

# **TENNEY ENVIRONMENTAL**

## **VERSATENN III CONTROLLER OPERATION MANUAL**

(TWO - CHANNEL)

**FOR TEMPERATURE / HUMIDITY CHAMBERS**

**And**

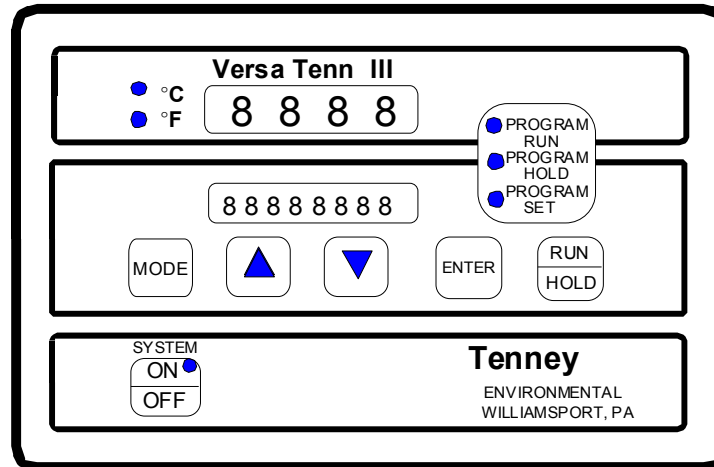
**TEMPERATURE / PRESSURE CHAMBERS**

LUNAIRE LIMITED  
4 Quality Street  
Williamsport, PA 17701  
(570 - 326 - 1770) Fax: (570 - 326 - 7304)

10/30/01

## TABLE OF CONTENTS

<b><u>CONTROL BASICS</u></b>	3
<b><u>PROGRAMMING NOTES</u></b>	4
<b><u>TUTORIAL</u></b>	
1. SELECT AND RUN A STEADY TEMPERATURE	5
2. SELECT AND RUN A STEADY TEMPERATURE / HUMIDITY	5
3. REVIEW AND CHANGE TEMPERATURE / HUMIDITY SETPOINTS	5
4. SELECT AN EVENT	6
5. ENTER A SAMPLE TEMPERATURE PROGRAM	6,7
6. ENTER A PROGRAM WITH TEMP, HUMIDITY, COPY, JUMLOOP, AND STOP	8-10
<b><u>PROGRAMMING BASICS</u></b>	
CALIBRATING HUMIDITY FOR ALTITUDE	10
SET THE CLOCK	10
SET THE ALARMS	11
CLEAR AN ALARM	11
CLEAR AN ERROR MESSAGE	11
VERIFY YOUR PROGRAM	12
CHECK THE STATUS OF A PROGRAM IN RUN	12
RUN YOUR PROGRAM FROM ANY STEP	13
RESUME A PROGRAM FROM HOLD	13
CLEAR YOUR PROGRAM	13
<b><u>OPERATION</u></b>	
WAITFOR and AUTOSTART	13,14
LOCK	14
DIPSWITCHES	14,15
GUARANTEED SOAK	15
CALIBRATION ( CAL ) OFFSET	15
SET AND ADJUST PID	16,17
ERROR MESSAGES	17,18
LOGIC INPUTS	19
MASTER OUTPUT LOGIC SPEC	19
SPECIAL FUNCTION VARIABLES	20
LOGIC VALUES	20,21
PERCENT OUTPUT DISPLAY	21
CALIBRATION SEQUENCE	22,23



**CONTROL BASICS:** Also Refer To The “VersaTenn Quick Reference Card” Supplied With Manual

- ◆ **DISPLAYS:** The upper display typically shows chamber temperature, as well as the step number when in the programming mode. The lower display is alphanumeric, showing the active menus and variables. **Note:** While running a program, the upper and lower displays can simultaneously show process temperature and humidity values as stated below.

Upper Display: Temperature process value - Channel 1

Lower Display: Humidity process value (preceded by “RH”) - Channel 2 (Go to System with Mode key and press ENTER.)

- ◆ **PROGRAM RUN LED:** This LED is lit when the program is running.
- ◆ **PROGRAM HOLD LED:** This LED is lit when the program is in hold. This LED will blink when in the Guaranteed Soak Mode.
- ◆ **PROGRAM SET LED:** This LED is lit when entering, editing, or checking a program in memory.
- ◆ The **MODE** key selects menus and variables within a menu.
- ◆ The **ENTER** key has three functions.
  1. Enters the selected numerical values into memory.
  2. Stores selected menus and variables into memory.
  3. Scrolls you through a menu in sequence.
- ◆ The **UP** and **DOWN** keys ( also referred to as Delta keys ) vary the value of the variable in the display. In addition, while programming, the up and down keys scroll through the command menu.
- ◆ The **SYSTEM ON / OFF** key selects VersaTenn's outputs on and off. VersaTenn is energized when the light is on. When you press the key and the light goes out, VersaTenn's outputs are disconnected. ( In the OFF mode, you can practice on the programmer without sending commands to the chamber. )
- ◆ The **RUN / HOLD** key, when in run, executes your program. When in hold, the program is held at its current setpoints.
- ◆ **C** and **F** indicate the selected temperature scaling. When changed from **C** to **F**, or vice versa, all programmable variables associated with temperature setpoints, 'Waitfor' temperatures, alarm limits, setpoint limits, PID, etc., will also be converted from **C** to **F**, or vice versa. **Note:** When making this change, all program entries and alarm settings will return to default values. The program entries and alarm settings must be re-entered.

**PROGRAMMING NOTES:**

The VersaTenn III is a sophisticated device, capable of executing a number of complicated tasks. A great deal of information must be transmitted through a limited display. Therefore, many messages in the displays are written in a form of numeric shorthand. It is important that you understand these symbols.

- ◆ **C2 / RH:** (In Lower display) Represents the current process value for Channel 2.
- ◆ **SP1:** Temperature setpoint #1
- ◆ **SP2:** Humidity setpoint #2
- ◆ **1HI:** Represents current value for various outputs as a percentage, depending on controller type.
- ◆ **1LO:** Represents current value for various outputs as a percentage, depending on controller type.
- ◆ **2HI:** Represents current value for various outputs as a percentage, depending on controller type.
- ◆ **2LO:** Represents current value for various outputs as a percentage, depending on controller type.
- ◆ **EV1 - EV6:** Event Output status - ON or OFF, for Events 1 through 6
- ◆ **EI:** Event Input status - OPEN or CLOSED
- ◆ **LEV1 - LEV2:** internal logic event
- ◆ **ER1:** Severe error message, which will shut down the VersaTenn controller.
- ◆ **ER2:** Non-fatal error message, which will hold the program.
- ◆ **CLR ALARM:** When displayed, pressing ENTER clears the alarm condition.
- ◆ **RETURN:** Initiated by pressing ENTER key. Returns the operator to the SYSTEM prompt.
- ◆ **PROGRAM:** Initiated by pressing ENTER. Enables operator to enter Program Parameter Group.
- ◆ **CLR FILE:** Allows you to begin to clear a previously entered program.
- ◆ **CLRFL? xx:** Prompts you enter the number of the file you want to clear.
- ◆ **FILE?:** Select the identifying number you wish to assign to a file. There can be from 1 to 10 files. Each file will start with Step #1.
- ◆ **STEP:** Represents the current system step. A total number of 99 steps are possible; i.e., number of steps in File #1 plus the number of steps in File #2, up to and including File #10.
- ◆ **COPY:** Allows you to copy the current step to any other step, as long as it is in the same profile and already exists or is one step number past the last step in the current profile.
- ◆ **JUMLOOP:** Allows you to return to a previously programmed step. Control goes to the beginning of the step to which you have selected. A jumploop is permitted only within the file itself. It is not possible, for example, to jumploop from Step #5 of File 2 to Step #9 of File 1.
- ◆ **WAITFOR:** A step which is a test that allows program execution to continue only when the requirements of the test have been met, such as for time, temperature, humidity, or for an event.  
**W1** = Wait for a programmed Channel 1 setpoint temperature.  
**W2** = Wait for a programmed Channel 2 setpoint.  
**WH** = Wait for a programmed number of Hours.  
**WM** = Wait for a programmed number of Minutes.  
**WE** = Wait for a programmed Event Input status - Open or Close.
- ◆ **AUTOSTART:** Provides a means by which the VersaTenn system can be put into a temporary hold state of operation until a specified DAY and Time-of-DAY is reached.
- ◆ **STOP:** This step permits the program to terminate.
- ◆ **LINK:** To link one file to another. The last step in the file must be a link step. A link step may not follow a STOP step.
- ◆ **START:** All run-time parameters are set to their initial values and then program execution will begin with Step XX, with XX being any valid step number in the file.
- ◆ **RESUME?:** Allows program execution to begin with the current step.

## TUTORIAL:

The simplest way to teach yourself to operate a VersaTenn III is to practice programming techniques with the following tutorial. In addition, you will find the **VersaTenn III Quick Reference Guide** helpful as a training tool and operation reference.

To begin, energize the chamber and VersaTenn. The word WARMSTRT (warm start) will appear for a few seconds. This is the standard start indicator. The lower display should read SYSTEM. SYSTEM is home base or starting point for any function. If you become confused or lost, get back to SYSTEM. If you are in RUN mode (status during run of program, read only), simply press HOLD, and the display will return to SYSTEM. In all other cases, press MODE until the display says RETURN. Then press ENTER, and the display will return to SYSTEM.

You program the control in steps. You must set one step at a time, and fully describe that step to the controller. If you make a mistake, you can always scroll through the entire step to get back to whatever function it was that contained the error.

### 1. SELECT AND RUN A STEADY TEMPERATURE

Begin at SYSTEM. Press ENTER. The display will now show either RH or SP1. If it shows RH, press MODE. It will now show SP1. It is ready to receive Setpoint 1, or temperature setpoint.

Using the UP and DOWN keys, select the temperature setpoint you want. The display will flash until you press ENTER, entering your setpoint temperature.

**TO ELIMINATE HUMIDITY**, press MODE. The display will show SP2 and a number. Press the DOWN key until the **DISPLAY READS - 0.1**. The display will flash until you press ENTER, eliminating humidity.

If you want the chamber to actively operate with the setpoint temperature you have entered, and without humidity, press the ON / OFF switch. The ON light will glow and the chamber will run.

### 2. SELECT AND RUN A STEADY TEMPERATURE / HUMIDITY

Begin at SYSTEM. Press ENTER. SP1, Setpoint 1, appears followed by a number. Using the UP and DOWN keys, select the temperature setpoint you want. The display will flash until you press ENTER, entering your setpoint temperature.

Press MODE. The display will show SP2 and a number. Humidity is entered in direct RH terms. To enter a humidity of 85%, press the UP and DOWN keys until 85.0 appears. 85.0 will flash until you press ENTER, entering the humidity setpoint.

### 3. REVIEW AND CHANGE TEMPERATURE / HUMIDITY SETPOINTS

By pressing MODE, you can scroll back to SP1 on the lower display. The previously programmed temperature setpoint will appear. To change the temperature setpoint, press the UP and DOWN keys until you reach the desired number. The setpoint will flash until you press ENTER. You have now entered your new setpoint temperature.

To change SP2, or the humidity setpoint, use the UP and DOWN keys to reach your desired number. Press ENTER. You have now entered your new humidity setpoint.

**Important!** Before ramping down from a humidity and temperature setpoint to a low temperature below freezing, make a step to turn off humidity, e.g., - 0.1, before you enter the ramp-down step.

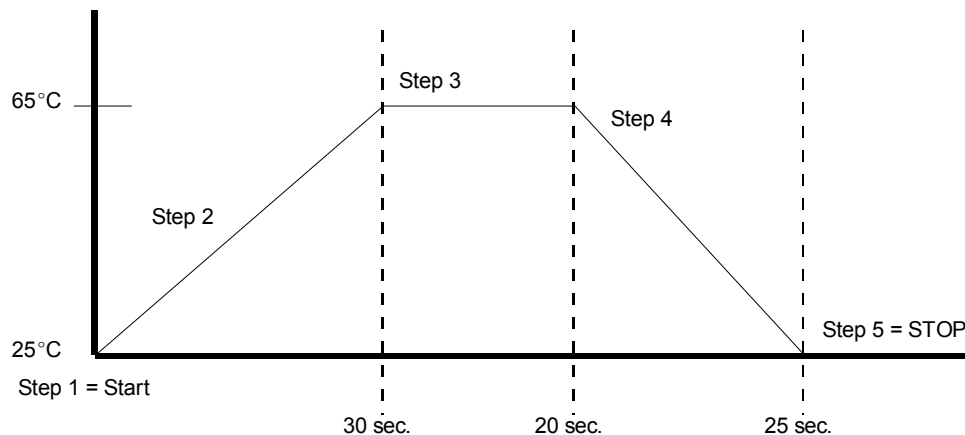
#### 4. SELECT AN EVENT

**Note:** Event Outputs are optional. If your chamber was ordered without events, skip this section.

- ◆ Start at SYSTEM. Press ENTER. Either RH or SP1 will be displayed.
- ◆ Press MODE until EV1 appears. This is Event 1, followed by ON or OFF, to the far right.
- ◆ Press UP and DOWN keys to get the event status you want: ON or OFF. The word will flash until you press ENTER. You have entered Event 1.
- ◆ Press MODE. EV2, Event 2, will appear.
- ◆ Using the UP and DOWN keys, select the desired status for Event 2; either ON or OFF.
- ◆ Press ENTER. You have entered Event 2.
- ◆ Continue the process for Events 3 through 6, selecting each Event ON or OFF as you desire. Skip EI, event input, and LEV 1, LEV 2, internal logic events. These events are used in special ways on specific chambers, and their use will be explained in the manual applying to those units.
- ◆ From LEV 1 or LEV 2, return to SYSTEM.
- ◆ Press MODE. The display will read RETURN.
- ◆ Press ENTER. The display will read SYSTEM.

#### 5. ENTER A SAMPLE TEMPERATURE PROGRAM

You will enter the sample program shown on the sketch below. This is an **accelerated program** with time in **seconds**, instead of minutes or hours as you would find in a real program.



**Step #1:** Setpoint 1 = 25 C, 1 second. Starts program at 25 C with 1 second as a starting point.

**Step #2:** Setpoint 1 = 65 C, 30 seconds. Ramps program up to 65 C in 30 seconds.

**Step #3:** Setpoint 1 = 65 C, 20 seconds. Holds at 65 C for 20 seconds.

**Step #4:** Setpoint 1 = 25 C, 25 seconds. Ramps program down to 25 C in 25 seconds.

**Step #5:** Stop program.

**Step #1:** Setpoint 1 = 25 C, 1 second. Starts program at 25 C with 1 second as a starting point.

- ◆ Begin at SYSTEM.
- ◆ Press MODE. PROGRAM will appear.
- ◆ Press ENTER. CLR FILE will appear. This function would allow you to clear a previously entered program.
- ◆ Press MODE. FILE? 1 will appear. Use the UP and DOWN keys to select the file number under which you wish to store your program. You may select from file number 1 to file number 10. Press ENTER to select File 1.

- ◆ STEP and a flashing number will appear. Use the UP and DOWN keys to make this number 1, for Step 1. Press ENTER.
- ◆ Press MODE. One of the following will appear: SETPOINT, JUMPLOOP, WAITFOR, AUTOSTART, STOP, LINK. Use the UP and DOWN keys, scroll until SETPOINT appears. Press ENTER.
- ◆ Press MODE. SP1 and a number or dashes appear.
- ◆ Use the UP and DOWN keys to make the number 25.0 appear. This is 25 C. Press ENTER.
- ◆ Press MODE until SEC, seconds, appears with a number to the right. Use the UP and DOWN keys to make this number 1.
- ◆ Press ENTER. You have now entered 1 second as a starting point for the program.

**Step #2:** Setpoint 1 = 65 C, 30 seconds. Ramps program up to 65 C in 30 seconds.

- ◆ Scroll using MODE until STEP appears with a number to its right. With the UP and DOWN keys, make this number 2. Press ENTER.
- ◆ Press MODE. Use UP and Down keys to scroll to SETPOINT. Press ENTER.
- ◆ Press MODE. SP1 and a number appear. Use the UP and DOWN keys and make this number 65.0. This is temperature. Press ENTER.
- ◆ Press MODE. SP2 and a number appear. **Make this No. -0.1 to eliminate humidity.** Press ENTER
- ◆ Use the MODE key and scroll to SEC, seconds, and a number. Use the delta keys and make this number 30. Press ENTER.

**Step #3:** Setpoint 1 = 65 C, 20 seconds. Holds at 65 C for 20 seconds.

- ◆ Use the MODE key and scroll to STEP and a number. Make this number 3 in the usual manner. Press ENTER.
- ◆ Press MODE. Use UP and DOWN keys to scroll to SETPOINT. Press ENTER.
- ◆ Press MODE and SP1 will be displayed with a number. Make this number 65.0 with the delta keys. Press ENTER.
- ◆ Press MODE. SP2 and a number appear. Make this No. -0.1 to eliminate humidity. Press ENTER.
- ◆ Scroll to SEC, seconds, with the MODE key.
- ◆ Use the UP and DOWN keys. Make the number 20 seconds. Press ENTER.

**Step #4:** Setpoint 1 = 25 C, 25 seconds. Ramps program down to 25 C in 25 seconds.

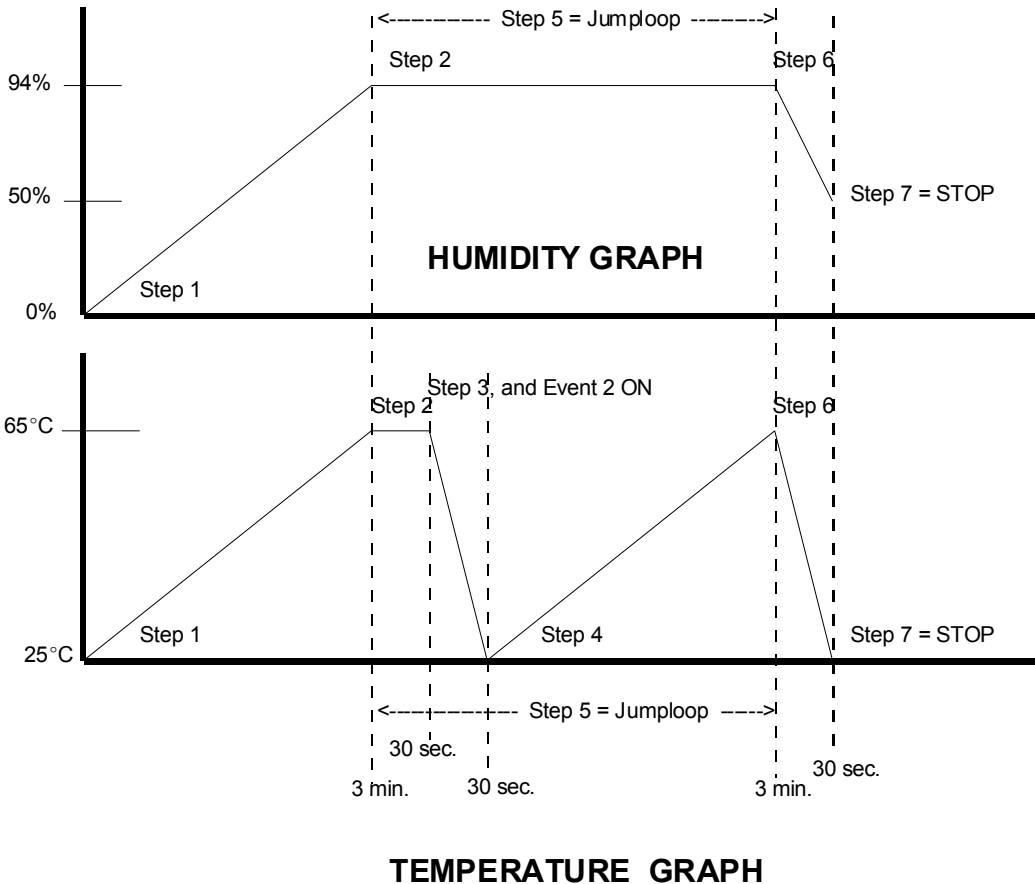
- ◆ Press the MODE key sufficient times to scroll to STEP and a number to its right. Make this number 4, using the UP and DOWN keys. Press ENTER.
- ◆ Press MODE. Use UP and DOWN keys until SETPOINT appears. Press ENTER.
- ◆ Press MODE. SP1 and a number appear. Make the number 25.0 using the UP and DOWN keys. This is temperature setpoint for the final ramp. Press ENTER.
- ◆ Scroll to SEC with the MODE key. Make the number 25 using the UP and DOWN keys. Press ENTER.

**Step #5:** Stop program.

- ◆ Scroll with the MODE key to STEP. Make this step 5 using the UP and DOWN keys. Press ENTER.
- ◆ Press MODE once. The display may say SETPOINT, JUMPLOOP, WAITFOR, AUTOSTART, STOP, OR LINK. Use the UP & DOWN keys and scroll until the display says STOP and is flashing.
- ◆ Press ENTER. The STOP will quit flashing.
- ◆ Press MODE. The display will say STOP and there will be a number 1 or 0 to its right.
- ◆ Use the UP and DOWN keys and select either 1 or 0. Selection of 1 tells VersaTenn III to continue controlling channel 1 and channel 2 at the last setpoints in the program. In this instance, 25 C. Selection of 0 tells VersaTenn to turn off channel 1 and channel 2 outputs at the end of the program.
- ◆ Press ENTER. Your entire program is entered.

## 6. ENTER A PROGRAM WITH TEMPERATURE, HUMIDITY, COPY, JUMLOOP, AND STOP

This is also an **accelerated** program with time in **minutes and seconds** rather than hours. Follow the progression of the program on the sketch below. You will enter the following seven steps into program memory.



- Step #1:** Setpoint 1 = 65 C, 94% RH, 3 minutes. Ramps program up to 65 C, 94% RH in 3 minutes.
- Step #2:** Setpoint 1 = 65 C, 94% RH, 30 seconds. Holds 65 C and 94% RH for 30 seconds.
- Step #3:** Setpoint 1 = 25 C, 94% RH, Event 2 ON, 30 seconds. Ramps chamber down with Event 2 ON.
- Step #4:** Copy 1. Ramps chamber up exactly as in Step 1. A quick way to enter a step that is an exact duplicate of an earlier step.
- Step #5:** Jumploop from this step (5) back to Step 2, and do this twice. Programmer will now repeat steps 2, 3, and 4 twice.
- Step #6:** Setpoint 1 = 25 C, 50% RH, 30 seconds. Ramps down.
- Step #7:** Stop program.

**You must first establish a starting place for the program. 25 C, 94% RH is the starting temperature from which you will begin.**



- ◆ Begin at SYSTEM.
- ◆ Press ENTER. If necessary, press MODE to cause SP1 and a number to appear.
- ◆ Using the UP and DOWN keys, make the number 25.0. Press ENTER.
- ◆ Press MODE. SP2 and a number appear. Using the UP and DOWN keys, make this number 94. Press ENTER.
- ◆ Press MODE until RETURN appears. Press ENTER and you will return to SYSTEM. You are now ready to program the seven steps.

**Step #1: Setpoint 65 C, 94% RH for 3 Minutes.**

- ◆ You are at SYSTEM. Press MODE.
- ◆ PROGRAM appears. Press ENTER.
- ◆ CLR FILE appears. We do not want to clear a file out of memory, so press MODE to skip this function.
- ◆ FILE? 1 appears. Since we entered our earlier practice program as file 1, let us enter this program as file 2. Use the UP and DOWN keys to select file 2 (flashing). Press ENTER.
- ◆ STEP and a number appear. The number should be 1. If it is not, use the UP and DOWN keys and make it 1. Press ENTER.
- ◆ Press MODE. Use the UP and DOWN keys to select SETPOINT. Press ENTER. (Not during verification).
- ◆ Press MODE. SP1 and a number appear. Using the UP and DOWN keys, make this number 65.0; then press ENTER.
- ◆ Press MODE. SP2 and a number appear. Make the number 94. Press ENTER.
- ◆ Press MODE to MIN. Make the number 3. Press ENTER.
- ◆ Press MODE to COPY. Make the number 2. Press ENTER. You have just copied Step #1 into Step #2.

**Step #2: Setpoint 65 C, 94% RH for 30 Seconds.**

Because you copied Step #1 into Step #2, the only variable you need to change is the time; from 3 minutes to 30 seconds.

- ◆ Press MODE until MIN appears. Make this number 0. Press ENTER.
- ◆ Press MODE until SEC appears. Make this number 30. Press ENTER.
- ◆ Press MODE to STEP 3. Press ENTER.

**Step #3: Setpoint 25 C, 94% RH for 30 Seconds. Event 2 ON.**

- ◆ Press MODE. Use the UP and DOWN keys to select SETPOINT. Press ENTER. (Not during verification).
- ◆ Press MODE until SP1 appears. Make this number 25.0. Press ENTER.
- ◆ Press MODE until SP2 appears. Make this number 94. Press ENTER.
- ◆ Press MODE to HOUR. Make this number 0. Press ENTER.
- ◆ Press MODE to MIN. Make this number 0. Press ENTER.
- ◆ Press MODE to SEC. Make this number 30. Press ENTER.
- ◆ Press MODE until EV2 appears with the word OFF or ON. Select ON and press ENTER.
- ◆ Press MODE until STEP 4 appears. Press ENTER.

**Step #4: Setpoint 65 C, 94% RH for 3 Minutes.**

This step is identical to step 1. Now that you have made step 4 a part of File 2, you can go back to step 1 and copy it into step 4. Proceed as follows:

- ◆ Press MODE until STEP appears. Make this number 1. Press ENTER.
- ◆ Press MODE until COPY appears. Make this number 4. Press ENTER.
- ◆ Press MODE until STEP appears. Make this number 5. Press ENTER.

**Step #5: Jumploop to repeat Steps #2, #3, and #4 twice.**

- ◆ Press MODE. Using the UP and DOWN keys, select JUMPLOOP. Press ENTER. (Not during verification)
- ◆ Press MODE. JS and number appear. Make this number 2. Press ENTER.
- ◆ Press MODE. JC and number appear. Make this number 2. Press ENTER.
- ◆ Press MODE until STEP 6 appears. Press ENTER.

**Step #6: Setpoint 25 C, 50% RH for 30 Seconds.**

- ◆ Press MODE. Using the UP and DOWN keys, select SETPOINT. Press ENTER. (Not during verification).
- ◆ Press MODE to arrive at SP1. Make this number 25.0 and press ENTER.
- ◆ Press MODE to arrive at SP2. Make this number 50 and press ENTER.
- ◆ Press MODE, confirming that HOUR and MIN are at 0 as you scroll past them using the MODE key. Go on to SEC, making this number 30. Press ENTER.

**Step #7: End Program and Cease Conditioning**

- ◆ Press MODE. Using the UP and DOWN keys, select STOP. Press ENTER.
- ◆ Press MODE. STOP appears again with a number. Make this number 0. Press ENTER. (Not during verification).
- ◆ Return to SYSTEM. You have completed entering your program.

**PROGRAMMING BASICS****CALIBRATING HUMIDITY FOR ALTITUDE:**

**Note:** Site altitude affects only those chambers using a dry-wet bulb system; NOT a dry (Vaisala) sensor.

The response of humidity instruments using a wet bulb reference is affected by the site altitude of your chamber. You can compensate for non-standard altitude as follows: Scroll through SETUP and CALIB to ALT. The number after ALT represents the range applicable to your altitude. Pick the range closest to yours.

- 0: up to 1,250 feet above sea level
- 1: 2,500 feet above sea level
- 2: 5,000 feet above sea level

**SET THE CLOCK:**

**Note:** The clock stops each time the VersaTenn is de-energized and must be reset.

- ◆ Begin at SYSTEM
- ◆ Press MODE twice to arrive at SETUP.
- ◆ Press ENTER. CALIB will appear.
- ◆ Press ENTER again. TI and numbers indicating clock time will appear. Time will be in military (24:00) format.
- ◆ Press MODE. HOUR and a number will appear.
- ◆ Use the UP and DOWN keys to set the current hour. Press ENTER.
- ◆ Press MODE. MIN and a number appear.
- ◆ Use the UP and DOWN keys to set the current minute.
- ◆ Press ENTER. You have set the clock.

**SET THE ALARMS:**

- ◆ Begin at SYSTEM.
- ◆ Press MODE to arrive at SETUP.
- ◆ Press ENTER. CALIB appears.
- ◆ Press ENTER. TI (clock time appears).
- ◆ Press MODE to arrive at **A1L**. **A1L** signifies Alarm, Channel 1, Low limit temperature setpoint.
- ◆ Choose a temperature somewhat below the lowest temperature you plan on simulating in the chamber.
- ◆ Using the UP and DOWN keys, select the desired low alarm temperature. The numbers will flash until you press ENTER.
- ◆ Press MODE. **A1H** and a number appear. **A1H** is the Alarm, Channel 1, High limit temperature setpoint. Choose a temperature somewhat higher than the highest temperature you plan on simulating. Use the UP and DOWN keys to select the temperature as you did for the low alarm.
- ◆ Press ENTER. The numbers will stop flashing.

NOTE: Pressing MODE again will reveal prompts A2L and A2H. These prompts are alarm settings for Channel 2. A2L = Alarm, Channel 2, Low; A2H = Alarm, Channel 2, High.

**CLEAR AN ALARM:**

**Note:** Should an alarm occur, the display will alternately flash the alarm message and the current variable. In order to continue entering data, you may mask the alarm condition for one minute by pressing the ENTER key once. To enter the data you have programmed, press ENTER twice. However, to continue normal operation, you must first correct the error that caused the alarm.

Once the error is resolved (no longer an alarm condition), you must clear the alarm message.

- ◆ Begin at SYSTEM. Press ENTER.
- ◆ Press MODE to arrive at **CLR ALARM**. Press ENTER. The alarm message is now cleared.

**CLEAR AN ERROR MESSAGE:**

An Error Message results from a problem within the VersaTenn Controller, the configuration of the controller, or with communications if applicable.

With an Error Message, the display will alternately flash the error message with the existing prompt. An Error Message displaying **ER1 XX** is a fatal error and all events and outputs will be turned off. An Error Message displaying **ER2 XX** is not fatal and if in the RUN mode, the controller should continue running. The error code numbers (**XX**) and their definitions are listed later in the manual in the Error Message section. **Note:** Before clearing an **ER2** message, you must first put the controller in the HOLD mode.

To clear either Error Message, press MODE until the SYSTEM prompt appears which will flash alternately with the Error Message. Continue with the following:

- ◆ Begin at SYSTEM. Press ENTER.
- ◆ Press MODE until either **ER1 XX** or **ER2 XX** appears. Press ENTER. The error will be cleared and the error code will now be zero (0) unless the error is a reoccurring type and it has not been resolved.

**Note:** Error codes will be masked for one minute in any menu after the ENTER key is pressed. Once the ER1 or ER2 message has been cleared, this prompt will not appear in the normal use of the SYSTEM parameter group.

## VERIFY YOUR PROGRAM:

It is important to check your work before you run a program. Verification is the same as entering the program except that most of your key strokes are made with MODE instead of ENTER.

**WARNING! :** During verification, there are certain points in the program where you **MUST NOT press ENTER**. These include: **SETPOINT, JUMLOOP, WAITFOR, AUTOSTART, STOP, & LINK**.

**If you press ENTER immediately after any of these words, the subsequent variables in the step will revert to default values. You will then have to re-enter the entire step.** In the program example, “not during verification” appears to warn you against using ENTER.

Verify each step of your program, preferably in the normal sequence of steps 1, 2, 3, etc.. To verify a particular step, simply scroll to STEP; then select the number of the step you want to review. Press MODE to display the values in the order in which you entered them.

For example, verify step 2 in your temp / humidity program as follows, starting at SYSTEM:

- ◆ Press MODE to arrive at PROGRAM. Press ENTER.
- ◆ CLR FILE and a number appears. Press MODE to arrive at STEP and a number. Make this number 2. Press ENTER.
- ◆ Press MODE. SETPOINT appears. **Do not press ENTER.**
- ◆ Press MODE. SP1 65.0 appears.
- ◆ Press MODE. SP2 94.0 appears.
- ◆ Press MODE. HOUR 0 appears.
- ◆ Press MODE. MIN 0 appears.
- ◆ Press MODE. SEC 30 appears.
- ◆ Press MODE until STEP 3 appears. Press ENTER and you can scroll through and verify step 3, if you care to. Otherwise you can return to SYSTEM.

## CHECK THE STATUS OF A PROGRAM IN RUN:

You may check the status of a program in run at any moment in real time. Press the MODE key to scroll from one variable to the next.

### Notes:

1. If dipswitch 3 is ON, events will not be displayed. This is a time-saving convenience if you do not have the event option.
2. The word JUMLOOP does not appear. The display goes directly to the next current STEP display.
3. The word STOP does not appear. The display goes directly to SYSTEM.
4. When the current step changes during run of the program, the display will return from all data points to STEP.
5. At a STOP step the display goes to SYSTEM.
6. Should the step type be WAITFOR or AUTOSTART rather than SETPOINT, the following scroll sequence applies: For WAITFOR, pressing MODE scrolls through W1, W2, WH, WM, WE, HR:MN:SS, then back to FILE(n). Definitions: W1 = wait for Chan. 1 temp., WH = wait for - hours, WM = wait for - minutes, WE = wait for Event Input

**Note:** The HOLD light will flash if the program is holding for WAITFOR.

7. The reference card describes the meaning of each display such as W2: Wait for Actual Relative Humidity.

**RUN YOUR PROGRAM FROM ANY STEP:**

This is the operating mode that you will use most of the time. It is also the simplest. You are at SYSTEM and on hold.

- ◆ Press RUN. FILE? (n) appears.
- ◆ Use UP and DOWN keys to select the file number you desire to run.
- ◆ Press ENTER. START (n) appears.
- ◆ Select the step number at which you want your program to start.
- ◆ Press ENTER. Your program will run from the beginning of the step you selected.

**RESUME A PROGRAM FROM HOLD:**

- ◆ You are at SYSTEM.
- ◆ Press RUN. FILE? (n) appears confirming the program at which you held.
- ◆ Press MODE twice to RESUME? Press ENTER. The program will resume from the point at which you held it. That may be at any time in a step.

**CLEAR YOUR PROGRAM:**

- ◆ You are at SYSTEM.
- ◆ Press MODE to PROGRAM. Press ENTER. CLR FILE appears.
- ◆ Press ENTER. CLRFL? (n) appears.
- ◆ Use UP and DOWN keys to select File number you wish to clear.
- ◆ Press ENTER. Your program is cleared.

**OPERATION****WAITFOR and AUTOSTART:**

These features are ones you might want to enter into a program on Friday afternoon, to have the chamber operating Monday morning.

**W1** = Wait for a programmed Channel 1 setpoint temperature.

**W2** = Wait for a programmed Channel 2 setpoint humidity.

**WH** = Wait for a programmed number of Hours.

**WM** = Wait for a programmed number of Minutes.

**WE** = Wait for a programmed Event Input status - Open or Close.

- ◆ On Friday afternoon, you enter 25 C and 94% RH in manual mode This gives you a starting point early Monday.
- ◆ Next you enter the following parameters into program memory:
- ◆ **Step 1:** Autostart at 4 hours and 30 minutes on Day 3. This command will start your chamber at 4:30 AM on Monday, running it at 25 C and 94% RH.
- ◆ **Step 2:** Wait for 25 C and 94% RH and 2 hours 30 minutes. Tells the programmer not to start running the program until chamber actual temperature reaches 25 C and humidity reaches 94% and 2 hours and 30 minutes have elapsed. If any one of these requirements is not met, the program will not start.
- ◆ **Note:** We will enter this as File 2, Steps 1 and 2.
- ◆ Start at SYSTEM.
- ◆ Press MODE. PROGRAM appears. Press ENTER.
- ◆ CLR FILE appears. Press MODE. FILE? (n) appears.

- ◆ Use UP and DOWN keys to reach for FILE 2. Press ENTER. STEP 1 appears.
- ◆ Press MODE. Use UP and DOWN keys. Scroll to AUTOSTART. Press ENTER. (Not during verification).
- ◆ Press MODE. DAY appears. Make the number 3. Press ENTER.
- ◆ Press MODE. HOUR appears. Make the number 4. Press ENTER.
- ◆ Press MODE. MIN appears. Make the number 30. Press ENTER. You have entered the autostart step.
- ◆ Press MODE until STEP 2 appears. Press ENTER.
- ◆ Press MODE. Use UP and DOWN keys. Scroll to WAITFOR. Press ENTER. (Not during verification).
- ◆ Press MODE. W1 appears. Channel 1 temp. Make it 25.0. Press ENTER.
- ◆ Press MODE. W2 appears. Humidity. Make it 94.0. Press ENTER.
- ◆ Press MODE. WH appears. Hours. Make it 2. Press ENTER.
- ◆ Press MODE. WM appears. Minutes. Make it 30. Press ENTER.
- ◆ Press MODE. WE appears. External event. **NOTE:** If there were an external event (input contact), pressing ENTER here implements that waitfor logic. A choice would be made as to whether to wait for the external contact to “close” or “open”. Since we are not using this in our example, we will Press MODE to RETURN; then ENTER back to SYSTEM.
- ◆ Now verify this program.

### LOCK:

This function will allow specific groups of parameters to be unaffected by the Increment / Decrement and Enter keys, thus preventing these groups from being changed accidentally. DIPSWITCH 8 must be ON to access LOCK. To use the feature, proceed as follow:

- ◆ Start at SYSTEM.
- ◆ Press MODE to SETUP. Press ENTER.
- ◆ Range: 0 to 2, Default: 0
- ◆ CALIB appears. Press MODE to SPCLFUNC. Press ENTER.
- ◆ Press MODE to LOCK (n). Enter 0, 1, or 2. Here are the responses:
- ◆ LOCK 0: No lock. Full access. Use this when programming.
- ◆ LOCK 1: All entries are blocked except as follows.
  1. Those in the SYSTEM group.
  2. Step number in the Program editor.
  3. The LOCK parameter itself.
- ◆ LOCK 2: All entries are blocked except ER1, ER2, ALRM, the step number in PROG, and LOCK.

### DIPSWITCHES:

Eight dipswitches are located on one of the boards in back of the pilot lights near the temperature display window. These switches are factory-set by Tenney. We urge you to be careful in changing dipswitch settings. If you do need to change a switch setting, be certain that you understand the function, as follows:

- ◆ #1: OFF - gives chamber normal range -99.9 to +200.0 C. ON - extended range -200 to +500 C.
- ◆ #2: Not used.
- ◆ #3: OFF - Event outputs and displays are activated.  
ON - Event outputs and displays are inactivated.
- ◆ #4: ON - L values appear in the Setup Menu, and may be changed (technician use only). Output diagnostic parameters will appear in System and Run.  
OFF - The above values are not accessed.

- ◆ **#5 and #6:** Function as a pair; their response is as follows:
  - A. #5 OFF, #6 OFF ( WARM START ):** Chamber will restart and run after a power failure. It will run from the point in the program where it was when the power failed.
  - B. #5 OFF, #6 ON ( COLD START ):** FACTORY USE ONLY.
  - C. #5 ON, #6 OFF ( COLD START ):** FACTORY USE ONLY.
  - D. #5 ON, #6 ON ( PROTECTED START ):** Chamber will remain shut down after a power failure.
- ◆ **#7:** Leave in OFF position. This is for factory use only. **DO NOT TOUCH!**
- ◆ **#8:** OFF - SPCLFUNC parameters locked out.  
ON - View all SPCLFUNC parameters.

**NOTE:** Since VersaTenn III reads dipswitch settings on power-up only, be sure to turn VersaTenn III OFF before changing any dipswitch.

### **GUARANTEED SOAK (GS):**

Guaranteed soak holds the program from advancing any time on a temperature plateau that the temperature deviates from setpoint more than the GS value. The GS value has a range of 0 to 9.0 F or 0 to 5.0 C in the normal range. ( In the extended range: 0 to 90 F, 0 to 50 C ). Suppose you have entered a program ramping from 0 to 100 C in one hour. Next step is hold 100 C for one hour. You have entered a GS value of 5 C.

At the end of the ramp step, the VersaTenn will check to see that the actual temperature is within the 5 C Guaranteed Soak value before proceeding to the next step ( hold at 100 C ). If the actual temperature is not within the 5 C, the clock will be held until the temperature catches up. The purpose of this is to “guarantee” that the test is at the 100 C soak period for one hour.

**Note:** The HOLD light will flash while the program is holding for guaranteed soak.

Enter guaranteed soak as follows: Scroll from SYSTEM to SETUP to CALIB to GS. At GS, enter the allowable deviation ( 5.0 in the above example ).

**Note:** To eliminate the guaranteed soak feature, enter a GS of 0 (zero).

### **CALIBRATION ( CAL ) OFFSET:**

Calibration offset allows you to enter a temperature offset of  $\pm 5.0$  C and a humidity offset of  $\pm 5.0\%$  RH. This will allow you to compensate for sensor position or any difference between VersaTenn and another instrument in the chamber. At stabilization, suppose another instrument indicates 98 C. VersaTenn indicates 100 C. You can bring the instruments into agreement by entering -2.0 into VersaTenn's CAL 1. The same correction can be applied to humidity by adjusting CAL 2. To enter this offset, scroll through SETUP and CALIB to CAL 1 or CAL 2, and enter the required offset number.

**SET and ADJUST PID:**

PID refers to **Proportional Band**, **Integral** ( reset ), and **Derivative** ( rate ). These values are carefully set at Tenney and should require no further adjustment. If adjustments are required for special performance, the adjustments should be performed by an experienced instrumentation technician.

Exact values used for your chamber are recorded on the quality assurance record forwarded with your chamber instructions. To adjust the PID parameters, access is gained using the SETUP prompt. When ENTER is pressed, PID CH1 ( Channel 1 ), or PID CH2 ( Channel 2 ) prompts may be selected.

**Prompts Under PID CH1**

AT1H - This parameter represents the current value for the **Auto Tune** function of the primary control output (heat). The following values may be entered:

0 = OFF, 1 = Slow thermal response, 2 = Medium thermal response, 3 = Fast thermal response

When the value is other than zero, AT1H will flash on the lower display for 1 second, alternating with the current display for 1 second. Auto Tune only occurs if channel 1 is ON and in the HOLD mode. The tuning will be done at 90% of the F equivalent setpoint. Once Auto Tune has been successfully completed, it will establish the corresponding heat proportional band, reset, and rate values. While tuning, the secondary control outputs will be off.

- PB1H - **Proportional Band**, Heating  
Range: 0.0 to 90.0 F, 0.0 to 50.0 C
- RS1H - **Reset**, Heating  
Range: 0.00 to 5.00 Repeats / Minute
- RT1H - **Rate**, Heating  
Range: 0.00 to 5.00 Minutes
- CT1H - **Cycle Time**, Heating  
Range: 1 to 60 seconds
- RB1H - **Rate Band**, Heating  
Range: 0 to 7 times the PB1H, (0 denotes rate is always functional.)
- DB1 - **Dead Band**, between Heating and Cooling  
Range: -45.0 to +45.0 F, -25.0 to +25.0 C
- PB1C - **Proportional Band**, Cooling  
Range: 0.0 to 90.0 F, 0.0 to 50.0 C
- RS1C - **Reset**, Cooling  
Range: 0.00 to 5.00 Repeats / Minute
- RT1C - **Rate**, Cooling  
Range: 0.00 to 5.00 Minutes
- CT1C - **Cycle Time**, Cooling  
Range: 7 to 60 seconds
- RB1C - **Rate Band**, Cooling  
Range: 0 to 7 times the PB1C, (0 denotes rate is always functional.)

**Prompts Under PID CH2**

- PB2H - **Proportional Band**, Channel 2, Humidity  
Range: 0.0 to 100.0% Humidity
- RS2H - **Reset**, Channel 2, Humidity  
Range: 0.00 to 5.00 Repeats / Minute



- RT2H - **Rate**, Channel 2, Humidity  
Range: 0.00 to 5.00 Minutes
- CT2H - **Cycle Time**, Channel 2, Humidity  
Range: 1 to 60 seconds
- RB2H - **Rate Band**, Channel 2, Humidity  
Range: 0 to 7 times the PB2H, (0 denotes rate is always functional.)
- DB2 - **Dead Band**, Channel 2, between Humidify and Dehumidify  
Range: -25.0 to +25.0% RH
- PB2C - **Proportional Band**, Channel 2, Dehumidify  
Range: 0.0 to 100.0% RH
- RS2C - **Reset**, Channel 2, Dehumidify  
Range: 0.00 to 5.00 Repeats / Minute
- RT2C - **Rate**, Channel 2, Dehumidify  
Range: 0.00 to 5.00 Minutes
- CT2C - **Cycle Time**, Channel 2, Dehumidify  
Range: 7 to 60 seconds
- RB2C - **Rate Band**, Channel 2, Dehumidify  
Range: 0 to 7 times the PB2C, (0 denotes rate is always functional.)

#### ERROR MESSAGES:

**ER1 error messages are severe. They are messages that will shut down the system and turn VersaTenn outputs off. You must clear the error in order to start system.**

- 0 = Not error.
- 1 = Processor Ram Failure - The Ram in the processor failed the RAM check.
- 2 = EPROM checksum error.
- 3 = Hardware configuration error.
- 4 = Low Battery - The battery on the battery backed-up RAM failed the low battery check.
- 5 = Battery backed-up RAM Failure - RAM in the battery backed-up RAM failed the RAM check.
- 6 = EE checksum error.
- 7 = Stack overflow error. The stack has gone too deep and corrupted the system RAM.
- 8 = Input 1 interpolation error.
- 9 = Input 2 interpolation error.
- 10 = Ground over range error.
- 11 = Ground under range error.
- 12 = Input 1 over range error.
- 13 = Input 1 under range error.
- 14 = Input 2 over range error.
- 15 = Input 2 under range error.
- 16 = Process input over range error.
- 17 = Process input under range error.

**ER2 error messages are non-fatal, but will hold the program. You must clear the error in order to resume your program.**

- 0 = No error.
- 1 = Transmitter Buffer Overflow - The serial communications transmitter buffer does not have the amount of memory necessary to hold the information requested. The transmitter will always have enough room to hold the information for a given request for data. Therefore, it is advisable to make one request for data at a time, with each additional request issued only after the current request has been processed and transmitted. Note that compliance with the active protocol ( Xon - Xoff / ANSI X3.28, 2.2-A3 ) is required as well.

- 2 = Receiver Buffer Overflow - The serial communications receiver buffer does not have enough memory to hold the given message transmitted. The receive buffer in the VersaTenn III is 64 bytes.
- 3 = Framing Error - The serial communications receiver has detected a framing or overrun error.
- 4 = Overrun Error.
- 5 = Parity Error - The serial communications receiver has detected a parity error. Not that this error obviously points to parity as a problem; however, it does not rule out the possibility of incorrect start bits, stop bits, or baud rate.
- 6 = Talking Out of Turn Error - This error will only occur under the ANSI X3.28, 2.2-A3 ( STX ) protocol. It is an indication that a full duplex transmission has taken place, which under this protocol, is allowed only in the case of a disconnect issued by the master device.
- 7 = Invalid Reply Error - This error will only occur under the ANSI 3.28, 2.2-A3 ( STX ) protocol. It is an indication that the unit was expecting an ACK or NAK character but received something else.
- 8 = Noise error.
- 9 thru 19 = Not used.
- 20 = Command Not Found - The serial communications command interpreter was unable to match any of the available command strings to the command issued.
- 20 = Command Not Found - The serial communications command interpreter was unable to match any of the available command strings to the command issued.
- 21 = Equal / Question Parameter Not Found - The serial communications command interpreter was unable to match the parameter string with any of the available parameter strings for the '=' or the '?' command.
- 22 = Incomplete Command Line - The serial communications command interpreter was unable to find all the arguments necessary to carry out the given command.
- 23 = Invalid Numeric Character - The serial communications command interpreter found an invalid numeric character within a numeric argument.
- 24 = Numeric Data Field Over 4 Characters - The serial communications command interpreter found a numeric data field that was over 4 characters long.
- 25 = Communications Input Out Of Limit - The serial communications command interpreter found a parameter argument that was out of limit with respect to the limits for that given parameter.
- 26 = Read-Only Parameter - A write to a read-only parameter was requested.
- 27 = Second Channel Invalid - A request for a parameter from or to channel 2 was issued and the unit has been set up for a single channel. ( Input #7 or #9 closed ).
- 28 = Write only error.
- 29 = Not used.
- 30 = Request To Run Invalid - A request for a Resume with the 'RSUM' command or a Restart with the 'RSTR' command was issued when the control is in a Run mode of operation.
- 31 = Request to Hold Invalid - A request to Hold with the 'HOLD' command was issued when the control is in the Hold mode of operation.
- 32 = Command Invalid In Run-mode - A command was issued which is either not valid or not available in the Run mode of operation.
- 33 = Self Test Mode Not Active - The unit is not in the Test mode of operation necessary for this parameter to be sent.
- 34 = Not used.
- 35 = Number Of Steps Stored = 99 - The unit is already full of steps and can not store any more.
- 36 = No File Found - The file requested does not exist.
- 37 = No Step Found - The step requested does not exist.
- 38 = Not used.
- 39 = Infinite Loop Error - There has been a programming error in which a step loops on itself or in which more than 3 'zero time' steps are in a row.
- 40 = File Change Error - A file that was running has been changed while the unit is in Hold mode and can not be resumed.

**LOGIC INPUTS:**

**Note:** See Master Output Logic Spec for a description of each OUTPUT.

- Logic Input #1: When closed, locks out SSR1 when SSR3 is active.
- Logic Input #2: When closed, selects SSR4 and when open selects SSR3. Use LEV1.
- Logic Input #3: When closed, selects COMPRESSOR CUT-IN LOGIC. Uses a pressure switch to turn on OUTPUT 6 and OUTPUT 10. Also affects OUTPUT 4.
- Logic Input #4: When closed, selects BURN-IN CHAMBER LOGIC. Turns on OUTPUT 5 and OUTPUT 8. Use LEV1.
- Logic Input #5: AGREE CHAMBER LOGIC. High temperature cooling. Locks out OUTPUT 5, turns on OUTPUT 6 AND OUTPUT 8. Use LEV1.
- Logic Input #6: When closed, selects PRESSURE OPERATING LOGIC for Channel 2. Disables HUMIDITY LOGIC for Channel 2.
- Logic Input #7: When closed, disables all Channel 2 prompts and outputs ( 1-Channel MicroTenn retrofit ).
- Logic Input #8: When closed, selects the 0 to 5 VDC humidity input.
- Logic Input #9: When closed, selects 1-Channel logic. When open, selects 2-Channel logic. When closed, all other logic inputs are ignored.
- Event Input An input which will be a remote WAITFOR event switch for the control.

**MASTER OUTPUT LOGIC SPEC:**

**Note:** This output logic applies only when 2-channel logic is selected ( INPUT 9 open ). 1SM-01 thru 1SM-12 (Outputs 1-12) are solid state relay outputs mounted on the remote 1SM board. SSR1 thru SSR5 outputs are solid state relay outputs mounted on the VersaTenn Controller.

- 1SM-01 (Output 1): FAN output.
- 1SM-02 (Output 2): ARTIFICIAL LOAD output.
- 1SM-03 (Output 3): PRIMARY HEAT output.
- 1SM-04 (Output 4): BOOST HEAT output.
- 1SM-05 (Output 5): LOW STAGE COMPRESSOR output.
- 1SM-06 (Output 6): HIGH STAGE COMPRESSOR output.
- 1SM-07 (Output 7): MAIN COOLING output.
- 1SM-08 (Output 8): FULL COOLING output.
- 1SM-09 (Output 9): ARTIFICIAL LOAD output.
- 1SM-10 (Output 10): CASCADE CONDENSER output.
- 1SM-11 (Output 11): VACUUM or PURGE output. Special Function Variable. Determined by **OT 17** in the SETUP menu. **(If measuring vacuum in feet of altitude, this output function switches with 1SM-12 function and becomes VENT output.)**
- 1SM-12 (Output 12): VENT or BOOST COOL output. Special Function Variable. Determined by **OT 18** in the SETUP menu. **(If measuring vacuum in feet of altitude, this output function switches with 1SM-11 function and becomes VACUUM.)**
- SSR1: AMBIENT COIL output.
- SSR2: HUMIDITY CONTROL output.
- SSR3: DEHUMIDIFY COIL output.
- SSR4: DRYER output. LEV 1 must be ON.
- SSR5: SUCTION LINE COOLING output.

**SPECIAL FUNCTION VARIABLES:**

The SPCLFUNC parameters are accessed via the SETUP prompt. The following are descriptions of the SPCLFUNC parameters:

- OT11: Selects type of control for SSR1 output (Ambient Coil)  
ON = ON / OFF control  
OFF = Time proportioning control
- OT17: Selects type of control logic for output 11 (1SM-11). Reference the Master Output Logic Specs.  
VAC = Vacuum - When measuring in Torr.  
VEN = Vent - When measuring in feet of altitude.  
PUR = Purge
- OT18: Selects the type of control logic for output 12 (1SM-12). Ref. the Master Output Logic Specs.  
VEN = Vent - When measuring in Torr.  
VAC = Vacuum - When measuring in feet of altitude.  
BST = Boost Cool
- R1L: Sets Channel 1 low operating limit.
- R1H: Sets Channel 1 high operating limit.
- R2L: Sets Channel 2 low operating limit.
- R2H: Sets Channel 2 high operating limit.
- RTD: Selects the RTD curve for the input temperature sensor.  
JIS or DIN ( Note: Tenney standard sensor is JIS )
- VCMP: Selects temperature compensation curve for Vaisala humidity sensor. ON or OFF. (Std. is ON)

**LOGIC VALUES:**

**Note:** The following parameters will appear only if DIP Switch #4 is in the ON position and IN #9 is open.

- L3: Logic % Main Cooling Turn On  
Percentage cooling demand on OUTPUT 7 to turn on OUTPUT 5  
Range: 0 to 100% of output
- L4: Logic % Main Cooling Turn Off  
Percentage heating demand on OUTPUT 3 to turn off OUTPUT 5  
Range: 0 to 100% of output
- L6: Logic Full Cooling Switchover  
Setpoint value below which OUTPUT 8 is turned on. Also affects OUTPUT 9.  
Range: -99.9 to 212.0 F, -99.9 to 100 C
- L7: Logic % Ambient Cooling Turn On  
Percentage cooling demand on OUTPUT 7 to turn on OUTPUT 8 and SSR1.  
Range: 0 to 100% of output.
- L8: Logic % Heat For Ambient Cooling Turn Off  
Percentage heating demand on OUTPUT 3 to turn off OUTPUT 8 and SSR1.  
Range: 0 to 100% of output.
- L9: Logic Ramping-up Cooling Turn Off  
A temperature above which a positive setpoint change will turn off cooling.  
Range: -99.9 to 212.0 F, -99.9 to 100 C
- L11: Logic % Dehumidify Turn On  
Percentage dehumidifying demand on SSR3 or SSR4 to turn on SSR3 or SSR4.  
Range: 0 to 100% of output.

- L12: Logic % Humidify to Turn Off Dehumidify  
 Percentage humidifying demand on SSR2 to turn off SSR3 or SSR4.  
 Range: 0 to 100% of output
- L14: Time Delay For Boost Cool  
 Time period that OUTPUT 7 must be at 100% before OUTPUT 12 ( configured as Boost Cool )  
 will turn off once OUTPUT 7 drops below 100%.  
 Range: 0.0 to 60.0 minutes
- L15: Time Delay For Compressor Turn Off  
 Timer starts when heating band is entered; then if % heat is greater than L4 and the timer has  
 timed out, the compressor is turned off. Any time the cooling band is entered the timer is reset.

#### PERCENT OUTPUT DISPLAY:

**Note:** The following parameters will appear in the SYSTEM or RUN mode of operation, only if Dipswitch #4 is in the ON position.

- 1HI: Percent ON time of OUTPUT 3 ( Heat )  
 0 = Full Off  
 100 = Full On
- 1LO: Percent ON time of OUTPUT 7 ( Cooling )  
 0 = Full Off  
 100 = Full On
- 2HI: Percent ON time of SSR2 ( Humidity )  
 0 = Full Off  
 100 = Full On
- 2LO: Percent ON time of SSR3 ( Dehumidify )  
 0 = Full Off  
 100 = Full On

**CALIBRATION SEQUENCE:**

The chamber should be allowed to warm up for at least 15 minutes before calibration is attempted.

Place a jumper on terminals 2 & 3 of B39 ( these pins are the two that are closet to the dipswitch ). Power the unit up. The lower display should show either "COLDSTRT", "WARMSTRT", or "PROTSTRT", depending on the state of dipswitch #5 and #6, for 5 seconds, and then move to the "CALDATA" Prompt. Follow the calibration procedure for only the prompts that appear.

**RTD CHANNEL 1 INPUT CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "RTD1L".
2. Provide the RTD low resistance of 17.14 Ohms. Wait 5 seconds and hit the ENTER key to enter the value. Press the mode key to advance to the next prompt.
3. Verify that the lower display shows "RTD1H".
4. Provide the RTD high resistance of 213.93 Ohms. Wait 5 seconds and hit the ENTER key to enter the value.

**RTD CHANNEL 2 INPUT CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "RTD2L".
2. Provide the RTD low resistance of 17.14 Ohms. Wait 5 seconds and hit the ENTER key to enter the value. Press the mode key to advance to the next prompt.
3. Verify that the lower display shows "RTD2H".
4. Provide the RTD high resistance of 213.93 Ohms. Wait 5 seconds and hit the ENTER key to enter the value.

**T / C INPUT CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "TCL".
2. Provide an input of 0.000 Millivolts with no reference compensator ( copper wire ) into the T / C input. Wait 5 seconds and hit the ENTER key to enter the value. Press the mode key to advance to the next prompt.
3. Verify that the lower display shows "TCH".
4. Provide an input of 3.300 Millivolts with no reference compensator ( copper wire ) into the T / C input. Wait 5 seconds and hit the ENTER key to enter the value.

**0 - 5 INPUT CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "PROCL".
2. Provide an input of 0.000 Volts into the 0 - 5 input. Wait 5 seconds and hit the ENTER key to enter the value.
3. Verify that the lower display shows "PROCH".
4. Provide an input of 5.000 Volts into the 0 - 5 input. Wait 5 seconds and hit the ENTER key to enter the value. **Note:** If chamber type is Temperature / Humidity with Vaisala HMM30 humidity transmitter for measuring relative humidity, and you wish to check the linearity of the 0 - 5 volt input, be sure to first set the VCMP parameter under SPCLFUNC to OFF. When finished with the calibration procedure be sure to set the VCMP parameter back to ON.

**4 - 20 MA OUTPUT 1 CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "C1L".
2. Monitor the output and alter the value on the lower display until the output reads 3.85 MA.  
Press the ENTER key to enter the value. Press the mode key to advance to the next prompt.
3. Verify that the lower display shows "C2H".
4. Monitor the output and alter the value on the lower display until the output reads 20.15 MA.  
Press the ENTER key to enter the value. Press the mode key to advance to the next prompt.

**ANALOG RETRANSMIT CALIBRATION PROCEDURE**

1. Press the mode key until the lower display shows "XTL".
2. Monitor the output and slew the value on lower display until the output reads -5.000 Volts.  
Press the ENTER key to enter the value. Press the mode key to advance to the next prompt.
3. Verify that the lower display shows "XTH".
4. Monitor the output and slew the value on lower display until the output reads +5.000 Volts.  
Press the mode key to advance to the next prompt.
5. To exit the calibration mode, pins 2 & 3 must be "unjumpered". The unit will then have to be powered down and then back up.