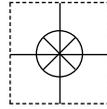


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User's Guide



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PHUTX601 Multi-parameter Transmitter



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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 PHUTX601 multi-parameter transmitter is a microprocessor based transmitter capable of measuring one of the following parameters, pH, ORP, conductivity or flow.

When shipped from the factory, the PHUTX601 is not set to measure any one parameter. When the PHUTX601 is powered up for the first time, it will display the meter selection screen where the meter type must be selected. (refer to section 4.5 Meter Selection)

This meter selection screen will only be displayed when the PHUTX601 is powered up for the first time.

After the user selects a meter type, the PHUTX601 transmitter will remain set to that meter type until it is changed with the meter selection menu function in the Utilities menu.

To return the PHUTX601 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 PHUTX601 User's menu has been divided into five main categories

- Calibration, used to calibrate the PHUTX601 with the selected sensor
- Utilities, used to manually control or override the outputs.
- Setup, used to configure the PHUTX601's many options
- Diagnostics, used to troubleshoot problems with the PHUTX601 or sensor
- Outputs, used to configure the PHUTX601's 4 to 20mA output.

PHUTX601 is packaged in a rugged NEMA 4X polycarbonate enclosure with a universal mounting kit for surface, panel and pipe-mount applications. This enclosure is perfect for stand-alone or panel-mount operation.

Section I - Specifications

	pH	ORP	Conductivity																		
Display	2 x 16 alpha-numeric LCD display																				
Power Requirements	4 to 20mA, Loop Powered, 16 to 32 VDC																				
Measuring Range	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/cm³</td> <td>0 to 19.99</td> <td>0.01</td> </tr> <tr> <td rowspan="4">uS/cm³</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 5000</td> <td>1.0</td> </tr> <tr> <td rowspan="2">mS/cm³</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 ³	0 to 19.99	0.01	uS/cm ³	0 to 2.000	0.01	0 to 20.00	0.1	0 to 200.0	0.1	0 to 5000	1.0	mS/cm ³	0 to 20.00	10	0 to 200.0	50	Temp: 0 to 100°C or 32° to +212°F
MΩ/cm ³	0 to 19.99	0.01																			
uS/cm ³	0 to 2.000	0.01																			
	0 to 20.00	0.1																			
	0 to 200.0	0.1																			
	0 to 5000	1.0																			
mS/cm ³	0 to 20.00	10																			
	0 to 200.0	50																			
Temperature Compensation	Automatic or Manual 0 - 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)																		
Temperature Unit	°C or °F																				
Temperature Sensor	User selectable: 300Ω NTC Thermistor, 3000Ω NTC Thermistor or Pt. 1000 RTD																				
Calibration Modes	Auto-Calibration Manual Calibration Temperature Calibration	Manual Calibration Temperature Calibration	Dry Calibration Sample Calibration Temperature Calibration																		
Ambient Conditions	Temperature: -20°C to +60°C or -4°F to +140°F Humidity: 0 to 90% RH (non-condensing)																				
Sensor to Transmitter Distance	Differential Sensor: 3000 ft (914 m) Combination Sensor: 10 ft (3 m)		300 ft (91.4 m)																		
Analog Output	4 to 20mA Isolated Output, Range expand 0 to 100% of full scale (min segment 10% of full scale), max. load 800Ω																				
Memory Back-up	All user settings are retained indefinitely in memory (EEPROM)																				
Mechanical	Enclosure: NEMA 4X, 1/4 DIN, polycarbonate enclosure with two 1/2" conduit holes Mounting: Universal Mounting kit for surface, pipe and panel mount included																				
Sensor Input	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																		
Invalid Entries	Invalid entries cannot be stored																				
Manual Test Mode	Process value can be simulated with arrow keys to verify correct setup of output																				
Output Hold	4 to 20mA output is placed on hold when the transmitter is in Menu mode																				
Calibration Data	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																		
Auto Return	User selectable auto return if the transmitter is left in menu mode for more than 10 min.																				
Display Damping	User can select rate at which the transmitter updates display. Enables display damping of unstable process																				
Net Weight	0.71 lbs (0.32 kg)																				

Section 2 - Installation

2.1 Unpacking

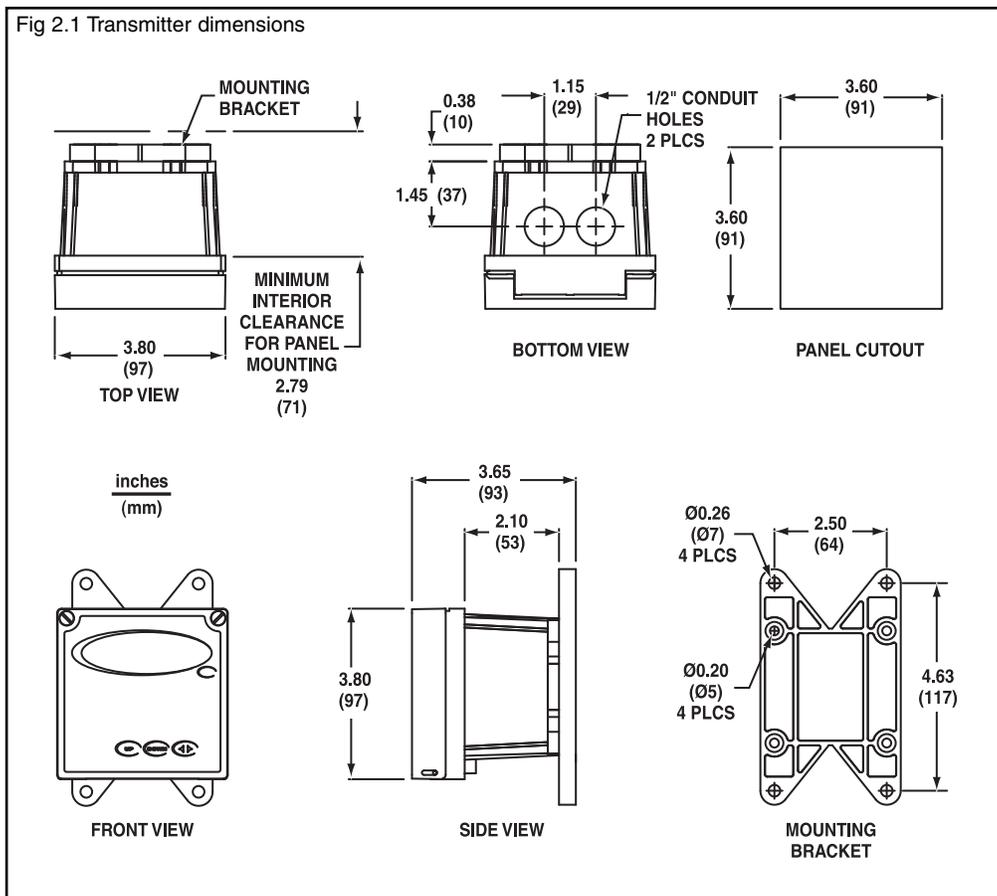
Save the shipping carton and packing material in case the instrument needs to be stored or returned. Inspect the instrument and packing material for shipping damage and report any problems immediately.

2.2 Location

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

- | | |
|------------------------------|----------------------|
| • Differential pH/ORP Probes | 3000 ft (914 meters) |
| • Combination pH/ORP Probes | 10 ft (3 meters) |
| • Conductivity Probes | 300 ft (91 meters) |

2.3 Mounting



Section 2 - Installation

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

Surface Mount – The PHUTX601 can be surface mounted using the hardware kit provided with the unit.

Pipe Mount – The transmitter can 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)

Figure 2.3 Panel Mount

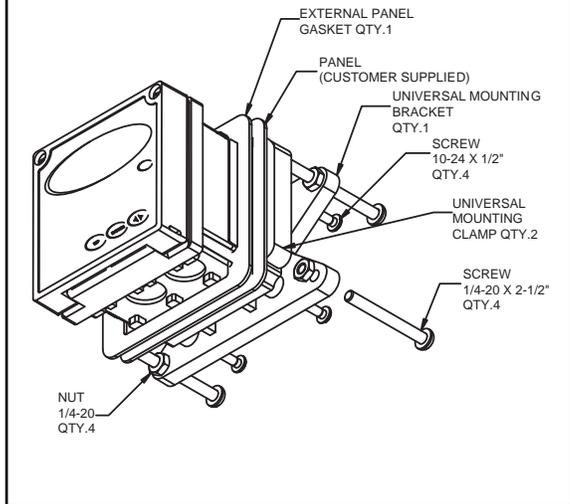


Figure 2.4 Surface Mount

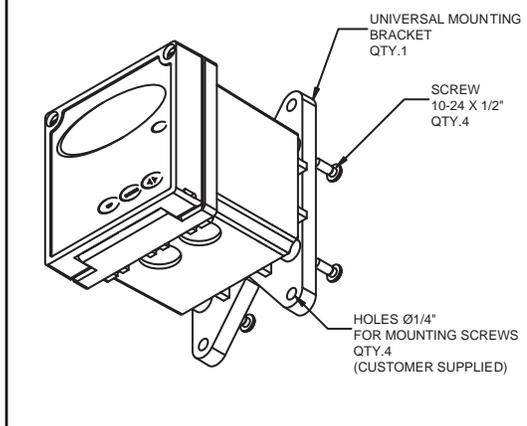


Fig. 2.5 Vertical Pipe Mount

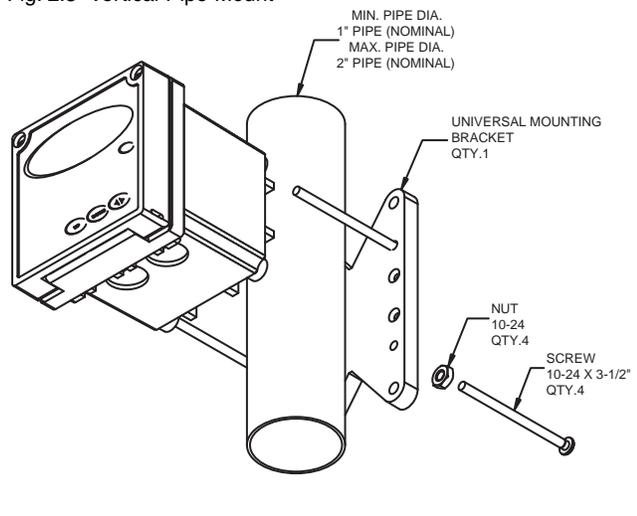
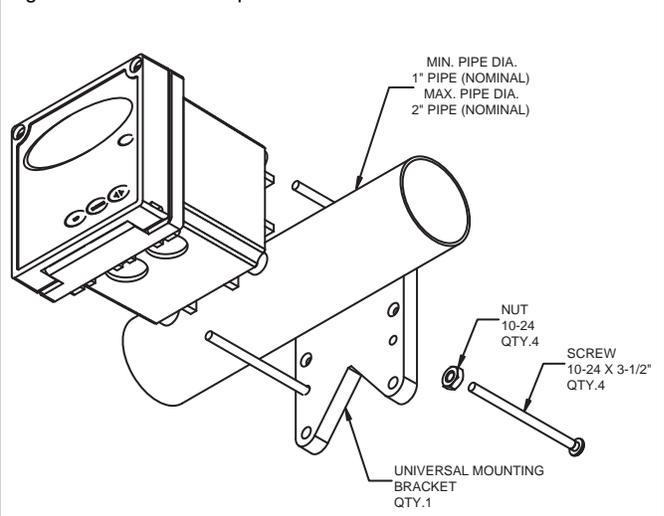


Figure 2.6 Horizontal Pipe Mount

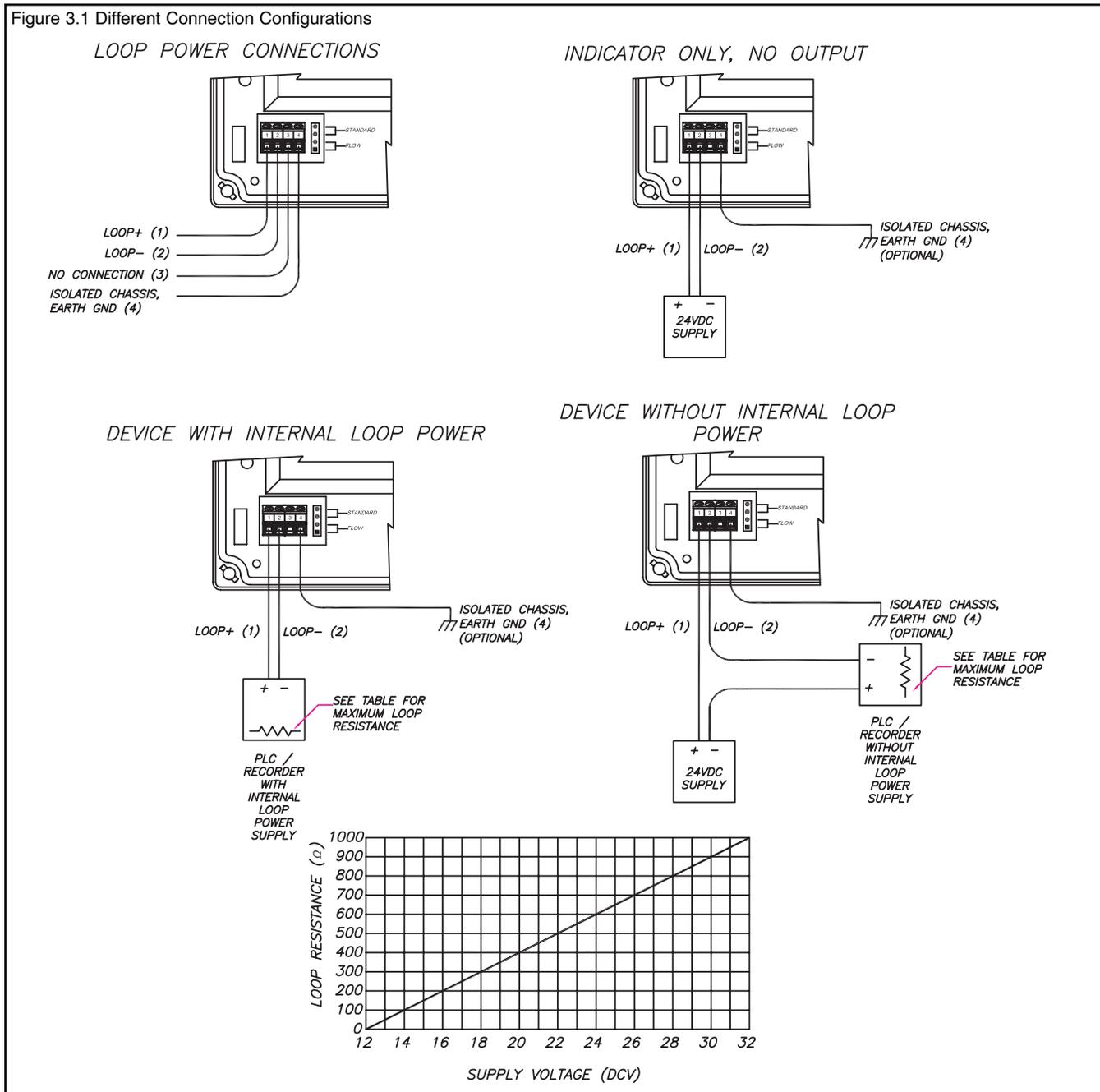


Section 3 - Electrical Connections and Setup

3.1 Conduit Connections

The PHUTX601 has two 1/2" conduit holes at the bottom 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.

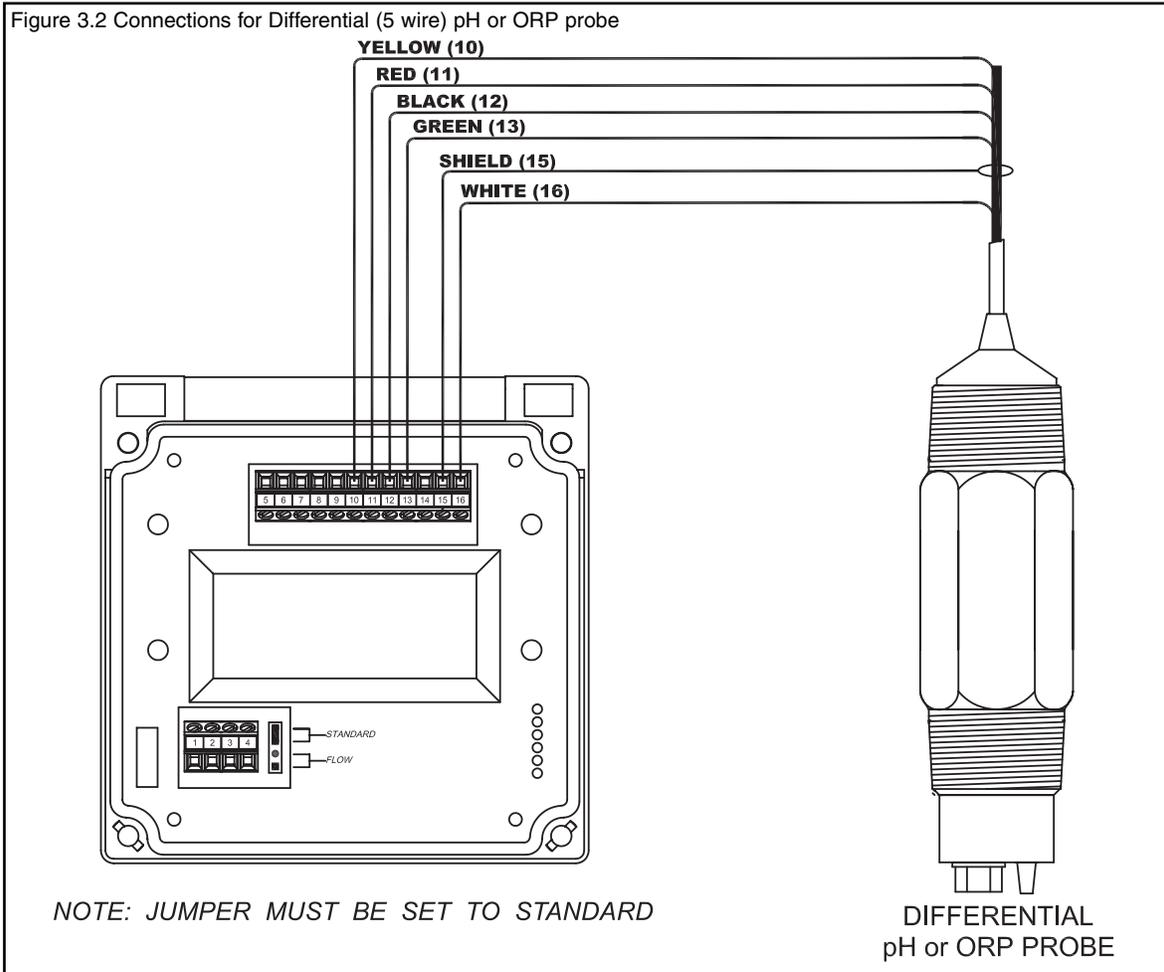
3.2 Power Connections



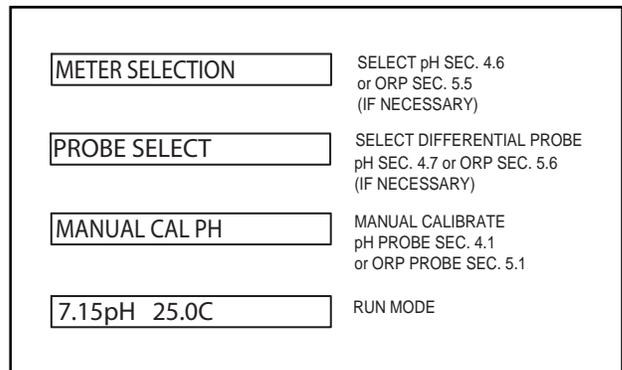
Section 3 - Electrical Connections and Setup

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.



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 transmitter is reading the probe temperature correctly for accurate temperature compensation. The ORP probe does not require temperature compensation, although the transmitter can display process temperature measured by the probe. The factory temperature calibration is usually accurate enough that no adjustments are necessary.



Section 3 - Electrical Connections and Setup

3.4 pH or ORP Combination Probe connections and setup

The drawing shows the connections for 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).

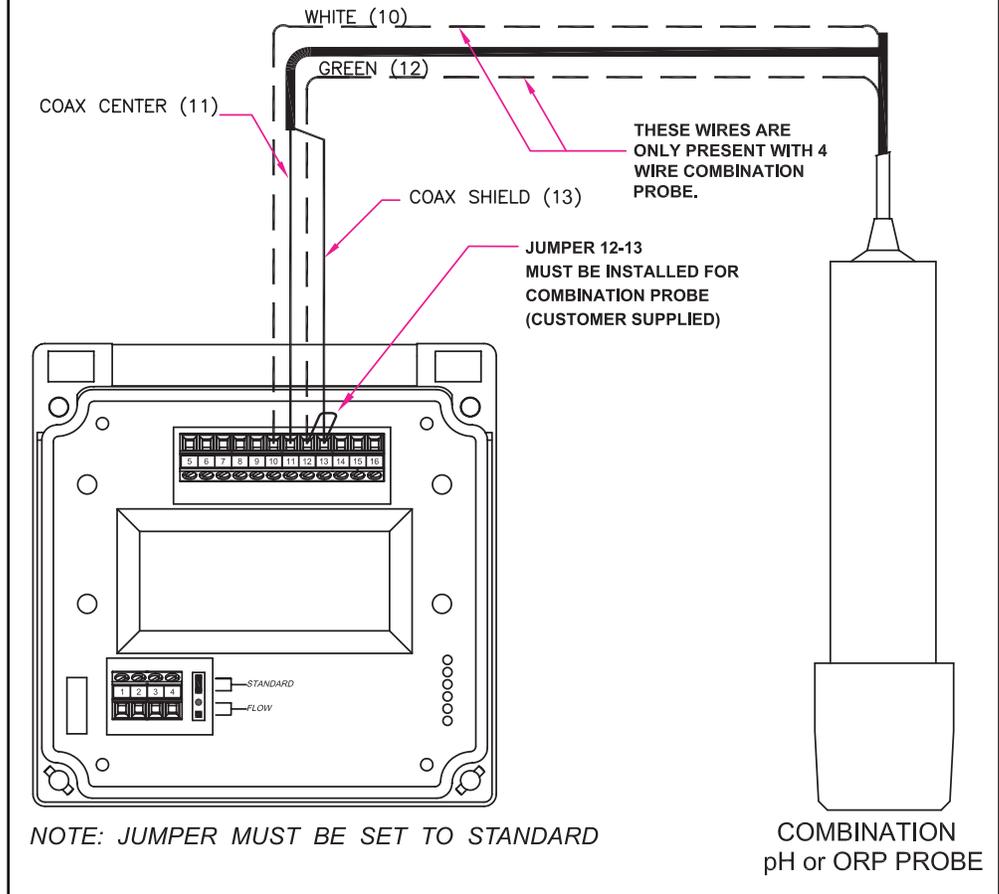
The **2 wire** version has no temperature sensor and is connected via a coaxial wire.

In a pH meter, the user should set the **T COMP OVERRIDE** menu to **ON** (Section 4.10) and adjust the temperature setting to the actual probe temperature.

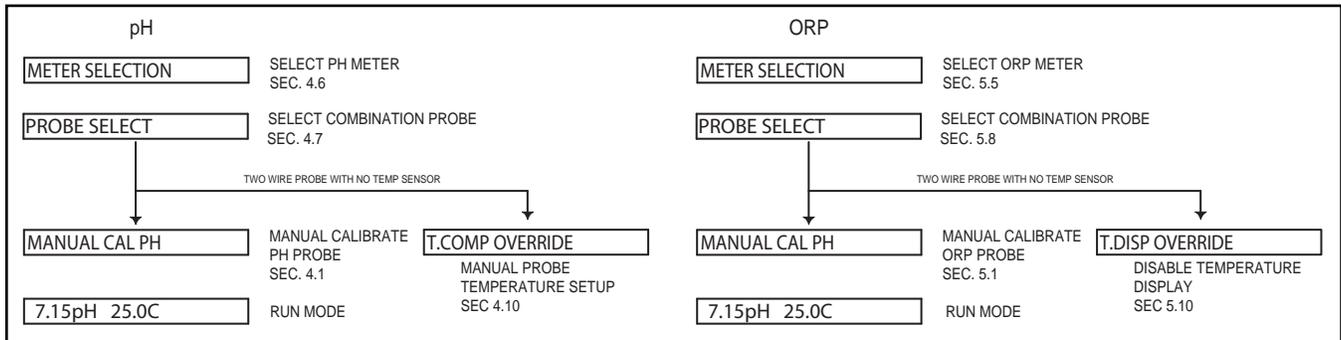
In an ORP meter, the user should set the **T.DISP OVERRIDE** to **ON** (Section 5.9) to blank the temperature reading on the display.

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**.

Fig. 3.3 Connections for the 2 and 4 wire Combination Probe



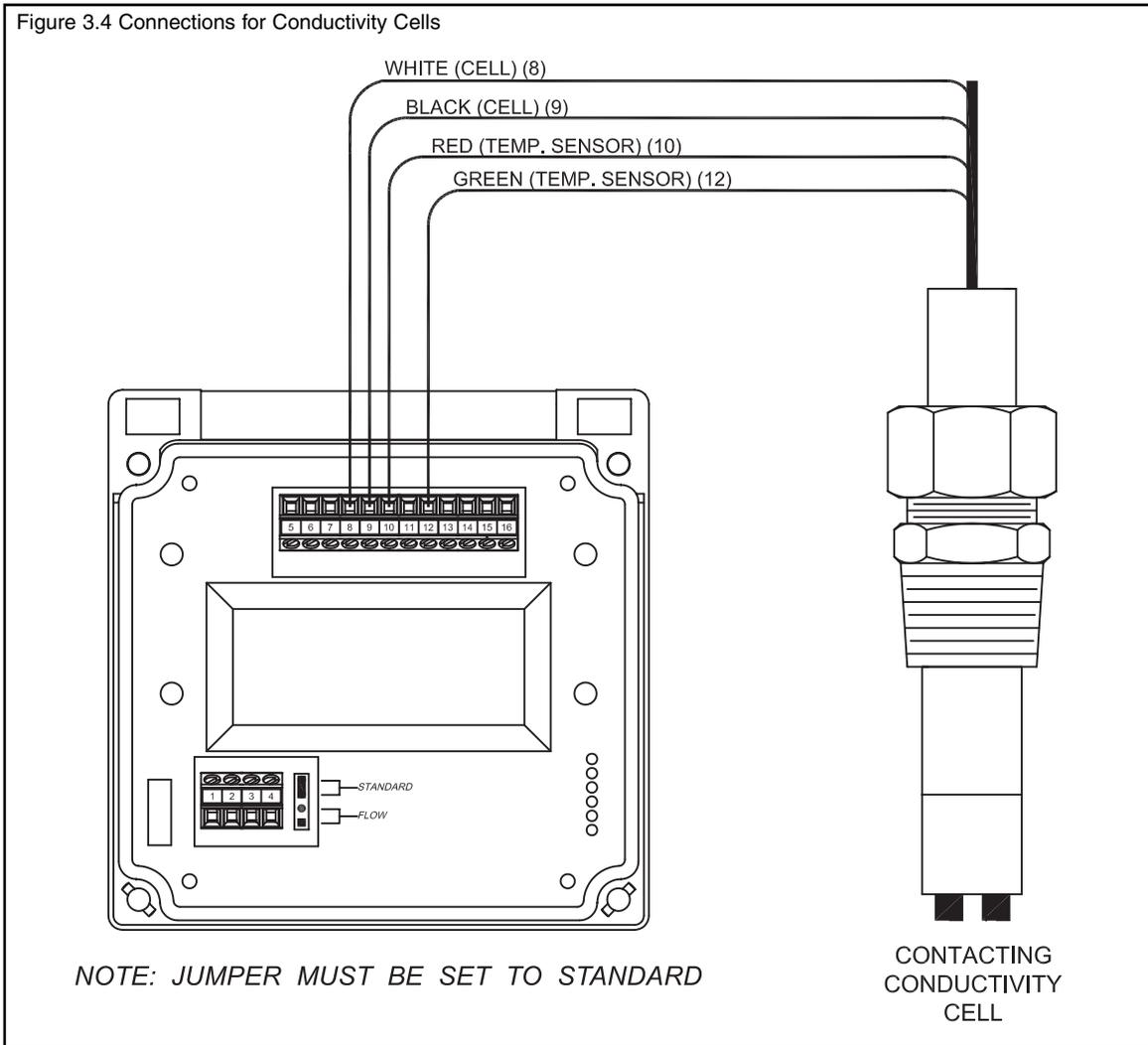
Once connected, step through the LCD menus to select the probe in the order shown. The first two steps may be skipped if the meter is already configured for a Combination Probe. If a two wire pH probe is used, which has no temperature sensor, ensure that the Temp. Comp. Override is set to same temperature 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.



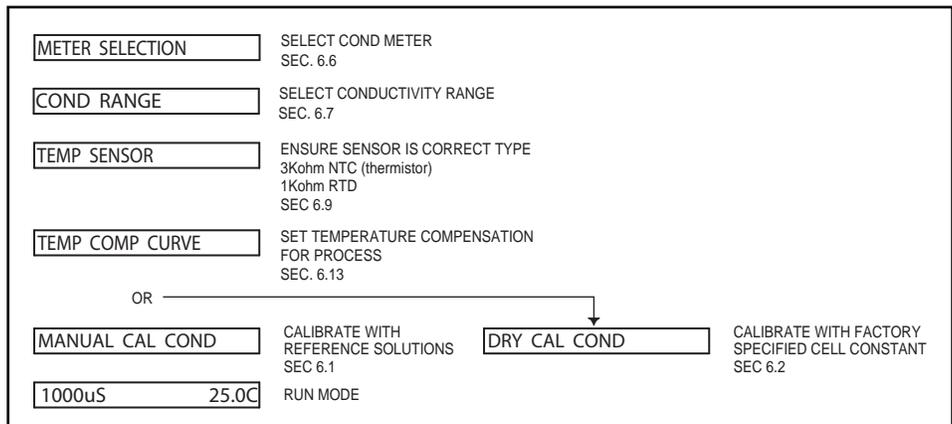
Section 3 - Electrical Connections and Setup

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).



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

3.10 MANUAL TEST MODE

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

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 output.

3.11 4-20 mA Isolated Output

(LCD MENU SECTIONS - pH: 4.15, ORP: 5.14, Conductivity: 6.16)

The Transmitter has a single 4 to 20mA output, electrically isolated from the ground. The output can source current into a resistive load. Maximum resistance depends on supply voltage. Drawing on page 6 (Fig. 3.1)

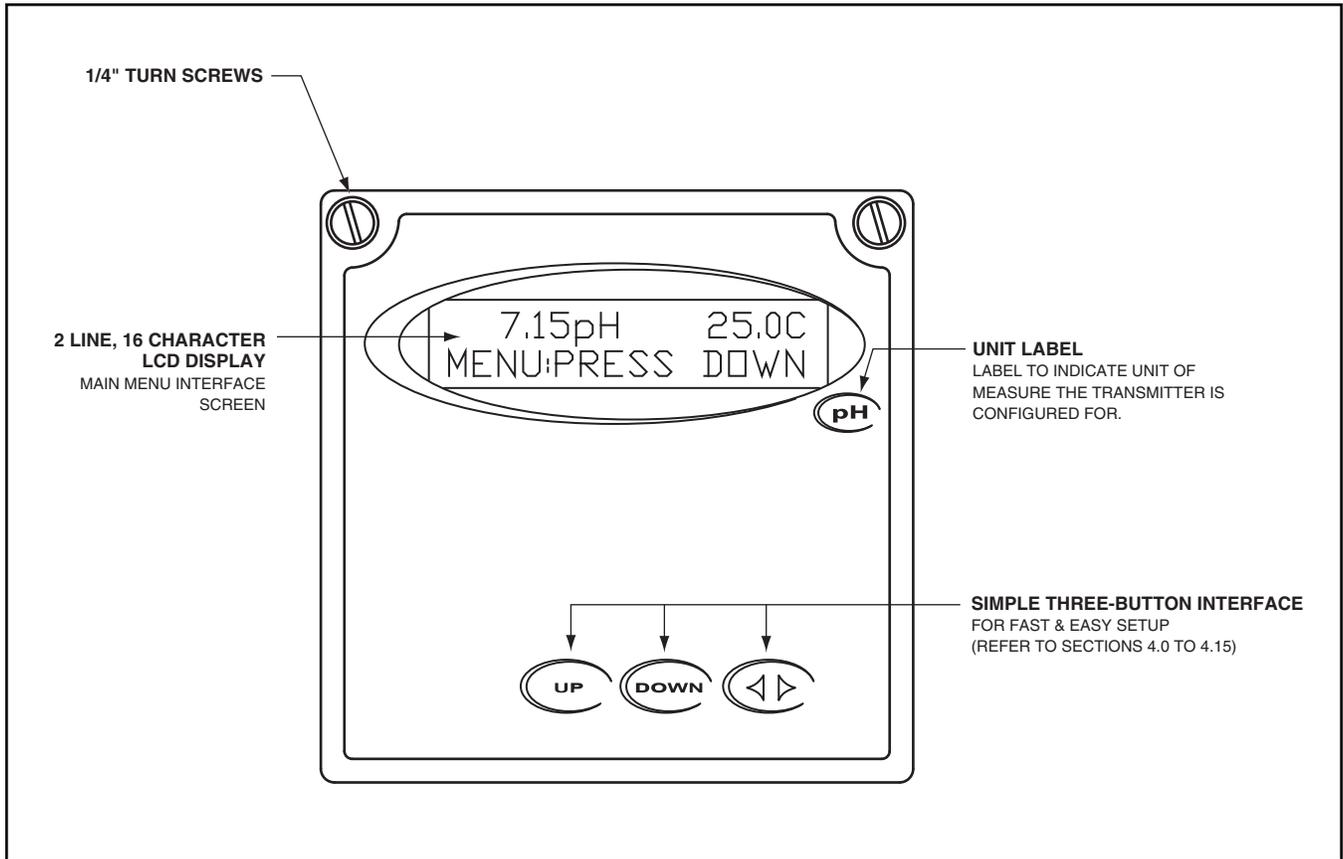
The output is dedicated to track the process and has fully independent and fully adjustable 4 & 20 mA output setpoints. This will enable the operator to span the output over the desired range.

The output can be precisely trimmed through the LCD menu for precision applications.

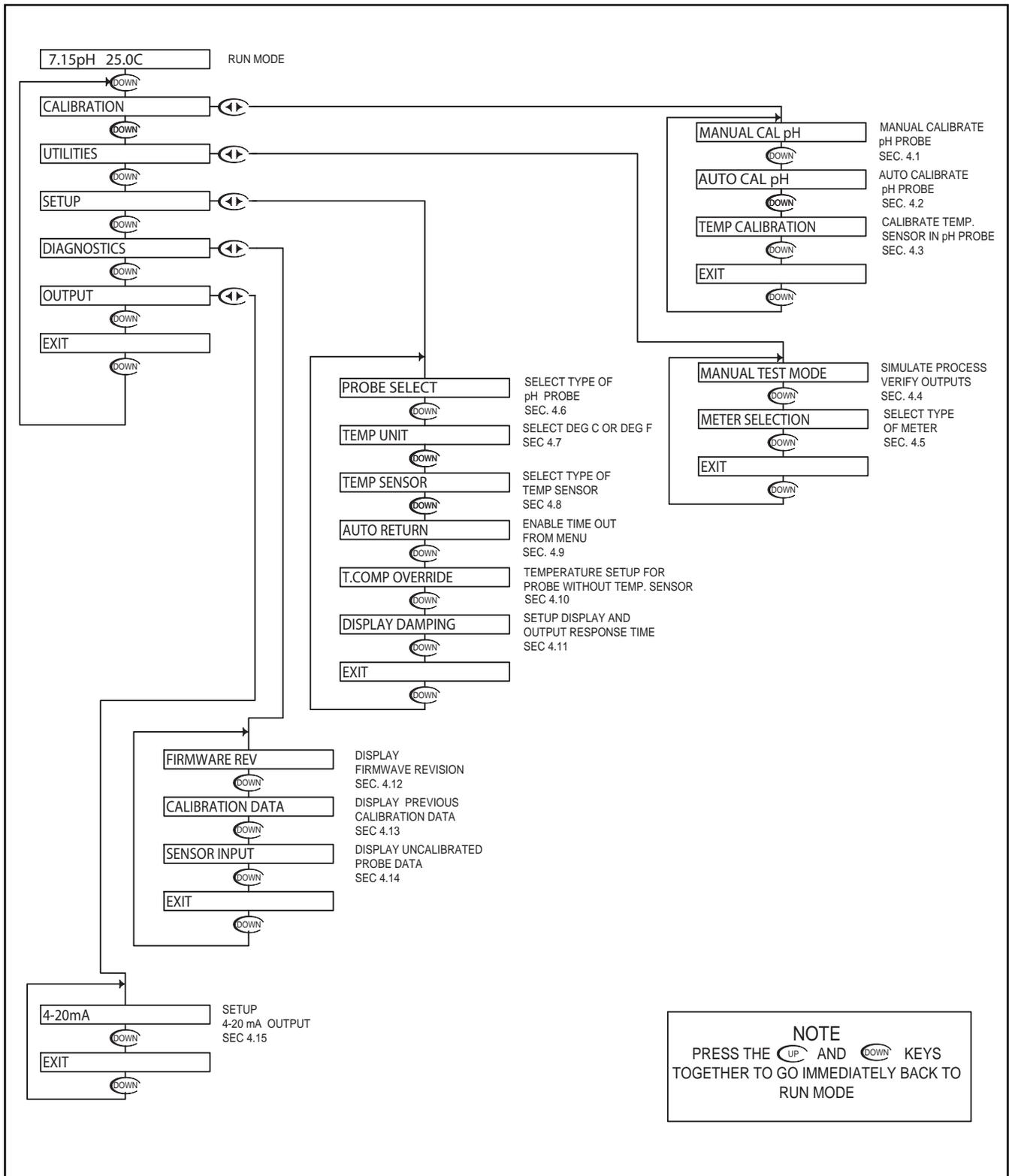
The drawing on page 6 (Fig. 3.1) shows the connections for the output.

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

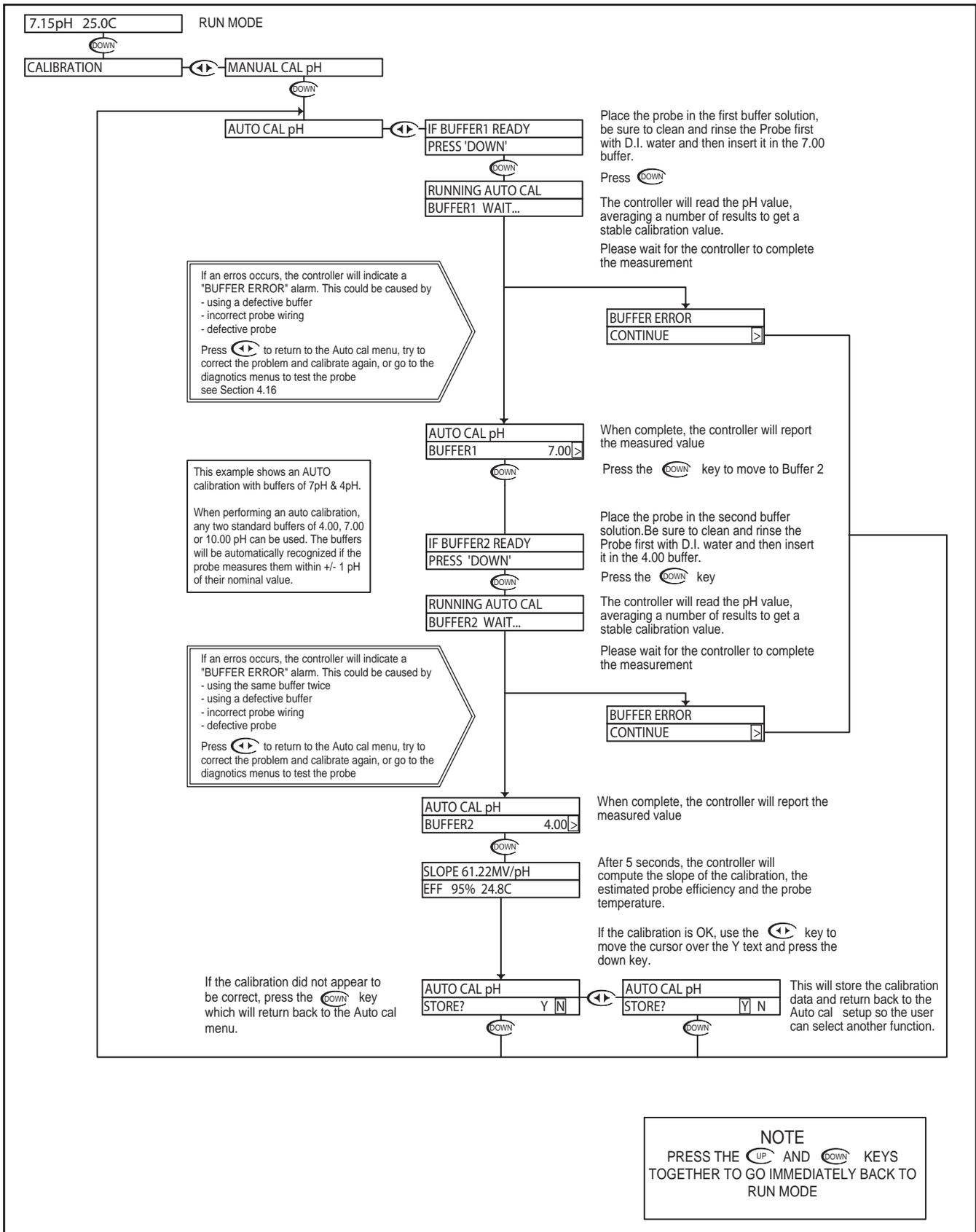
Section 4 - Using the Transmitter in pH Mode



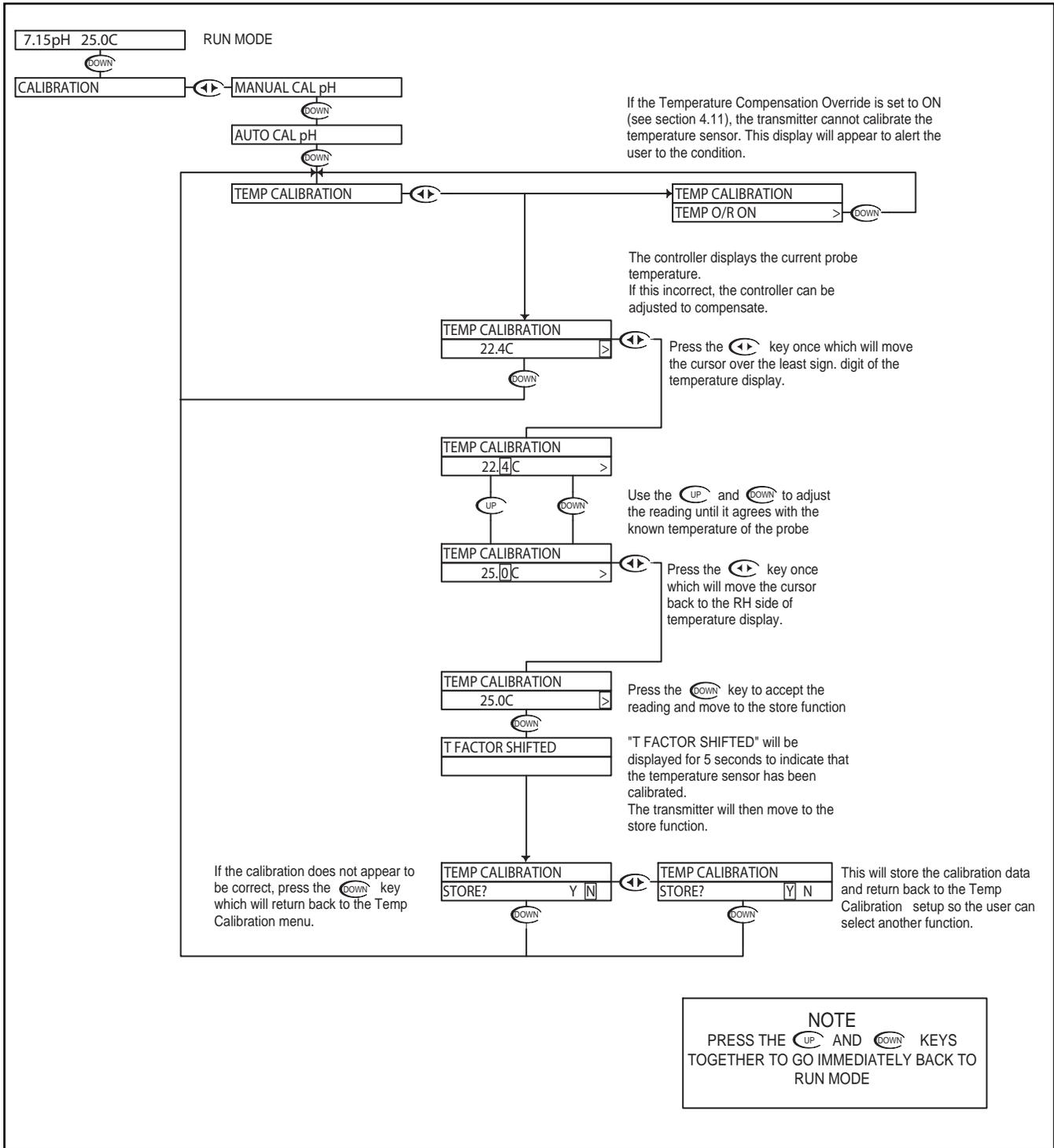
pH - Menu Overview 4.0



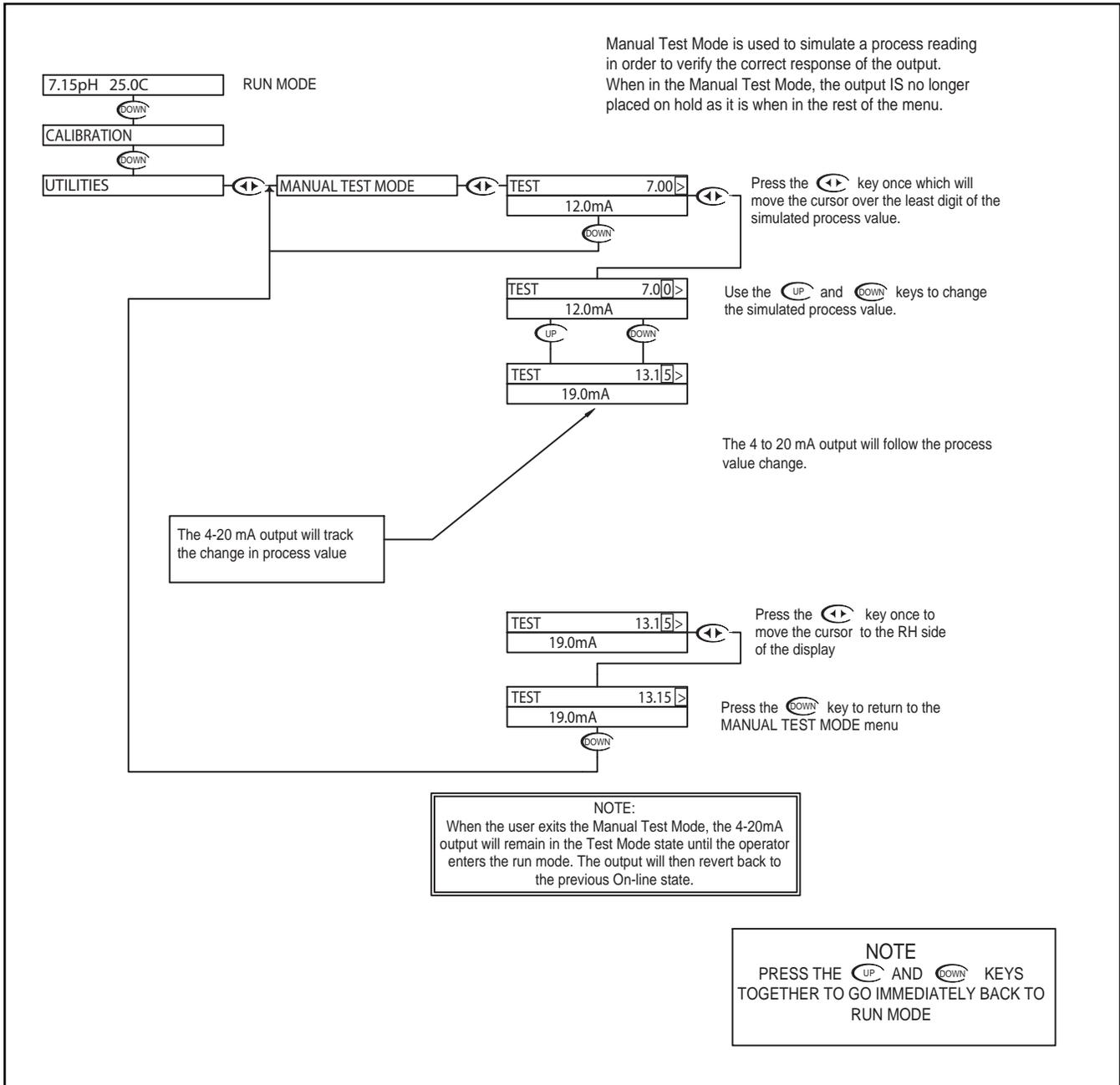
pH - Calibration Menu - Auto Calibrate 4.2



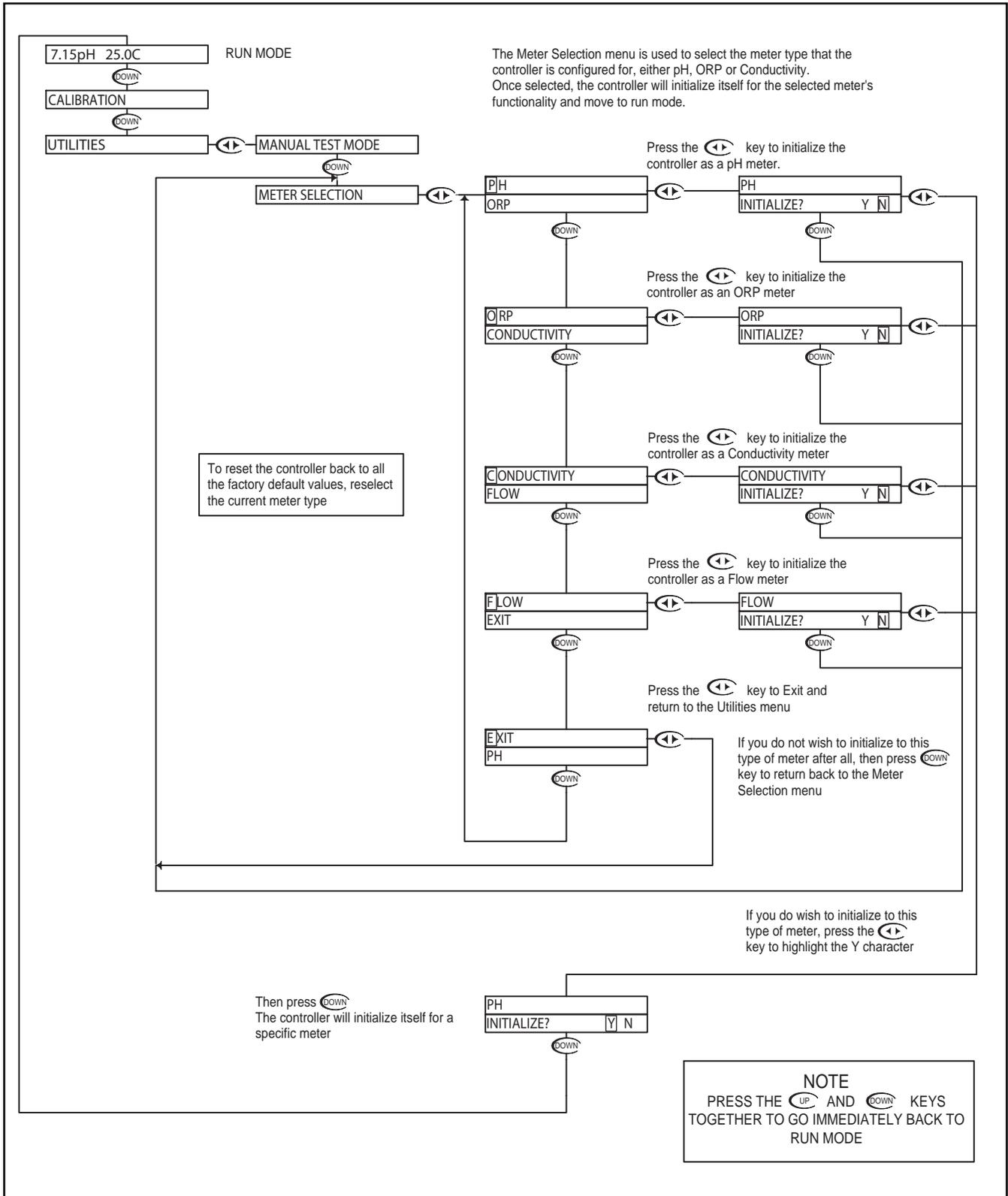
pH - Calibration Menu - Temperature Calibration 4.3



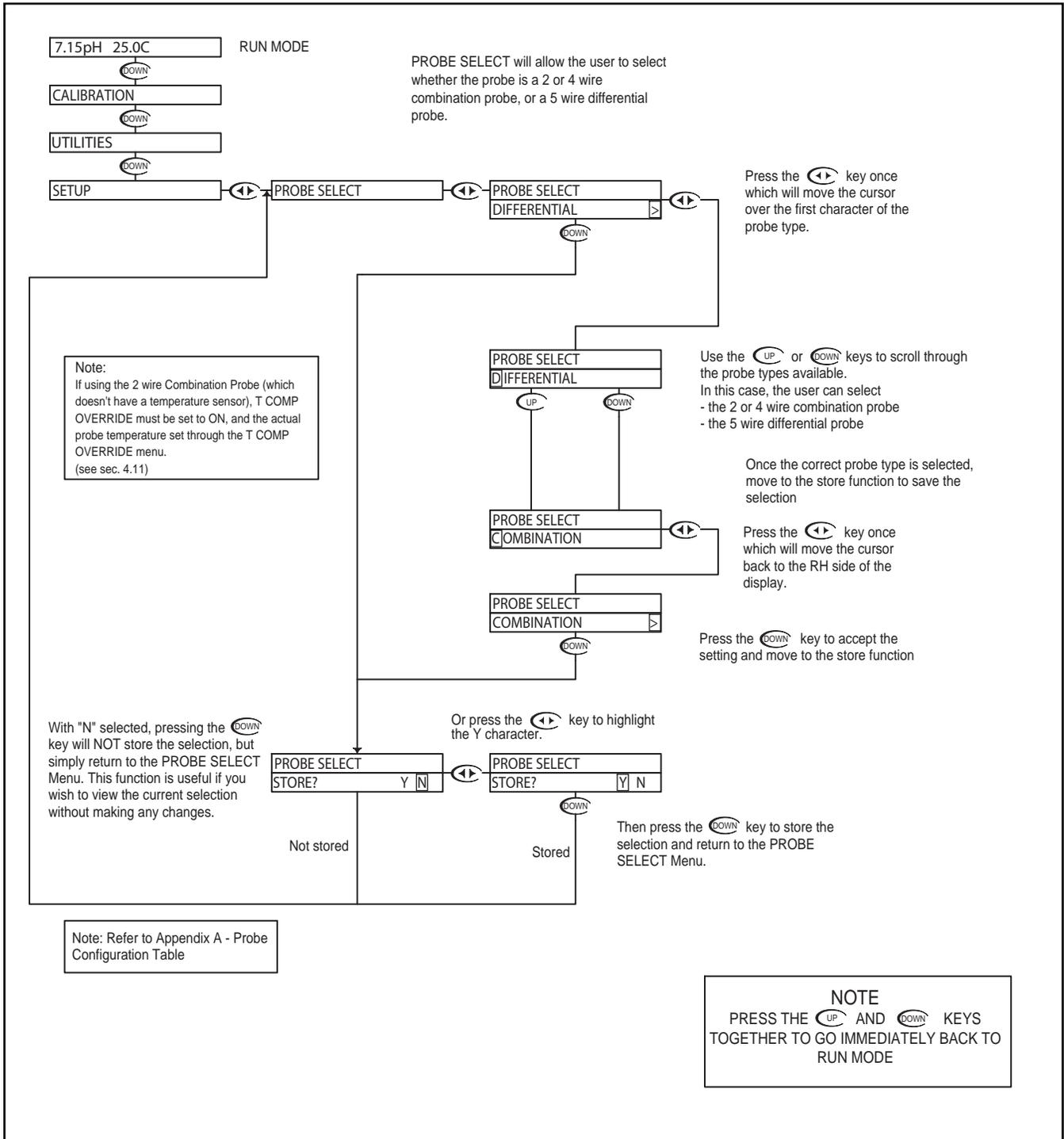
pH - Utilities Menu - Manual Test Mode 4.4



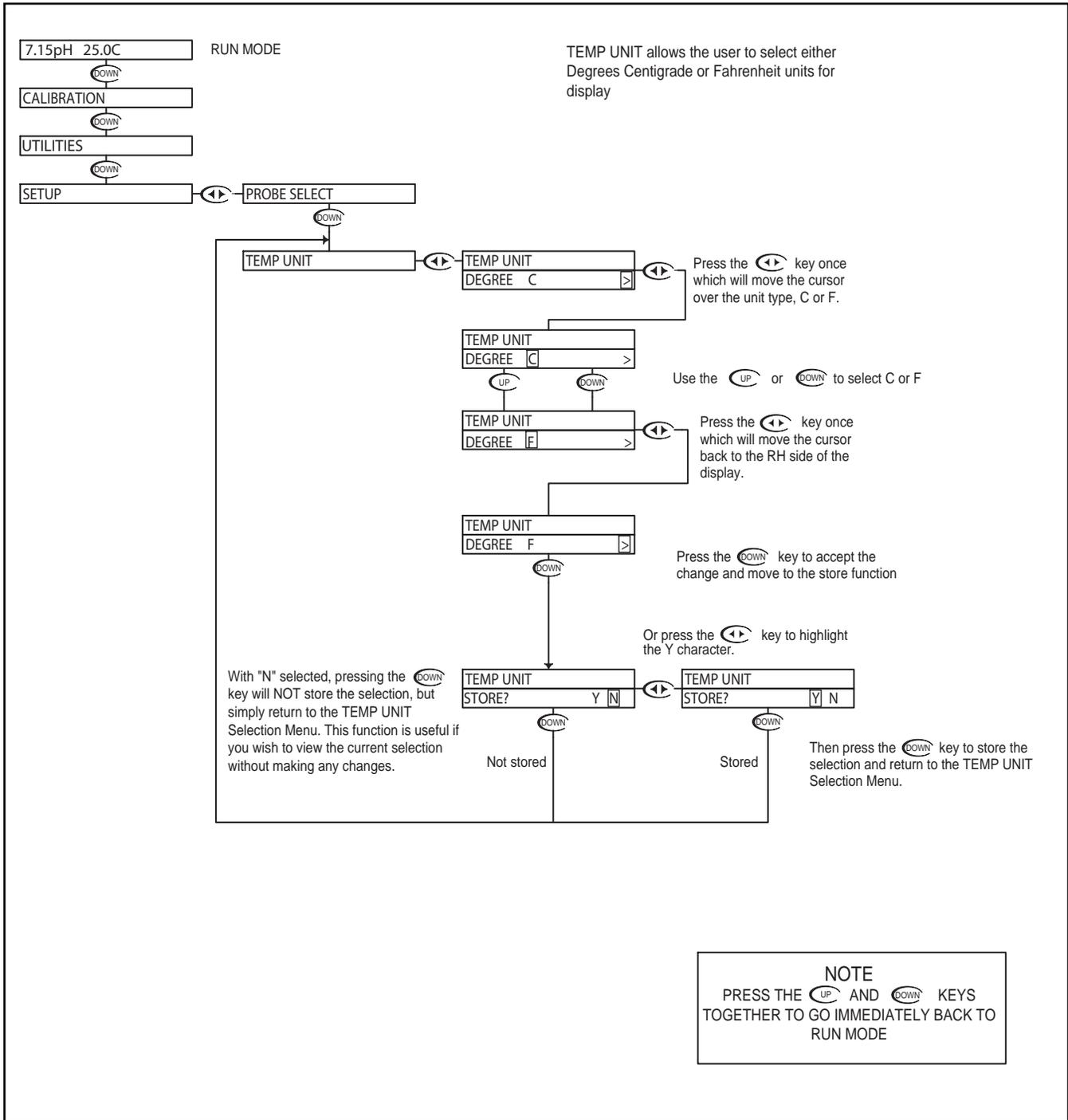
pH - Utilities Menu - Meter Selection 4.5



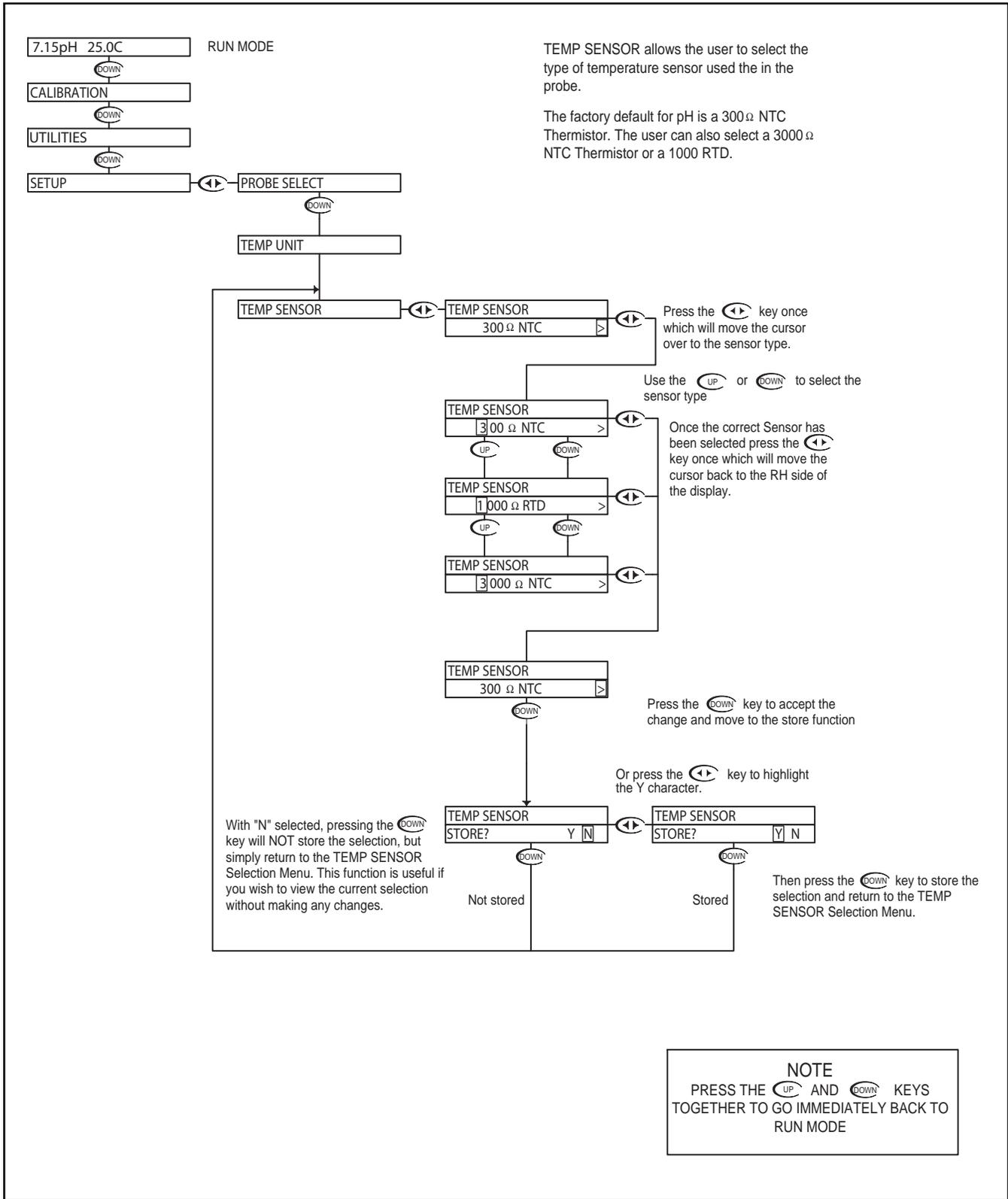
pH - Setup Menu - Probe Select 4.6



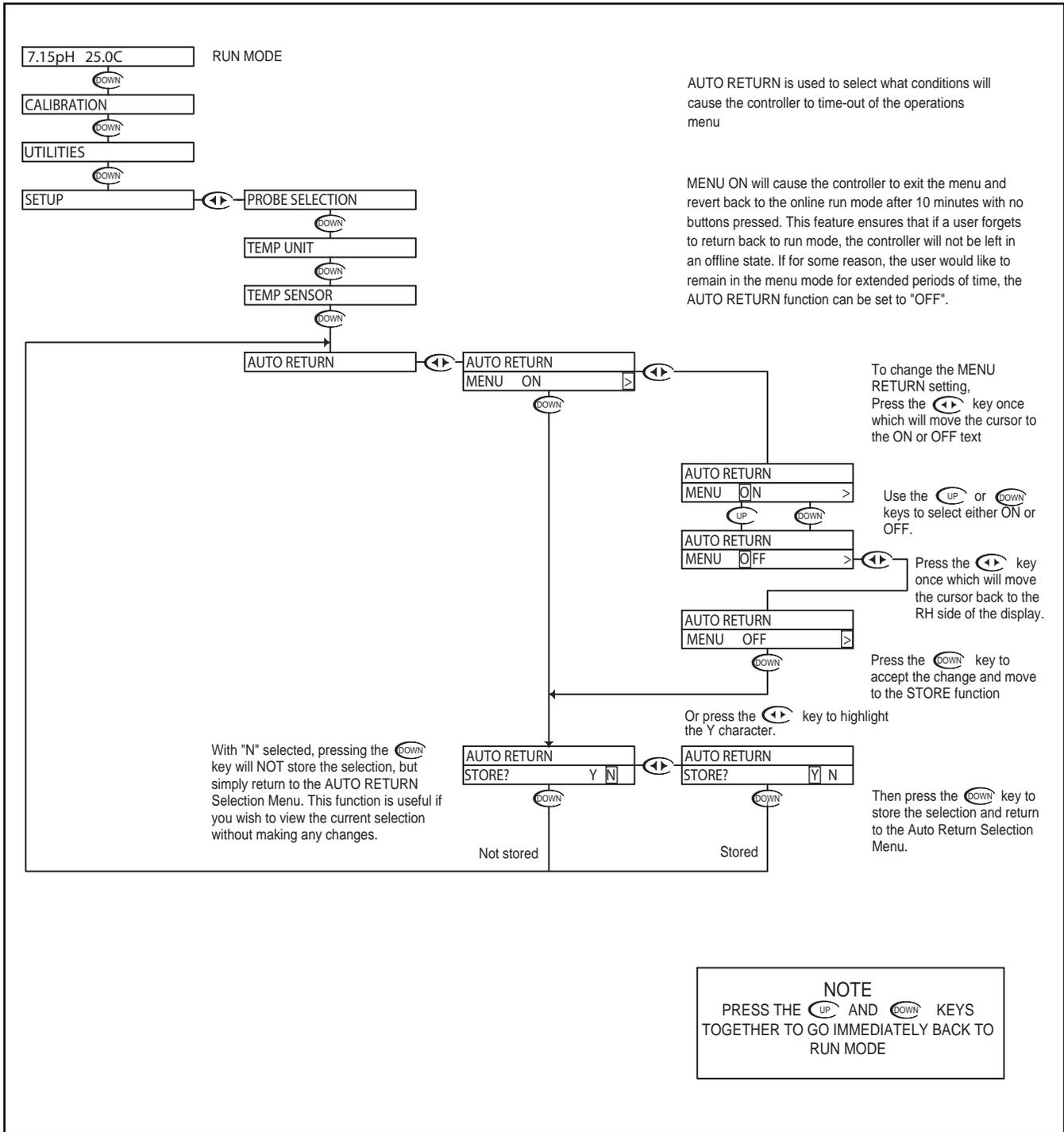
pH - Setup Menu -Temp Unit 4.7



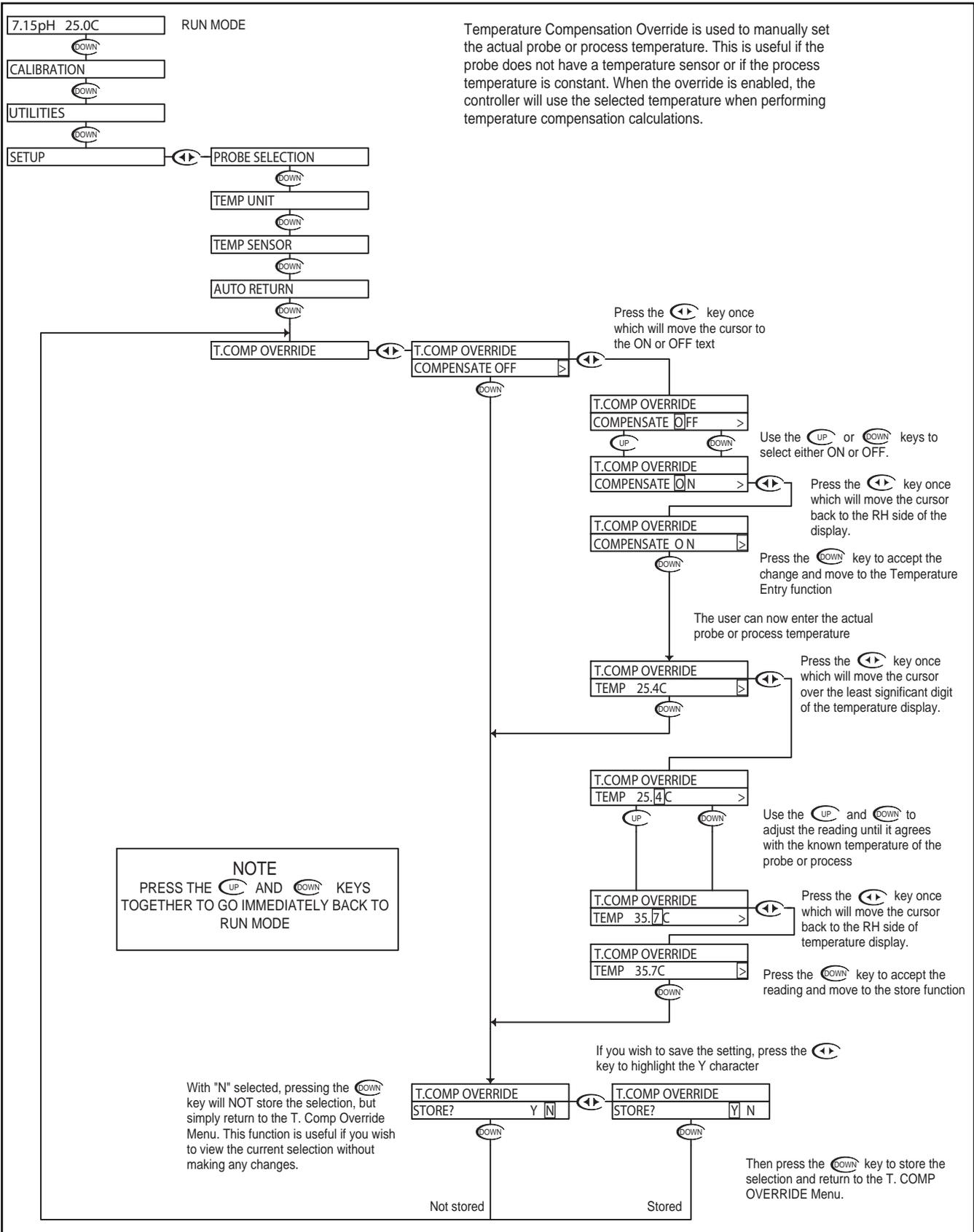
pH - Setup Menu - Temp. Sensor 4.8



pH - Setup Menu - Auto Return 4.9

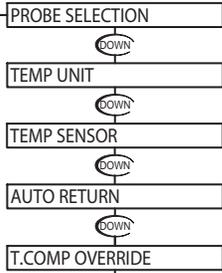
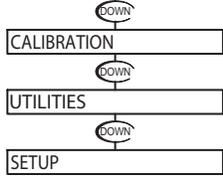


pH - Setup Menu - T.Comp Override 4.10



pH - Setup Menu - Display Damping 4.11

7.15pH 25.0C RUN MODE



The Display Damping menu allows the user to adjust the rate at which the display and the output is 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.)



DISPLAY DAMPING
UPDATE 0SEC

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

DISPLAY DAMPING
UPDATE 0SEC

Use the **↑** and **↓** to adjust the damping time, the default setting is 0 seconds. The setting can be adjusted from 0 to 10 seconds.

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

DISPLAY DAMPING
UPDATE 10SEC

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

DISPLAY DAMPING
STORE? Y N

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

DISPLAY DAMPING
STORE? Y N

Then press the **↓** key to store the selection and return to the Display Damping Menu.

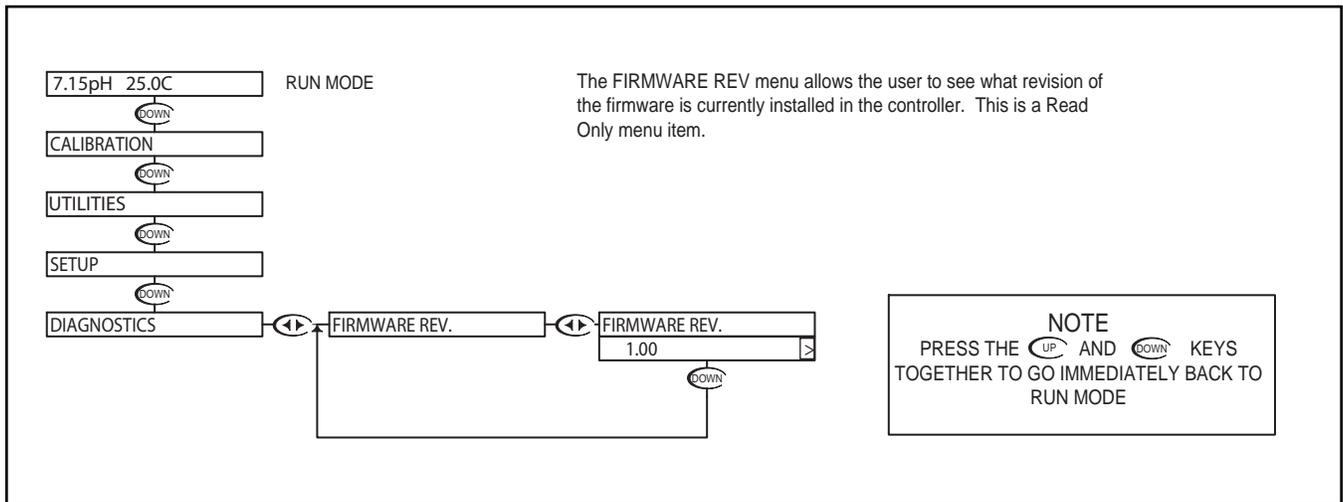
With "N" selected, pressing the **↓** key will NOT store the selection, but simply return to the Display Damping Menu. This function is useful if you wish to view the current selection without making any changes.

Not stored

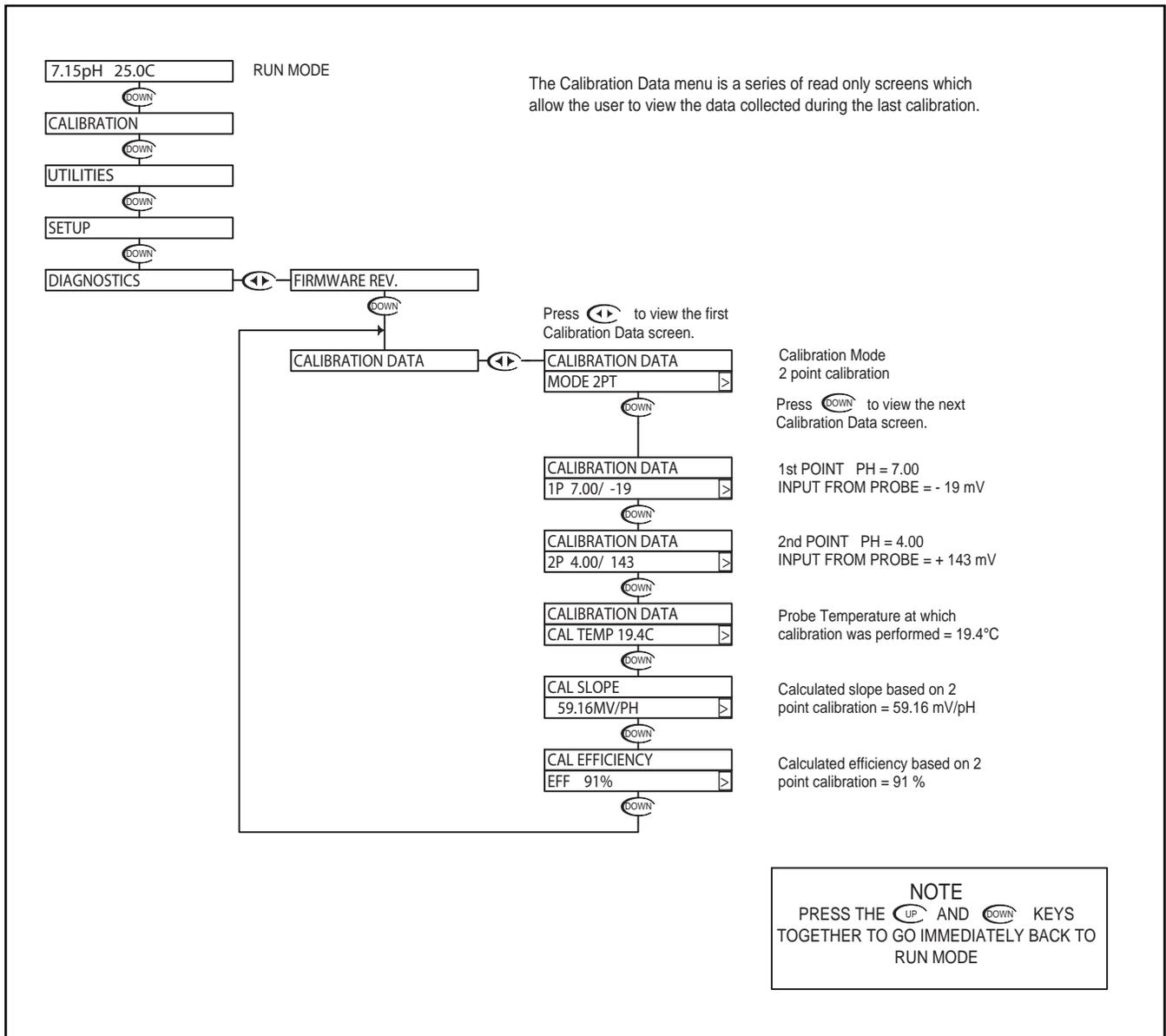
Stored

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

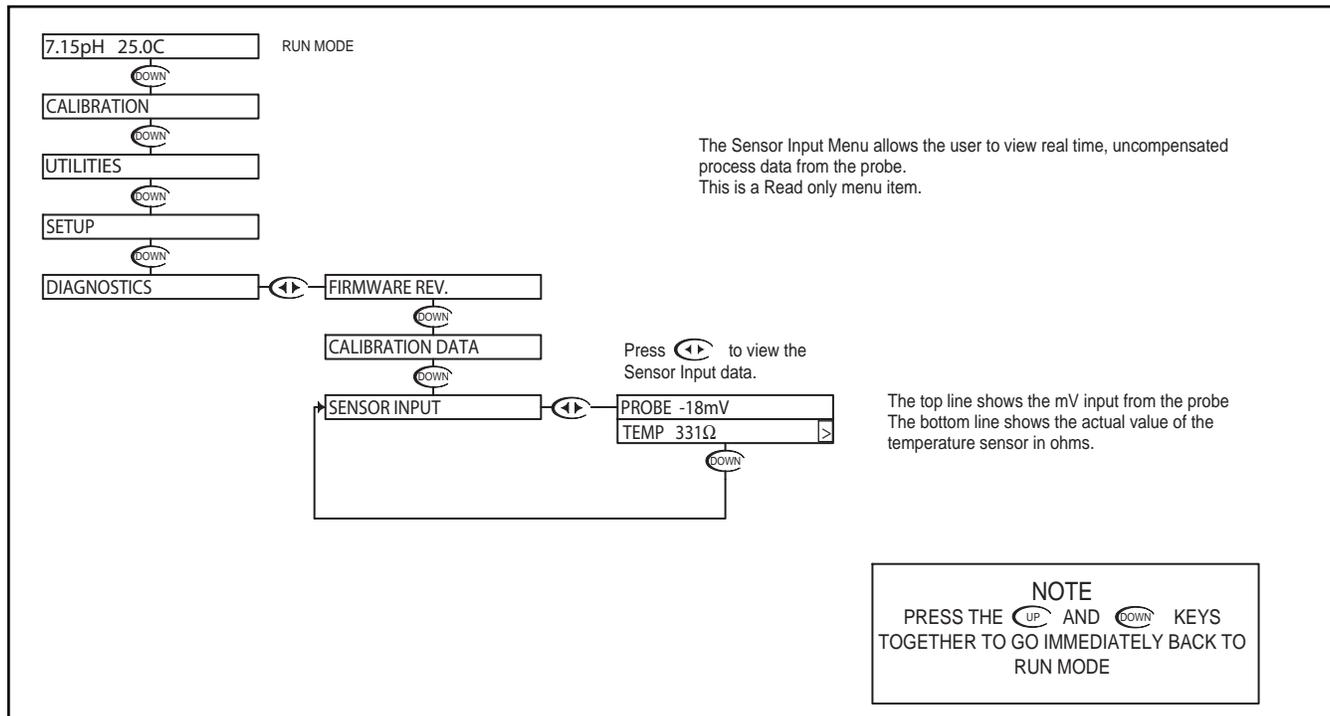
pH - Diagnostics Menu - Firmware Rev 4.12



pH - Diagnostics Menu - Calibration Data 4.13



pH - Diagnostics Menu - Sensor Input 4.14



Troubleshooting a pH probe using the sensor input

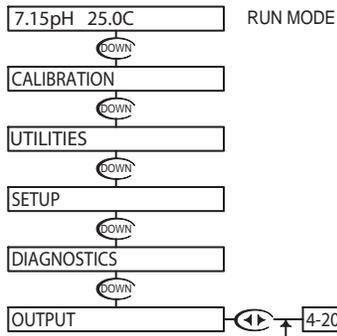
Sensor input displays the uncompensated sensor input data. The pH probe values are displayed in mV (millivolts). The temperature sensor value is displayed in Ω (ohm).

Connect the pH probe as per Probe Configuration Table below.

1. Place the probe in buffer 7pH (allow temperature to stabilize)
 - Probe should read 0mV [± 50 mV]
 - Temperature should read 300 Ω [$\pm 50\Omega$] @ 25°C
 - Record both of these numbers.
2. Place the probe in buffer 4pH
 - Probe should read +160mV more than probe value at 7pH
 - Temperature should read the same as in 7pH
3. 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 Ω	ORE-610	DIFFERENTIAL	300 Ω
PHE-620	DIFFERENTIAL	300 Ω	ORE-620	DIFFERENTIAL	300 Ω
PHE-600	DIFFERENTIAL	300 Ω	PHE-600	DIFFERENTIAL	300 Ω

pH - Output Menu - 4-20mA Output 4.15



The Transmitter has a single 4-20mA output, electrically isolated from the ground. The output can source current into a maximum of 800 ohms. See Section 3.9 for wiring diagram. The channel has a fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

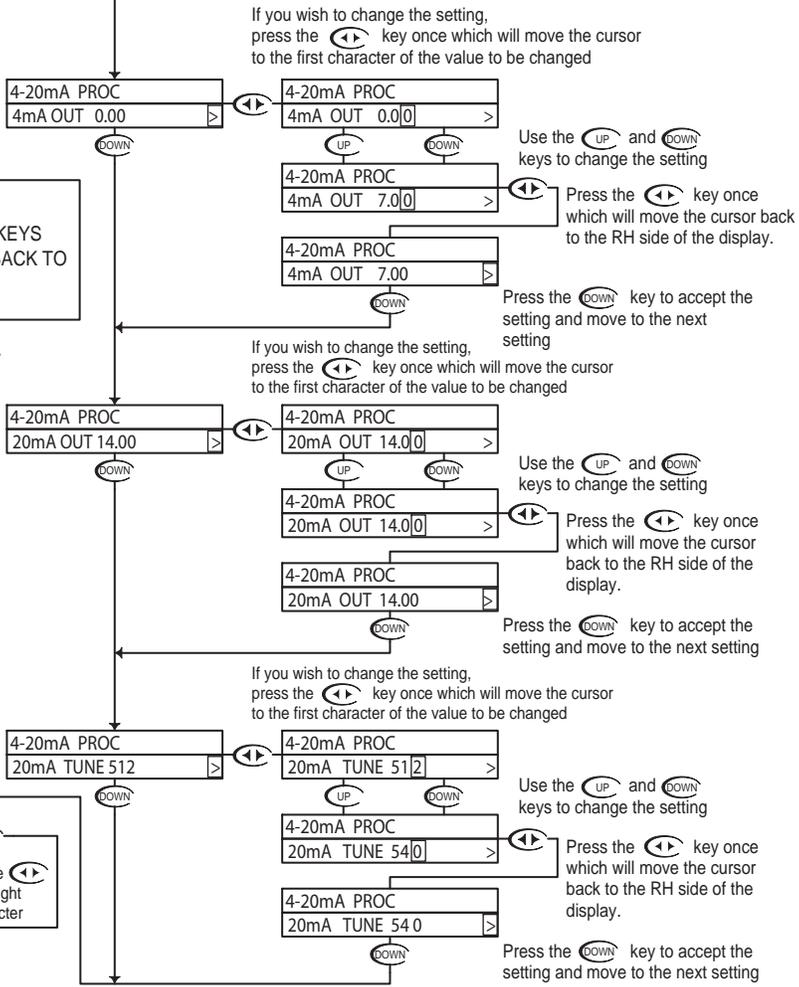
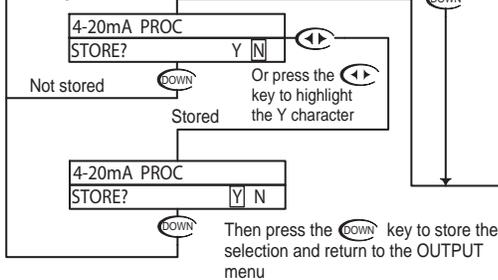
The example below shows the 4-20 mA set to 4mA = 7.00pH and 20mA = 14pH. The output would then span 4 to 20 mA for a pH swing of 7.0 to 14.0. Note that the span can be reversed, in that 4 mA can be set to a high pH value, and 20 mA can be set to a low pH value, effectively reversing the control direction.

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

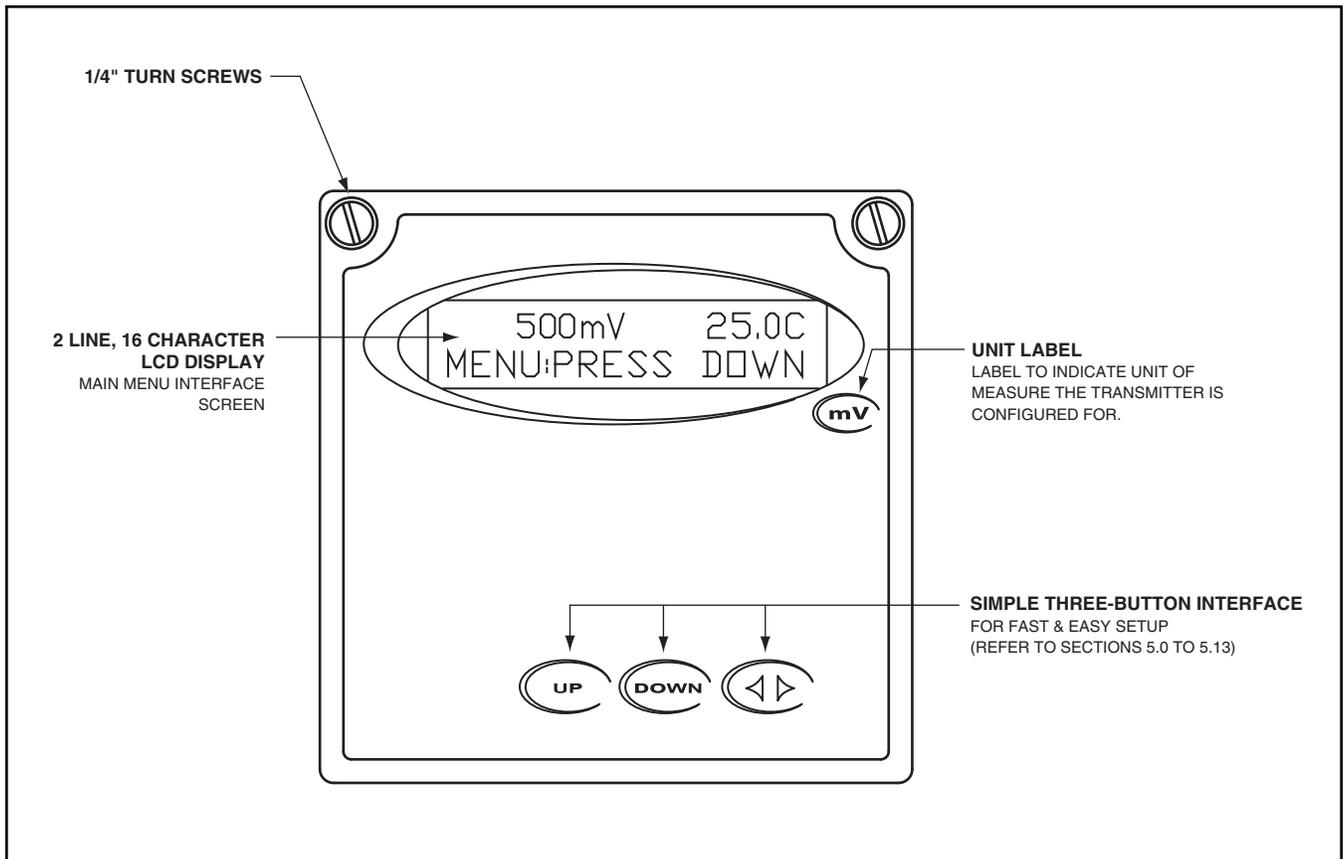
The TUNE function allows the user to precisely adjust the 4-20 mA output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary. To make the adjustment, place an accurate current meter in series with the 4-20 mA output, with the appropriate loads 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.

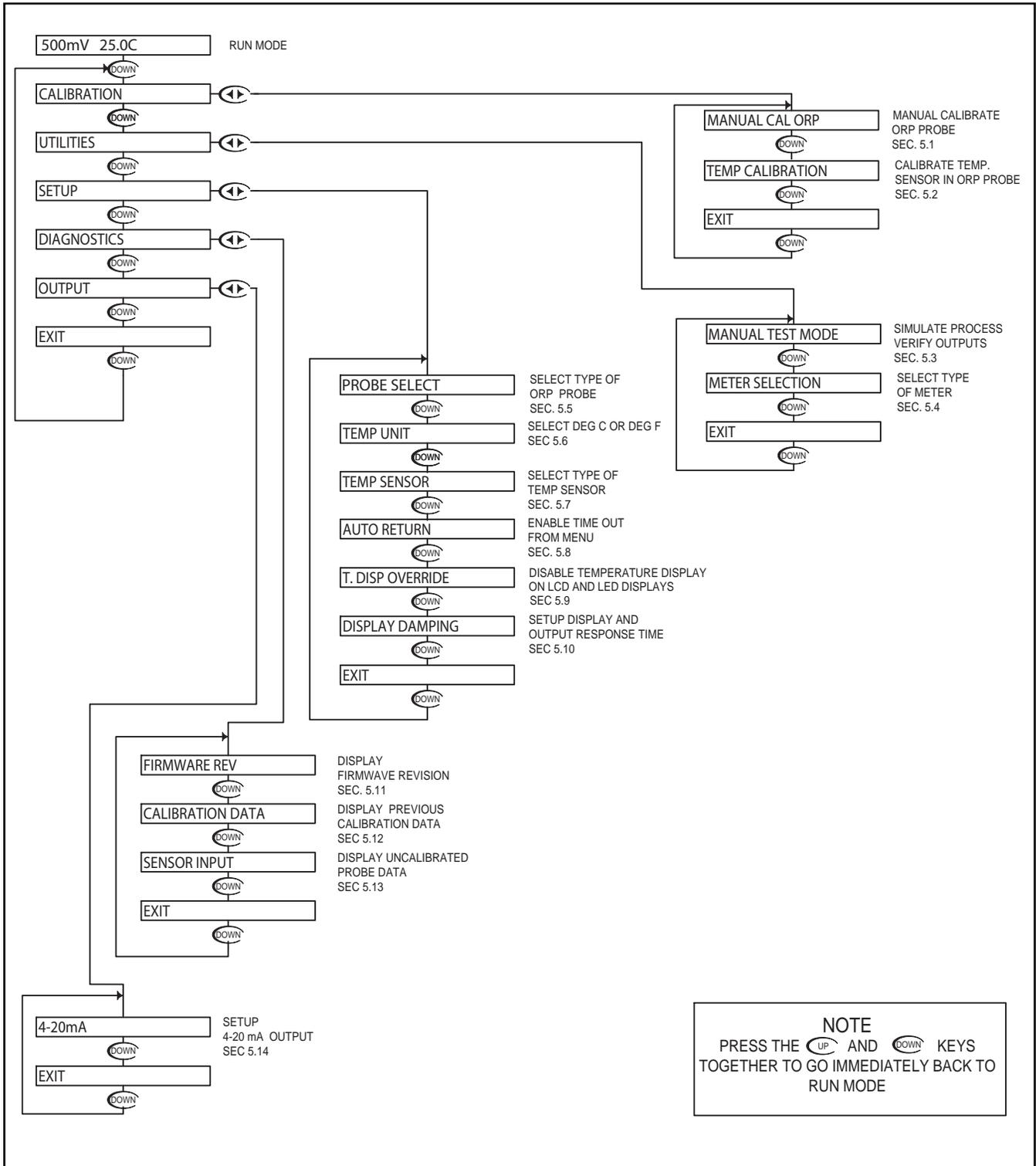
With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUT Menu. This function is useful if you wish to view the current selection without making any changes.



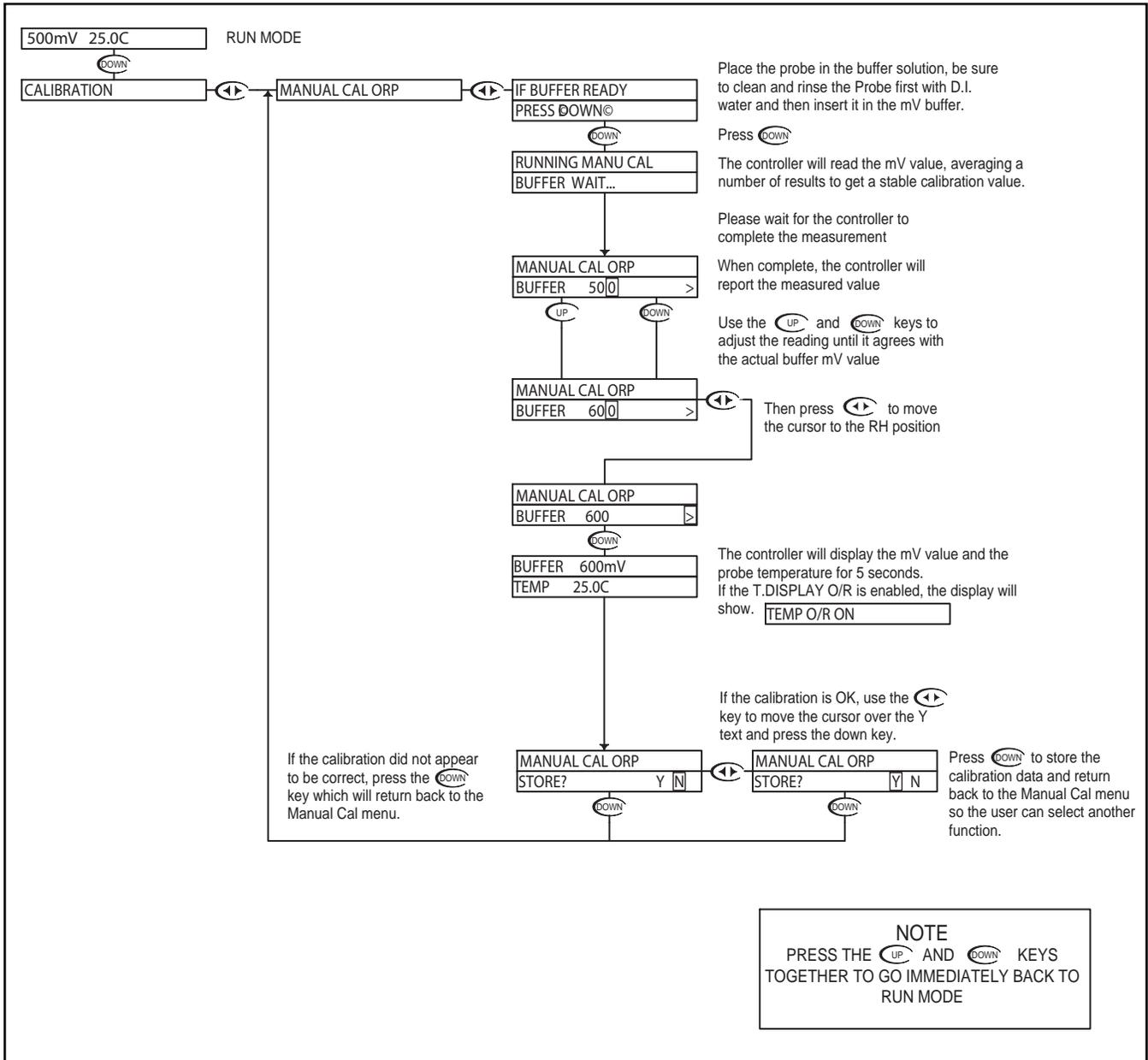
Section 5 - Using the Transmitter in ORP Mode



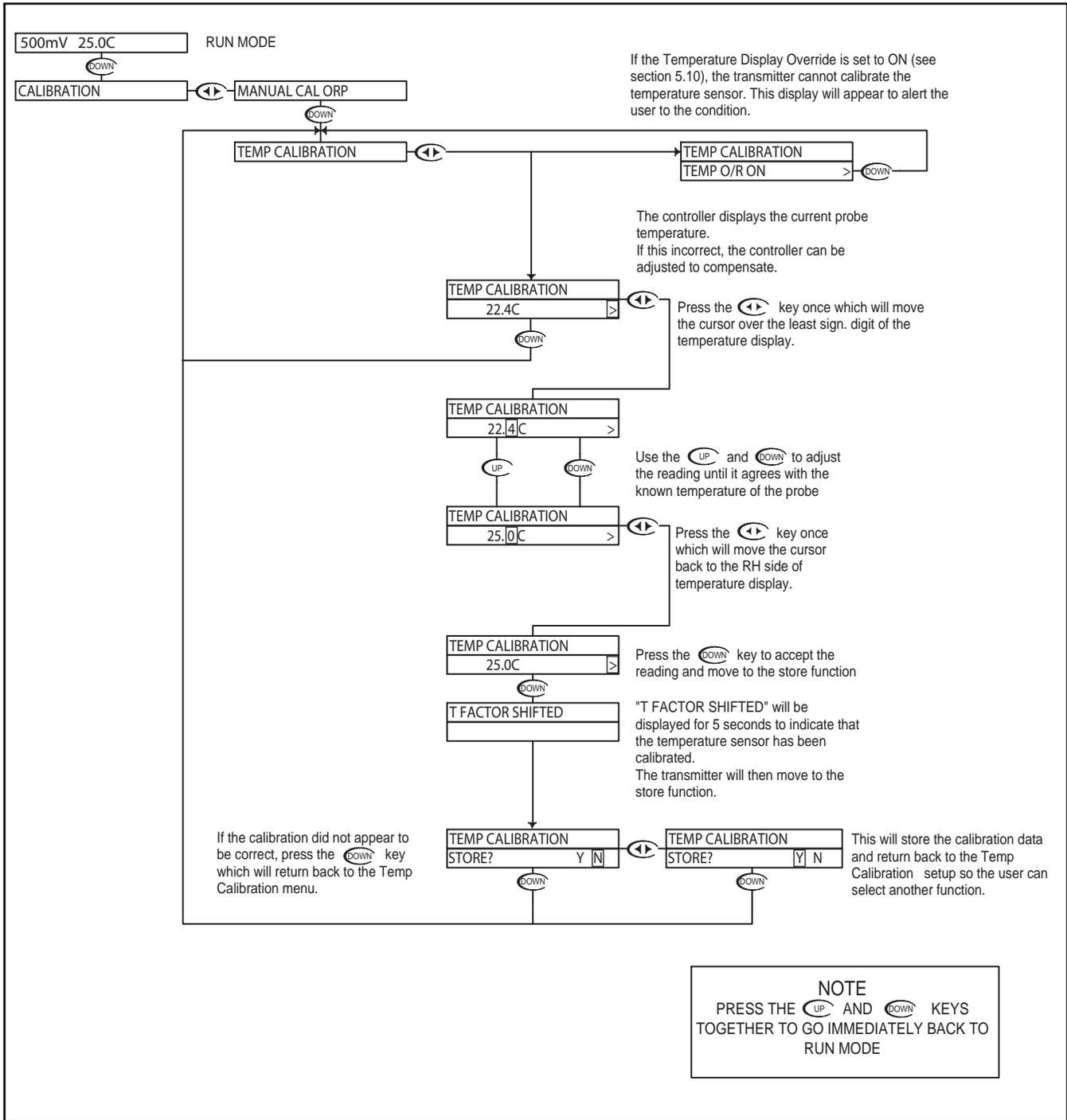
ORP - Menu Overview 5.0



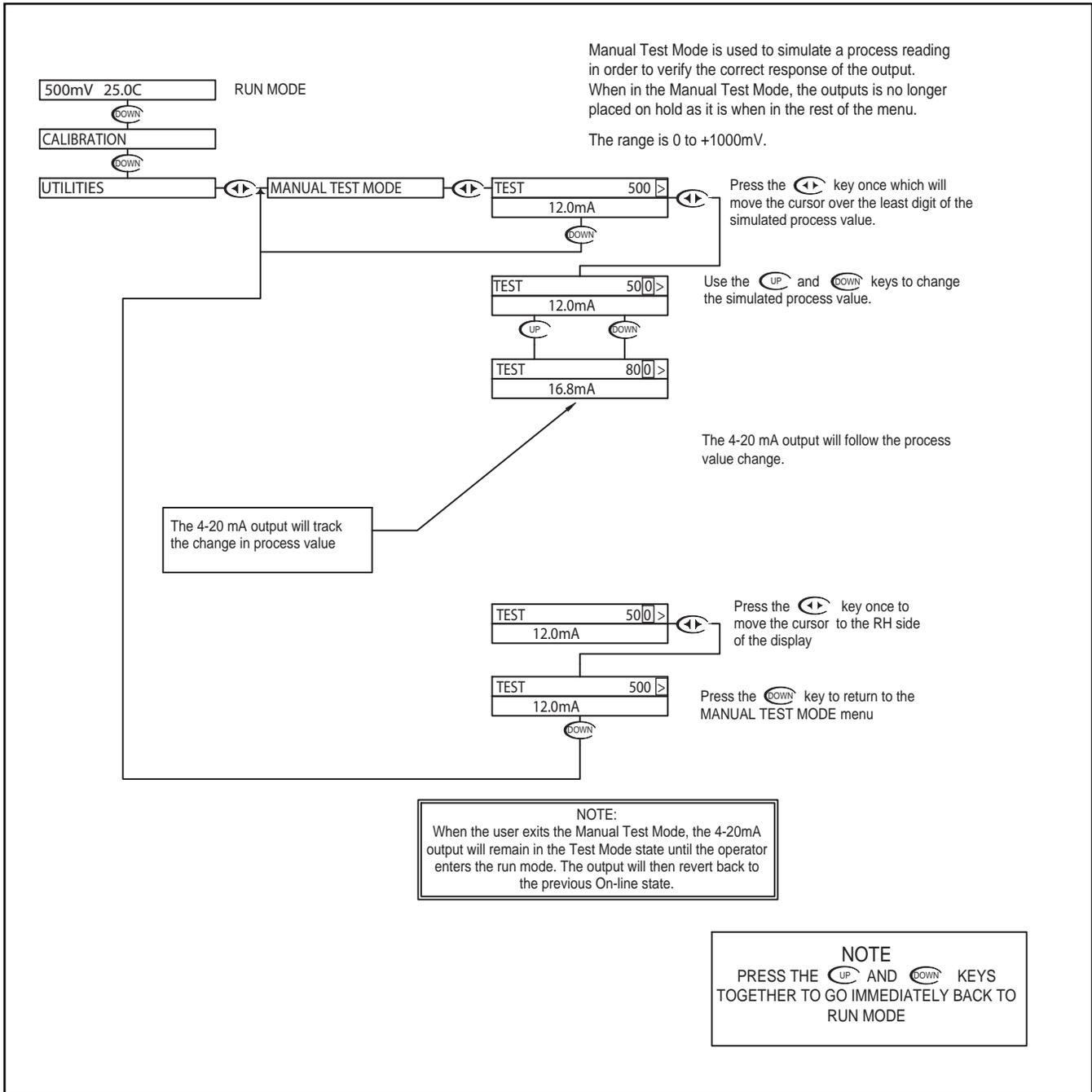
ORP - Calibration Menu - Manual Calibrate 5.1



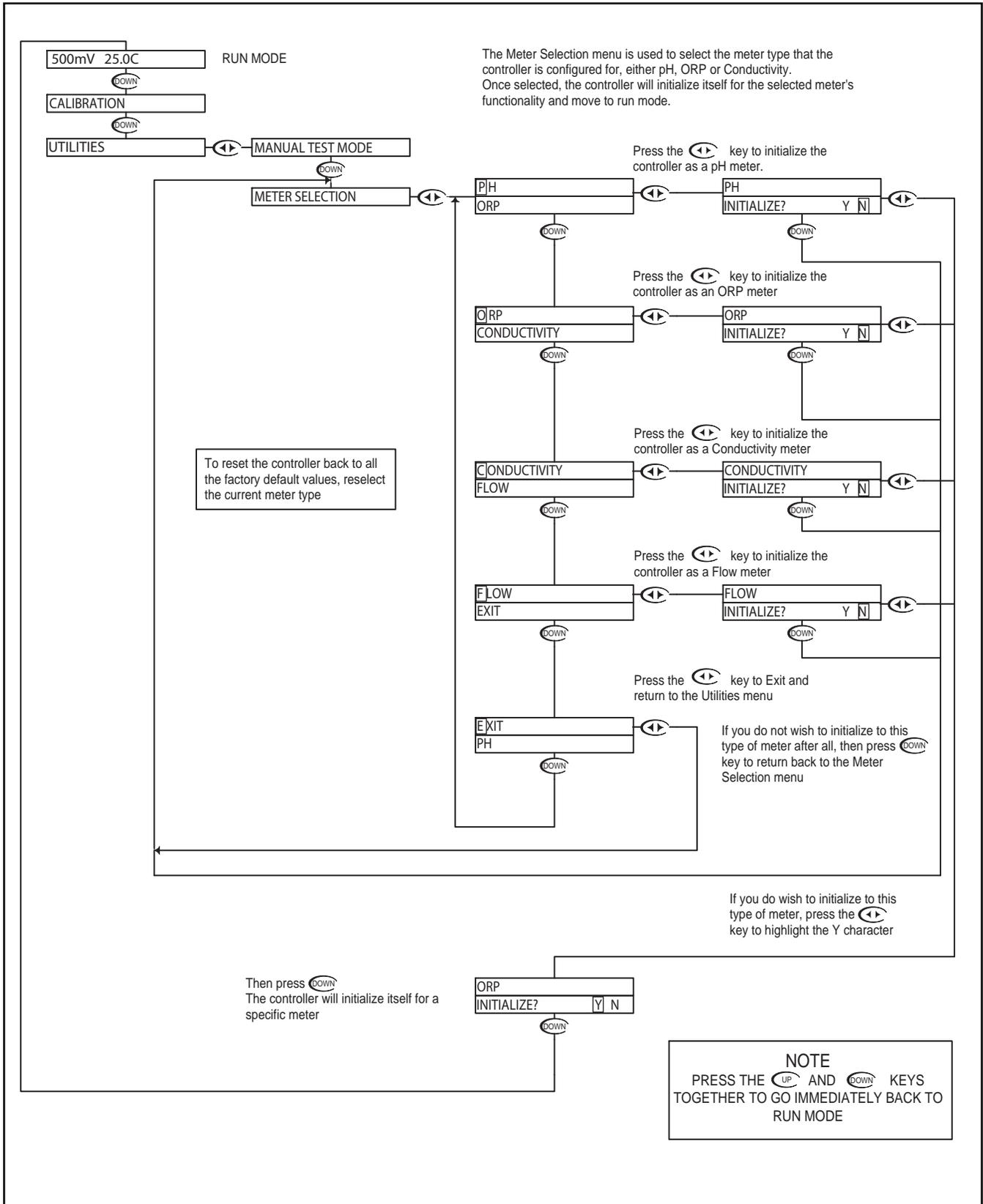
ORP - Calibration Menu - Temp. Calibration 5.2



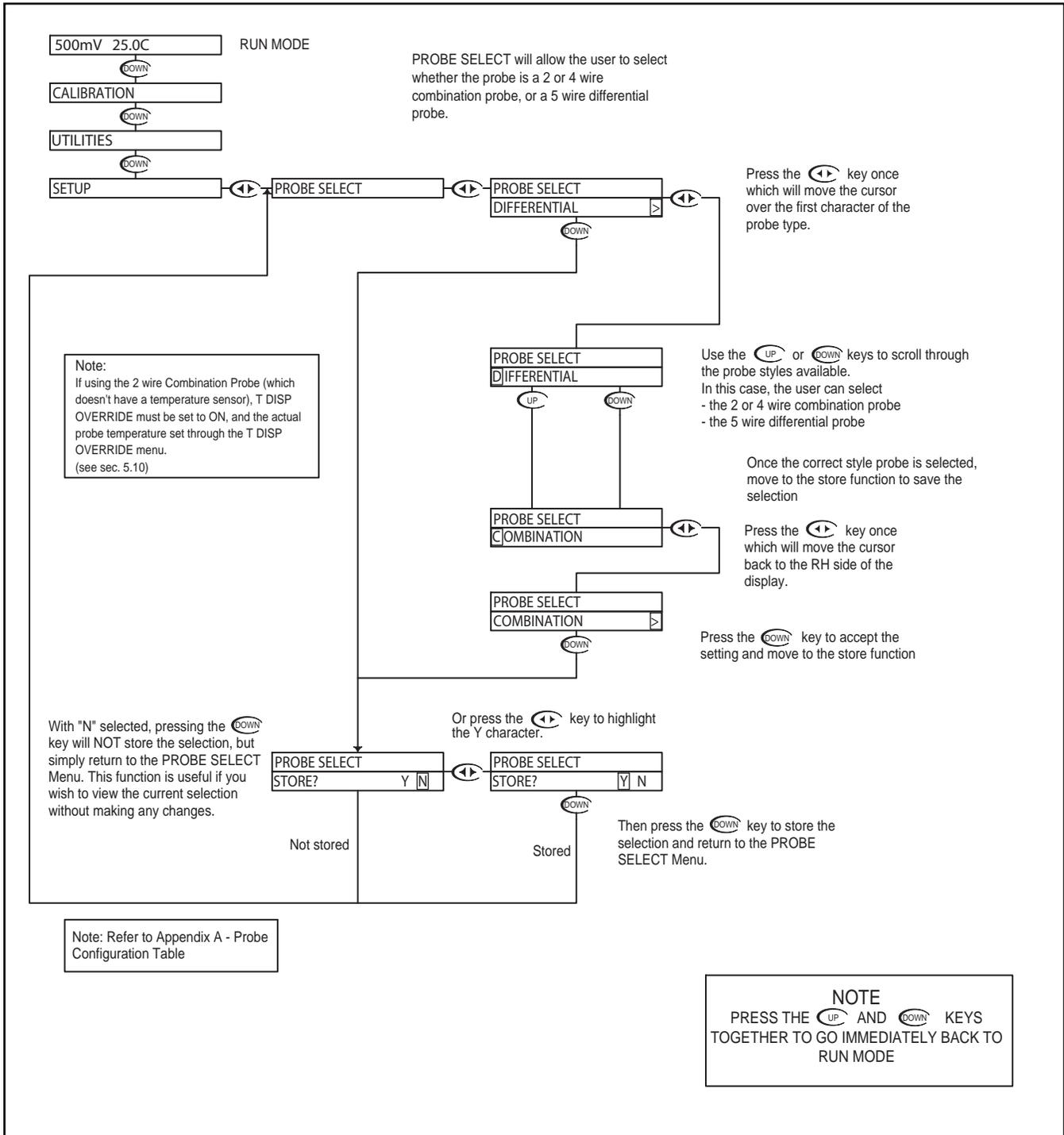
ORP - Utilities Menu - Manual Test Mode 5.3



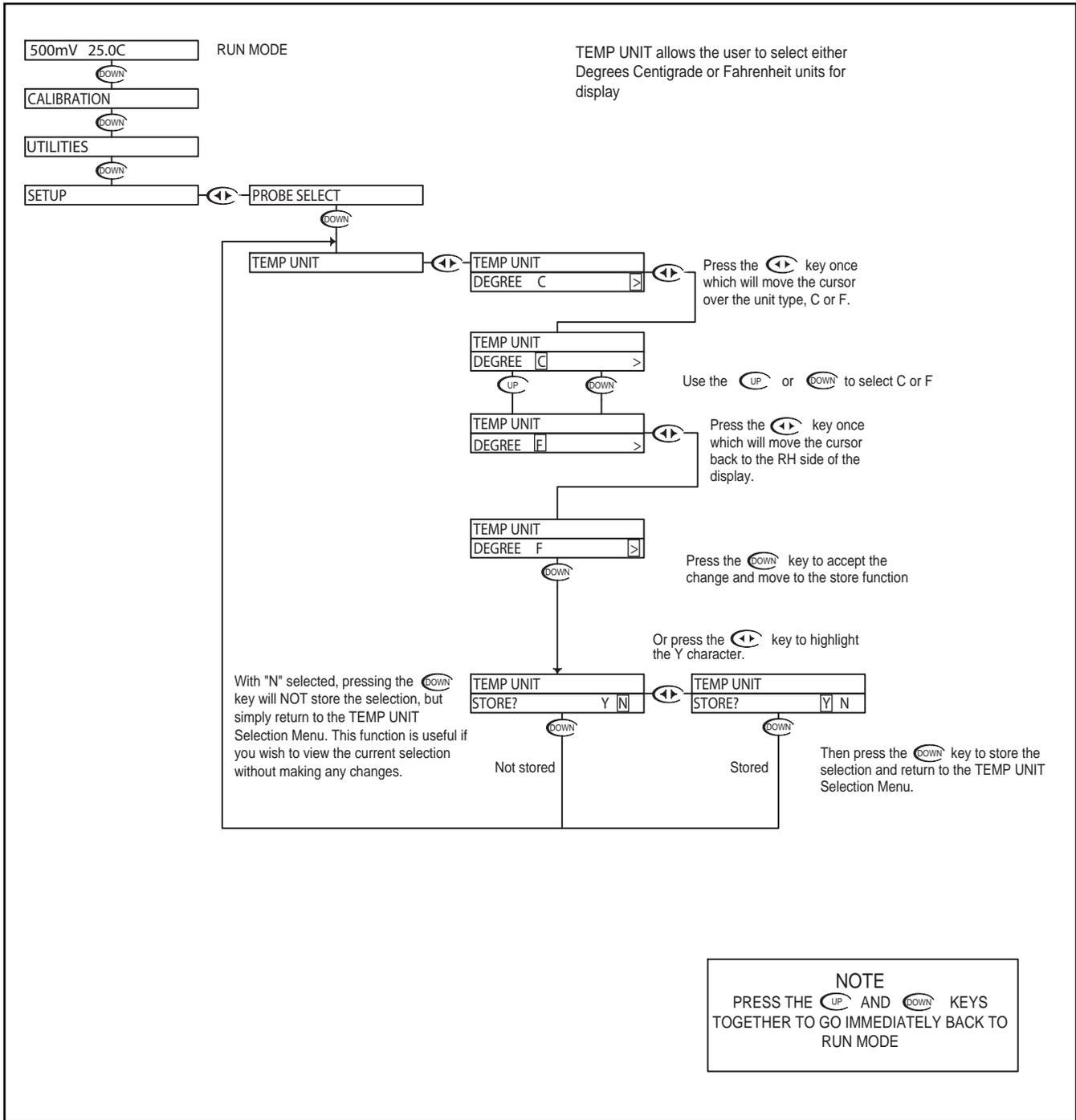
ORP - Utilities Menu - Meter Selection 5.4



ORP - Setup Menu - Probe Select 5.5



ORP - Setup Menu - Temp. Unit 5.6



ORP - Setup Menu - Temp. Sensor 5.7

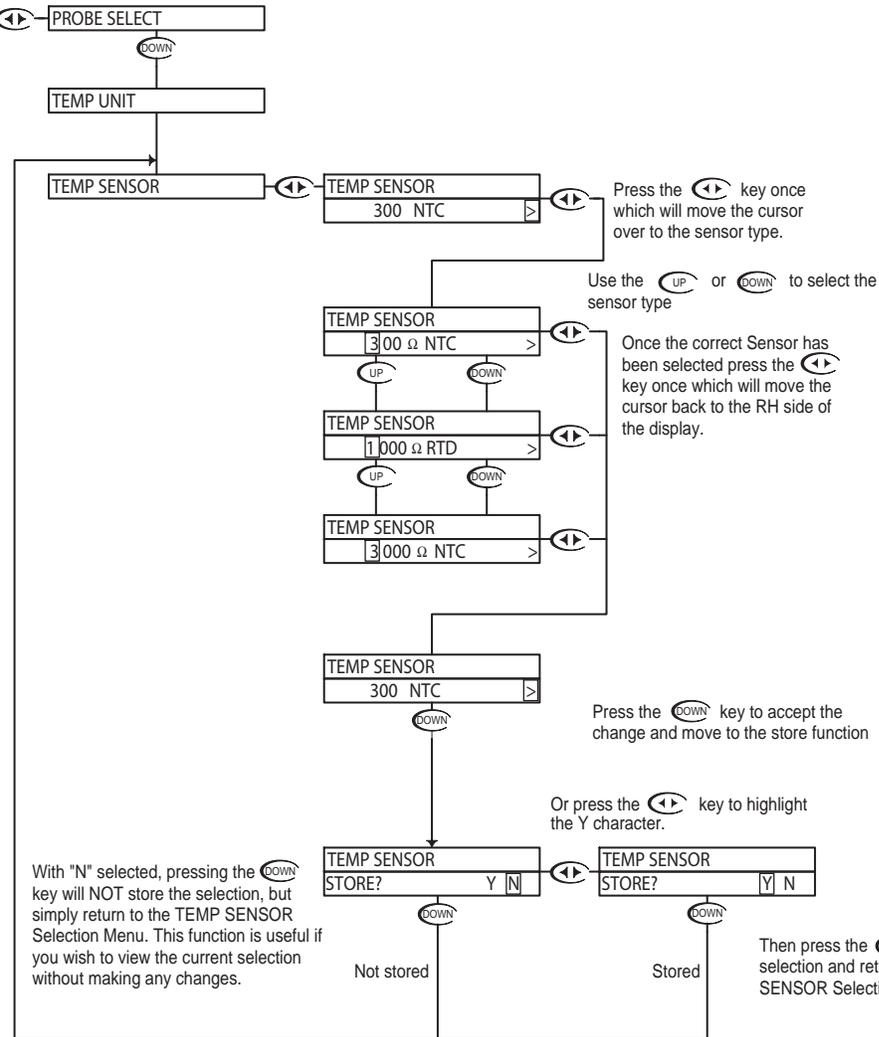
500mV 25.0C RUN MODE

CALIBRATION

UTILITIES

SETUP

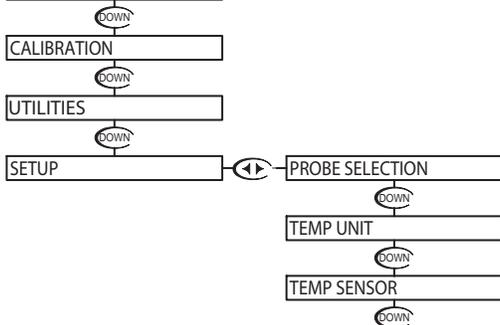
TEMP SENSOR allows the user to select the type of temperature sensor used in the probe.
 The factory default for ORP is a 300 NTC Thermistor. The user can also select a 3000 NTC Thermistor or a 1000 RTD.



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

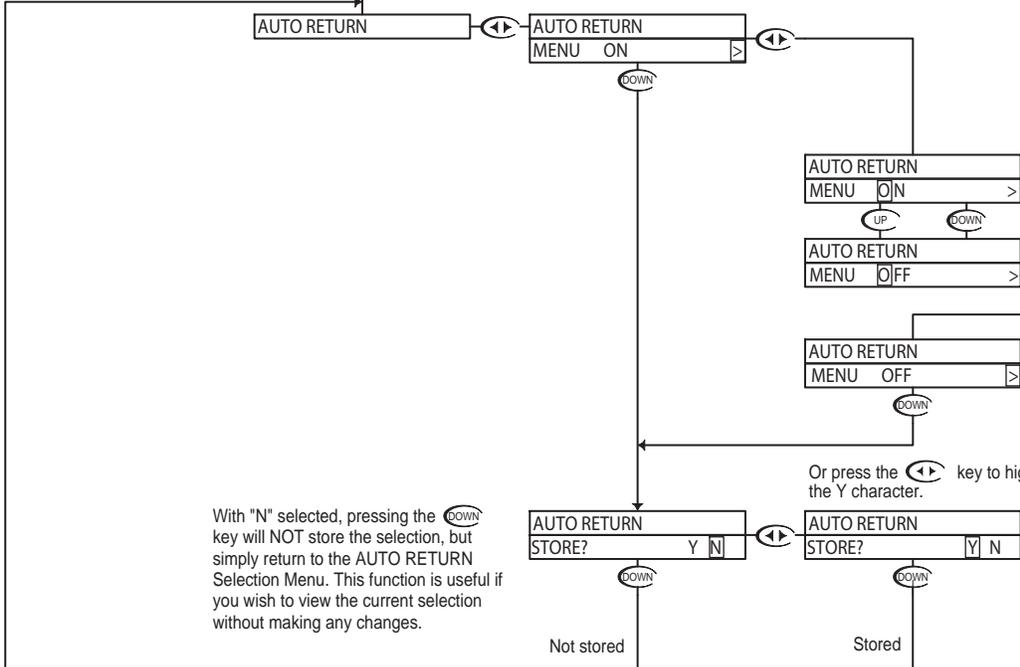
ORP - Setup Menu - Auto Return 5.8

500mV 25.0C RUN MODE



AUTO RETURN is used to select what conditions will cause the controller to time-out of the operations menu

MENU ON will cause the controller to exit the menu and revert back to the online run mode after 10 minutes with no buttons pressed. This feature ensures that if a user forgets to return back to run mode, the controller will not be left in an offline state. If for some reason, the user would like to remain in the menu mode for extended periods of time, the AUTO RETURN function can be set to "OFF".



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

Not stored

Stored

To change the MENU RETURN setting, Press the **LEFT** key once which will move the cursor to the ON or OFF text

Use the **UP** or **DOWN** keys to select either ON or OFF.

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

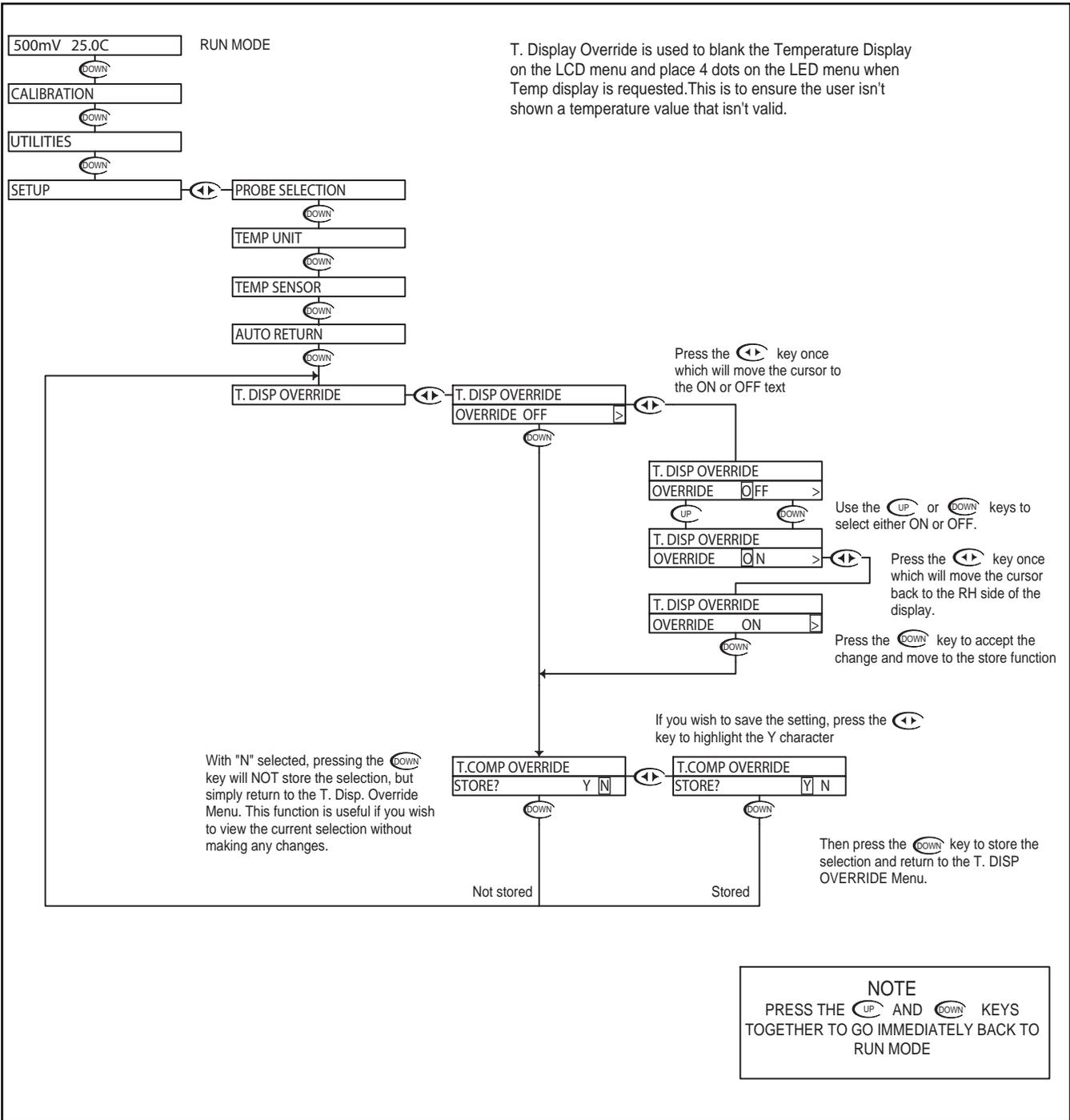
Press the **DOWN** key to accept the change and move to the STORE function

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

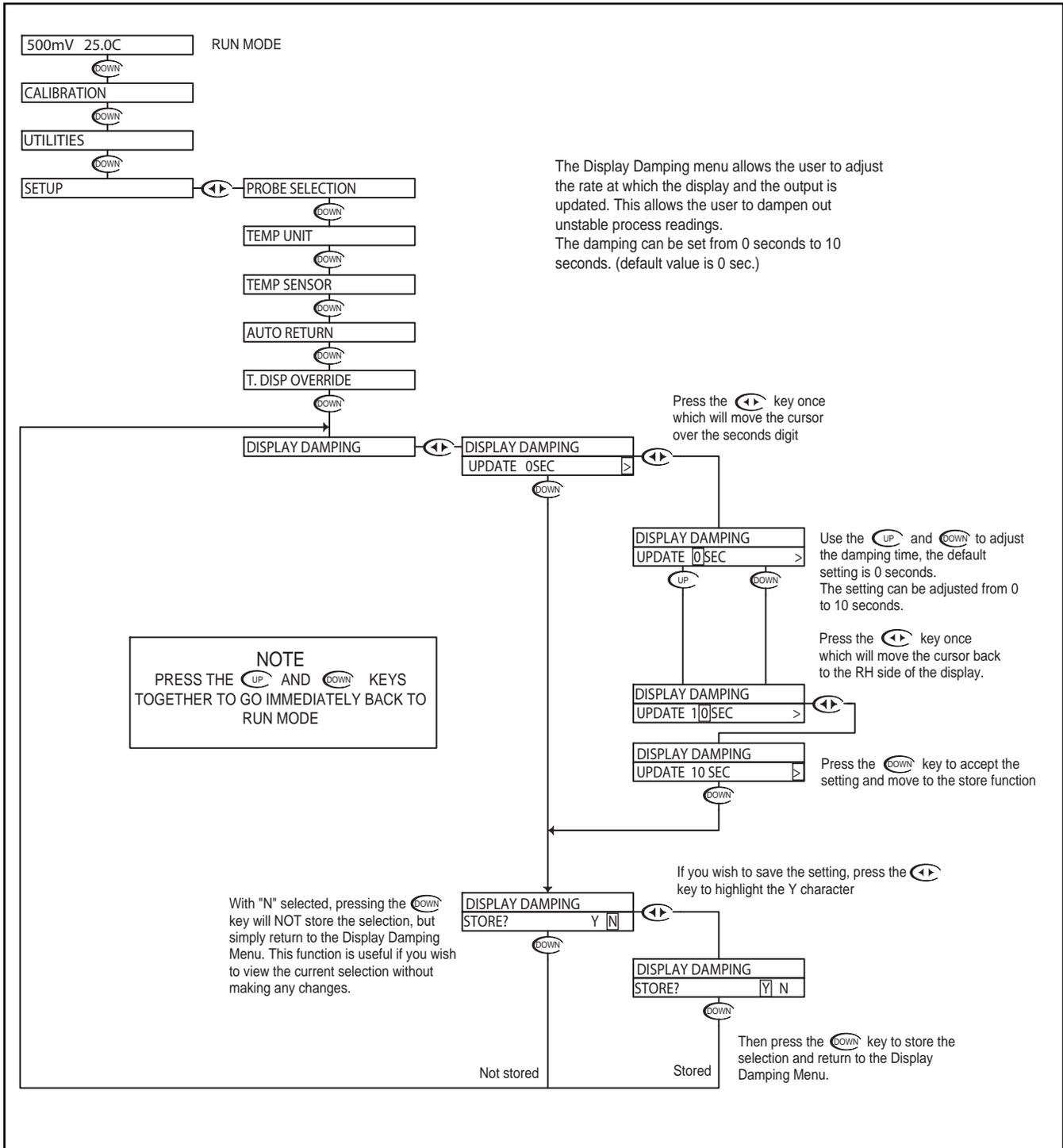
Then press the **DOWN** key to store the selection and return to the Auto Return Selection Menu.

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

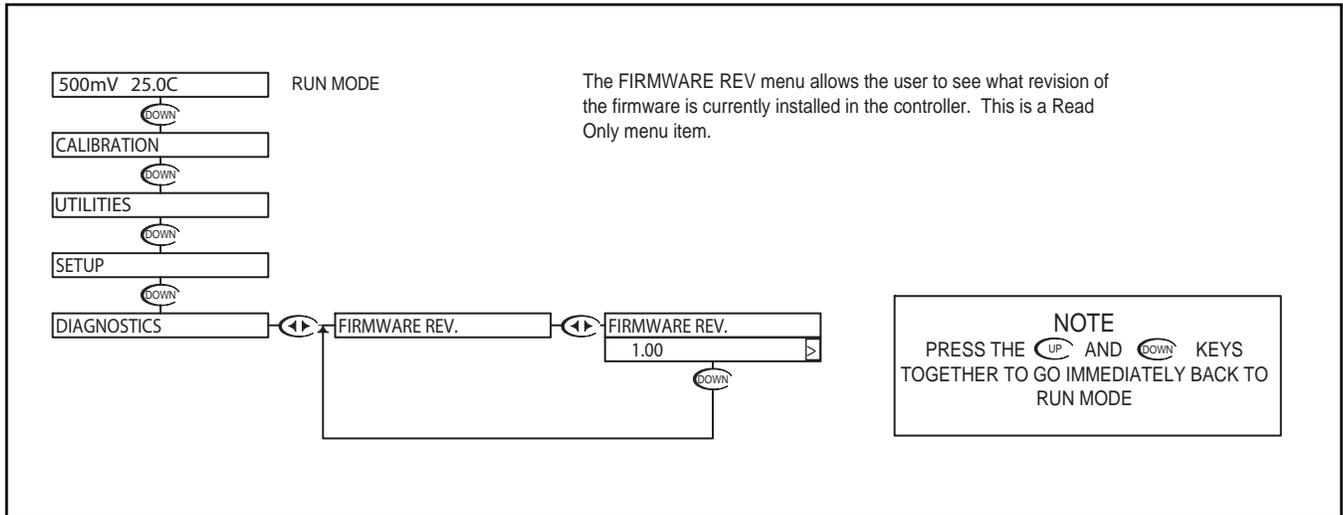
ORP - Setup Menu - Temp. Display Override 5.9



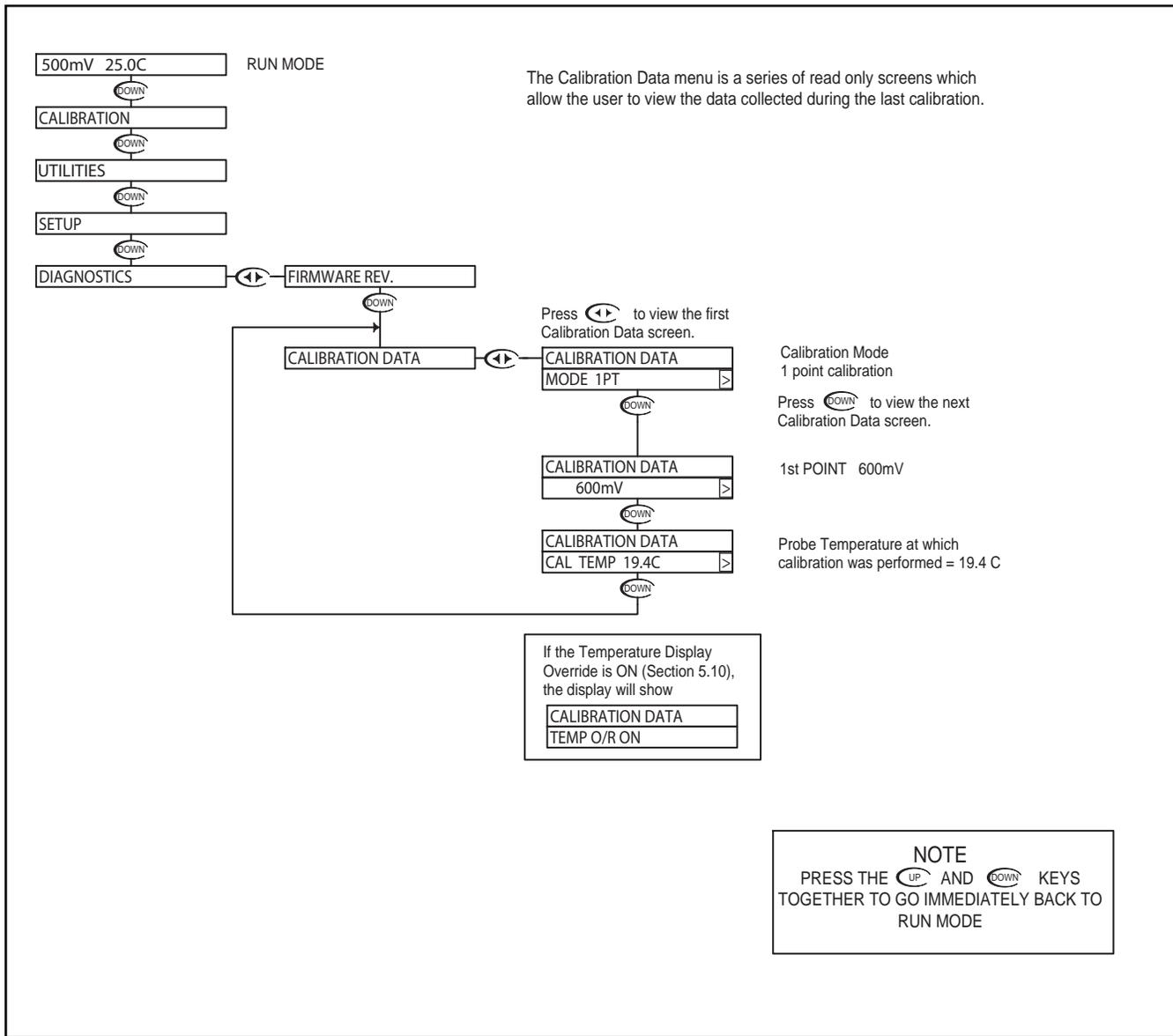
ORP - Setup Menu - Display Damping 5.10



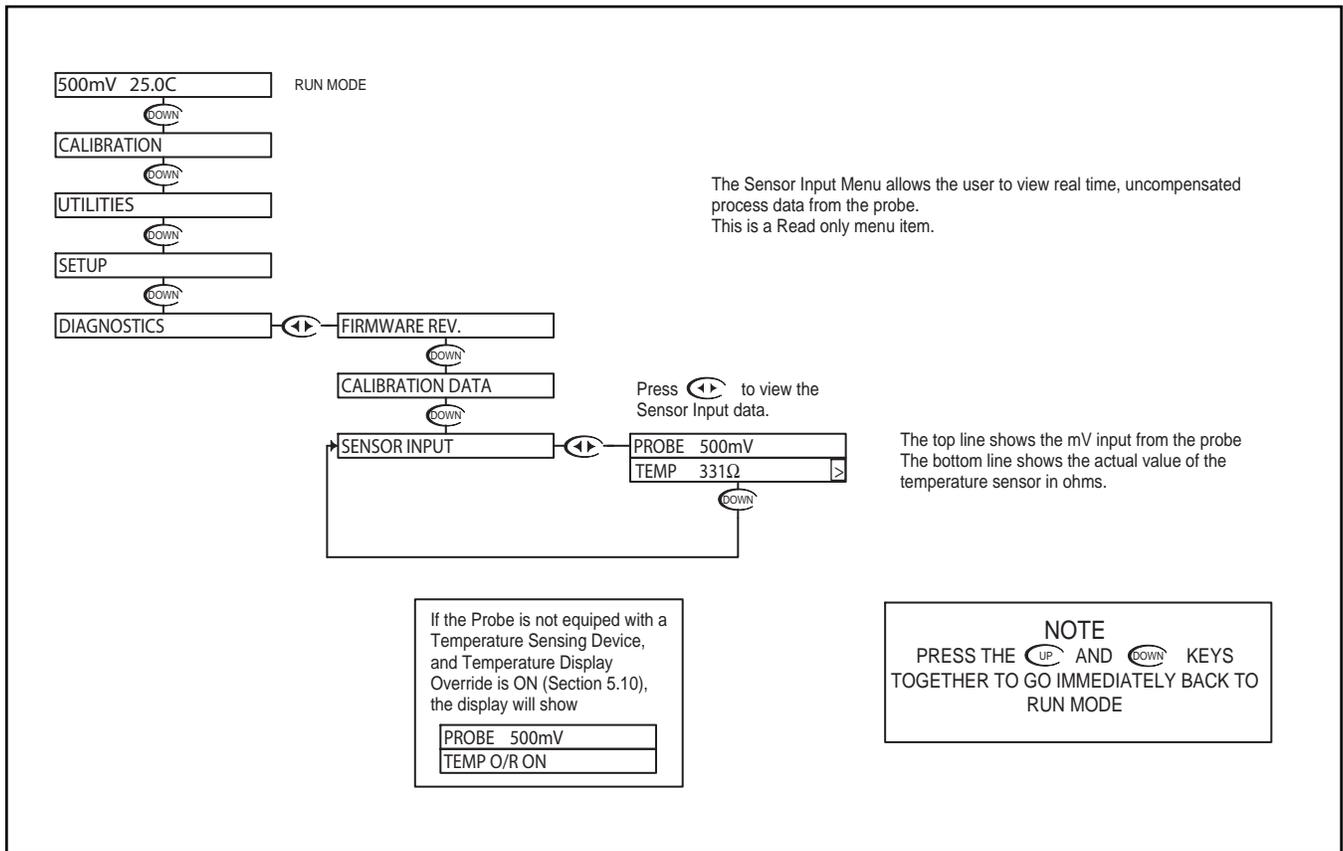
ORP - Diagnostics Menu - Firmware Rev 5.11



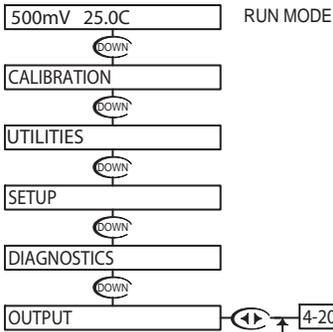
ORP - Diagnostics Menu - Calibration Data 5.12



ORP - Diagnostics Menu - Sensor Input 5.13



ORP - Output Menu - 4-20mA Output 5.14



The Transmitter has a single 4-20mA output, electrically isolated from the ground. The output can source current into a maximum of 800 ohms. See Section 3.9 for wiring diagram. The channel has a fully adjustable 4 & 20 mA output adjustments. This will enable the operator to span the output over the desired range.

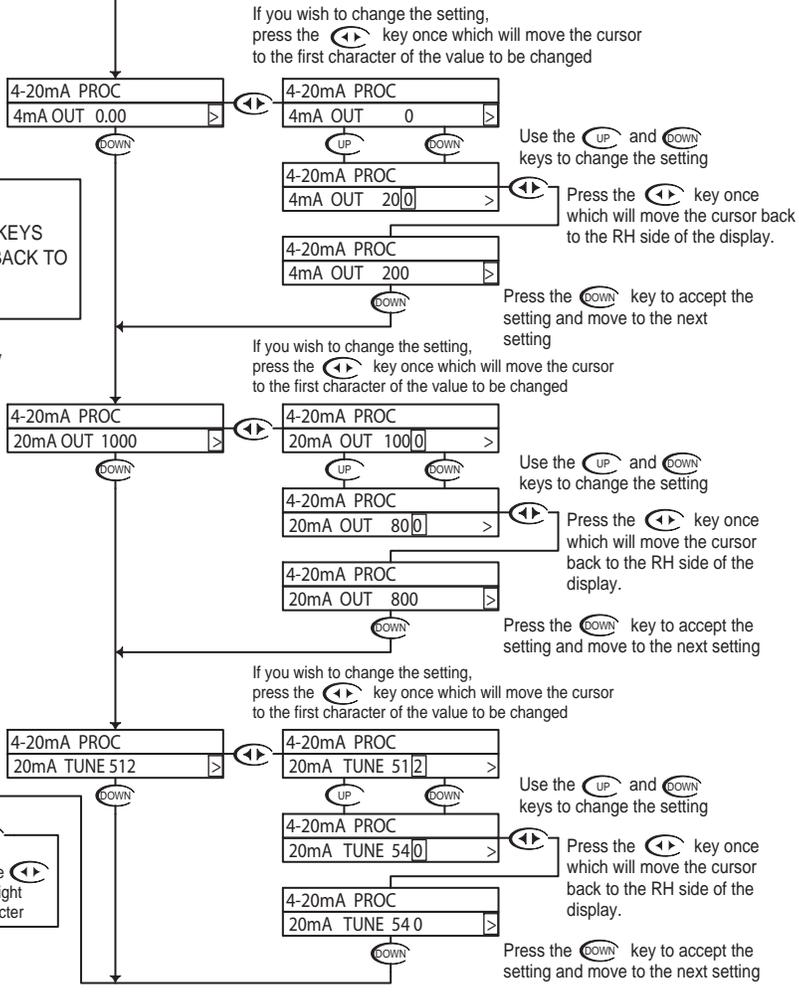
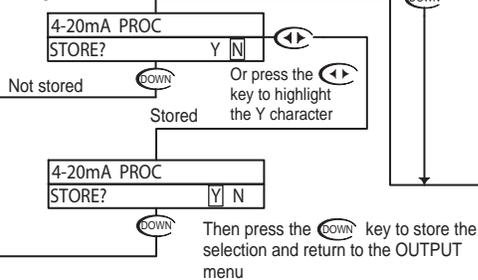
The example below shows the 4-20 mA set to 4mA =200mV and 20mA = 800mV. The output would then span 4 to 20 mA for a mV swing of 200mV to 800mV. Note that the span can be reversed, in that 4 mA can be set to a high mV value, and 20 mA can be set to a low mV value, effectively reversing the control direction.

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

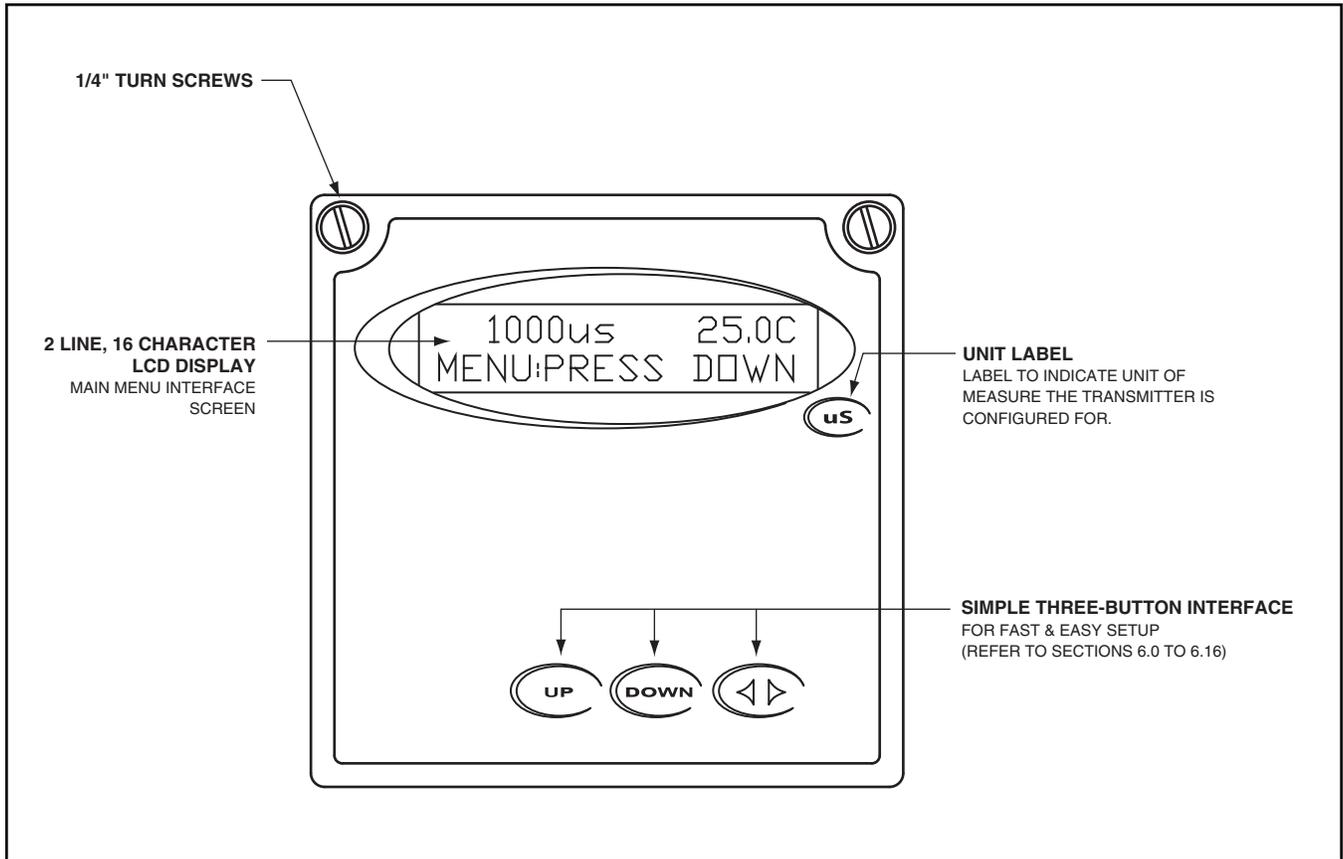
The TUNE function allows the user to precisely adjust the 4-20 ma output to compensate for any errors in the output circuitry. Normally, fine tuning the 4-20mA output is not necessary. To make the adjustment, place an accurate current meter in series with the 4-20 mA output, with the appropriate loads 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.

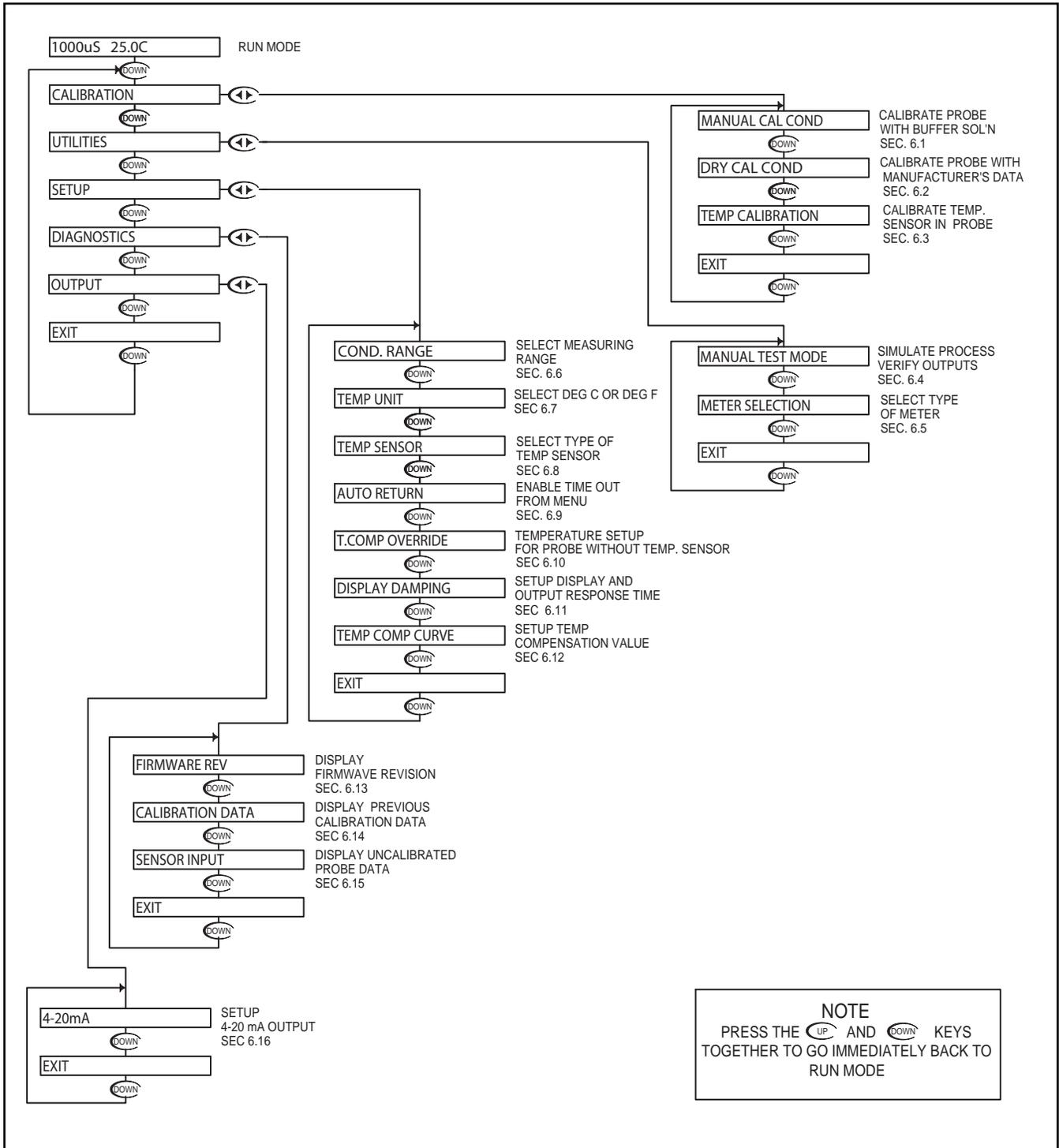
With "N" selected, pressing the **DOWN** key will NOT store the selection, but simply return to the OUTPUT Menu. This function is useful if you wish to view the current selection without making any changes.



Section 6 - Using the Transmitter in Conductivity Mode



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.

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

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

Then press  to move the cursor to the RH position

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

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

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

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 

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

Conductivity - Calibration Menu - Dry Cal Cond 6.2

1000uS 25.0C RUN MODE

CALIBRATION MANUAL CAL COND

DRY CAL COND DRY CALIBRATION

Dry Calibration eliminates the need for conductivity reference solutions, the user inputs the Cell K factor supplied by the factory.

If the conductivity cell has a tag attached to it, specifying the exact cell constant, the user is prompted to enter this value.

NOTE:
ACCELERATOR KEYS
Pressing the UP or DOWN key once will change the value by the smallest digit. Holding the key down will cause the value to change at an increasing rate until the key is released. Pressing the key again will cause the value to start changing at it's slowest rate again. This allows the user to get to the new multiplier value quickly.

DRY CALIBRATION
K FACTOR 1.0000

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

DRY CALIBRATION
K FACTOR 1.0000

Use the **UP** and **DOWN** keys to adjust the value to the K factor specified on the probe tag

DRY CALIBRATION
K FACTOR 10.000

Then press **←** to move the cursor to the RH position

DRY CALIBRATION
K FACTOR 10.000

If the setting is OK, use the **←** key to move the cursor over the Y text and press the down key.

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

DRY CALIBRATION
STORE? Y N

DRY CALIBRATION
STORE? Y N

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

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

Conductivity - Calibration Menu - Temp. Calibration 6.3

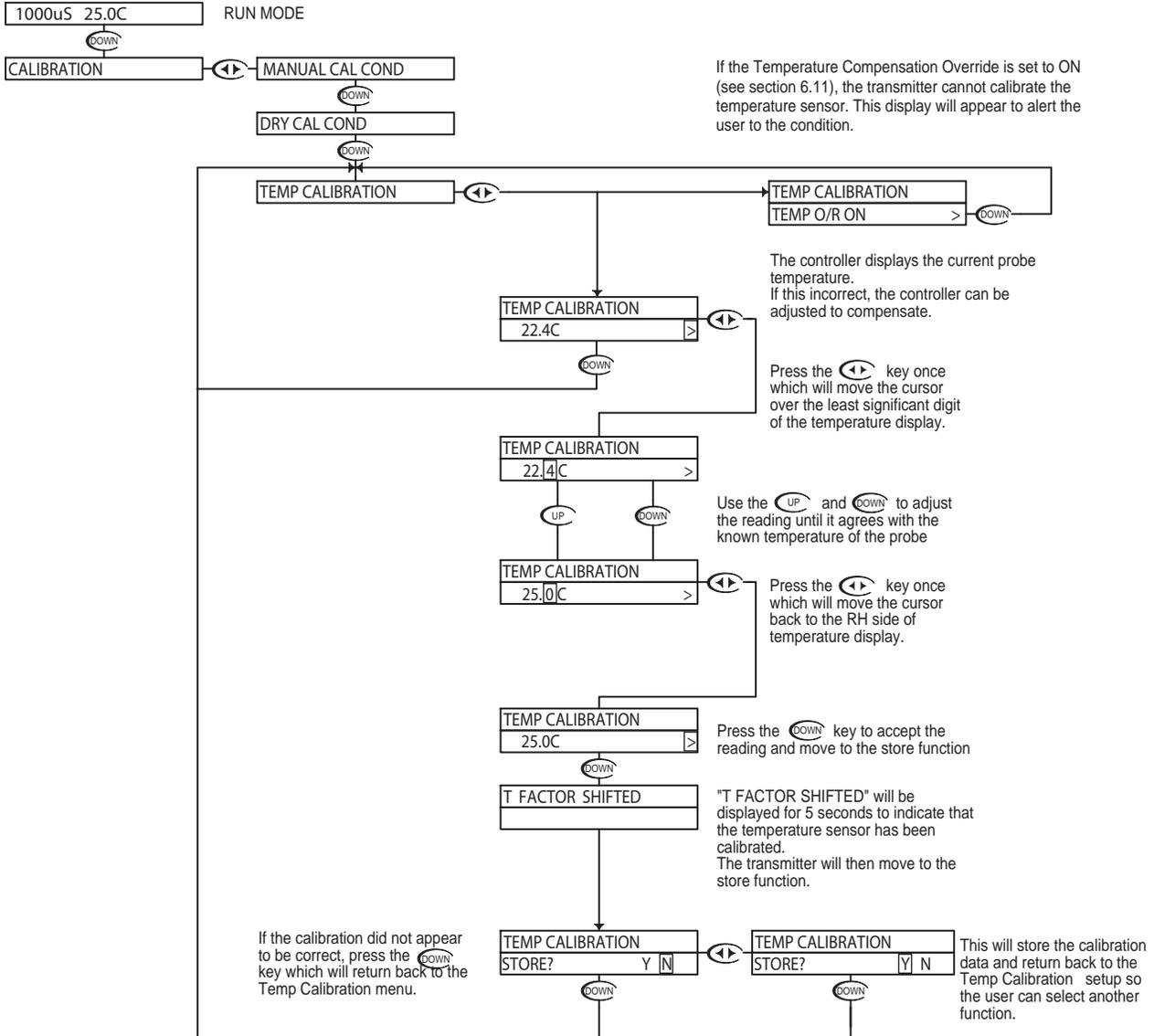
Temperature Calibration

In most cases, the factory 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 the user to calibrate the temperature anywhere within its range.

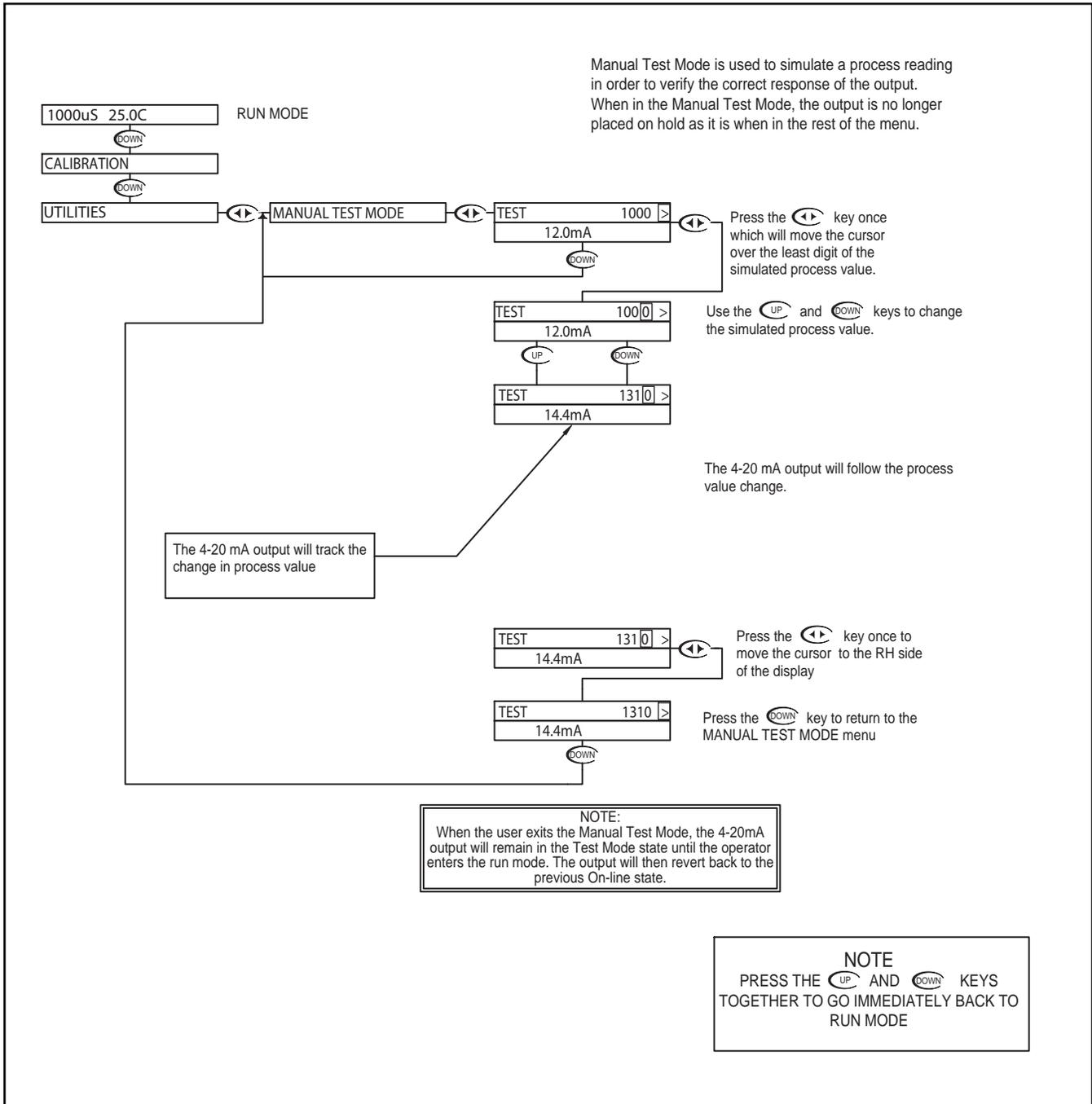
Be aware, that the conductivity reading is affected by the temperature reading (due to the temperature compensation) so accurate temperature calibration is vital to obtaining accurate conductivity readings. If the user is unsure of the calibration test fixture, then it would be best to leave the temperature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

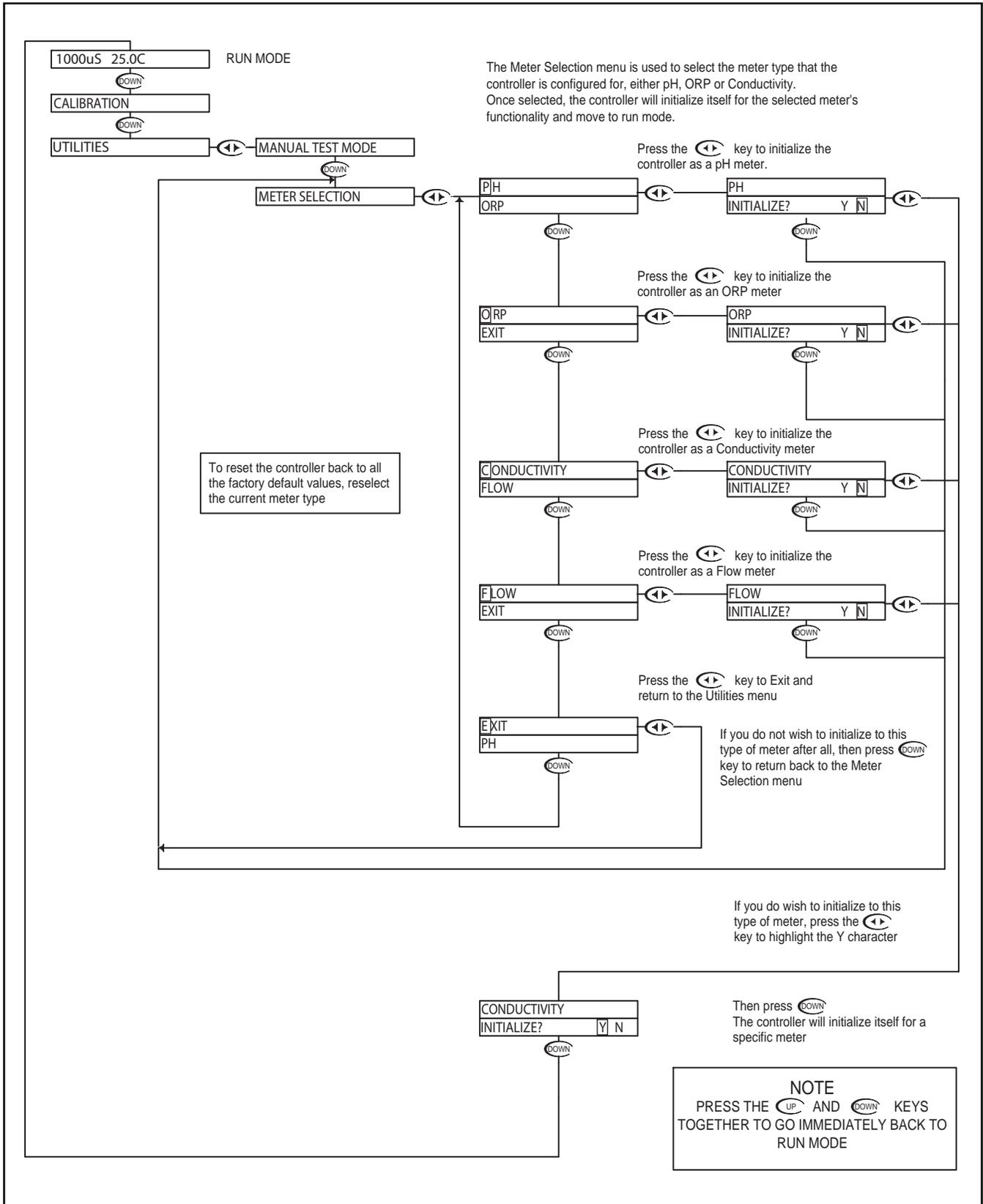


NOTE
PRESS THE **↑** AND **↓** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

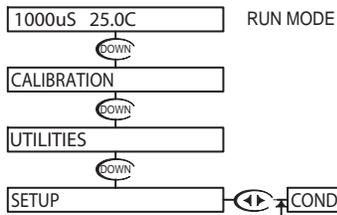
Conductivity - Utilities Menu - Manual Test Mode 6.4



Conductivity - Utilities Menu - Meter Selection 6.5



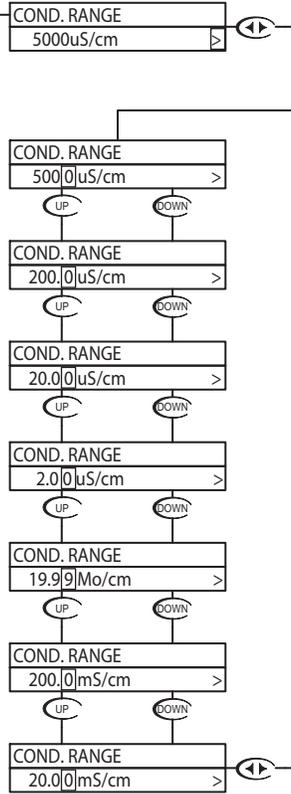
Conductivity - Setup Menu - Conductivity Range 6.6



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
 5000 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



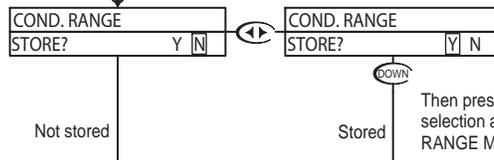
Once the correct range is selected, move to the store function to save the selection

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.

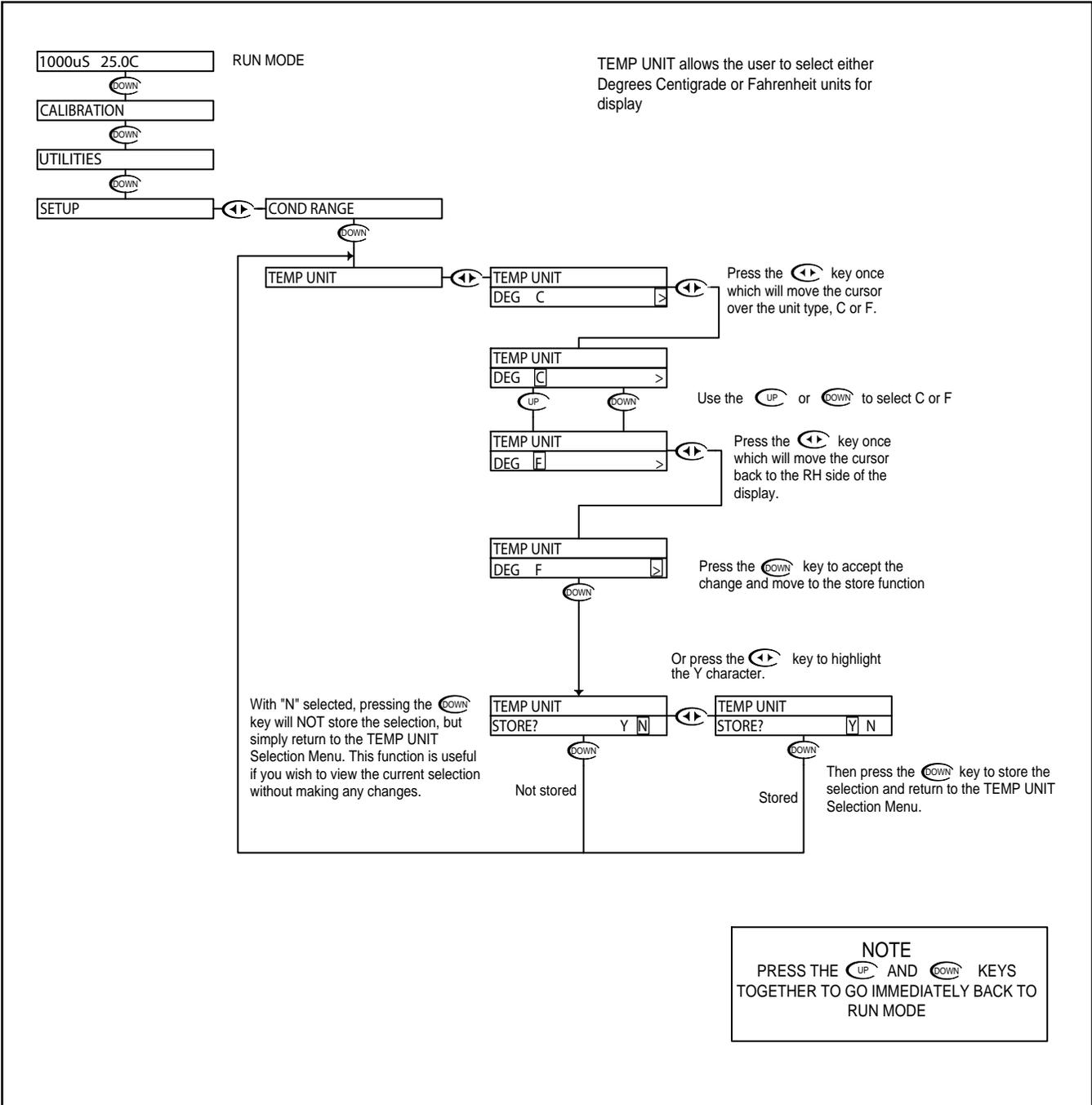
Or press the **←** key to highlight the Y character.



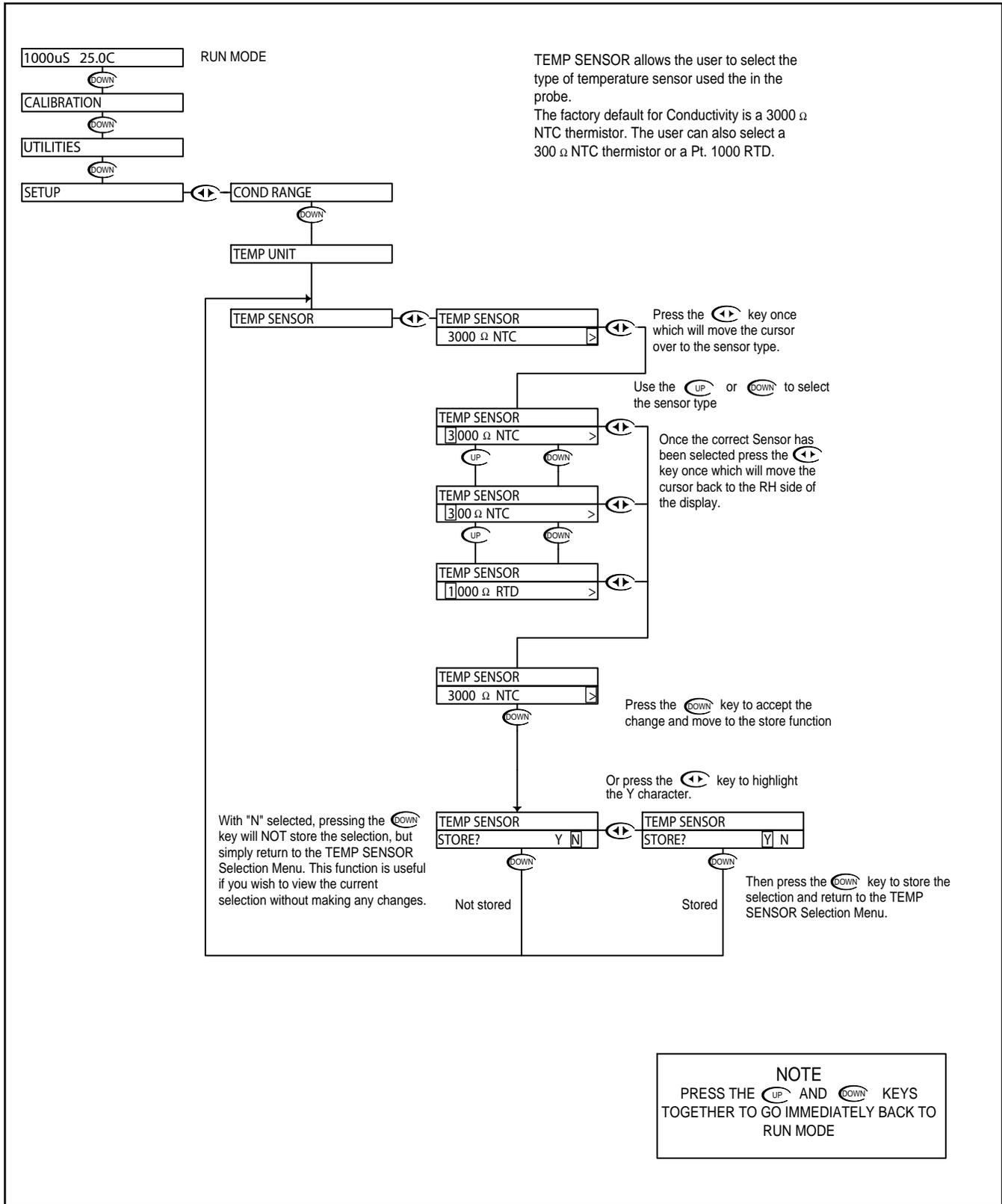
Then press the **↓** key to store the selection and return to the COND RANGE Menu.

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

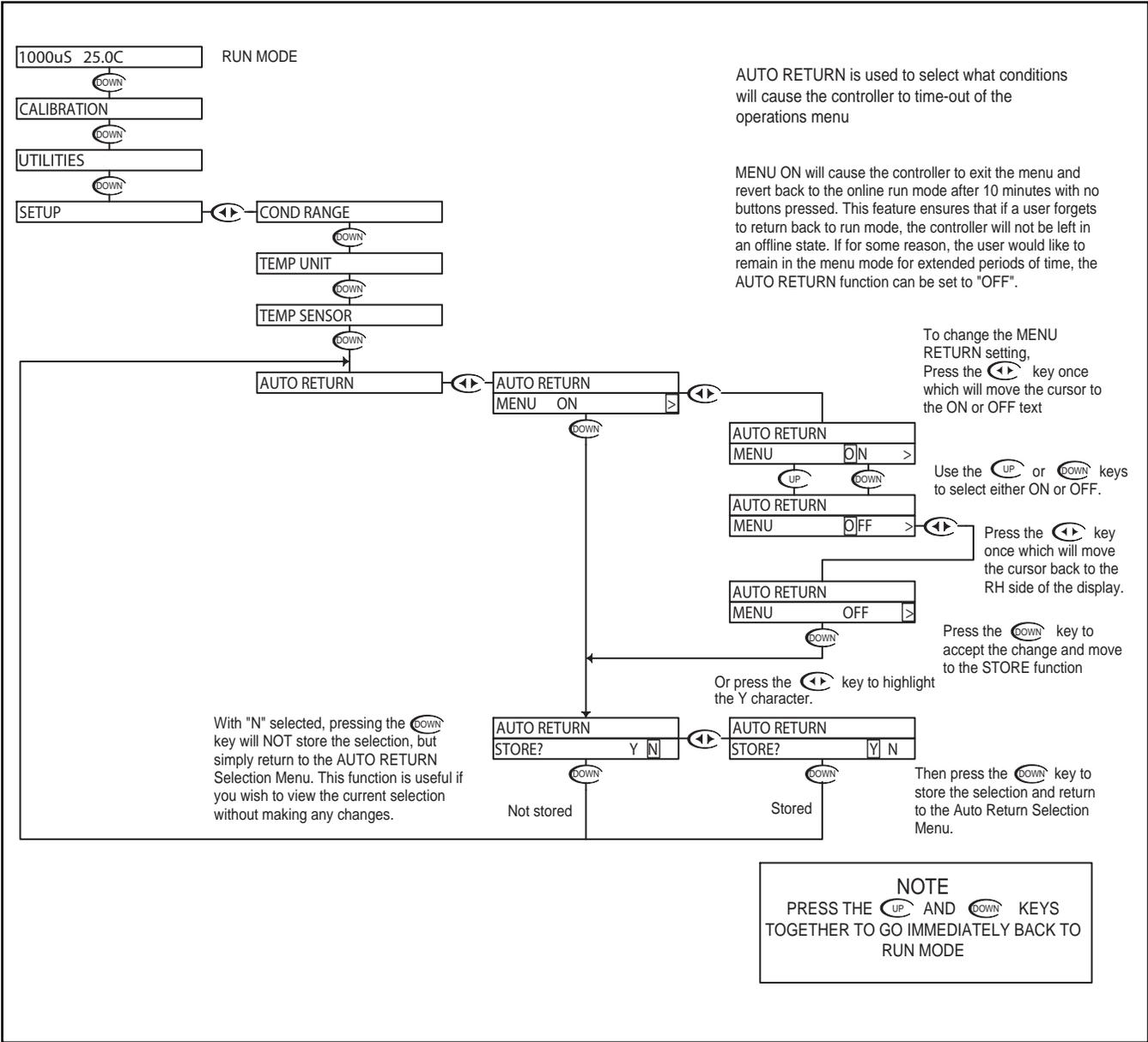
Conductivity - Setup Menu - Temp. Unit 6.7



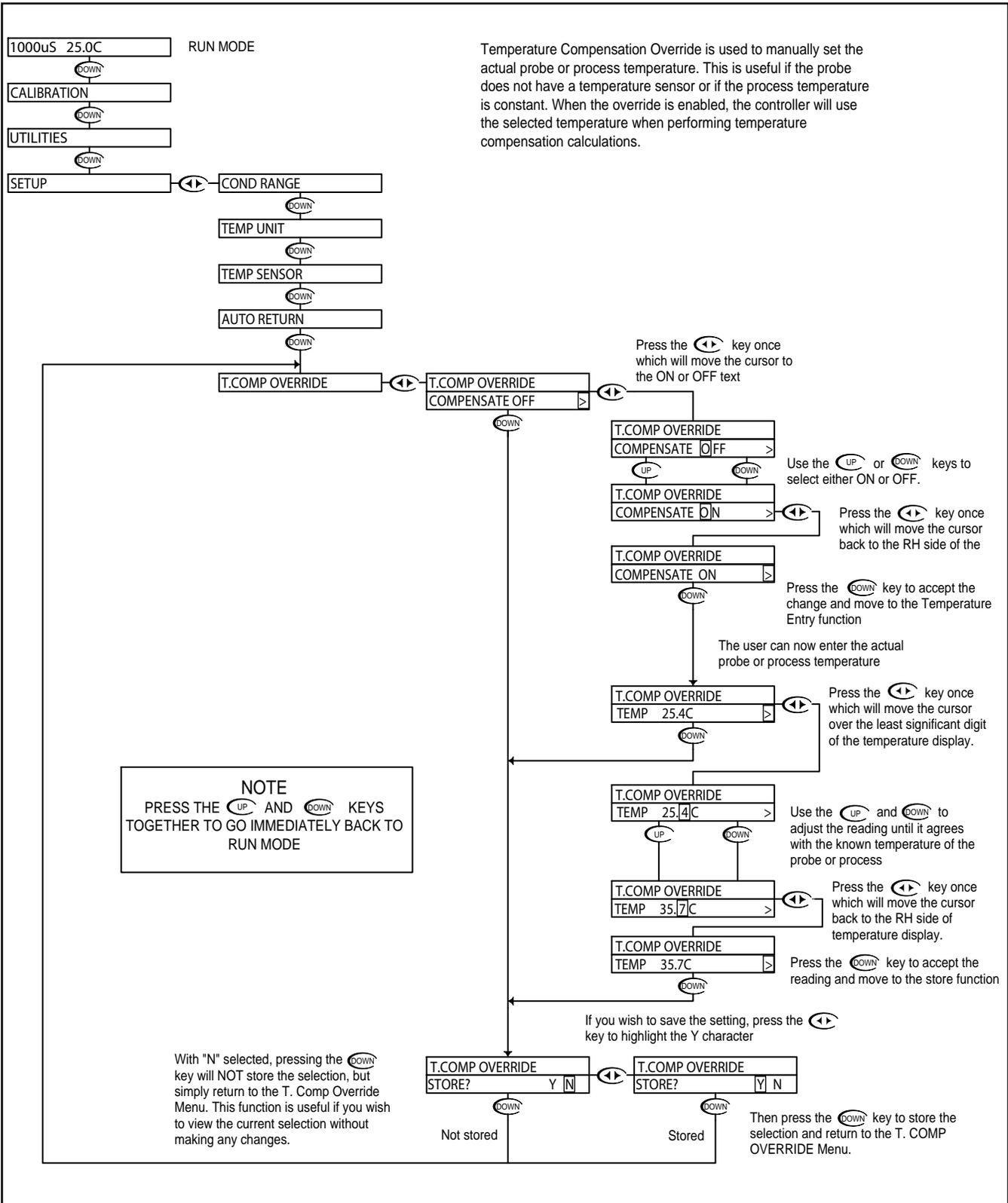
Conductivity - Setup Menu - Temp. Sensor 6.8



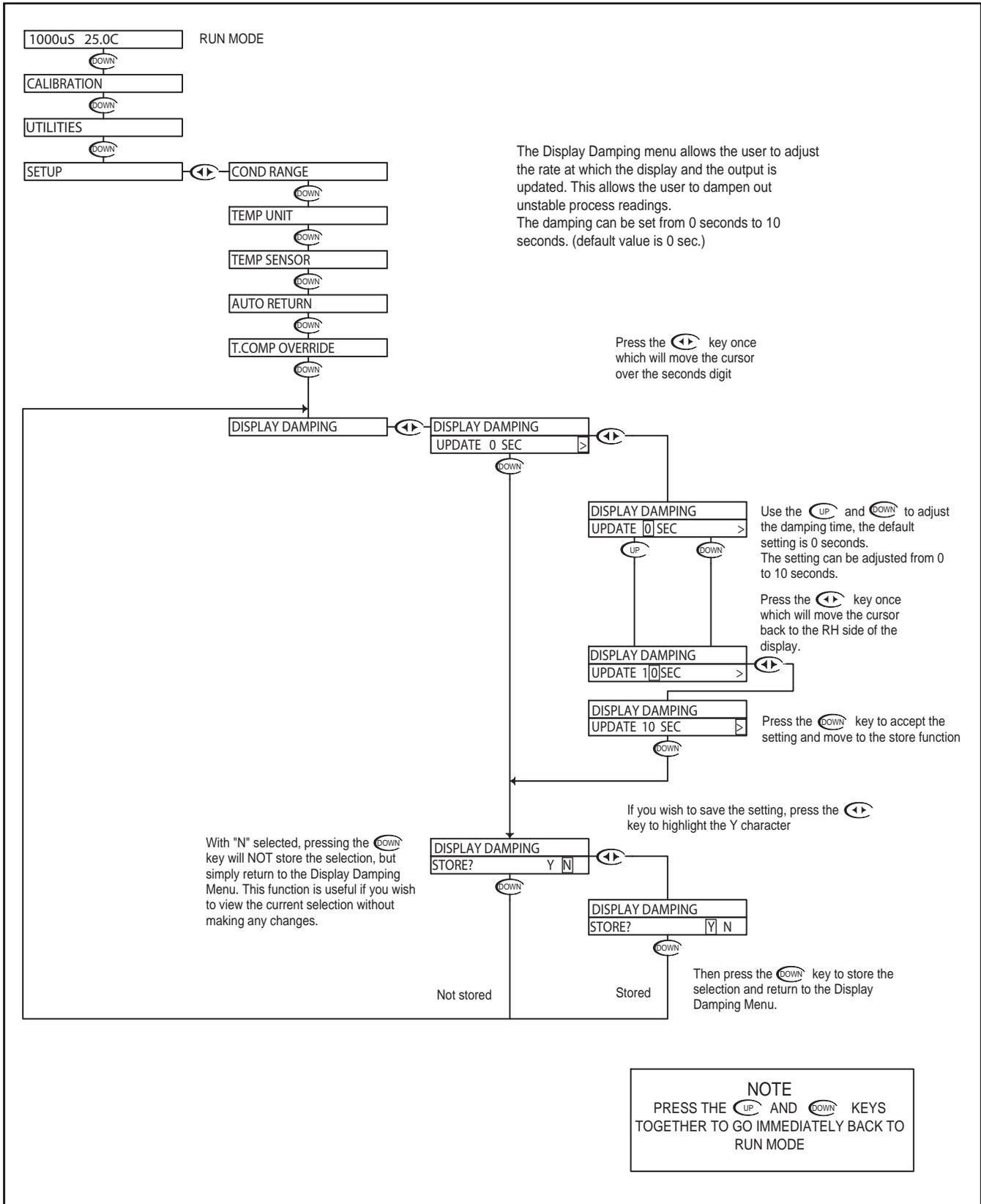
Conductivity - Setup Menu - Auto Return 6.9



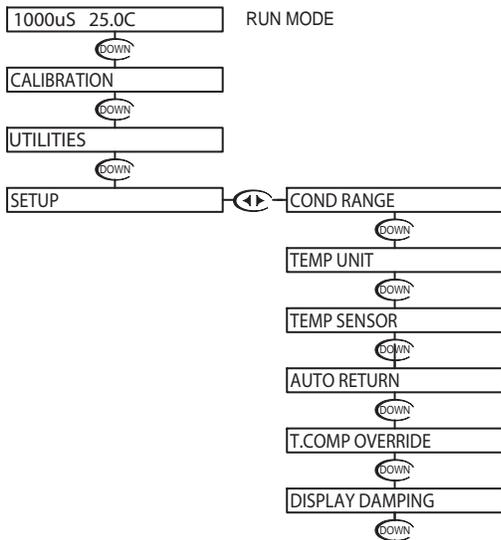
Conductivity - Setup Menu - T. Comp Override 6.10



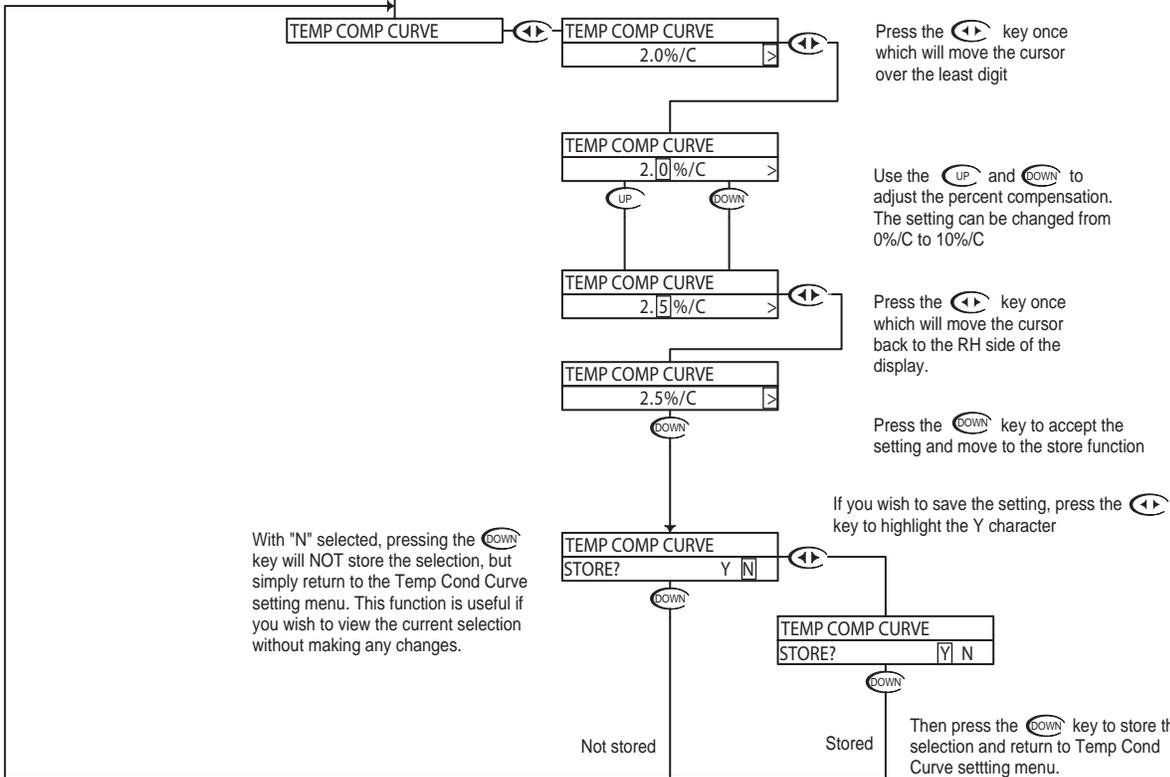
Conductivity - Setup Menu - Display Damping 6.11



Conductivity - Setup Menu - Temp. Comp. Curve 6.12

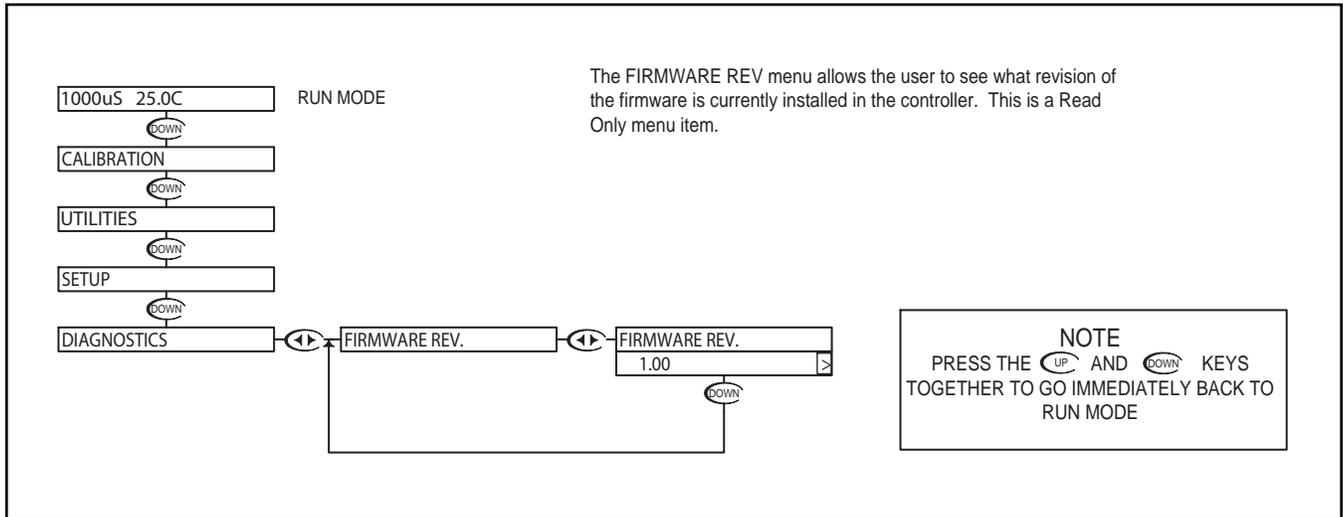


The Temperature Compensation Curve setting allows the user to select the temperature compensation to match a specific process. The variation of Conductivity versus Temperature is dependent on the type of solids and liquids in water, so no fixed compensation value will accurately compensate every process. 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.

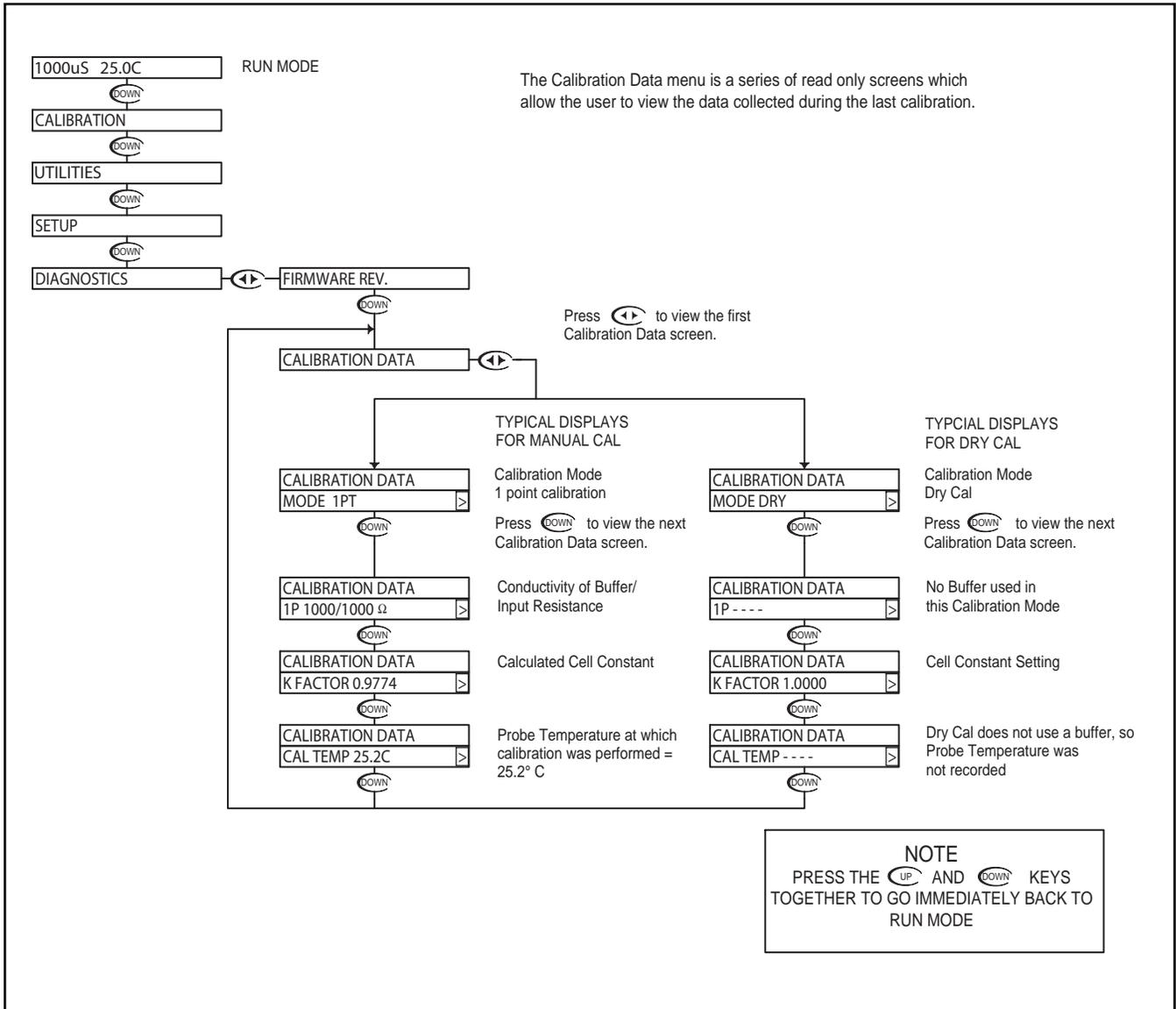


NOTE
PRESS THE **UP** AND **DOWN** KEYS TOGETHER TO GO IMMEDIATELY BACK TO RUN MODE

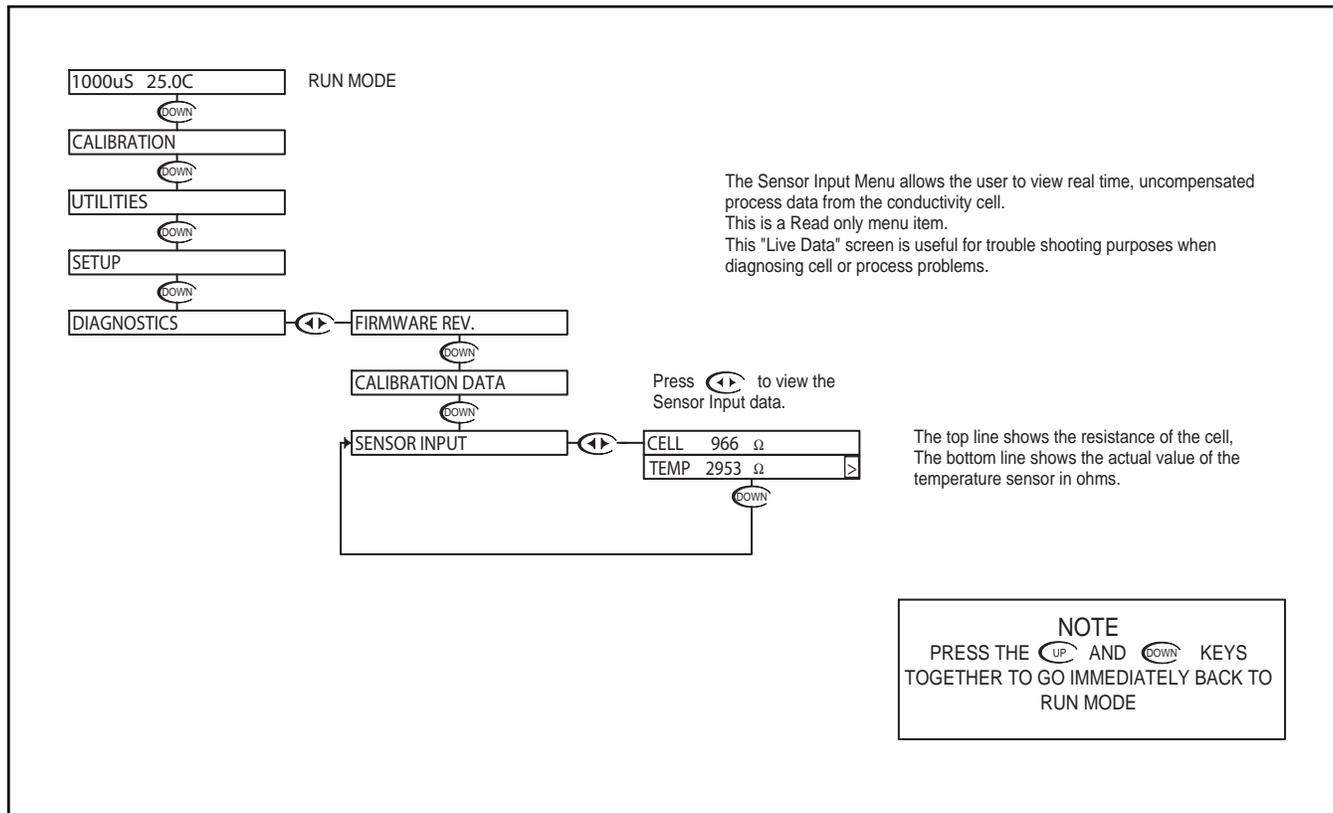
Conductivity - Diagnostics Menu - Firmware Rev. 6.13



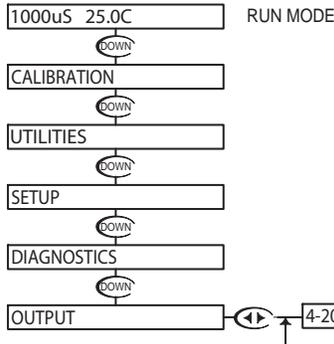
Conductivity - Diagnostics Menu - Calibration Data 6.14



Conductivity - Diagnostics Menu - Sensor Input 6.15

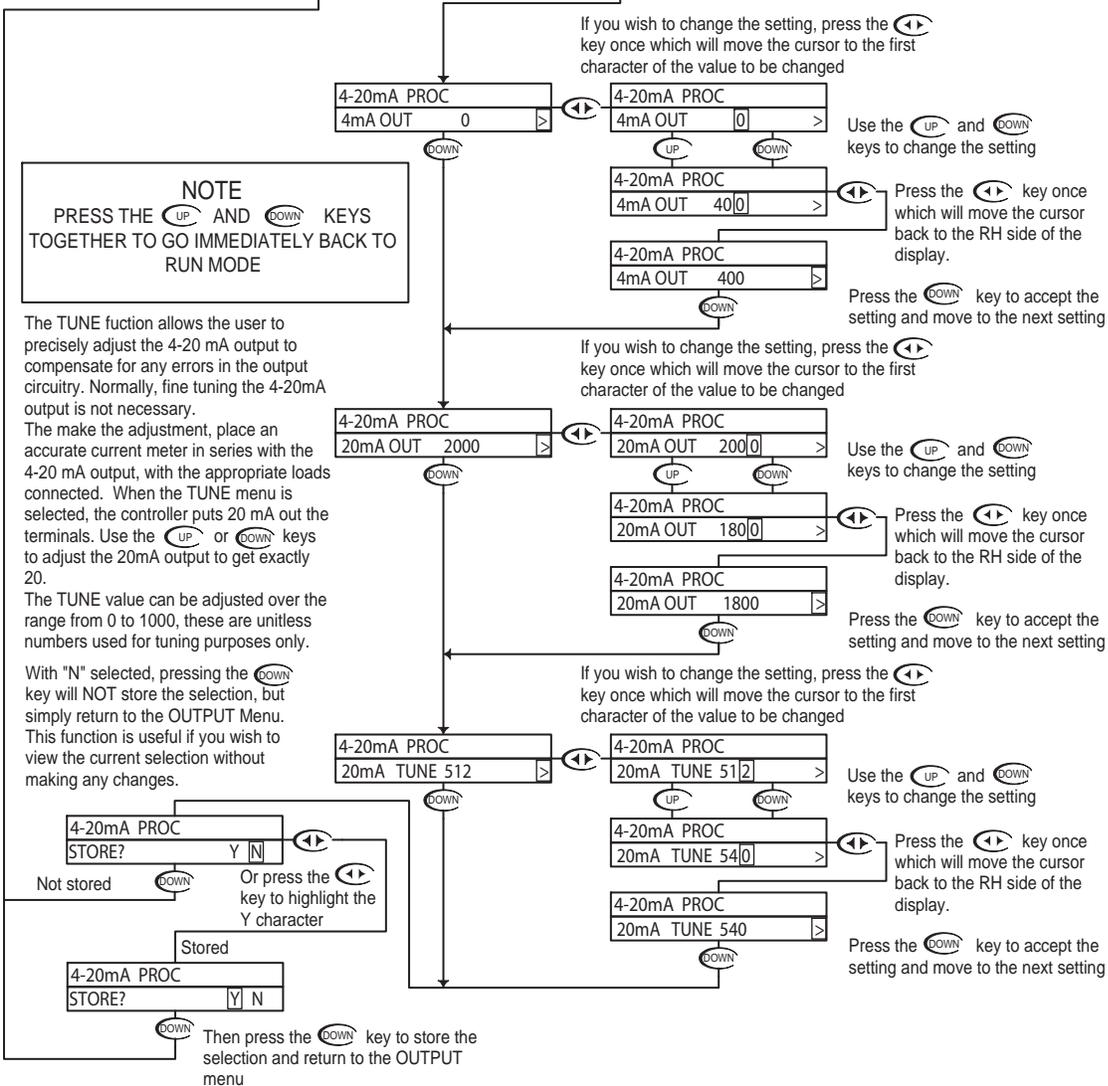


Conductivity - Output Menu - 4-20mA Output 6.16



The Transmitter has a single 4-20mA output, electrically isolated from the ground. The output can source current into a maximum of 800 ohms. See Section 3.9 for wiring diagram. The channel has a 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 =400 uS and 20mA = 1800 uS. The output would then span 4 to 20 mA for a conductivity swing of 400 to 1800. Note that the span can be reversed, in that 4 mA can be set to a high conductivity value, and 20 mA can be set to a low conductivity value, effectively reversing the control direction.





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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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RETURN REQUESTS/INQUIRIES

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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