

# MODEL DPS3

## HEATED DEW POINT MEASURING SYSTEM OPERATORS MANUAL



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REV. D August 2015



## DPS3 HEATED DEW POINT MEASURING SYSTEM QUICK STARTUP GUIDE

### STARTUP



Before Starting installation  
Check the power supply for configuration  
110V AC **OR** 220VAC  
Labels are provided on the unit defining the power configuration

1. Mount the DPS3 to a convenient vertical surface.
2. Bring the heated sample line into the unit through the opening on the bottom right side.
3. Connect the sample line to the fitting inside the hinged front cover. Do not connect sample gas source at this time.
4. See Section 4.4, Wiring Connections, as follows:
5. Connect the Analog Output and Alarm Relays through the center wiring feed-through on the bottom of the unit.
6. Route the AC power line through the bottom left feed-through, and connect it to the main terminal strip inside the front cover. Please check unit power supply configuration as labeled 110VAC or 220VAC is compatible with your supply voltage.
7. With AC power source OFF, connect the input end of the power wiring to a properly fused source of AC power.
8. Apply AC power. The instrument will go through an initiation cycle, and will then be ready to measure dew point.
9. Set the DPS3 temperature setting (Ts on the LCD display) at least 10°C above the highest dew point to be measured. Remove the front cover. Press Up or Down arrows until the Ts display reaches your desired setting. The available range is 20 to 99 °C. The Tx display shows the actual sensor temperature. Allow adequate time for the sensor temperature to equilibrate to the set point before connecting the gas source.
10. Connect the input end of the heated sample line to the gas source to be measured. **Important:** Ensure that there are no unheated sample line components upstream of the DPS3. See Section 3.2.
11. After an equilibration period, the DPS3 will provide continuous dew point readings, tracking the dew point if it changes.

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## 3.0 INTRODUCTION

### 3.1 GENERAL DESCRIPTION

The Edgetech Instruments Inc. Model DPS3 (Figure 3-1) is an integrated system including a microprocessor-based instrument, chilled mirror dew point sensor, sample flow meter and flow control valve, vacuum pump and associated tubing and fittings, all contained within a heated, temperature controlled NEMA 4 enclosure. The wall mount enclosure is easily mounted to any vertical surface.

The system includes:

- An alphanumeric LCD display to report the measured dew point and heated sensor temperature information.
- Heated enclosure with temperature controller.
- Periodic sensor balance check.
- 4 to 20mA analog output. (0 to 5VDC or 0 to 10VDC field selectable)
- One 3 ft. (0.9 meter) heated sample line.

### 3.2 THE PURPOSE OF A HEATED SYSTEM

When the dew point temperature to be measured by a sensor is higher than the temperature of the sensor body and the sample tubing, a condition of saturation, or 100% relative humidity, will occur inside the sensor and the rest of the measuring system. Liquid water condensing out inside the system will be the result. Under these conditions, no reliable dew point measurements can be expected. The solution to this problem is to heat all of the interior surfaces of the sensor and the rest of the sampling system upstream of the sensor so that surface temperatures are always above the dew point temperature to be measured.

The DPS3 has been developed to solve this measuring problem. The sensor can be heated and controlled so that its interior surface temperature is always above that of the dew point to be measured. In addition, the heated sample hose upstream of the sensor will also be maintained above the dew point temperature of the sample gas.

#### **AN IMPORTANT NOTE FOR ACCURATE MEASUREMENTS:**

**It is the responsibility of the operator to ensure that every surface upstream of the DPS3 that will be exposed to the sample gas to be measured is heated at least 10 °C above the maximum dew point. This includes, for example, any additional filters, flowmeters, tubing, valves, etc. that are not inside the heated enclosure. Heater tape is available from other sources for this purpose. It is not necessary to heat the portion of the sampling system that is located downstream of the sensor, but liquid condensate should be allowed to escape. In general, a short length of tubing connected to the gas outlet fitting on the right side of the DPS3 housing will suffice. Slope it downward for condensate to easily escape.**



Figure 3-1 The DPS3 Heated Dew Point System

### 3.3 AVAILABLE OPTIONS

Factory Options include:

- Platinum Mirror Surface
- Pressure Transducer Kit
- RS-232C Digital Output
- Enhanced Dew Point Accuracy
- Ambient Temperature Output
- Other Humidity Units
- Custom Output Scaling
- Longer Heated Tubing Lengths

Consult Edgetech Instruments Inc. for further information on these and other options.

# INSTALLATION AND SETUP

## 4.1 MOUNTING

The Edgetech Instruments Inc. DPS3 can be installed on any flat vertical surface with four ¼ inch diameter screws. Mounting hole-center dimensions are 14-1/2 (H) X 10-1/4 (W) inches [36.8 (H) X 26 (W) cm].

## 4.2 REMOVING THE HOUSING COVER

To gain access to the heated sensor housing and the terminals mounted inside, use the supplied key and unlock the latch holding the front cover. Do not put undue strain on the electrical wiring connected to the cover.



Figure 4-1 DPS3 Heated Interior

Figure 4-1 shows the heated housing with the dew point sensor, flow meter with flow control valve, and vacuum pump. The main wiring terminal strip can be seen at the bottom. The Heated Sample Line should be inserted in the opening at the bottom right. The center opening is for the terminal strip output signals, and the opening at the left is for the AC power line.

### **4.3 SAMPLE CONNECTIONS**

The sample may be brought to the instrument with ¼ inch copper, stainless steel, or plastic (non-hygroscopic) tubing and terminated in a ¼ inch female compression fitting. A heated 3 foot length of tubing is supplied. Consult the Factory for longer lengths.

- Notes:**
- 1. The maximum inlet pressure is 150 PSIG.**
  - 2. Any sample line upstream of the dew point sensor must be heated above the maximum dew point to be measured.**

### **4.4 WIRING CONNECTIONS**

The DPS3 is designed to operate on AC voltages of 100 or 220 VAC, +/- 10% 50/60Hz, with a maximum power requirement of 250 watts.

**Applying the wrong voltage will damage the unit and will void the warranty**  
Wiring connections are made to the terminal strip inside the DPS3 housing. See Figure 4–2 below.

### **4.5 ALARM RELAY CONNECTIONS**

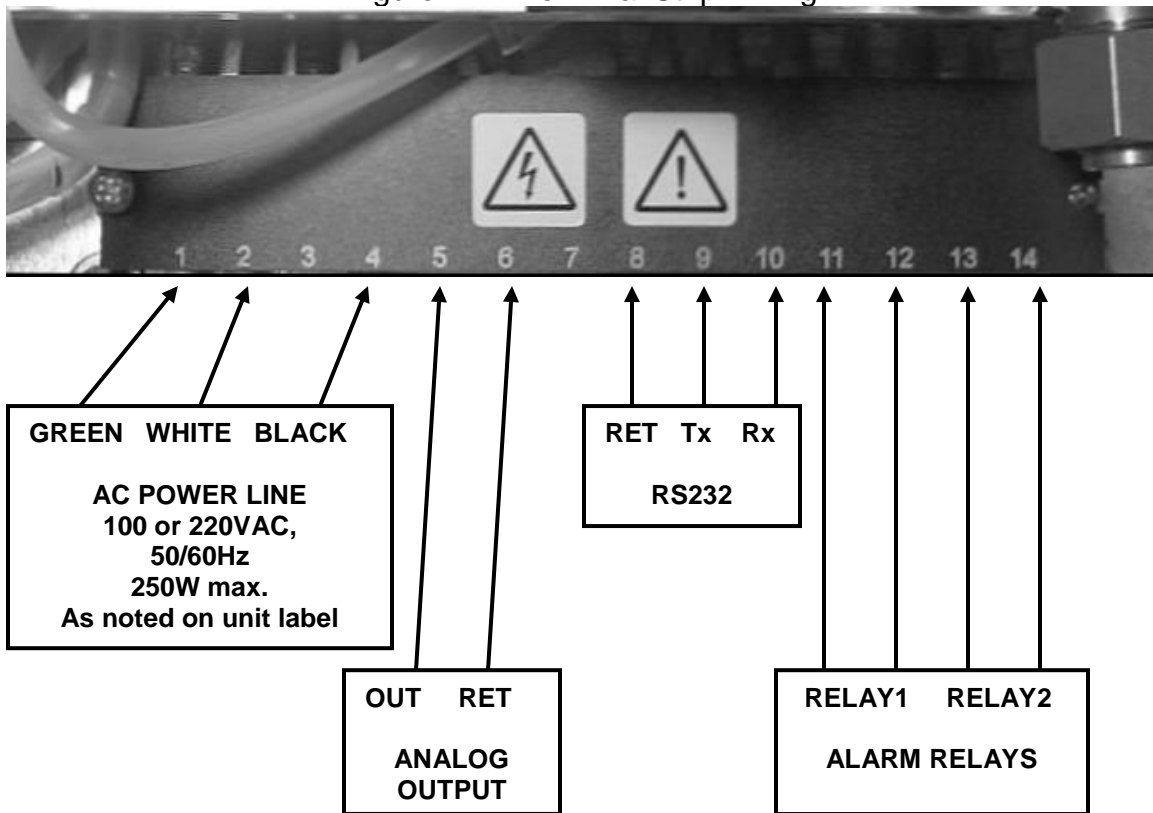
There are two built-in alarm relays. They may be programmed to open or close on any parameter, such as dew point, sensor temperature, etc. The relay contacts are Normally Open (Form A). They are rated for 3A at 250VAC, or 30VDC.

### **4.6 ANALOG OUTPUT CONNECTIONS**

Wiring connections should be made at this terminal strip for operation of data loggers, A/D converters, analog recorders, etc. The standard dew point range for the Analog Output is:

**4 to 20 mA corresponds to 15°C to 95°C Dew Point**

Figure 4-2 Terminal Strip Wiring



#### 4.7 SELECTION OF ANALOG OUTPUTS

Although the Factory default Analog Output range is 4 to 20 mA, the user can easily modify it to either 0 to 5VDC or 0 to 10VDC if desired. Follow the instructions below:

Remove the screws retaining the plastic cover of the Electronics Unit mounted to the metal DPS3 cover. Two small electrical switches allow the selection of analog output scaling. These switches are located in the top left corner of the circuit board as shown in Figure 4-2 below. You can select the outputs to be either 4 to 20 mA (standard range), 0 to 5VDC, or 0 to 10VDC. To modify the output scaling, proceed as follows:

1. Be sure that AC Power is not applied to the unit.
2. Remove the outer plastic cover.
3. Using a small screwdriver, carefully set the switches as shown in Table 4-1.
4. Replace the cover.
5. Reapply AC power.

OUTPUTS	SWITCH 1	SWITCH 2
4 to 20 mA	DOWN	----
0 to 5VDC	UP	UP
0 to 10VDC	UP	DOWN

Table 4-1 Analog Output Switch Settings

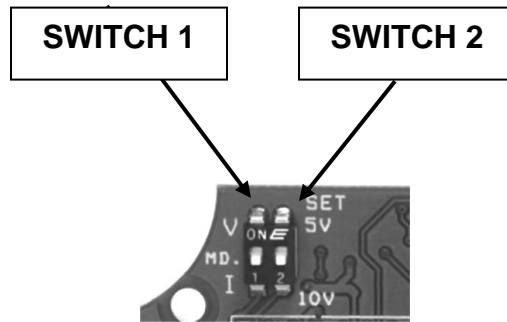


Figure 4-3 Output Selector Switches

#### 4.8 TURNING ON THE POWER

**Before turning on the power ensure the supply voltage matches the unit voltage.**

The unit is labeled with the operating voltage 110VAC or 220VAC. Application of incorrect voltage will damage the unit and void the warranty.

Set both the Power switch and the Pump switch in the upper right corner of the DPS3 heated housing to the ON position. You will hear the vacuum pump operating. It is advisable to keep the pump operating at all times when taking measurements. This ensures proper dew point response time.

#### 4.9 SETTING THE FLOWMETER

The Flowmeter, or Rotameter, that is built into the DPS3 has an arbitrary calibration scale. Since many users prefer to think of flow rate in units of Standard Cubic Feet per Hour (SCFH), a simple conversion table is included here.

METER SCALE	SCFH (APPROX.)
25	1
40	2
50	3
60	4

Table 4-2 Flow Rate Conversion

Flow rate is not critical. The recommended rate is 1 – 2 SCFH. Note that flow rate is proportional to sensor contamination rate, so that a low flow rate will keep the sensor mirror clean longer, minimizing maintenance requirements.

#### 4.10 SETTING THE SENSOR TEMPERATURE

The minimum sensor temperature is critical. See Section 3.2 for further information.

To set the sensor temperature to the desired level, proceed as follows:

1. Open the outer plastic cover.

2. The sensor temperature setpoint is shown as Ts on the digital display. To change it, press the UP or DOWN arrow button shown in Figure 4-4 below. You will have to hold the button down for approximately 1 second, until you see the displayed number change. Each time you press the button, you raise or lower the temperature by one degree.

3. Replace the outer cover.

Note: The *actual* sensor temperature is displayed as Tx. Be sure to wait long enough for it to reach the setpoint temperature before bringing sample gas into the unit and attempting to take measurements.

#### 4.11 PROGRAMMING THE DPS3

The small keypad inside the outer cover allows you to display various humidity parameters other than dew point, and to select units such as °C or °F. You can also select the desired location on the digital display to show the humidity units, sensor temperature, and other information. In addition, the ON and OFF point of the alarm relays may be selected. In addition to dew point, the humidity parameters available for displaying include vapor pressure in millibars, wet bulb temperature, and grams per cubic meter.

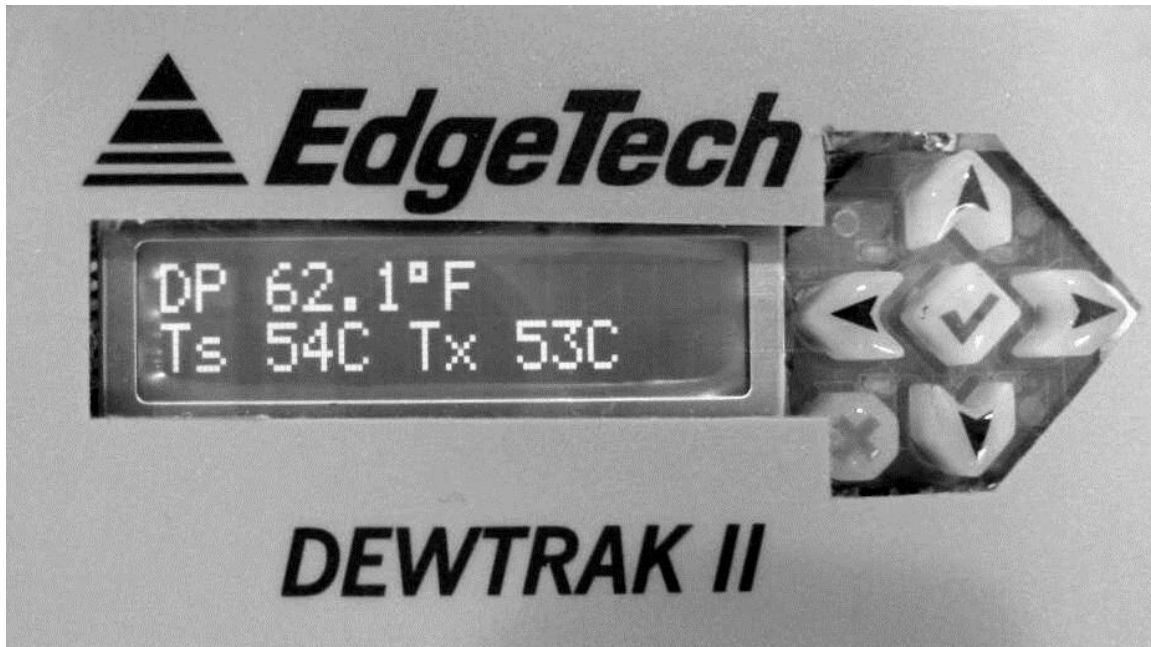


Figure 4-4 The Digital Display and Keypad

As shipped from the Factory, the upper display shows the dew point temperature, and the lower display shows the sensor set point temperature (Ts) and the actual sensor temperature (Tx). Factory default is °C for all.

After spending a few minutes using the UP and DOWN and the other arrows, you will see that programming is quite intuitive.

#### 4.11.1 PROGRAMMING EXAMPLE

As an example, in this case we would like to change the display from dew point in °F to dew point in °C.



First, press the green (check mark) button. This will show Value 1, the upper display. (Since this is the one we wish to change, we will stay here. Later we will step through the other value positions.) Press the green

button again to enter the program. The parameter now has a flashing underline.

Next, use the UP and DOWN arrow keys to see what other parameters you can change the humidity display to. When °C appears, you can select it by pressing the red (X) button. A new display will appear, allowing you



to save the change, if desired, or exit the program. Press the green (check mark) button to save the changes. Now, the final result will be shown, as seen below.



Note: If you have connected the RS232 serial port to a computer or terminal, all the programming steps shown above may also be made remotely. See 7.1 in the Appendix, Custom-Programming the DPS3.

#### 4.11.2 ADDITIONAL PROGRAMMING

As you have seen, pressing the green (check mark) button gets you to the program. You stay in by pressing the green button again. Then, the UP and DOWN arrows allow you to step through the program and select the options you prefer. You have also seen that the first step in the program, Value 1, allows you to change the units of the upper display. Here are all of the available program steps.

STEP	VALUE	COMMENTS
1	Dew Point	Other units programmable
2	Ts	Setpoint temperature
3	Tx	Actual temperature
4	Analog output 1	Standard
5	Analog output 2	Factory option
6	Alarm 1	Open and close
7	Alarm 2	Open and close
8	Alarm 1	Range
9	Alarm 2	Range
10	Serial port	Time stamp and Averaging
11	Calibrate output 1	¼ and ¾ FS
12	Calibrate output 2	¼ and ¾ FS (Factory option)
13	Auto validate cycle	On or off

Table 4-3 DPS3 Programming Capability

#### Value

1. Dew Point or Other Units



2. Set Point Sensor Temperature



3. Actual Sensor Temperature



4. Analog Output 1



5. Analog Output 2 (option)



6. Alarm 1 Open/Close



7. Alarm 2 Open/Close



8. Alarm 1 Range



9. Alarm 2 Range



10. Serial Port (bi-directional)



11. Calibrate Output 1



12 Calibrate Output 2 (option)



13 Auto Validate Cycle On/Off



#### 4.11.2.1 VALUE 11: CALIBRATING THE ANALOG OUTPUT

If you have a precise milliammeter or voltmeter, you can check the accuracy and scaling of the analog outputs. Connect your meter to the main terminal strip. If you have the factory default 4 to 20 mA current output, you can connect it in series with the load. If you have selected 5 or 10 VDC (Section 4.7), connect it between the voltage output and RTN.

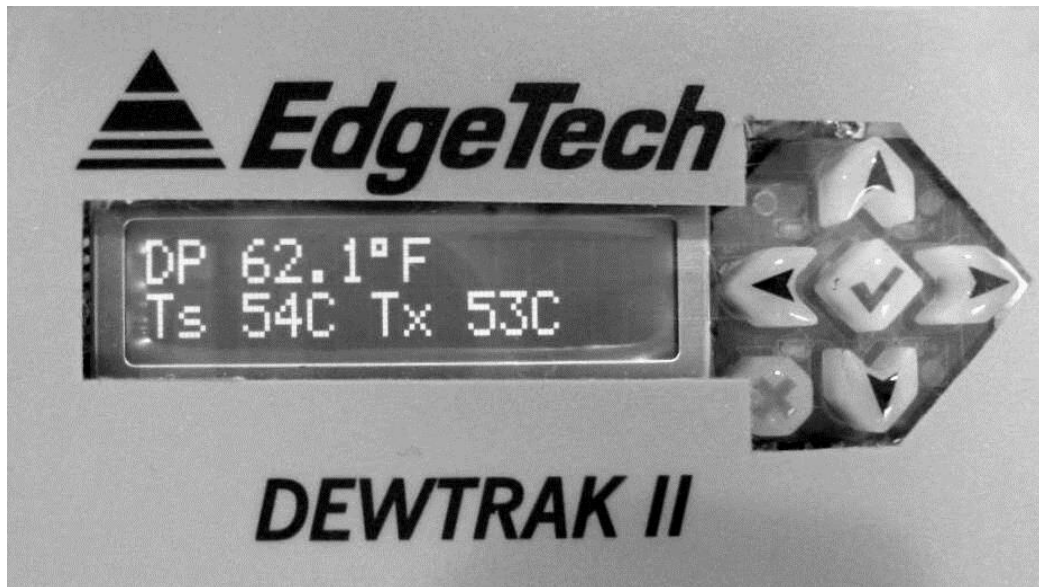
Select CAL OUTPUT 1 with the green checkmark button on the keypad. The display window shows that the analog output is set for 4 to 20 mA. Press the green button again. A new output current will be measured on the terminal strip, corresponding to  $\frac{1}{4}$  of Full Scale. Using the UP/DOWN arrow keys, insert this current reading as requested by the program. Press the green key again. You will then see a second screen, giving you the value of  $\frac{3}{4}$  of Full Scale. Insert this value as requested by the program. Press the green key again. Now, the voltage corresponding *exactly to midscale* will be measured at the output. Your meter should read exactly the midscale current, +/- system error, +/- the meter error. You can save the calibration by pressing the red X key and exiting the program.

#### 4.11.2.2 VALUE 13: SELECTING THE AUTO-VALIDATE CYCLE

If desired, you can also enable or disable the Auto Validation cycle. This automatic built-in cycle is a self-test feature. The DPS3 comes from the Factory with the Auto-Validate cycle selected, or ON. Every 6 hours, this cycle heats the mirror, evaporating the dew layer, and checks for excessive contamination on the surface. If conditions are acceptable, it proceeds to grow a new dew layer and continues to take measurements. If contaminants are excessive, it initiates the Clean Mirror alarm (optional). During the periodic cycle, the analog outputs are held for 30 seconds at the value that existed *just before* the cycle started. Use the green checkmark key to select this function, and use the green key again to select ON or OFF. Then use the red X key to SAVE and EXIT as desired.

#### 4.11.2.3 INITIATING A MANUAL AUTOMATIC BALANCE CYCLE (ABC)

The Automatic Balance Cycle (ABC) is initiated upon instrument turn-on. In addition, the ABC can be initiated automatically by depressing the left arrow key. The ABC cycle will then begin.



## 5.0 MAINTENANCE

### 5.1 ROUTINE MAINTENANCE

To ensure the maximum in accurate and reliable operation of any optical chilled mirror system, a periodic maintenance schedule should be established.

### 5.2 MIRROR CLEANING SCHEDULE

Depending on the application, you may want to schedule mirror cleaning on a routine basis. It is recommended that the time interval between cleaning be determined by the performance experience of the system. In other words, operation experience with the instrument will dictate that mirror cleaning will be scheduled just prior to when it is necessary. Cleaning the mirror excessively is no more useful than not cleaning the mirror when it is needed.

The buildup of contamination on the mirror surface normally occurs very slowly. Over time, particulates and other matter present in the sample gas and not captured by filters, build up on the mirror. The result of the buildup of contaminants on the mirror surface is reduced dry mirror reflectivity and a change in the optical reference point. When the contamination becomes too severe to allow specified dew point accuracy to be maintained, an internal electrical signal called the CLEAN MIRROR warning will be generated. This can be brought out for operator use as a Factory option if desired. Normally, intervals of at least 90 days between routine mirror cleanings can be achieved. However, if the sample contaminants are particularly high, more frequent mirror cleanings may be required. When cleaning is required, clean the mirror surface and optical parts, as follows:

### 5.3 MIRROR CLEANING PROCEDURE

See Figures 5-1 and 5-2, showing the sensor mirror location. When cleaning is required as a routine periodic maintenance item, or the optional Clean Mirror warning appears, proceed as follows.

1. Turn power off. If the system was heated, allow it to cool.

**Note: When operating with a pressurized sampling system, remove pressure from the Sensor prior to removing the Sensor cover.**

2. Open the cover of the heated DPS3 enclosure.
3. Remove the spin-off cover from the sensor to expose the mirror.

4. Moisten a clean cotton swab with isopropyl alcohol (IPA). Cotton swabs and IPA are provided in the Cleaning Kit supplied with the system.
5. Gently wipe the mirror surface and the optics surface in a circular motion.
6. After cleaning the mirror, wipe the surfaces dry with a clean cotton swab.
7. Next, moisten a clean cotton swab with clean, preferably distilled water and wipe the mirror and optics area.
8. Dry these areas thoroughly with a clean, cotton swab.
9. Replace the sensor cover.
10. Re-establish sample pressure and flow.
11. Turn power back on.

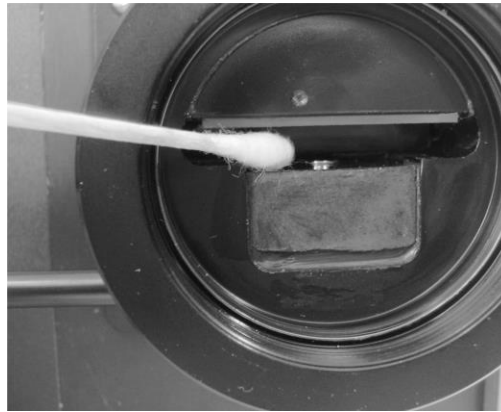
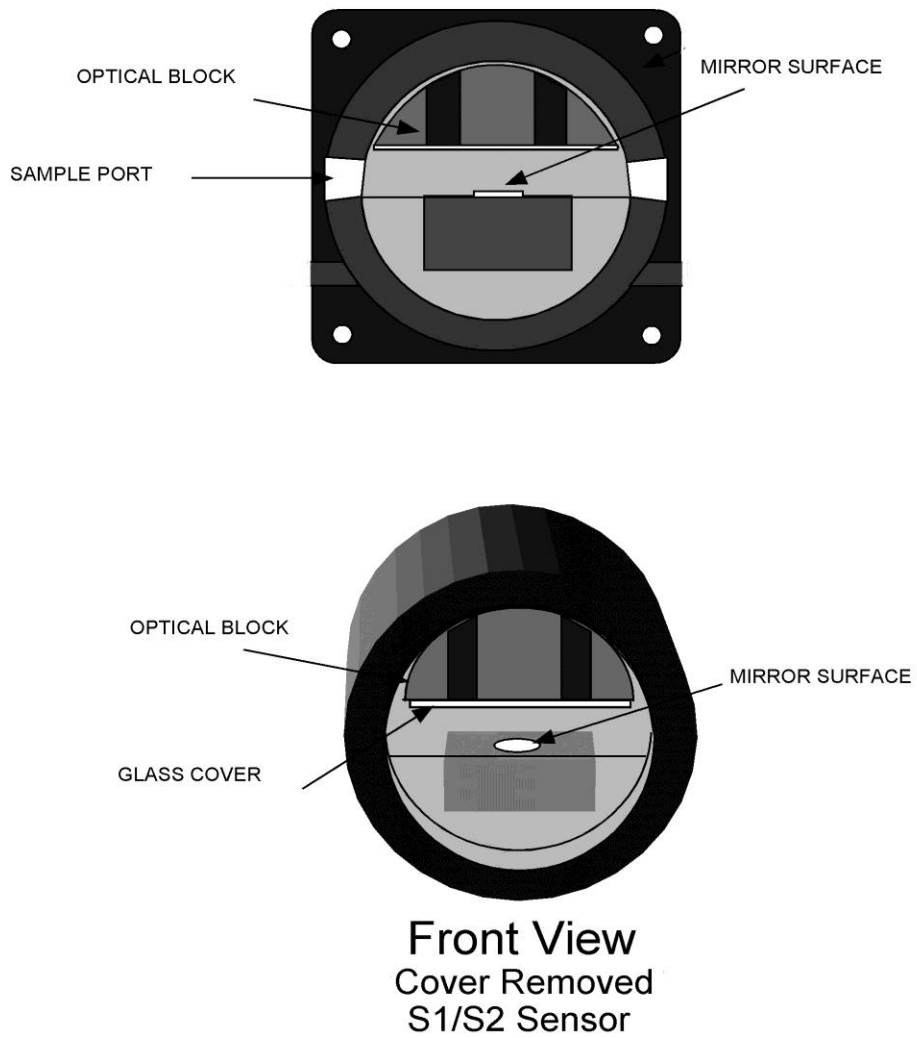


Figure 5-1 Cleaning the Mirror

Figure 5-2 Sensor Mirror Location



## 6.0 SPECIFICATIONS

<b>Measurement Range:</b> Dew Point	-35 to 95°C (-31 to 203°F)
<b>Standard Scaling:</b> Dew Point	15 to 95°C (59 to 203°F) = 4 to 20 mA
<b>Measurement Accuracy:</b> Dew Point	±0.2°C (±0.4°F)
<b>Functional:</b> AC Power	100 or 240VAC, 50/60Hz, 250 Watts Unit is labeled with power configuration
Ambient Temperature	0 to 50°C (32 to 122°F)
Heated Enclosure Temperature	20 to 99°C, field adjustable 1°C resolution
Sample Connection	¼ in. female compression fitting
Heated Sample Line Length	115 VAC or 220 VAC option as designated on labels 3 feet (0.9 meters)
Sample Flow	0.5 to 5 SCFH, integral flow meter
Sample Pressure	0 to 150 psig Max.
Purge Connection	¼ in. female compression fitting
Analog Outputs Load	4 to 20mA = 15 to 95°C standard 0 to 5 VDC or 0 to 10VDC user selectable 4 to 20 mA: 400 ohms or lower 0 to 5/10VDC: 1K ohm or higher
Display	Alphanumeric LCD
Relay Outputs K1 K2 Contact Rating:	Alarm 1 Alarm 2 Normally Open (Form A) 3A at 250VAC, or 30VDC
Serial Outputs (optional)	RS-232C, bidirectional

**Physical:**

Housing	NEMA-4
Dimensions	14 x 12 x 11 inches (35.6 x 30.5 x 28 cm.)
Mounting Hole Centers	14-1/2 (H) X 10-1/4 (W) inches (36.8 (H) X 26 (W) cm)
Weight	28 lbs. (12.7kg)

## **7.0 APPENDIX**

- 7.1 Custom - Programming the DPS3**
- 7.2 Warranty Statement**
- 7.3 NIST Traceability**
- 7.4 Commitment to Quality**
- 7.5 Basic Humidity Definitions**

## 7.1 CUSTOM - PROGRAMMING THE DPS3

The standard configuration of the Edgetech Instruments Inc. DPS3 provides a digital display and analog output for only one parameter – Dew Point. The Factory default units are Degrees Celsius. However, this instrument is extremely flexible, and there are a number of special configurations that can be ordered from the Factory.

These include:

- Air Temperature measurements
- Humidity measurement in other units
- Servolock signal
- Clean mirror alarm
- Custom ranges for analog outputs

The main terminal strip is located at the bottom of the DPS3 heated enclosure. Spare terminals are provided for special custom outputs.

Inside the plastic housing mounted to the cover of the DPS3 is the DewTrak electronics unit. The DewTrak electronics is extremely flexible, and this chapter provides information so that the user in the field may take advantage of some of the extra capability. You have already seen that switches are available to change the DPS3 Analog Output from 4 to 20 mA to 0 to 5VDC or 0 to 10VDC. (See Section 4.6).

Information is included here for:

- Changing the Analog Output range
- Changing the Alarm Setpoints
- Calibrating the Analog Outputs
- Programming the Serial (RS-232) Outputs
- Using the Auto-Validation Cycle
- Using the Clean Mirror Signal
- Selecting Other Measurement Units

**Note: Some of these capabilities may be present on the main terminal strip (See Figure 4-2) located at the bottom of the heated enclosure. Some may only be accessible within the plastic housing of the electronics unit mounted to the cover of the DPS3. It depends upon the configuration that was ordered from the Factory. Not all humidity units discussed here are available in every DPS3, since some depend on the use of other optional sensor measurements such as Temperature or Pressure.**

## 7.1.1 INTERNAL TERMINAL STRIP CONNECTIONS

Figure 7-1 Terminal Strip Connections

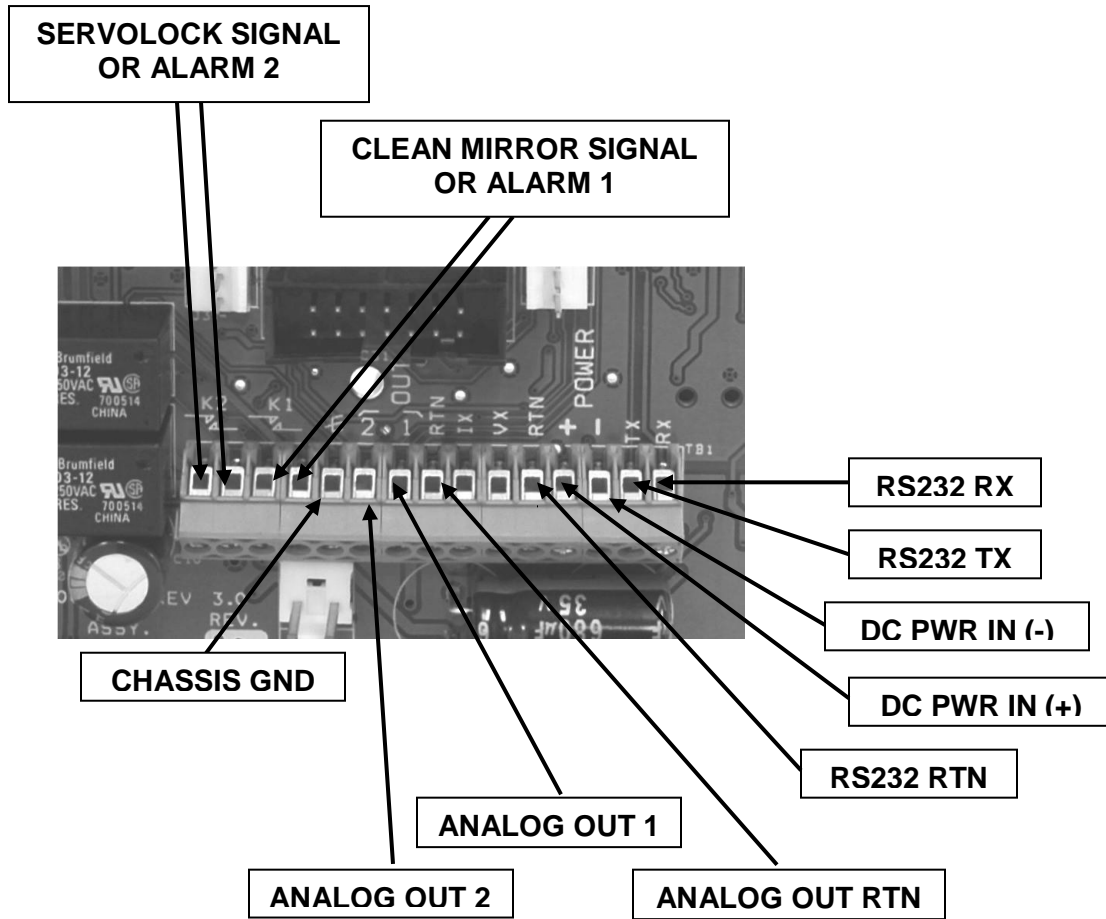


Table 7-1 Terminal Strip Connections

TERMINAL	ITEM
1,2	SERVOLOCK SIGNAL OR ALARM 2
3,4	CLEAN MIRROR SIGNAL OR ALARM 1
5	CHASSIS GROUND
6	ANALOG OUTPUT 2
7	ANALOG OUTPUT 1
8	ANALOG OUTPUT RET.
9	FOR FACTORY USE
10	FOR FACTORY USE
11	RS232 RETURN
12	DC POWER IN (+)
13	DC POWER IN (-)
14	RS232 TX
15	RS232 RX

## 7.1.2 USING THE RS-232 SERIAL PORT TO REPROGRAM YOUR SETTINGS

### Notes:

1. If the Factory Default settings are satisfactory, there is no reason to perform any programming.
2. Any desired programming may also be accomplished by using the front panel keypad. See Section 4.11.

The DPS3 is very versatile. Through the Serial Port, the user has complete control over the display units, the electrical outputs, and other features as well.

### 7.1.3 SERIAL PORT SETUP

You will need a serial cable with a standard DB-9 connector on one end, which will plug into the standard serial port connector on the back of your computer. (If your computer does not have a serial port, you can use a USB-to-Serial converter.) The other end will have three stripped wires, which will connect to the main terminal strip at the bottom of the housing.

Table 7-2 Serial Cable Wiring

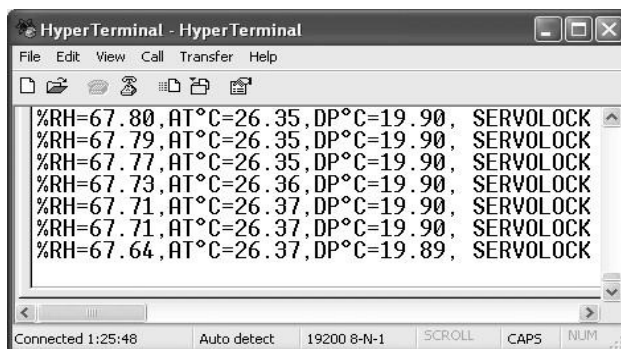
DB-9 SERIAL CONNECTOR	MAIN TERMINAL STRIP
Pin 2	TX – Term. 9
Pin 3	RX – Term 10
Pin 5	RTN – Term. 8

You can use a terminal emulation program, such as HyperTerminal, with Windows XP or earlier operating systems. For Vista or Windows 7, Teraterm is available from [www.usconverters.com](http://www.usconverters.com). Set your PC Com Port to:

BAUD: 19200  
BITS 8  
STOP BITS 1  
PARITY NONE  
FLOW CONTROL NONE

HyperTerminal has a setting called Control for Terminal Emulation. Set it to AUTODETECT.

After connecting both ends of the serial cable, apply power to the unit. A window should be seen, which will show some warm-up and self test data. After the self checking and warm-up period, the window will display information similar to the photo shown here. This is the default condition.

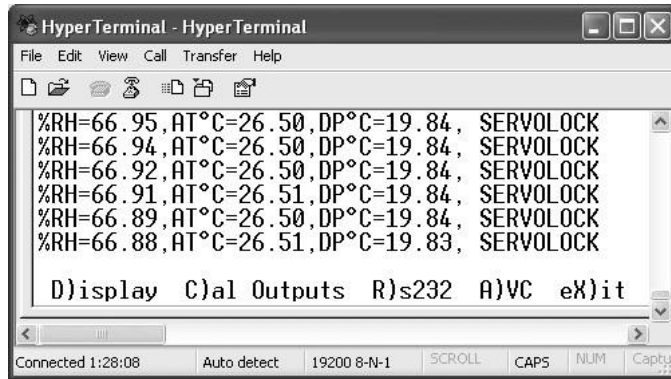


### 7.1.4 PROGRAMMING THE DPS3 VIA THE SERIAL PORT

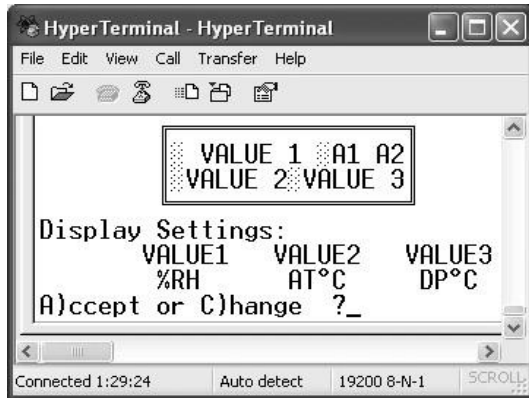
If you do not see a window similar to the one shown above, you will not be able to program this instrument. Check your terminal emulation program, the power supply, and check the interconnecting cable wiring as shown in Table 7 -2 above.

**NOTE: WHEN PROGRAMMING ALPHABETIC CHARACTERS, USE UPPER CASE ONLY.**

To begin reprogramming, press the ESCape key on your computer keyboard. The window will change to that shown here. To select the desired parameter, simply select the first letter as shown. You will find it quite intuitive once you try it. Several programming examples will be shown here.

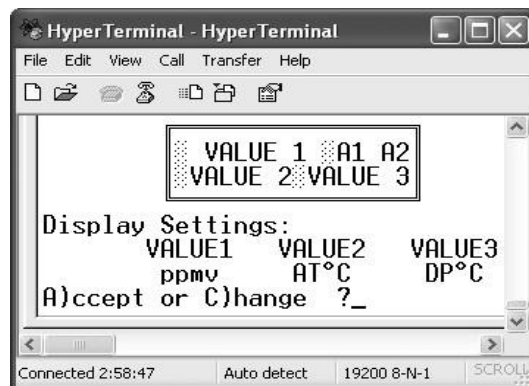


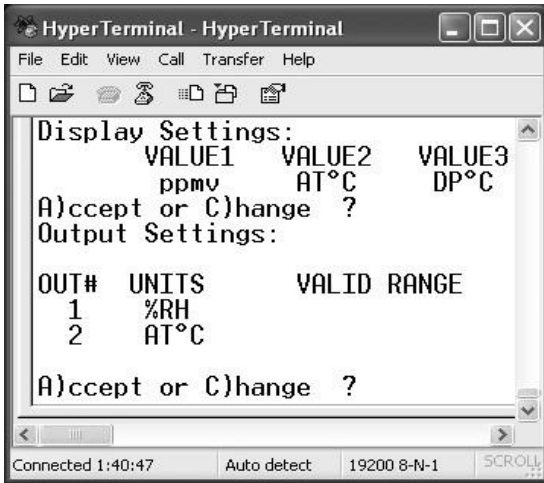
### 7.1.5 CHANGING THE DIGITAL DISPLAY



Press the D key to change the displayed values. The window at the left will appear. Press the A key to keep the present values, or the C key to change them. In this case, you will change them. So, you will press C to change the values.

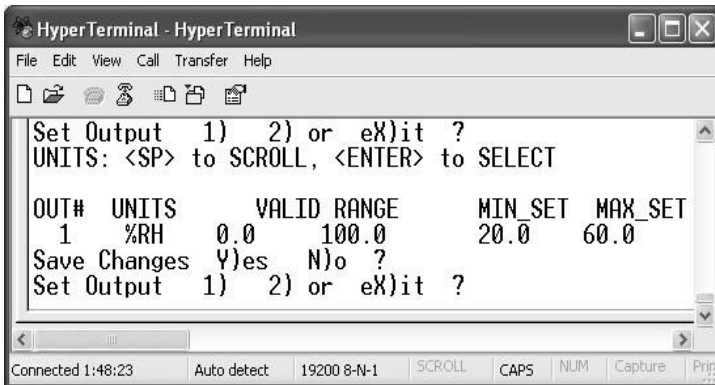
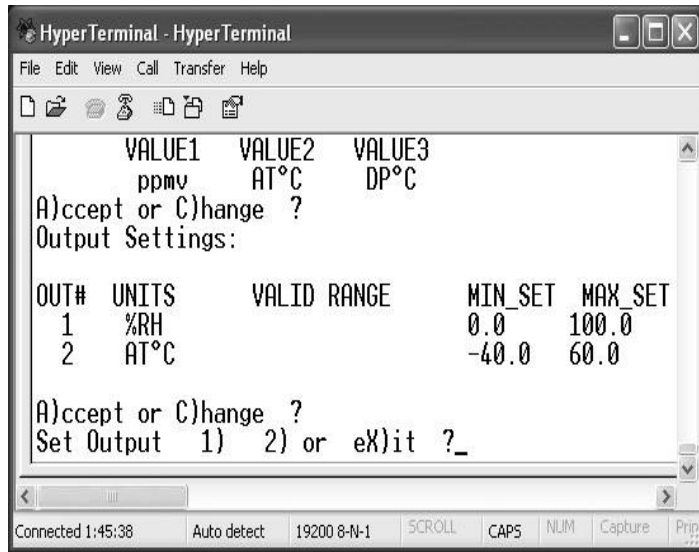
Using the Space Bar on the keyboard, you can toggle through all the available units to display. You will change the first displayed parameter from %RH to ppmv, as shown here. For VALUE1, cycle all the available parameters using the Space Bar until ppmv is shown. Press Enter. Press Enter again to keep VALUE2, and press Enter again to keep VALUE3. Press A for A)ccpt. You have now selected your desired displayed parameters.





The screen at the left will now be seen, and you will have an opportunity to select the electrical outputs and make them represent any parameter you wish. To do so, press C for C)hange, and the screen shown below will appear.

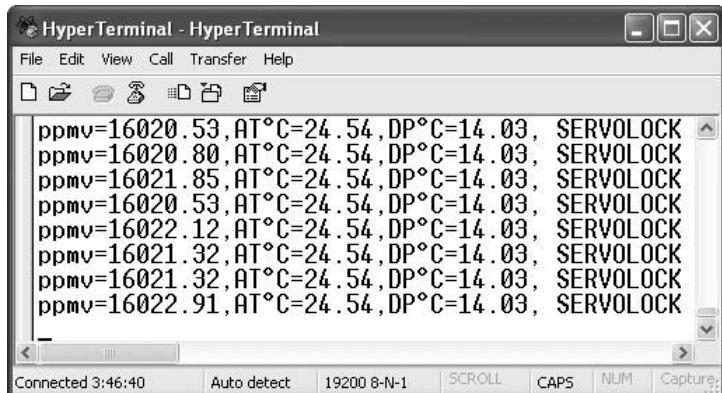
The outputs shown are %RH with a range of 0 to 100%RH, and Air Temperature (AT) with a range of -40 to 60°C. These are the Factory defaults.



Perhaps you would like additional resolution on the Relative Humidity analog output. So, for this example, you will change the output scaling from 0 to 100 %RH to 20 to 60%RH. Press 1 on the keyboard in order to change Parameter 1. Set the MIN SET to 20. Press Enter. Set the MAX SET to

60. Press Enter. Press Y for Y)es to save the changes. You can then enter X for eX)it if desired.

You will see that the default window will reappear, and will be constantly updated.



Comparing it with the window shown at the beginning of this chapter, the first parameter has been changed from %RH to ppmv. A meter on the analog output would show that the first output is on %RH, with scaling of 0 to 100% corresponding to 20 to 60%RH.

### **7.1.6 RELAY OUTPUTS**

Two relays, K1 and K2, are built into the DewTrak II. The relay contacts are brought out to the main terminal strip, TB1. The contacts are Normally Open (NO), or Form A. As supplied from the Factory, they are configured as follows:

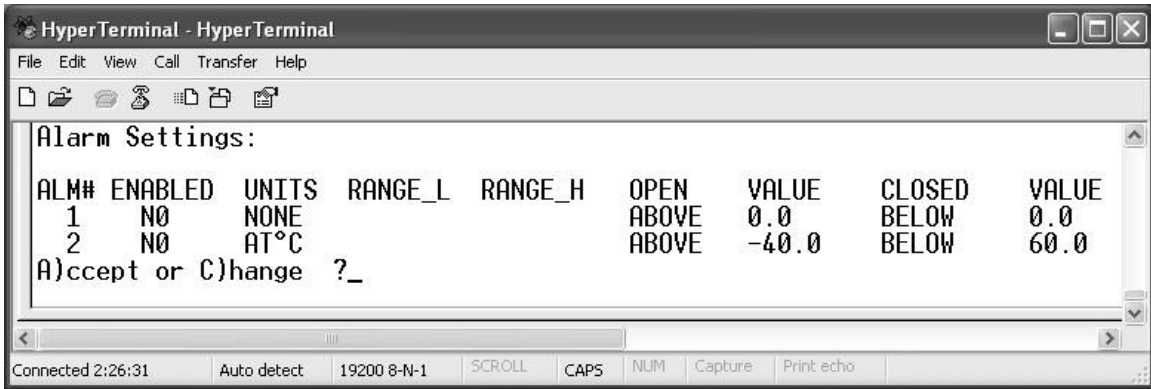
K1 may be used as the Clean Mirror signal as a Factory option. When energized, it advises the user that contamination has accumulated on the dew point sensor mirror, and the system should be shut down for a routine cleaning. When this signal occurs, the system still provides dew point measurements that are in specification, but the closure indicates that readings may become unreliable if the mirror is not cleaned before long.

K2 may be used as the the ServoLock signal as a Factory option. ServoLock is an Edgetech Instruments Inc. term indicating that the mirror servo loop is operating properly, and there is a correct dew layer on the mirror surface. You can use this relay signal as an indication that good dew point data is being supplied. Or conversely, the lack of this signal may be used as a “busy” signal, telling the user to disregard the data being received at this time.

### **7.1.7 CONFIGURING THE ALARM RELAYS**

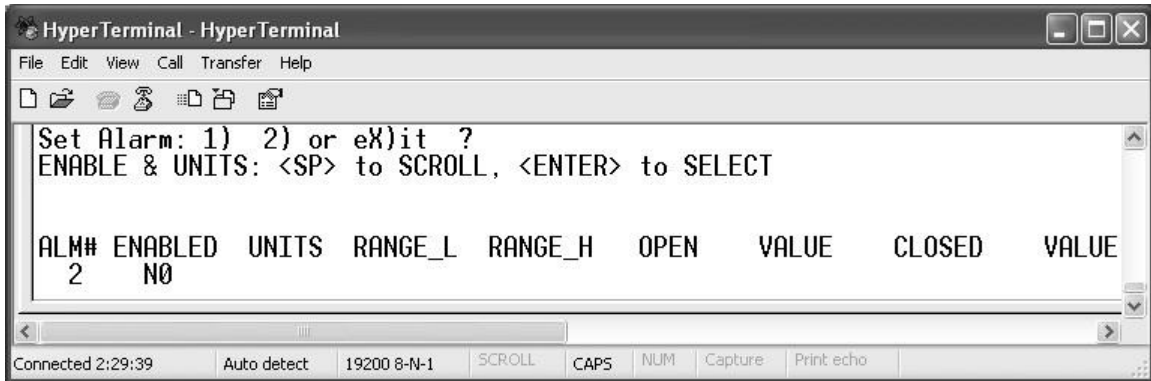
Using the RS-232 Port, Alarm Relays K1 and K2 may be set. You can program them to actuate on any increasing or decreasing measured or calculated humidity parameter.

**NOTE: IT IS ADVISABLE TO PROGRAM IN A SMALL OVERLAP OF THE “ON” VALUE AND THE “OFF” VALUE, SO THAT THE RELAY DOES NOT CHATTER WHEN THE MEASURED VALUE IS EXACTLY AT THE SETPOINT. THIS OVERLAP IS CALLED “HYSTERESIS.”**

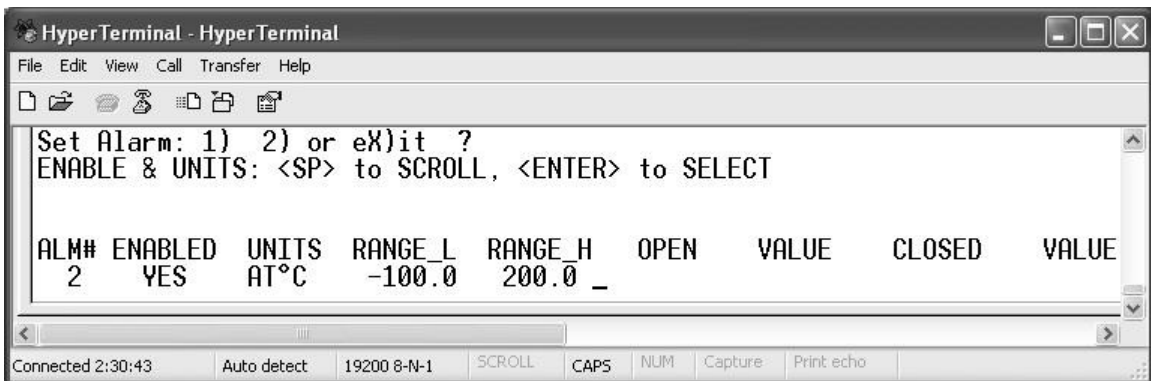


You can press D for D)isplay until the above picture appears. If you do not wish to use the Alarm Relays, A for A)cccept, then X to eX)it.

To program the relays as Alarms, proceed as follows: Press C for C)hange when the above picture appears. You will then be able to program Alarm1 and Alarm2 as shown in the picture below.



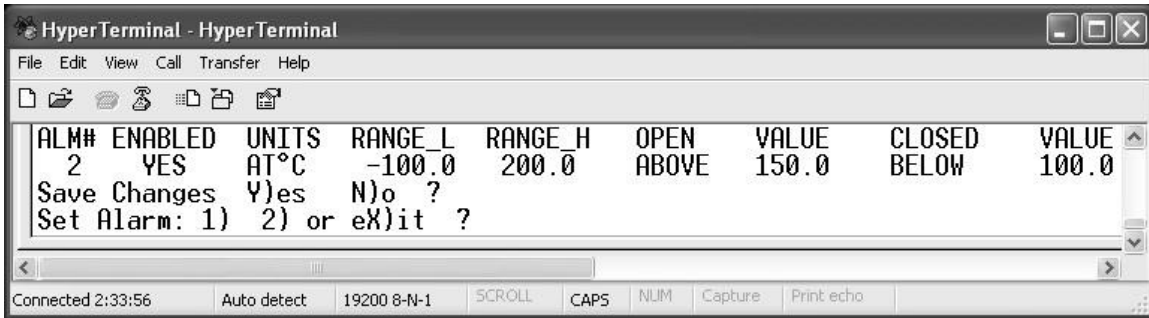
In this case, enable Alarm2 by scrolling with the space bar and selecting YES. See the picture shown below.



You will then be able to select the values for the OPEN and CLOSED conditions. In this case, you would like Alarm2 to OPEN at an Air Temperature reading of 150, and to remain open above that value.

Note: Air Temperature is a Factory option not available on the standard DPS3.

You would like the relay to CLOSE at a reading of 100, and to remain closed



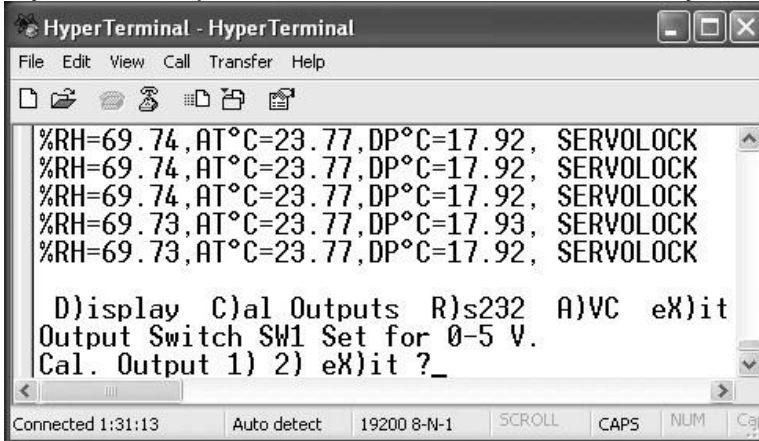
```
HyperTerminal - HyperTerminal
File Edit View Call Transfer Help
[Icons]
ALM#  ENABLED  UNITS  RANGE_L  RANGE_H  OPEN  VALUE  CLOSED  VALUE
  2   YES    AT°C    -100.0   200.0   ABOVE 150.0   BELOW 100.0
Save Changes Y)es N)o ?
Set Alarm: 1) 2) or eX)it ?

Connected 2:33:56   Auto detect   19200 8-N-1   SCROLL   CAPS   NUM   Capture   Print echo
```

below that value. You can then save the changes, and then proceed to program Alarm1 or press X for eX)it.

### 7.1.8 CALIBRATING THE ANALOG OUTPUTS

If you have a precise milliammeter or voltmeter, you can check the accuracy and

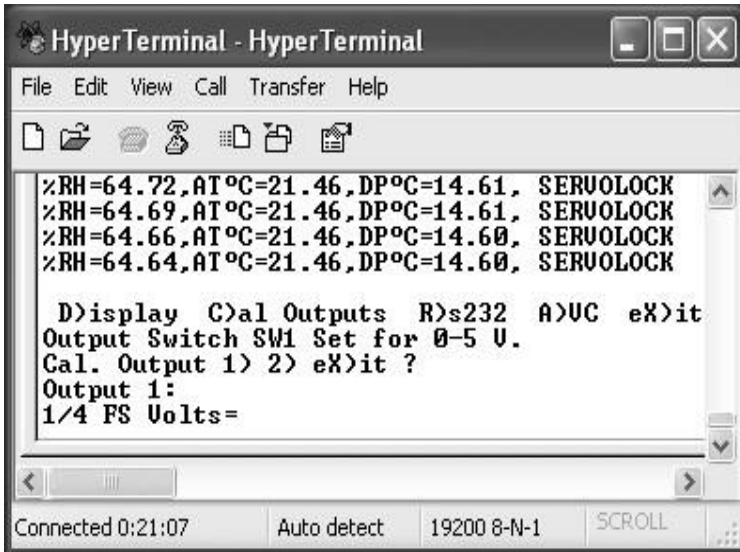


```
HyperTerminal - HyperTerminal
File Edit View Call Transfer Help
[Icons]
%RH=69.74,AT°C=23.77,DP°C=17.92, SERVOLOCK
%RH=69.74,AT°C=23.77,DP°C=17.92, SERVOLOCK
%RH=69.74,AT°C=23.77,DP°C=17.92, SERVOLOCK
%RH=69.73,AT°C=23.77,DP°C=17.93, SERVOLOCK
%RH=69.73,AT°C=23.77,DP°C=17.92, SERVOLOCK

D)isplay C)al Outputs R)s232 A)VC eX)it
Output Switch SW1 Set for 0-5 V.
Cal. Output 1) 2) eX)it ?_

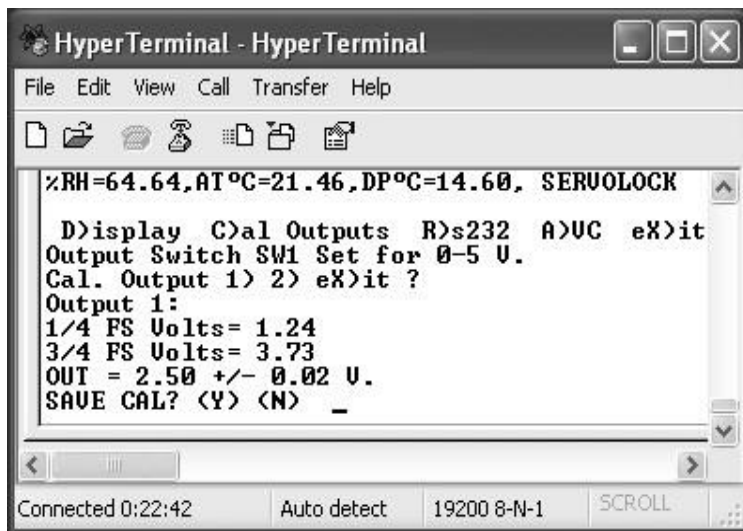
Connected 1:31:13   Auto detect   19200 8-N-1   SCROLL   CAPS   NUM   Cap
```

scaling of the analog outputs. Connect your meter to terminal strip TB1 on the circuit board. If you have selected 4 to 20 mA current output, you can connect it in series with the load. If you have selected 5 or 10 VDC, connect it between the voltage output and RTN.



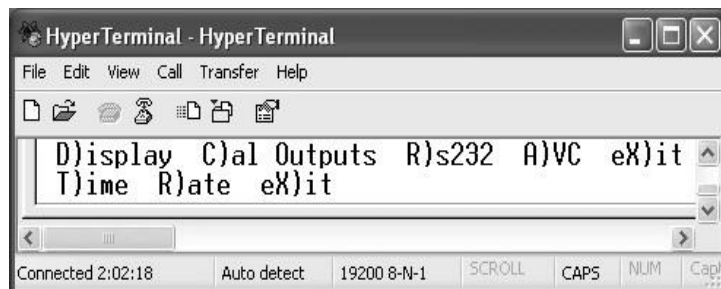
Press C for C)al Outputs. This window shows that the output switches on the circuit board are set for analog outputs of 0 to 5VDC, and you can now select Output 1 or 2 to test. Selecting Output 1, a new window will be seen, as shown below. A new output voltage will be measured on the terminal strip, corresponding to  $\frac{1}{4}$  of Full Scale. Type in this voltage reading as

requested by the program. Press the Enter key. You will then see a second screen, giving you the value of  $\frac{3}{4}$  of Full Scale. Also, type in this value as requested by the program. Press Enter. Now, the voltage corresponding *exactly to midscale* will be measured at the output. Your meter should read 2.50VDC +/- 0.02 volts, +/- the meter error. You can save the calibration, and then eX)it from the program.

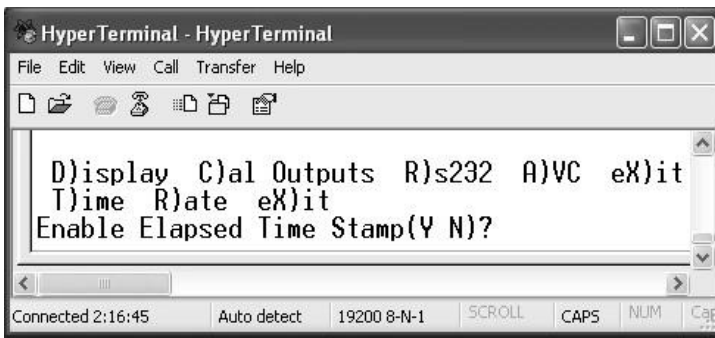


### 7.1.9 PROGRAMMING THE SERIAL OUTPUT

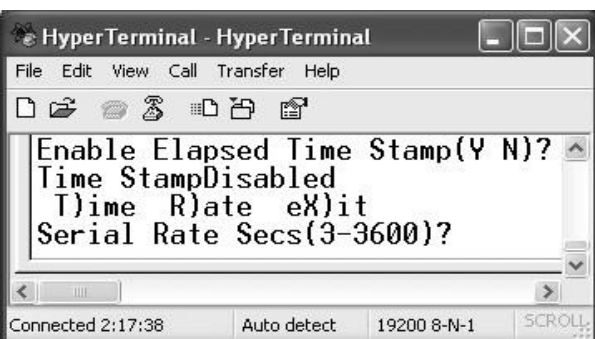
From the main (default) window, press the ESCape key. Then press R for R)s232. You will then have two options. You can add an Elapsed T)ime Stamp to the serial output, and you can select an Update R)ate. If you select T for the output T)ime Stamp, you will see the window shown here.



You can now select Y for YES, or N for NO. If you select R for Update R)ate,

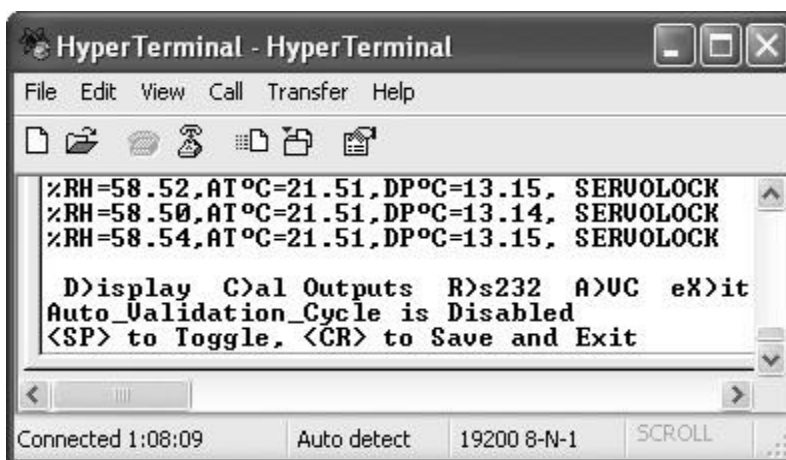


update rate in seconds, from 3 to 3600 seconds, or 1 hour maximum.



### 7.1.10 AUTO VALIDATION CYCLE

If desired, you can also enable or disable the Auto Validation cycle. This automatic built-in cycle is a self-test feature. Every 6 hours, it heats the mirror, evaporating the dew layer, and checks for excessive contamination on the surface. If conditions are acceptable, it



proceeds to grow a new dew layer and continues to take measurements. If contaminants are excessive, it initiates the Clean Mirror alarm. During the periodic cycle, the analog outputs are held for 30 seconds at the value that existed *just before* the cycle started. Press the Space Bar to Enable or Disable the Auto Validation cycle, and then Save and Exit.

### 7.1.11 CLEAN MIRROR SIGNAL

The DewTrak II Humidity Transmitter features an electro-optical technique to detect and maintain the dew layer on the mirror surface. By use of the Auto Validation Cycle, the system will indicate when the mirror needs attention. In the factory default configuration, the Clean Mirror alarm relay actuates when the mirror requires periodic cleaning. An indication also appears on the RS-232 serial output. When the Clean Mirror alarm actuates, the instrument is still operational and the accuracy of the measurement is not affected by the presence of contaminants on the mirror surface.

**NOTE: THIS ALARM REQUIRES THAT THE MIRROR BE CLEANED WITHIN A REASONABLE PERIOD OF TIME, OR THE SPECIFIED ACCURACY CAN NO LONGER BE GUARANTEED.**

There are many variables determining the frequency that your transmitters require maintenance. These include flow rate and the amount of particulate matter in the gas being measured. Once you determine the typical contamination rate in your unique application, it is recommended that you initiate a periodic maintenance schedule. This minimizes the chance of obtaining incorrect data due to mirror contamination.

#### **7.1.12 SERVOLOCK SIGNAL**

The Servolock signal can be used to signal to the operator that the mirror control servoloop has come *into control*. This is an indication that the mirror temperature is tracking the dew point in real time as it changes, and that the output data is reliable.

**NOTE: THE DPS3 FACTORY DEFAULT IS ALARM RELAY OUTPUTS. YOU MAY SELECT THE CLEAN MIRROR SIGNAL AS AN OPTION INSTEAD OF ALARM 1. YOU MAY SELECT THE SERVOLOCK SIGNAL INSTEAD OF ALARM 2. THESE ARE FACTORY OPTIONS SELECTED AT THE TIME OF ORDERING.**

## 7.2 WARRANTY STATEMENT

All equipment manufactured by Edgetech Instruments Inc. is warranted against defective components and workmanship for repair at their plant in Massachusetts, free of charge, for a period of twelve months.

Malfunction due to improper use is not covered in this warranty and Edgetech Instruments Inc. disclaims any liability for consequential damage resulting from defects in the performance of the equipment. No product is warranted as being fit for a particular purpose and there is no warranty of merchantability. This warranty applies only if (i) the items are used solely under the operating conditions and in the manner recommended in the instruction manual, specifications, or other literature; (ii) the items have not been misused or abused in any manner or repairs attempted thereon; (iii) written notice of the failure within the warranty period is forwarded to Edgetech Instruments Inc. and the directions received for properly identifying items returned under warranty are followed; and (iv) the return notice authorizes Edgetech Instruments Inc. to examine and disassemble returned products to the extent Edgetech Instruments Inc. deems necessary to ascertain the cause for failure. The warranties expressed herein are exclusive. There are no other warranties, either expressed or implied, beyond those set forth herein, and Edgetech Instruments Inc. does not assume any other obligation or liability in connection with the sale or use of said products.

Equipment not manufactured by Edgetech Instruments Inc. is supported only to the extent of the original manufacturer's warranties

## 7.3 N.I.S.T. TRACEABILITY – WHAT DOES IT MEAN?

The Model DPS3 Heated Dew Point Hygrometer is certified by Edgetech Instruments Inc. to be traceable to N.I.S.T., the National Institute of Standards and Technology (formerly known as the National Bureau of Standards, or NBS), in Gaithersburg, Maryland, U.S.A. You have received a Certificate of Calibration with this instrument. What does N.I.S.T. Traceability mean in terms of this instrument?

The Model DPS3 measures Dew Point using the Optical Chilled Mirror (OCM) technique, which provides a primary rather than a secondary measurement of Dew Point temperature. In addition, Dew Point is a fundamental measurement of humidity. It is not affected by temperature.

The Dew Point temperature is measured using a Platinum Resistance Thermometer (PRT). This device is a coil of nearly pure platinum, where the rate of change of resistance with temperature is precisely known. Resistance is accurately measured and is automatically converted to temperature information within the instrument.

### **TRACEABILITY:**

- 1. The precise platinum resistance thermometer is N.I.S.T. traceable by the traceable resistance standards maintained by the PRT manufacturer.
- 2. A multi-point Dew Point calibration is performed on every chilled mirror sensor, using Edgetech Instruments Inc.'s traceable secondary dew point standard. This instrument, a precise chilled mirror hygrometer, is periodically sent directly to N.I.S.T. for certification against the USA's Dew Point transfer standard, a Two-Pressure Generator.

## **7.4 EDGETECH INSTRUMENTS INC.'S COMMITMENT TO QUALITY**

To Our Customers:

Thank you for purchasing one of our products. At Edgetech Instruments Inc., it is our policy to provide cost-effective products and support services that meet or exceed your requirements, to deliver them on time, and to continuously look for ways to improve both. We all take great pride in the products we manufacture.

We want you to be entirely satisfied with your instrument. The information contained in this manual will get you started. It tells you what you need to get your equipment up and running, and introduces its many features.

We always enjoy hearing from the people who use our products. Your experience with our products is an invaluable source of information that we can use to continuously improve what we manufacture. We encourage you to contact or visit us to discuss any issues whatsoever that relate to our products or your application.

*The Employees of Edgetech Instruments Inc.*

## Notes