

# ECube OS Manual

## 1.0 Introduction

The ECube OS program is designed to monitor from one, up to twenty different sensors. Sensors such as Temperature, Humidity, Co2, Ethylene and Ammonia can be connected to the ECube. The programming of the ECubes may seem intimidating at first, but once you work with the ECube a little bit you will find it is quite easy to set the necessary parameters for the ECube.

The sensors are physically wired to the individual E-Cube for monitoring. The E-Cubes communicate with a remote computer for data display and alarm monitoring. Parameters such as alarm levels, On/Off setpoints and deadbands can be setup for each sensor. These values can be changed at the E-Cube and on the remote computer.

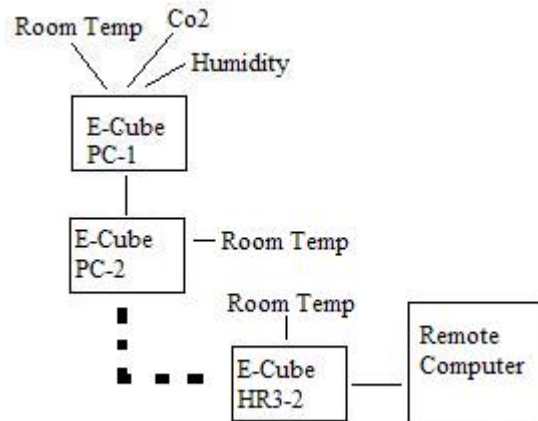


Fig. 1

Shows how remote computer is connected to E-Cubes

The remainder of this document is written to show how to enter all set points and calibrate a sensor connected to the ECube.

## 2.0 Power Up and Main Screen

Each time you power up the E-Cube you will see the following screen for approximately 10 seconds.



Fig. 2

Once the countdown is over the screen will change to main operating screen for the first sensor.

The following screen is the main screen for the first sensor in the sequence of sensors. This screen will always have the name of the sensor you are working with on the top line. It will also tell you the value that sensor is reading if it is connected to the E-Cube and working properly. For the screen below we are using a room temp sensor that is connected to the E-Cube. The examples used in this document use a room temperature sensor. Other types of sensors will be set following the same procedures.



Fig. 3

There are four options along the bottom of the screen. If you push the button below those options you will change screens and set up different parameters. Details for each option will be explained.

**Nxt**- Rotate through all the sensors on the E-Cube.

**Ctl**- Enter various operating set points.

**Alr-** Enter the alarm set points and dead bands for the sensor.

**Ex-** Exit the current screen. Not active on all screens.

### 3.0 Alr – Alarm Settings

While at the main screen (Fig. 3) for the Room Temperature sensor you will need to set alarm values for the current sensor and all the active sensors on the E-Cube. Once you press the **Alr** button you will see the following screen.

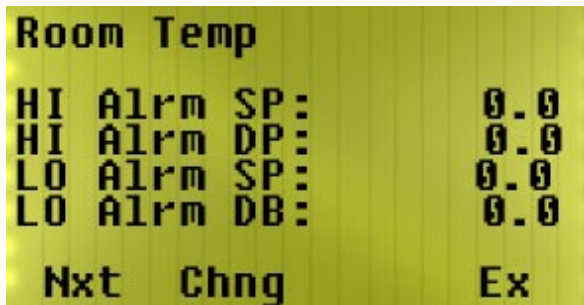


Fig. 4

This will allow you to change alarm set points and alarm dead bands for the current sensor. This particular screen will allow you to change these parameters for the Room Temperature sensor. To change set point values hit the “Chng” button. The bottom line on the display will change to:

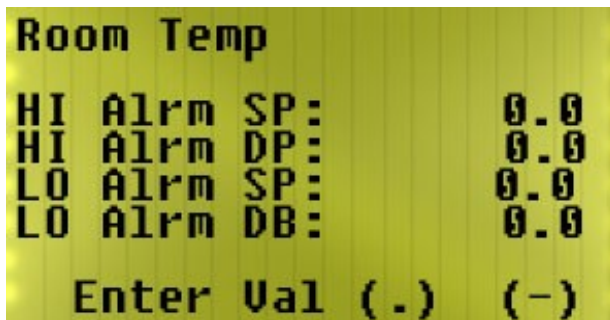


Fig. 5

This will allow you to enter a decimal point or a negative number.

You are now able to change the individual alarm and set point values. You will see a vertical cursor flashing to the right of the value that you are now able to change. The first time you hit the “Chng” button you will be able to

change the topmost value. For this screen, that will be the HI Alarm set point for the room temperature.

To change the actual value push the Edit/Clear button to backspace over the existing value. You can hit the Edit/Clear key several times if you like, but you only need to hit it enough times to erase the old value and enter the new value. Once you have erased the old value, you can enter the new value. After you have entered the new value hit the View/Enter button to make the E-Cube accept the value. The E-Cube will then put the cursor to the right of the value on the next line. You will repeat the process above (erase old value, enter new value) to change all the values on this screen.

**NOTE: THE BUTTONS CAN BE VERY SENSITIVE, IT IS EASY TO PRESS THE BUTTON ONCE AND HAVE THE E-CUBE READ IT TWICE OR MORE!**

### **3.1 Activate Alarm Set points**

Once you have entered the new values it is now time to activate the alarm set points. After you have entered the new values the following screen will appear.

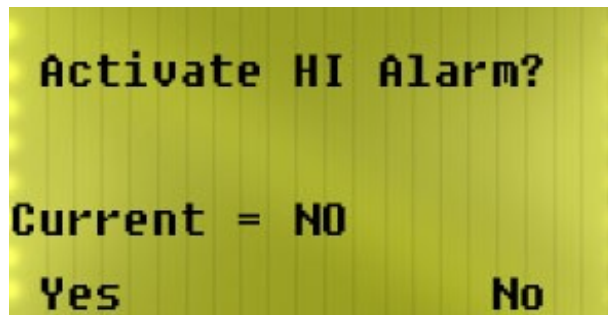


Fig. 6

Once you have selected the correct option (Yes/No) hit the View/Enter button to accept that setting. Once you have accepted that value the screen will change slightly from the screen above. The new screen will look just like the last screen except the “HI” in the top line will change to “LO”. You will set this value in the same fashion as with the “HI” alarm.

Once you have set the “HI” and “LO” alarms the E-Cube will return to the alarm set point screen (fig. 4). You will then hit the **Nxt** button to cycle to the next sensor.

## 4.0 Ctl-Control option

**Ctl** is the most in-depth option and allows the user to define how the sensor will operate. From this screen.



Fig. 7

Push the **Ctl** button, the following screen will appear.

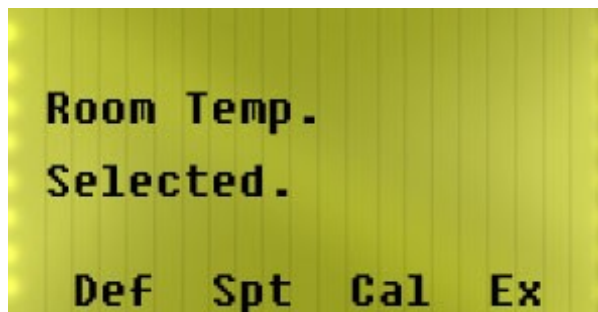


Fig. 8

From this screen you can perform several important steps.

**Def**- Define the sensor. Here you instruct the E-Cube how the sensor is physically wired to the E-Cube.

**Spt**- Define what output, if any, is controlled by the sensor and set the values and deadband at which the output will turn on or off.

**Cal**- Calibrate the sensor. This must be done before the ECube will operate properly!

**Ex** – Exit this screen.

Detailed descriptions of each step will be described below.

## 4.1 Def-Define

Here you will define how the ECube gets data from the sensor and makes that data available to the monitoring computer. Once you hit the Def key you have several steps to go through to complete this process. When you hit the Def key you will see the following screen.



Fig. 8

You will tell the E-Cube what input is being used for this particular sensor. This will generally be a number between 64 and 67, but may be higher if your system has a large number of sensors connected to it. We are using the Room Temp for these instructions. The value entered here would be the Signal ID # that the room temperature sensor is connected to. If the room temperature were connected to Signal ID #65 then the number 65 would be entered here. The details for your particular system will be provided separately, these details will explain the Signal ID numbers for your particular system.

The cursor will be located to the right of the number that has been chosen for your Signal ID. Hit the Edit/Clear button three times to clear out the existing value and enter the correct value for that particular sensor.

When you have entered the correct Signal ID and hit the View/Enter key, you will get the following screen.

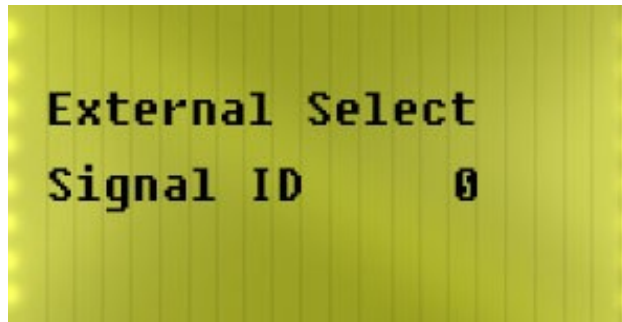


Fig. 9

Sometimes it may be necessary to connect two sensors to the same input on the ECube, such as Room Temp and Product Temp. When this is necessary, the number entered here will control the relay that switches between the two signals. Hit the Edit/Clear button to erase the old value, enter the new value and hit the View/Enter key. If this step is necessary for your system it will be described in your setup information.

**Signal Scan Seconds** After you have told the E-Cube more than one signal is connected to a single input you have to tell it how much time must pass before switching to the next signal.

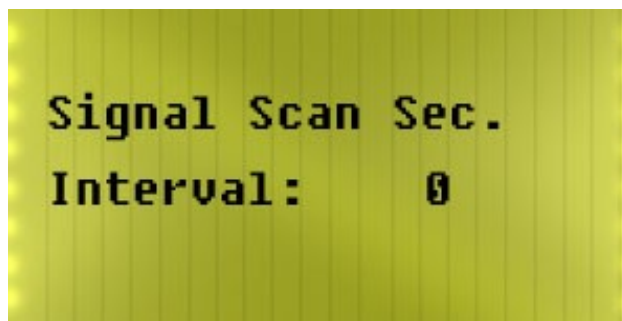


Fig. 10

Here you will enter the number of seconds you want the E-Cube to wait before switching to the next signal.

Example: If you had two temperature sensors connected to the same input on the ECube and you wanted to switch between the two sensors every two minutes. You enter the number 120 at this screen.

## **X100 Storage**

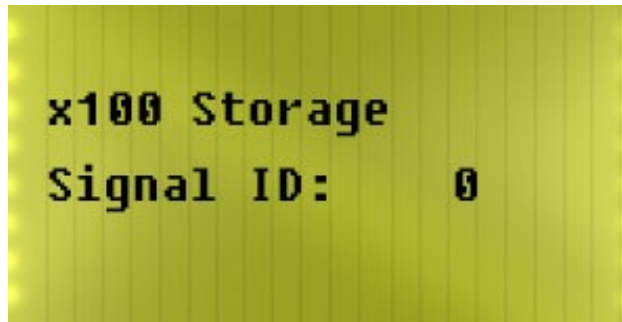


Fig. 11

The ECube program is designed to pass data back and forth between the ECube and a remote computer terminal. It does this using the number entered at this screen as the signal ID: Numbers entered at this screen could be 104 or greater. Details about what numbers to use will be provided in an information package specific to your system.

## **Filter Analog Conversion**

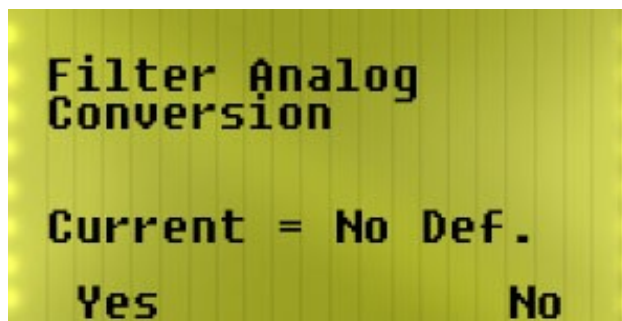


Fig. 12

This screen is designed to prevent the ECube from displaying any sudden brief changes in an input value. It takes the previous sensor reading and multiplies it by 4, then adds the new sensor reading to that number and divides by five to get an average. This almost eliminates a sudden change in sensor readings due to electrical noise.



## 5.0 Spt Setpoints

In this section you will define how the ECube controls its output according to input you defined earlier. Here you will define what output will be used and when it will be turned on and off.

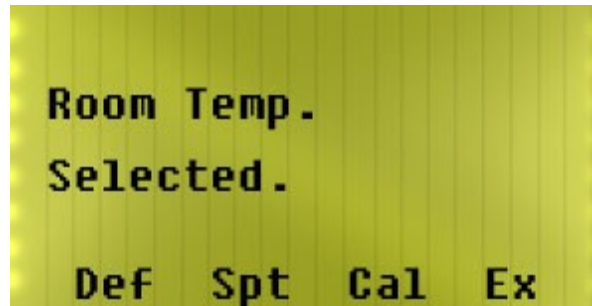


Fig. 12

### 5.1 ON Signal ID

Select the Spt option. The following screen will appear.

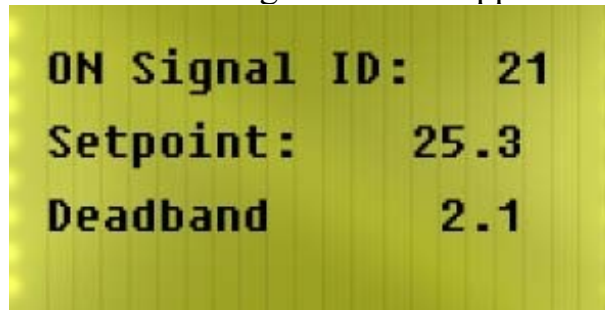


Fig. 13

This screen allows you to set how the ECube reacts to the input associated with the sensor you are programming. Remember, for this example we are working with the Room Temp sensor. Here you control what output is activated and what values of inputs it will react to. For example: Signal ID# 21 is a signal to start cooling. The cooling will turn on when the room temperature reaches the setpoint of 25.3. The cooling will remain on until the temperature drops below the setpoint minus the deadband (25.3-2.1), which is 23.2. When the room temperature drops below 23.2 the cooling will turn off. The cursor will be blinking to the left of the number on the ON Signal ID: line. Once you change this number (Edit/Clear to erase the old number) the screen will change slightly and you will see a new line at the

bottom of the screen: Enter Val (.) (-) will appear. This allows you to enter a decimal point or a negative number for the last two settings.

The details of this programming step will be provided in documentation specific for your system.

### **5.2 OFF Signal ID:**

After you enter the values for the ON Signal ID: the screen will change to

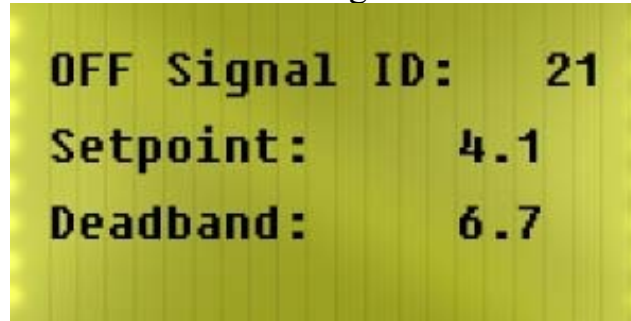


Fig. 14

This screen will allow you to set the point at which the output will turn off. Perhaps you are running a unit that is providing heat. In the screen above the heater would be connected to signal id #21. When the heat in the room went above 4.1 degrees the heater would turn off. The heater would remain off until the temperature dropped below the setpoint (4.1) minus the deadband (6.7) for a temperature of -2.6. At which point the heater would turn back on. What a bizarre situation you have here!

The cursor will be blinking to the left of the number on the OFF Signal ID: line. Once you change this number (Edit/Clear to erase the old number) the screen will change slightly and you will see a new line at the bottom of the screen: Enter Val (.) (-) will appear. This allows you to enter a decimal point or a negative number for the last two settings. The details of this programming step will be provided in documentation specific for your system.

## **6.0 Cal – Calibrate the sensor**

### **WARNING!**

Once you begin the calibration process you will need to make sure you have all necessary equipment ready to complete the process quickly. If you get

started and have to stop for some reason you will have to begin the process again. If you are calibrating a temperature sensor you will want to have an ice water bath, ambient temp bath and a hot water bath ready. Each bath should have thermometers showing the actual temp. The same is true for ammonia sensors or Co<sub>2</sub> sensors. Make sure you have your measured amounts of gas available to complete the process.

## 6.1 Full Calibration

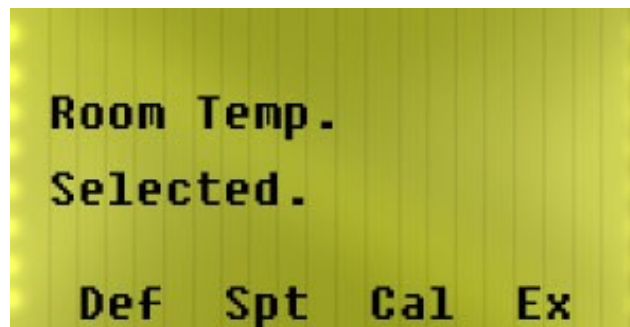


Fig. 15

At this point it is now time to calibrate the sensor. When you select the Cal option the window below will appear.

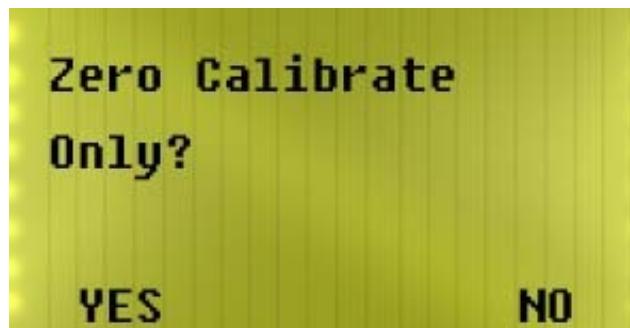


Fig. 16

Select NO at this screen. The following screen will appear.

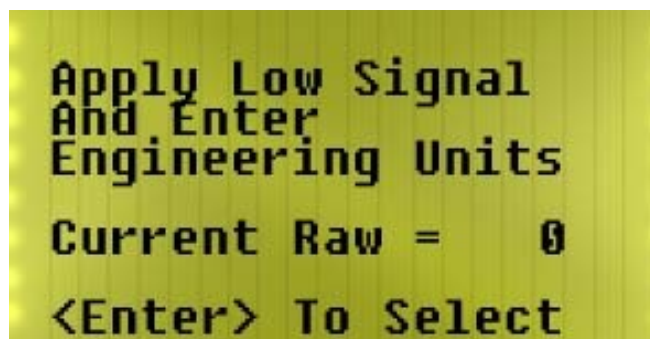


Fig. 17

You are going to calibrate the sensor using two different known values of the parameter (temperature, ammonia...) you want to measure. Using temperature as an example you would immerse the sensor in an ice water

bath to obtain the temperature of 32F. At this point on this screen you will see a number after the = sign. This is called a raw value and won't have any meaning to the user, it is simply the number the ECube uses that gets converted to an engineering value. Once this number stops changing hit the View/Enter key to accept this value. The screen will change to the following.

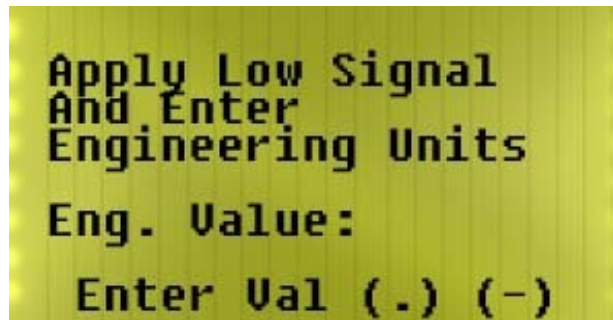


Fig. 18

At this point you will enter what is referred to as "Engineering Units". For our example here, it would be the temperature (of the ice water bath) value in degrees F or degrees C. We know that an ice water bath has a temperature of 32 F or 0C. You would enter 32 at this screen if you were working in degrees F. Once you enter your engineering units the screen will change to this.

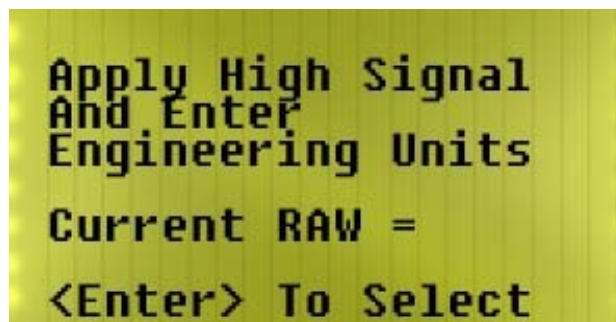


Fig. 19

At this point you need to immerse the temperature sensor in your hot water bath. You should have a thermometer in your hot water bath so you will know the temperature of the water. Preferably, hot water that is above 100 degrees F. This screen is simply showing you the RAW value the ECube is receiving from the sensor. Hit View/Enter at this screen. You will see the following screen.

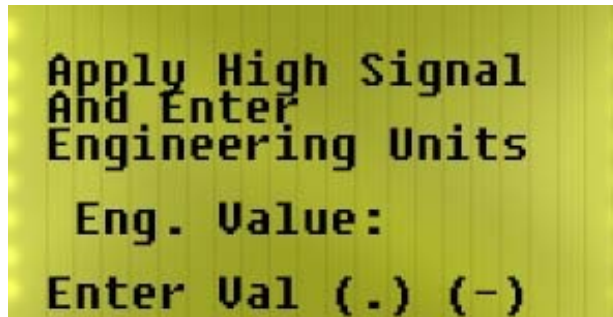


Fig. 20

At this screen you will enter the temperature of the (hot) water that contains the temperature sensor. For example: if the thermometer in the water that your temperature sensor is immersed in shows 130F you would enter 130 at this screen. Once you enter the engineering units (or temperature) of the hot water the screen will change to:

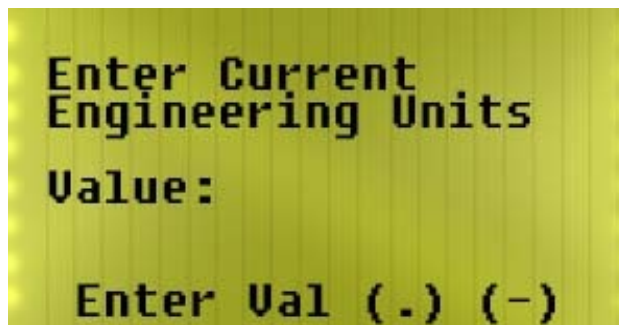


Fig. 21

At this point, put the temperature sensor in a cup of water that has been allowed to sit long enough to obtain the temperature of the surrounding air. Enter the value of the water that the temperature sensor is now immersed in. After the value has been entered the screen will change to the following.

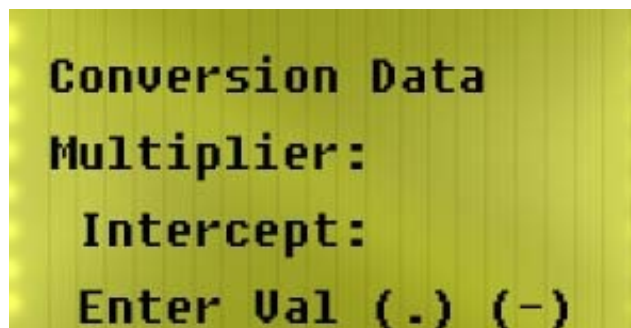


Fig. 22

This screen will have values on the Multiplier and Intercept lines. Simply hit the View/Enter key to see these values. Once you have looked at both values the screen will revert to the Room Temp (Fig. 15) Screen.

## 6.2 Zero Calibration Only

We aren't done with the calibrate option yet! There is still another screen we have to look at. Refer back to Fig. 16., the Zero Calibrate screen. This time we are going to choose the YES option for Zero Calibrate Only.

We will use this screen when we need to make a small adjustment to the calibration of the sensor.

For Example: if you suspect the temperature sensor is off by 3 degrees you can use the zero calibrate to make the necessary adjustments. When you select YES at the Zero Calibrate Only the following screen will appear.

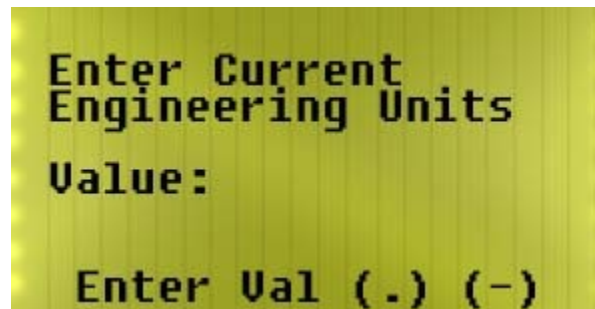


Fig. 23

Here you will enter the value of the parameter you are measuring. For a temperature sensor you will enter the value of the air temperature that the sensor is measuring. For Example: if the current temperature of the air the sensor is measuring has been verified to be 25 degrees F then you will enter 25 at this screen.