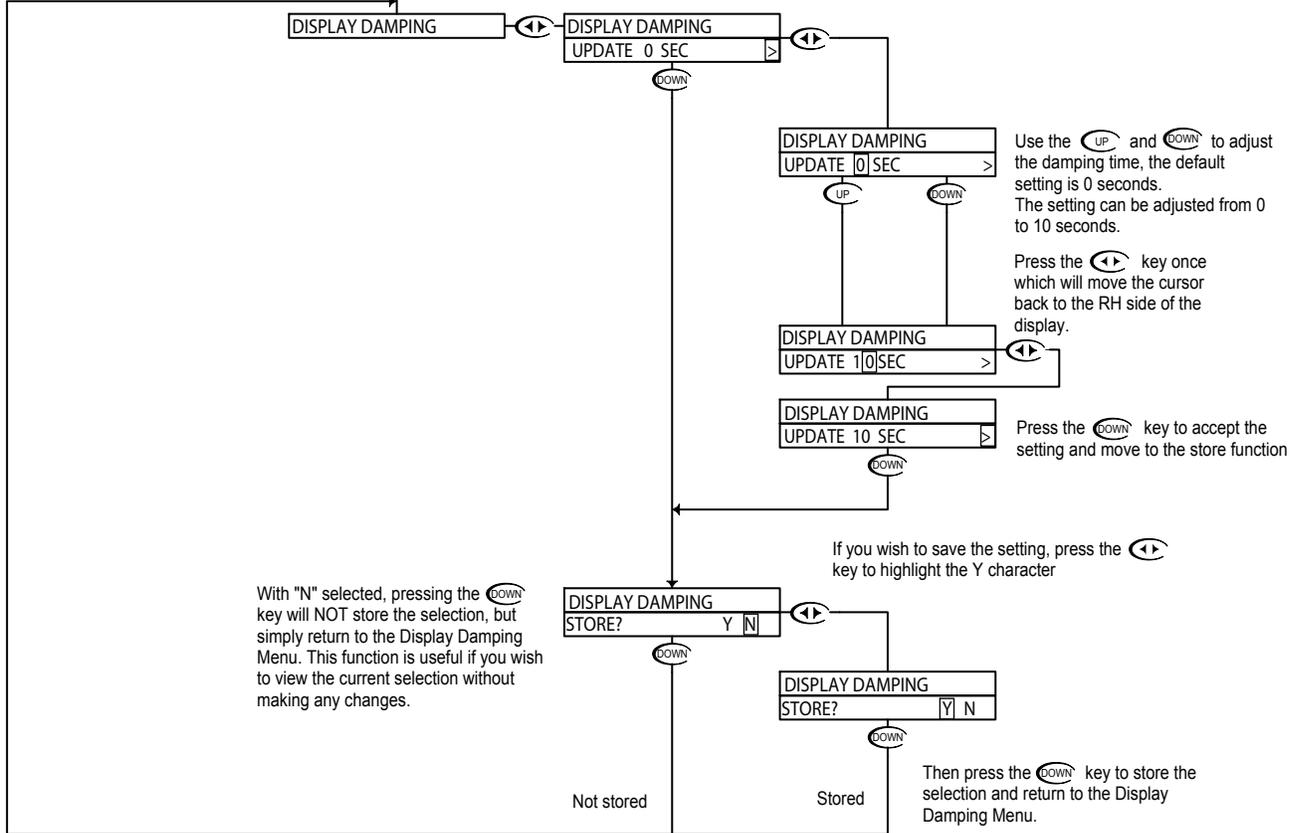


# Conductivity - Setup Menu - Display Damping 6.13



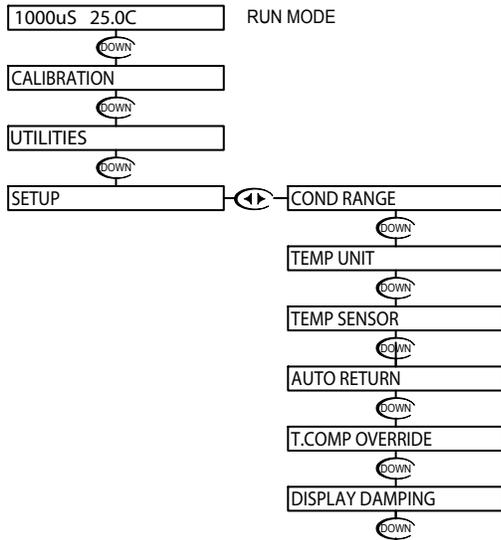
The Display Damping menu allows the user to adjust the rate at which the display and all outputs are updated. This allows the user to dampen out unstable process readings. The damping can be set from 0 seconds to 10 seconds. (default value is 0 sec.)

Press the **←→** key once which will move the cursor over the seconds digit

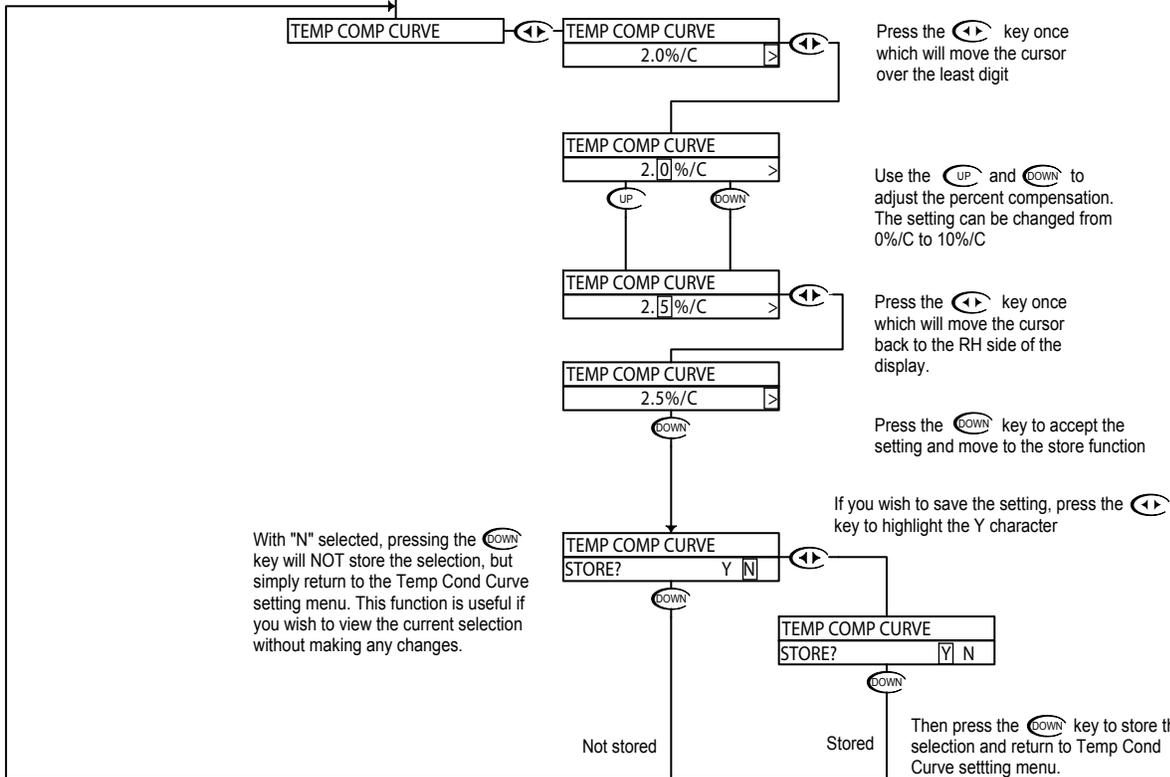


**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Setup Menu - Temp. Comp. Curve 6.14

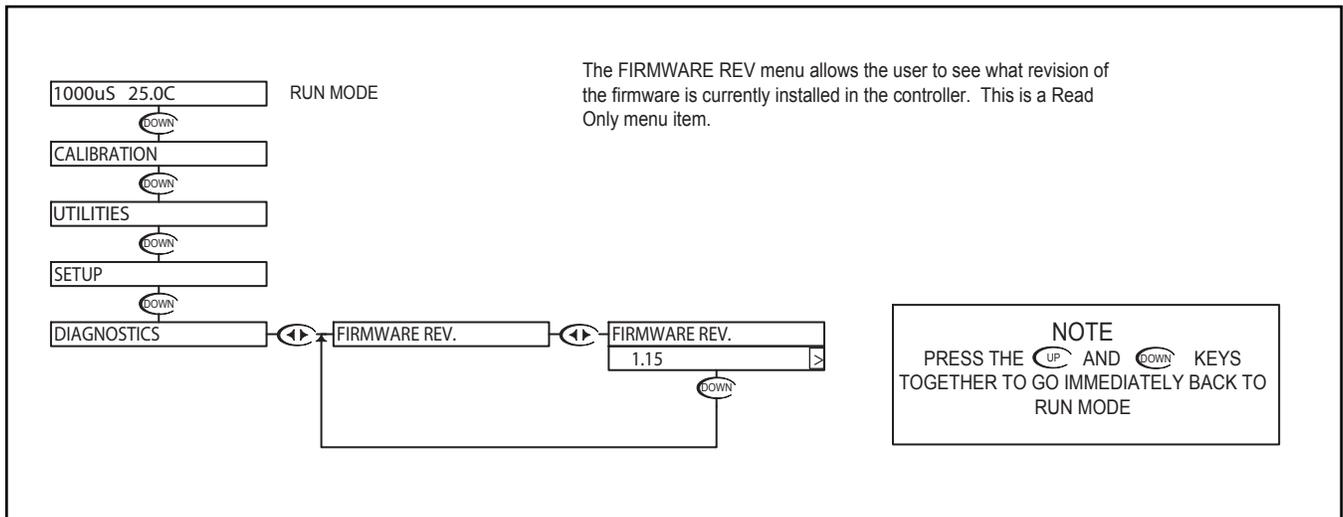


The Temperature Compensation Curve setting allows the user to select the temperature compensation to match a specific process. The variation of Conductivity versus Temperature is dependent on the type of solids and liquids in water, so no fixed compensation value will accurately compensate every process. This setting allows the user to fine tune the compensation to their specific process. Estimates of the correct compensation for certain chemicals are available and can be preset via this menu, otherwise the user will need to set the compensation to 0%/C, measure the effect of temperature for a specific process, calculate the actual compensation required and enter it through this menu. The Compensation can be varied from 0%/C to 10%/C.

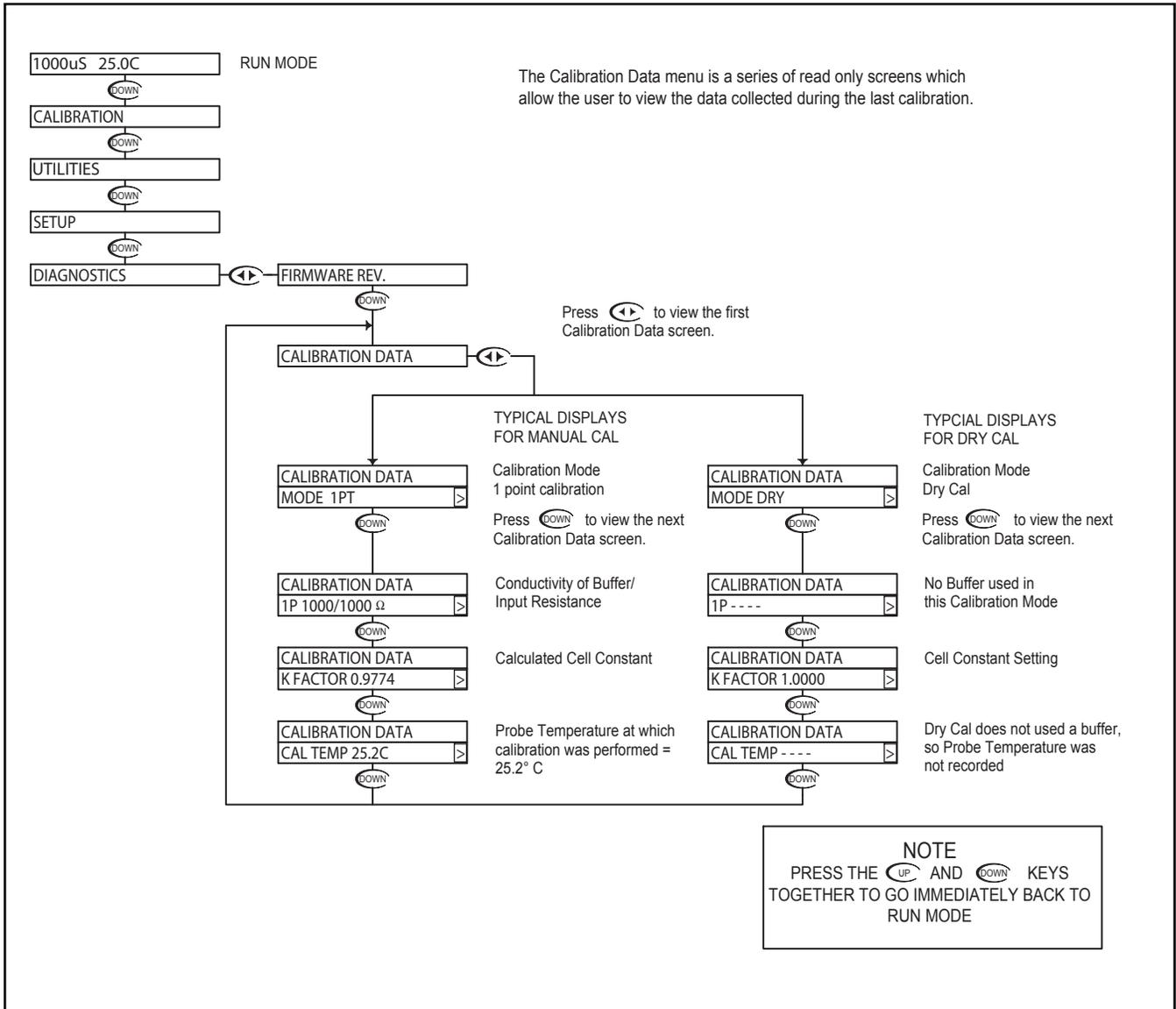


**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

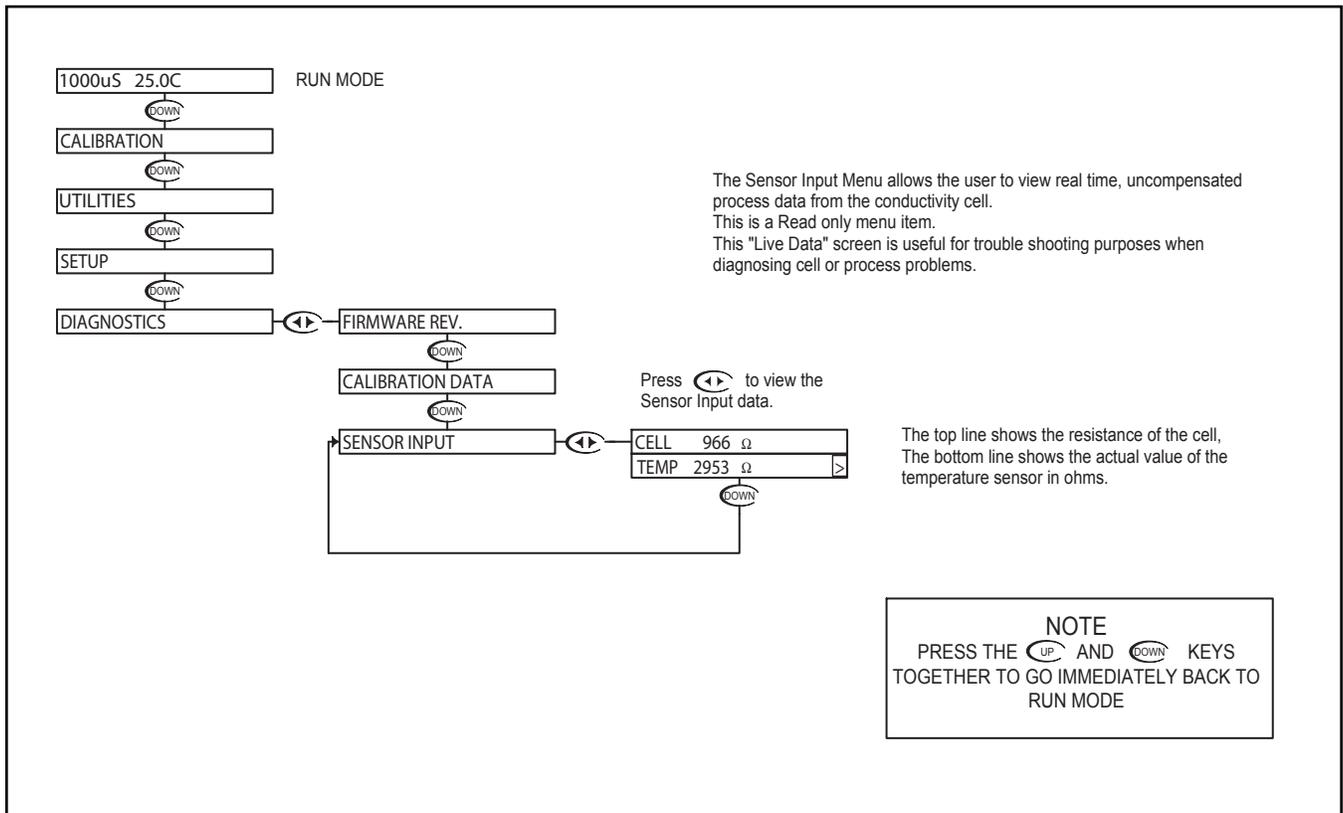
## Conductivity - Diagnostics Menu - Firmware Rev. 6.15



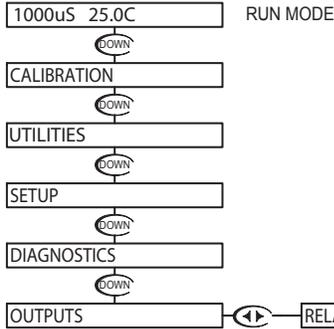
# Conductivity - Diagnostics Menu - Calibration Data 6.16



## Conductivity - Diagnostics Menu - Sensor Input 6.17



# Conductivity - Outputs Menu - Relay A 6.18



Relay A can be configured for the following operations

- Response to rising or falling process values
- Adjustable on and off set-points
- Cycle on and off times
- Failsafe operation

The relay can be set to control either a RISING or FALLING process. In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point. In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere in the normal range of the sensor.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the ON setting.

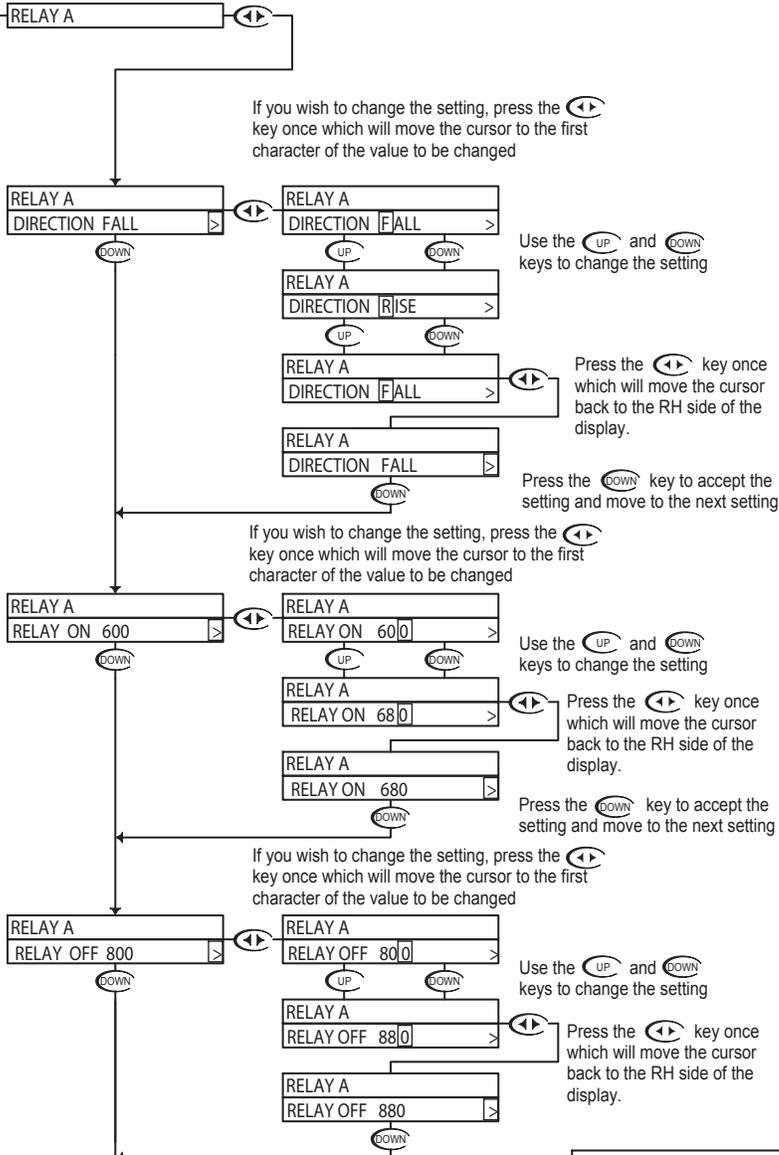
The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.



**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Outputs Menu - Relay A 6.18

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds.  
The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

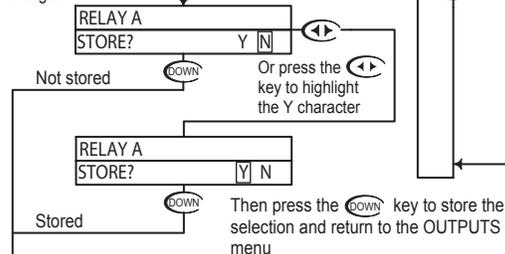
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

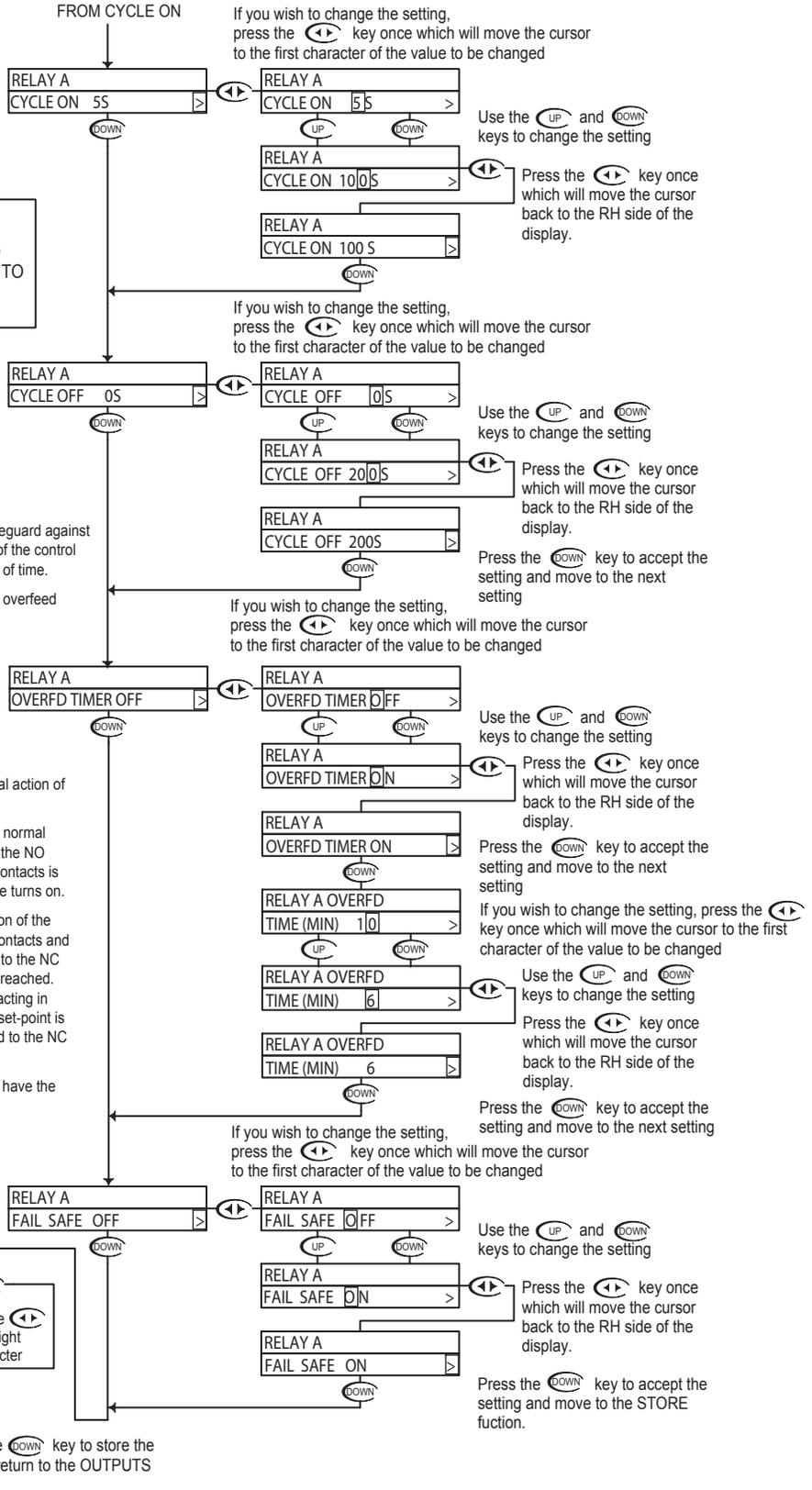
When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption.

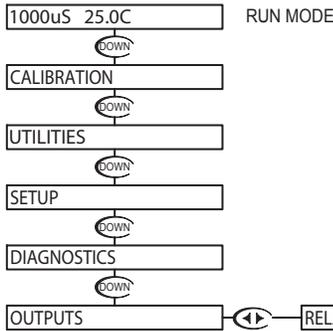
With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



TO OUTPUTS MENU



# Conductivity - Outputs Menu - Relay B 6.19



Relay B can be configured for the following operations  
 - Response to rising or falling process values  
 - Adjustable on and off set-points  
 - Cycle on and off times  
 - Failsafe operation  
 Each function will be explained below

The relay can be set to control either a RISING or FALLING process.  
 In a RISING process, the control relay will energize when the process rises above a set value. In this case, the ON set-point must be set higher than the OFF set-point.  
 In a FALLING process, the control relay will energize when the process falls below a set value. In this case, the ON set-point must be set lower than the OFF set-point.

The RELAY ON setting is the process value at which the relay will energize. It may be set anywhere in the normal range of the sensor.

The RELAY OFF setting is the process value at which the relay will de-energize. The setting must be rationalized against the On setting. For example, in a falling process, the Off setting must be higher than the ON setting.

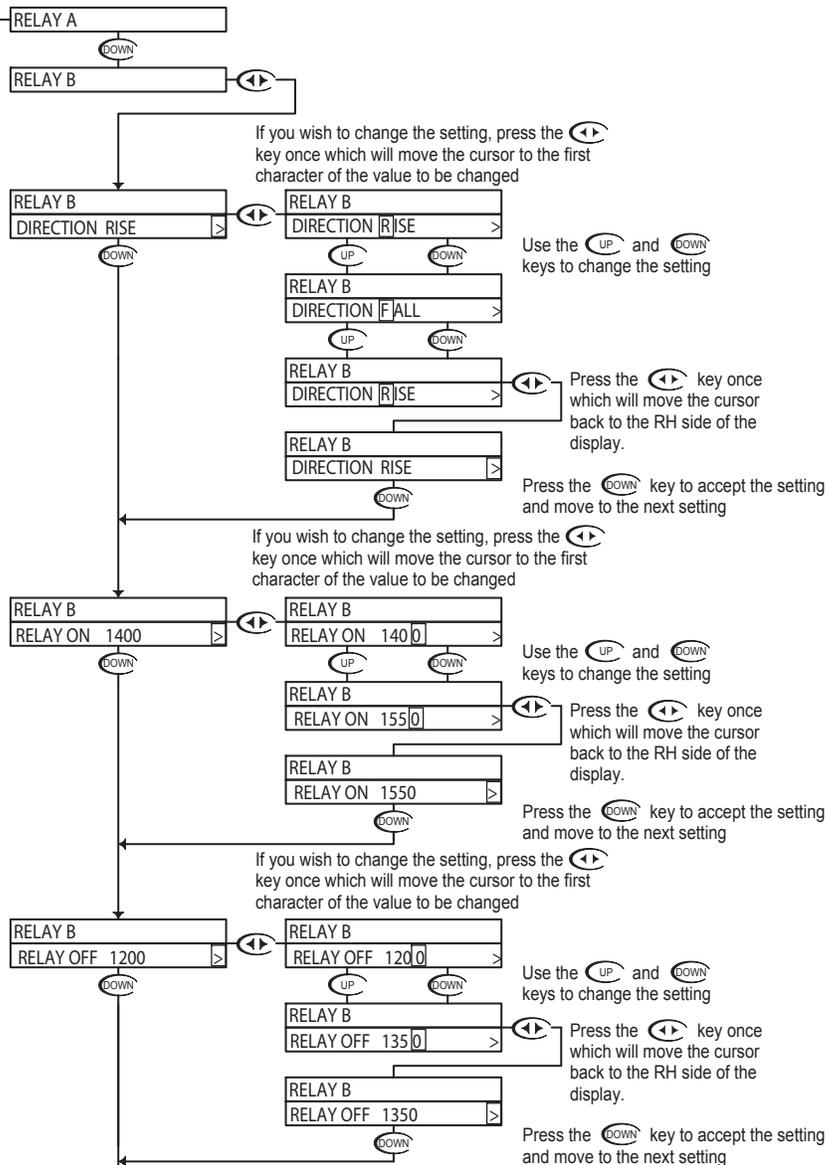
The controller will not allow you to select the RELAY OFF value on the wrong side of the RELAY ON value for the selected direction. If the user tries to set the RELAY OFF on the wrong side, the following errors will be displayed:

FALLING PROCESS  
 ON SPT < OFF SPT

Error when trying to set OFF point lower than ON point when set to falling.

RISING PROCESS  
 ON SPT > OFF SPT

Error when trying to set OFF point higher than ON point when set to rising.



**NOTE**  
 PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Outputs Menu - Relay B 6.19

The relay can be set to CYCLE when the process is between the RELAY ON setting and the RELAY OFF setting. This is meant to help eliminate overshoot.

The CYCLE ON time is the amount of time in seconds that the relay will be on. The value can be set between 0 and 600 seconds. The default ON time is 5 seconds.

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

The CYCLE OFF time is the amount of time in seconds that the relay will be off for, it can be set between 0 - 600 seconds.

To disable the cycling feature set the cycle off time to 0.

The Default OFF time is 0 seconds.

The OVERFEED TIMER is designed to help safeguard against a process or instrumentation error causing one of the control relays to remain energized for extended periods of time.

When enabled, the user must select the desired overfeed timeout time (1-999 min.)

If the overfeed timer times out:

- Alarm relay will energize.
- Control (A&B) will de-energize
- LED on front will flash

Must be reset via Utilities Menu or Power reset.

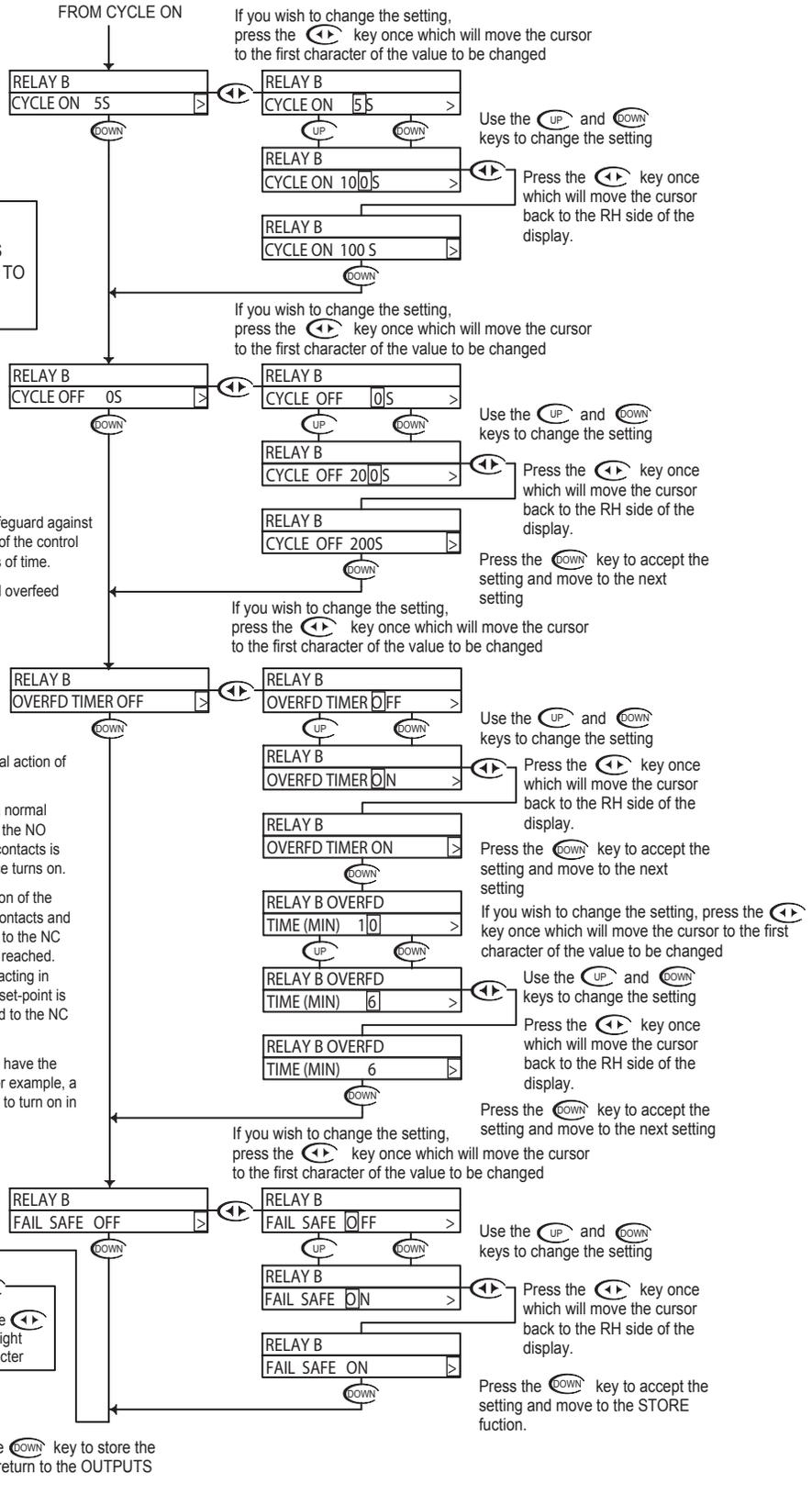
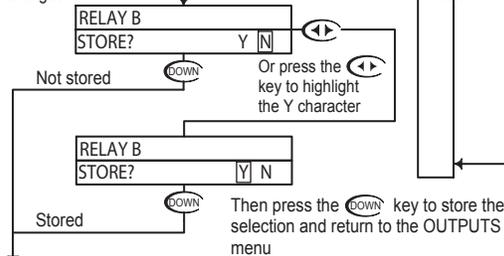
The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

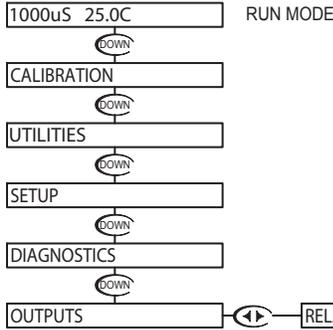
When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption. For example, a process that needs a constant feed, would want a pump to turn on in the event of a controller power failure.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



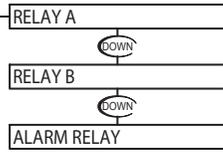
# Conductivity - Outputs Menu - Alarm Relay 6.20



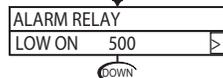
The ALARM RELAY will respond to both a rising and falling process. The ALARM RELAY will act as a low alarm (falling process) and a high alarm (rising process). Both relay bands will have independently adjustable on and off set-points. If a low alarm on set-point is set at a value 800uS for example, the off set-point must be set higher. The controller will not let the user input a value below the low alarm on. The same rule holds true for the high alarm.

The Alarm Relay can be configured for the following operations

- LOW ON Set-point
- LOW OFF Set-point
- HIGH ON Set-point
- HIGH OFF Set-point
- Failsafe



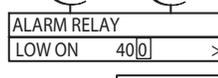
The LOW ON set point is the low process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.



If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed



Use the **UP** and **DOWN** keys to change the setting

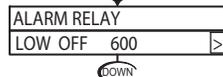


Press the **←→** key once which will move the cursor back to the RH side of the display.



Press the **DOWN** key to accept the setting and move to the next setting

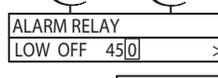
The LOW OFF set point is the value that the process must reach in order to de-energize the alarm relay after it has dropped below and tripped the LOW ON set-point. This value must be higher than the LOW ON Set-point.



If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed



Use the **UP** and **DOWN** keys to change the setting

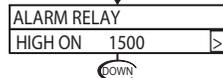


Press the **←→** key once which will move the cursor back to the RH side of the display.



Press the **DOWN** key to accept the setting and move to the next setting

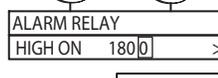
The HIGH ON set-point is the high process value that will cause the relay to energize. This value can be set anywhere 0-100% of Full Scale.



If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed



Use the **UP** and **DOWN** keys to change the setting



Press the **←→** key once which will move the cursor back to the RH side of the display.



TO HIGH OFF

**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Outputs Menu - Alarm Relay 6.20

The HIGH OFF set-point is the value that the must reach in order to de-energize the alarm relay after it has increased over and tripped the HIGH ON set-point. This value must be lower than the HIGH ON Set-point.

The FAIL SAFE feature is designed to reverse the normal action of the relay.

When set to FAIL SAFE OFF, the relay will operate as a normal relay, which means that when the relay is not energized the NO contacts are open, and a device connected via the NO contacts is turned off. When the relay becomes energized the device turns on.

When the relay is set to FAIL SAFE ON, the normal action of the relay is reversed. Thus the NO contact acts as the NC contacts and the NC acts as the NO. Therefore the device connected to the NC contacts will be turned on when the relay on set-point is reached. Actually the relay will be de-energized but because it is acting in reverse the device will be turned on. When the relay off set-point is reached the relay will energize and the device connected to the NC contact will turn off.

The reason that the Fail Safe option would be used is to have the device turned on in the event of a power interruption.

If the Low On set-point is set higher than the factory default Low Off set-point, when the user advances from the low on set-point to the Low Off set-point the controller will adjust the Low Off set-point to be equal to the Low On set-point. If the user then tries to decrease the Low Off set-point the Controller will display the Low Alarm setup error screen.

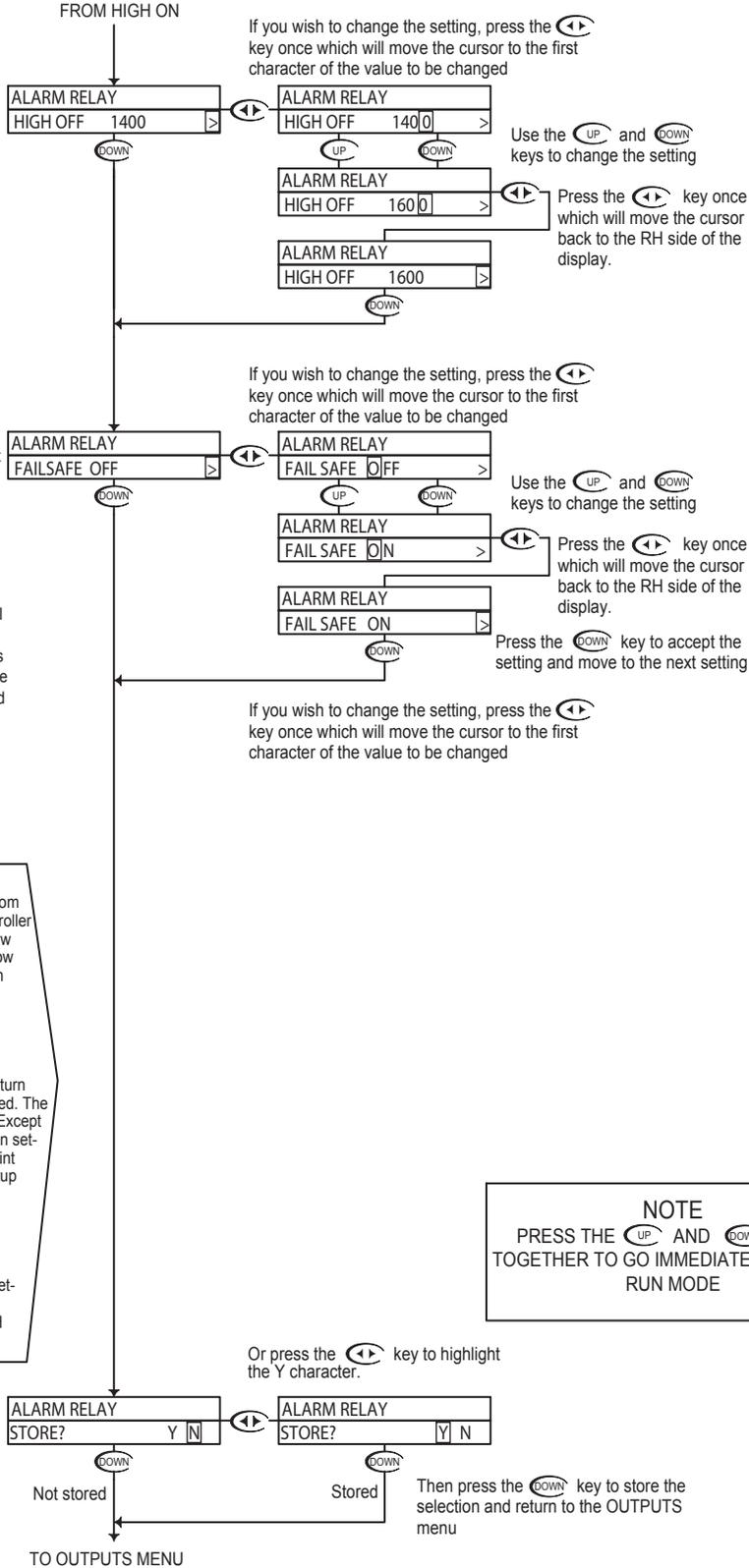
LOW ALARM  
ON SPT < OFF SPT

This screen will be displayed for 10 seconds, then return back to the setup screen that was previously displayed. The same conditions apply to the High alarm set-points. Except the High Off set-point must be lower than the High On set-point. If the user tries to increase the High Off set-point higher than the High On set-point the High Alarm setup error screen will be displayed.

HIGH ALARM  
ON SPT > OFF SPT

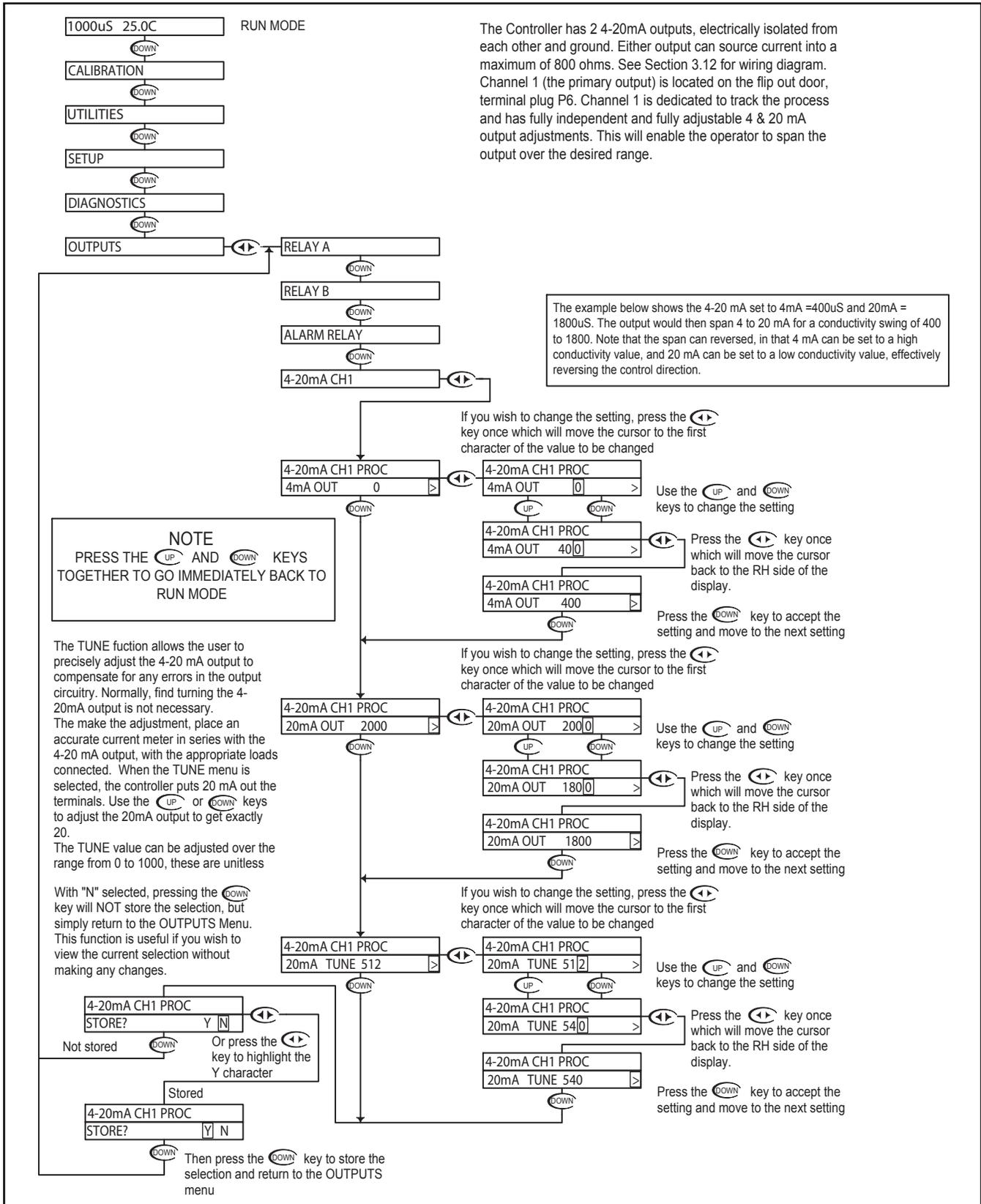
If the user sets the low on set-point and the low off set-point equal to 0, it will disable the Low Alarm relay. Similarly, setting the High On set-point and the HIGH OFF set-point to 0 will disable the High Alarm.

With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.

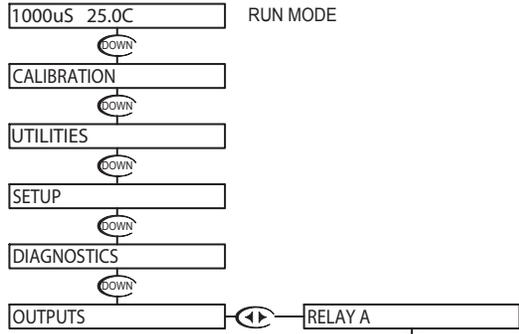


**NOTE**  
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - Outputs Menu - 4-20mA CH1 Output 6.21



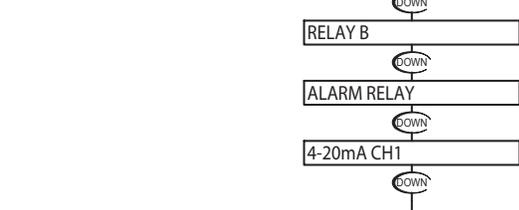
# Conductivity - Outputs Menu - 4-20mA CH2 Output 6.22



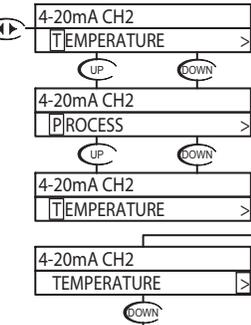
The Controller has 2 4-20mA outputs, electrically isolated from each other and ground. Either output can source current into a maximum of 800 ohms. Channel 2 can be selected to track the process or temperature. Channel 2 has fully independent and fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

Note that if the T COMP OVERRIDE is ON and Channel 2 output is set to track temperature, the output will not change, but hold at a value representing the temperature set in the T COMP OVERRIDE.

The example below shows the 4-20 mA set to 4mA = 0 C° and 20mA = 100 C°. The output would then span 4 to 20 mA for a temperature swing of 0 C° to 100 C°. Note that the span can be reversed, in that 4 mA can be set to a high process value, and 20 mA can be set to a low process value, effectively reversing the control direction.



If you wish to change the setting, press the **←→** key once which will move the cursor to the first character of the value to be changed



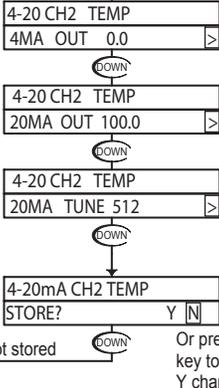
Use the **↑** and **↓** keys to change the setting

Press the **←→** key once which will move the cursor back to the RH side of the display.

Press the **↓** key to accept the setting and move to the next setting

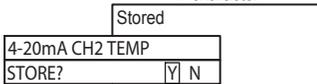
The TUNE function allows the user to precisely adjust the 4-20mA output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary. To make the adjustment, place an accurate current meter in series with the 4-20mA output, with the appropriate loads connected. When the TUNE menu is selected, the controller puts 20mA out to the terminals. Use the **↑** or **↓** keys to adjust the 20mA output to get exactly 20. The TUNE value can be adjusted over the range from 0 to 1000, these are unitless numbers used for tuning purposes only.

With "N" selected, pressing the **↓** key will NOT store the selection, but simply return to the OUTPUTS Menu. This function is useful if you wish to view the current selection without making any changes.



The 4mA, 20mA and TUNE functions are set up the same way as 4 - 20 mA CH 1 output.

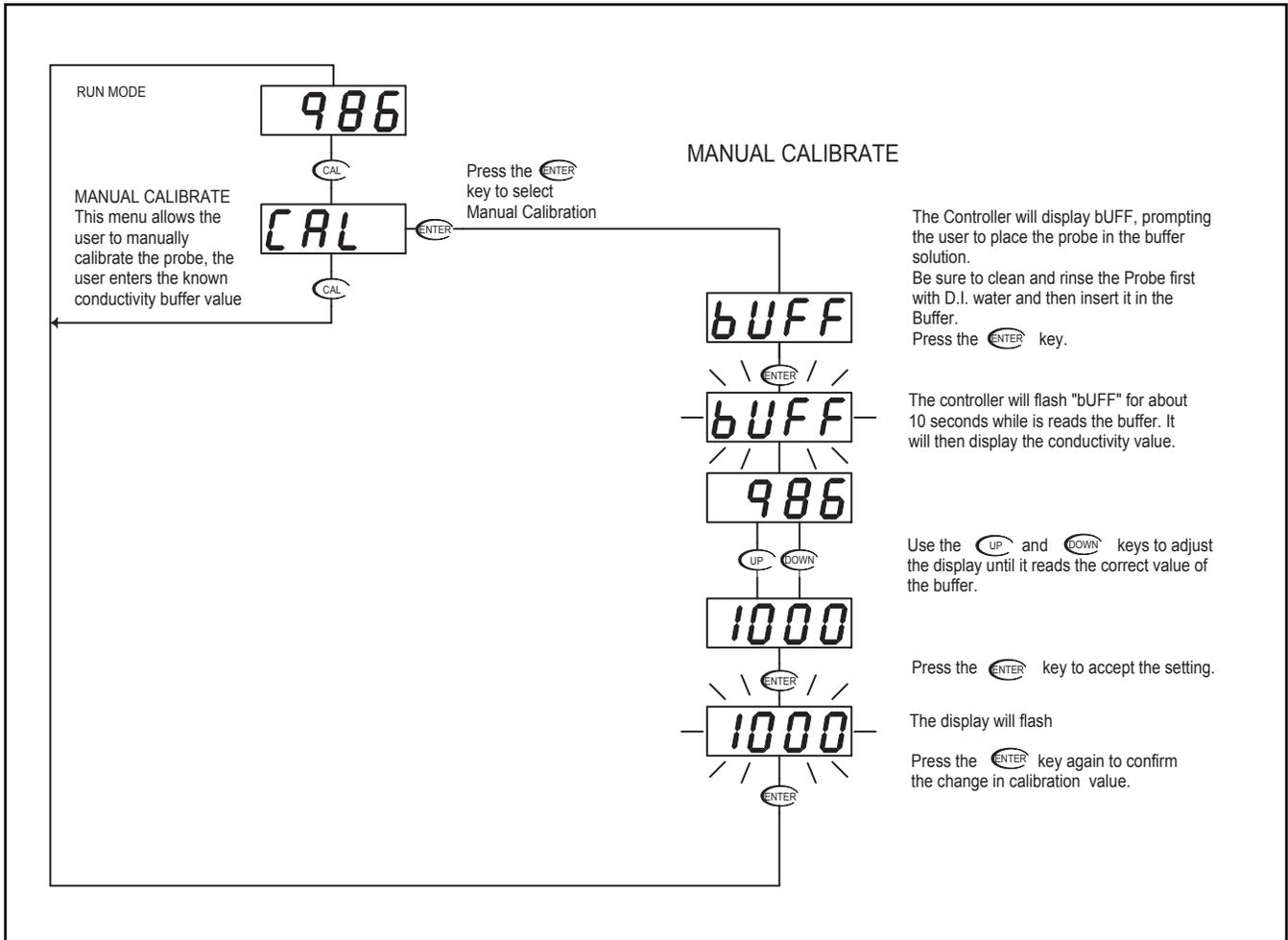
Not stored **↓** Or press the **←→** key to highlight the Y character



Then press the **↓** key to store the selection and return to the OUTPUTS menu

**NOTE**  
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

# Conductivity - LED Display Menu - Conductivity Manual Calibrate 6.23





## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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