ΩΞ OMEGA®

User's Guide

HUMIDITY TRANSMITTER — MODEL 200

DEW POINT	AMB TEMP	RH%
4-20 mA DC	4-20 mA DC	4-20 mA DC

500 OHM MAX LOAD

24 VDC	24 VAC	115 VAC	220 VAC

DEW POINT:
-40° TO 60° C / -40° TO 140° F   SPECIAL DEW POINT:

2A3454

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RHCM-40 SERIES
Dew Point Transmitter with a Humidity Option Configuration

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

RHCM-40 Series
Dew Point Transmitter with a Humidity Option Configuration
OPERATORS MANUAL

ΩΞ OMEGA®

RHCM-40
QUICK STARTUP GUIDE

STARTUP

1. Mount the RHCM-40 in position to measure the desired gas.

2. Connect wiring to the main terminal strip as shown below:

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

Note: Connect DC POWER IN and only the Outputs desired. See the Manual for details.

3. Turn on the DC power supply. Specifications are: 24VDC ± 20%, 1A maximum.

4. After the self-test procedure, start recording valid data.

TABLE OF CONTENTS   Page

LIST OF ILLUSTRATIONS   Page

LIST OF TABLES

2.0 INTRODUCTION

2.1 GENERAL DESCRIPTION

The RHCM-40 Dew Point/Humidity Transmitter is an optical chilled mirror hygrometer, designed to continuously measure the moisture content in gases. With an option to acquire an air temperature probe, this transmitter can than display dew point, humidity and temperature and have a signal out for two of the following three parameters, dew point, humidity or temperature The instrument is powered by 24VDC. It uses the chilled mirror dew point temperature condensation principle to determine the water vapor concentration in gas mixtures, and a platinum resistance thermometer to accurately measure that temperature. This principle is fully explained in the Appendix to this manual. Outputs include 4 to 20 mA (Factory default unless specified otherwise when ordering), 0 to 5VDC, or 0 to 10VDC, field-selectable. Two sets of analog outputs are supplied, unless Dew Point only is ordered. Additional outputs include an RS-232C serial port, as well as electrically isolated relay contacts.

Various housings are available for the RHCM-40. These include a plastic (IP65) dust-tight and water resistant package, as well as an aluminum housing with conduit fittings. Many options and accessories are available, and these are described below. Figure 2-1 shows a few of the available models.

Figure 2-1 Standard RHCM-40 Configurations

Wall Mount   Remote Mount
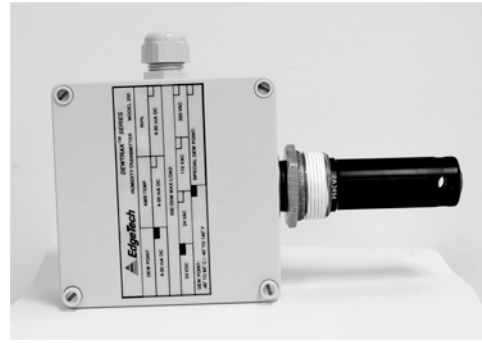
Duct Mount   Pipe Mount

2.2 STANDARD FACTORY CONFIGURATIONS

The RHCM-40 is designed with a large number of standard configurations for user convenience, as shown here. In addition, you can consult the Factory for special configurations if needed.

RHCM-40-PL-W   A wall-mount configured Dew Point/Humidity transmitter*** with a plastic enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, and alarm relays.

RHCM-40-AL-W   A wall-mount configured Dew Point/Humidity transmitter*** with an aluminum enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, and alarm relays.

RHCM-40-PL-D   A duct-mount configured Dew Point/Humidity transmitter*** with a plastic enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, duct mount flange kit, and alarm relays.

RHCM-40-AL-D   A duct-mount configured Dew Point/Humidity transmitter*** with an aluminum enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, duct mount flange kit, and alarm relays.

RHCM-40-PL-R   A remote-mount configured Dew Point/Humidity transmitter*** with a plastic enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, duct mount flange kit, 6 foot cable between sensor and electronics, and alarm relays.

RHCM-40-AL-R   A remote-mount configured Dew Point/Humidity transmitter*** with an aluminum enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, duct mount flange kit, 6 foot cable between sensor and electronics, and alarm relays.

RHCM-40-PL-P   A pipe-mount configured Dew Point/Humidity transmitter***
with an plastic enclosure, a two-stage chilled mirror sensor, two programmable
analog outputs, an RS-232 bi-directional serial port, 1-1/4 inch NPT brass pipe
mount fitting, and alarm relays.

RHCM-40-AL-P   A pipe-mount configured Dew Point/Humidity transmitter***
with an aluminum enclosure, a two-stage chilled mirror sensor, two
programmable analog outputs, an RS-232 bi-directional serial port, 1-1/4 inch
NPT brass pipe mount fitting, and alarm relays.

**** this transmitter is typically a dew point transmitter and can only be
configured as a humidity transmitter when the air temperature probe option is
purchased

2.2.1 FACTORY DEFAULT OUTPUT RANGES

These <u>standard output measurement ranges</u> apply to all instruments unless specified otherwise when ordering. They correspond to 4 to 20 mA. See 2.1 above for other field-selectable electrical ranges.

- Dew Point Only
  Dew Point: -40°C to 60°C

- Dew Point/Air Temp.
  Dew Point: -40°C to 60°C
  Air Temp: -40°C to 60°C
  % RH   0 to 100%

2.3 OPTIONS AND ACCESSORIES

The RHCM-40 is designed to accept a number of options and accessories to expand its capabilities.

ATDT-W   Add a platinum RTD Air Temperature probe to the wall-mount package. (Used with either the plastic or aluminum housing.)

ATDT-R   Add a remote-mount platinum RTD Air Temperature probe. A 10 foot cable is standard. (Used with either the plastic or aluminum housing.)

ATDT-I   Add an integrated air temperature platinum RTD sensor embedded in the dew point sensor.

RTD   Resistive (100 ohm platinum RTD) Dew Point output

ACDT   A universal power supply for the RHCM-40, for AC sources of 85 to 230 VAC, 50/60 Hz.

ECDT   Add additional sensor cable length for either the dew point or the air temperature sensor, up to 50 feet in length.

AR   Aspirator kit

RD   Add a digital LCD display to the plastic-housed RHCM-40.

SC1   A sample chamber for flow-through humidity measurements

SC   A low pressure sample chamber with fittings

3.0 INSTALLATION

3.1 PLACEMENT OF INSTRUMENT

If possible, locate the RHCM-40 dewpoint/humidity Transmitter in a clean area where the air to be measured is allowed to freely move around the enclosure. Optimal performance of the instrument is experienced when air is gently moving over the chilled mirror sensor, providing a representative sample for measurement. If you have purchased an instrument with the optional digital display, choose a location where the display may be conveniently observed. Depending on the location selected, it may be convenient to wire the instrument prior to mounting.

3.2 MOUNTING

3.2.1 WALL MOUNT

Instruments with the plastic wall mount housing are mounted to a flat surface as follows:

1. Remove the front cover. Using a flat screwdriver, carefully unscrew the four slotted plastic screws.

2. Mounting screws (not provided) are inserted in the same holes as the cover screws. They must have a head diameter that is small enough to fit inside the clearance holes, but large enough to press against the collar located at the bottom of the holes. No. 8 pan head or round head screws are recommended.

3. Reinstall the front cover. Do <u>not</u> over-tighten the cover mounting screws.

3.2.2 DUCT MOUNT

The duct mount unit is available with a metal housing and metal conduit fittings, and has a built-in mounting flange. Use No. 6 screws to mount the flange securely to the duct.

It is also available with a plastic (IP65) housing. In this case, a separate duct mount flange kit is provided.

3.2.3 REMOTE MOUNT

A 6 foot (1.8 meter) remote sensor cable is provided between the sensor and the instrument housing. Consult the factory for other lengths. A remote mount unit is available with either a plastic or metal housing. Mount the housing as described above. If a duct mount flange kit is provided, mount it to the duct in a location close to the electronics housing.

3.2.4 PIPE MOUNT
The pipe mount configurations are available with either a plastic or metal electronics housing. They include a 1-¼ inch NPT brass pipe mount fitting. A corresponding female mating fitting, user-supplied, should be mounted in a gas-tight manner to a flat surface of a duct, pipe, or chamber wall containing the gas to be measured. Clean all surfaces of the pipe mount of oil, grease, and contaminants.

To install the mount and sensor:

> Screw the front portion of the mounting sleeve (the tapered NPT fitting) into the pre-mounted user-supplied mating fitting. Teflon™ tape or pipe thread sealant may be used for a good seal. Do <u>not</u> over-tighten.

If the Type SC1 sample chamber is to be used, simply screw it down to any flat surface, and connect ¼ inch OD tubing to the inlet and outlet compression fittings. Tubing should be reasonably non-hygroscopic, such as copper, Teflon™, or Tygon™. Do <u>not</u> use PVC tubing. See the above instructions for probe mounting.

3.3 ELECTRICAL WIRING

3.3.1 POWER SUPPLY
You will need a power supply voltage of 24VDV +/- 20% at 1A for each DewTrak ll that you are installing. Stranded wire, 18 gauge minimum, color coded, should be used. Route the wires through the feed-through bushing on the body of the unit, and connect them to Terminal Strip TB1 as shown in Table 3-1 and Figure 3-1 below.

CAUTION: BE SURE TO OBSERVE CORRECT WIRING POLARITY.

DO NOT APPLY POWER TO THE UNIT UNTIL THE
INSTALLATION HAS BEEN COMPLETED.

Table 3-1 Terminal Strip Wiring

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

Figure 3-1 Terminal Strip Wiring
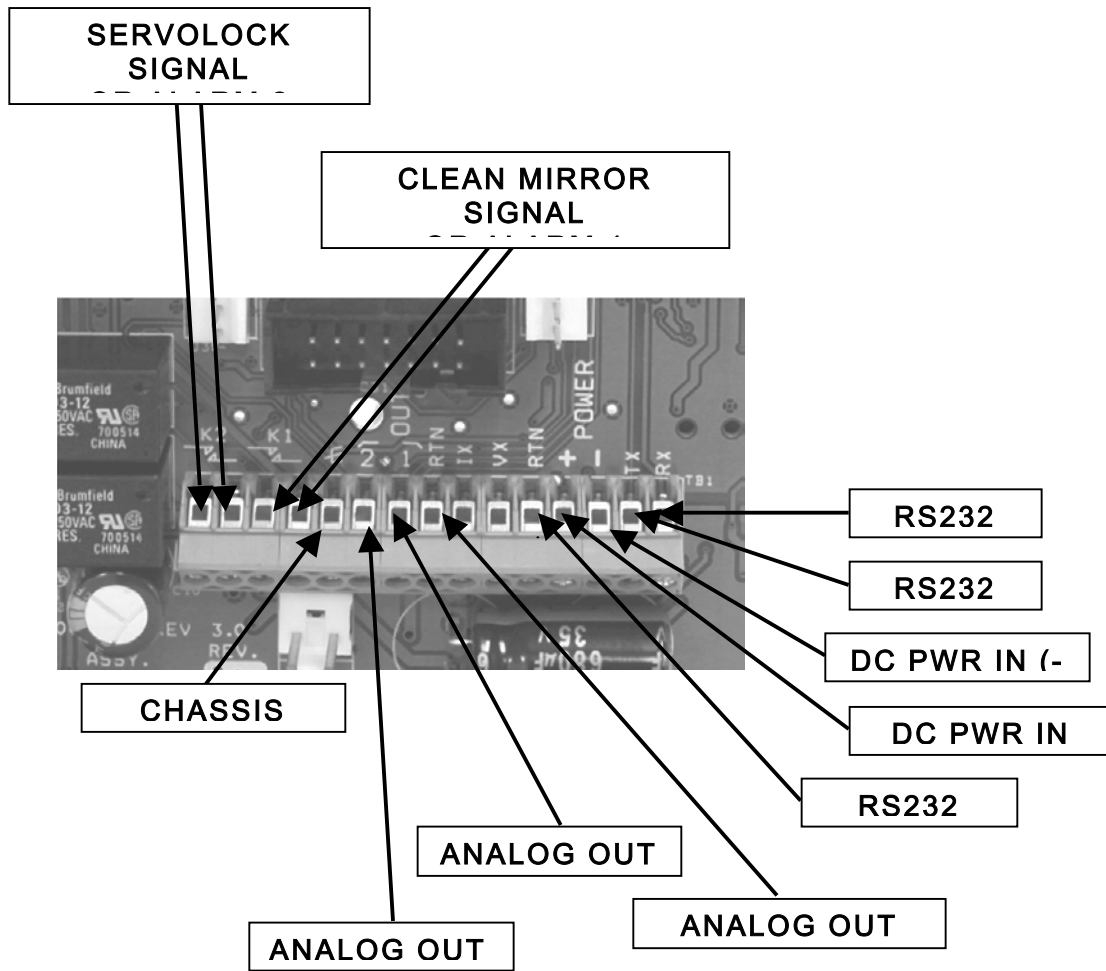
3.3.2 INPUT/OUTPUT WIRING

Wire the Analog Outputs as required. See 3.4 below for information on output selection.

Connect the RS-232 Serial Output if desired. Only 2 wires are required if the output is needed for transmitting information only. A third wire is added for bi-directional communications with the serial port.

Connect the relays as needed. Note that they may be programmed to provide either a Clean Mirror signal and a ServoLock signal, or they may be used as upper or lower setpoint Alarm Relays. See Section 4.4.4 for further information.

3.4 SELECTION OF ANALOG OUTPUTS

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 3-2 below. You can select the outputs to be either 4 to 20 mA, o to 5VDC, or 0 to 10VDC. To modify the output scaling, proceed as follows:

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

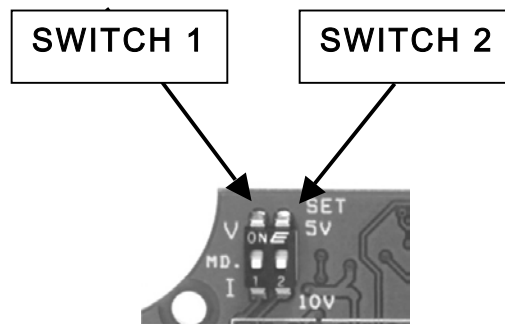| OUTPUTS	SWITCH 1	SWITCH 2
4 to 20 mA	DOWN	----
0 to 5VDC	UP	UP
0 to 10VDC	UP	DOWN

Table 3-2. Analog Output Switch Settings

Figure 3-2 Output Selector Switches

4.0 OPERATION

4.1 PLACEMENT OF INSTRUMENT

If possible, locate the RHCM-40 Humidity Transmitter in a clean area where the air to be measured is allowed to freely move around the enclosure. Optimal performance of the instrument is experienced when air is gently moving over the chilled mirror sensor, providing a representative sample for measurement.

4.2 FLOW CONTROL

The sensor probe is designed so that the flow rate can be changed. This is achieved by means of rotating the sensor cover around the sensor probe base. By aligning and misaligning the holes on the sensor cover with those of the sensor base, the air flow can be controlled across the surface of the chilled mirror sensor. The proper alignment of the holes (and thus gas flow control) depends on the application. The RHCM-40 sensor is designed to accommodate various application conditions. Optimal performance of the sensor may require several trial and error adjustments. "Optimal" performance is defined by the response time of the sensor, (lower flow results in a slower response). Accuracy is unaffected by the flow.

Flow control can also be achieved by constructing a simple external sampling system. You can use an Omega Engineering Sample Chamber, Model SC1, along with a flowmeter which can adjust the flow between 0 to 5 SCFH. Contact the factory for more details.

4.3 CLEAN MIRROR SIGNAL

The RHCM-40 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.

4.4 USING THE RS-232C SERIAL PORT TO REPROGRAM YOUR SETTINGS

Note: If the Factory Default settings are satisfactory, there is no reason to perform any programming.

The RHCM-40 is very versatile. Through the Serial Port, the user has complete control over the display units, the electrical outputs, and other features as well. Here are some of the parameters you can select and change:

- Displayed Values (if the optional display has been supplied)
- Output Units
- Output Ranges
- Alarm Scaling (if alarms have been selected)
- RS-232 Settings (Elapsed Time Stamp, Update Rate)
- Auto Validation (On or Off)

4.4.1 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. The other end will have three stripped wires, which will connect to Terminal Strip TB1 on the RHCM-40 circuit board as shown below:

Table 4-1   Serial Cable Wiring

DB-9 SERIAL CONNECTOR	TB1 TERMINAL STRIP
Pin 2	TX – Term. 14
Pin 3	RX – Term 15
Pin 5	RTN – Term. 11

Using a terminal emulation program, such as HyperTerminal, 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 RHCM-40. 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.
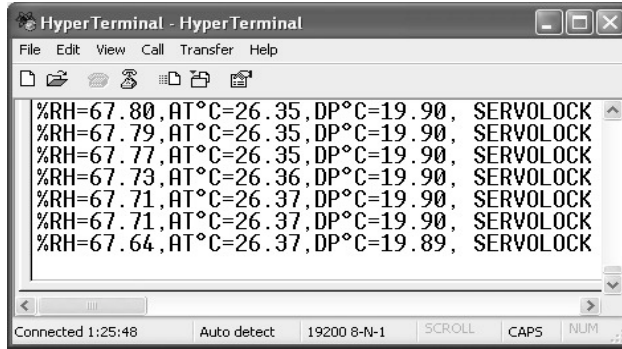

## 4.4.2 PROGRAMMING THE RHCM-40 VIA THE SERIAL PORT

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 5 -1 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.
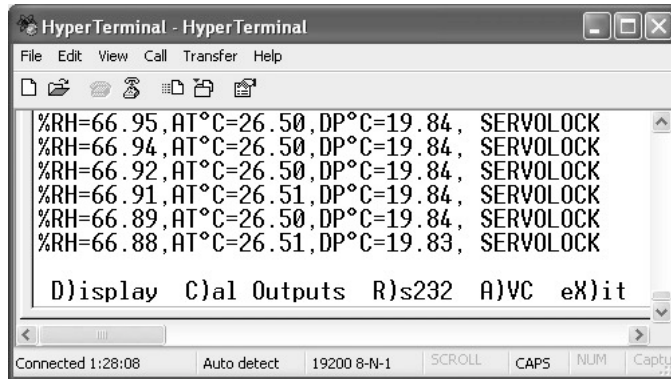

4.4.3 CHANGING THE DIGITAL DISPLAY (if you have the Display option)
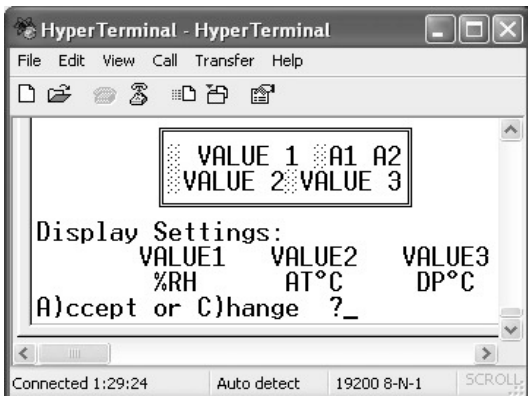
Press the D key to change the displayed values. The window at the left will appear. Press the A key to keep the present values, or the C key to change them. In this case, you will change them. So, you will press C to change the values.

17

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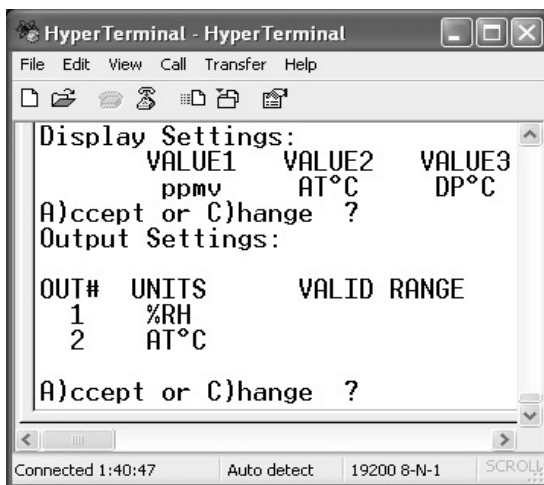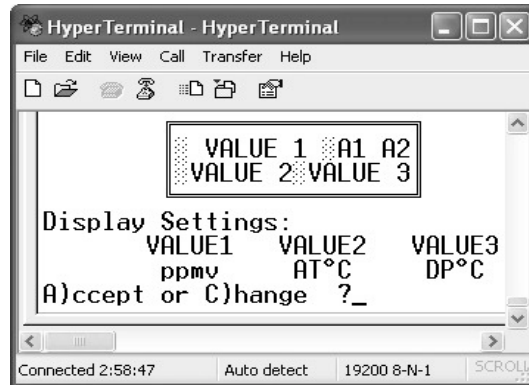
The screen at the left will now be seen, and you will have an opportunity to select the electrical outputs and make them represent any parameter you wish. To do so, press C for C)hange, and the screen shown below will appear.

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.
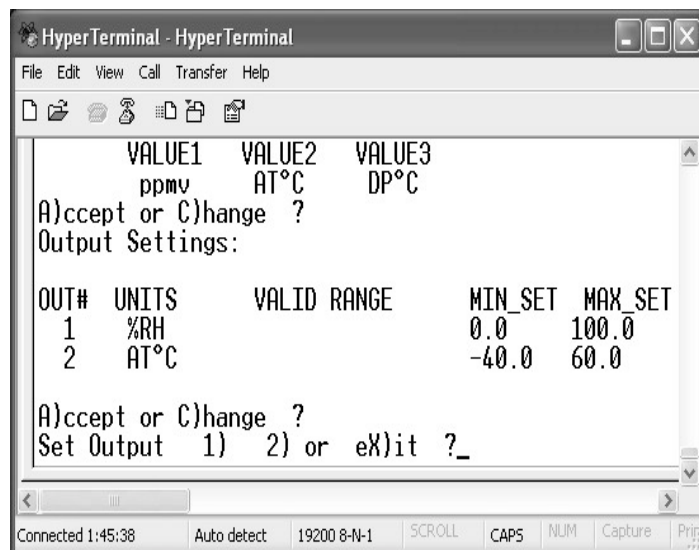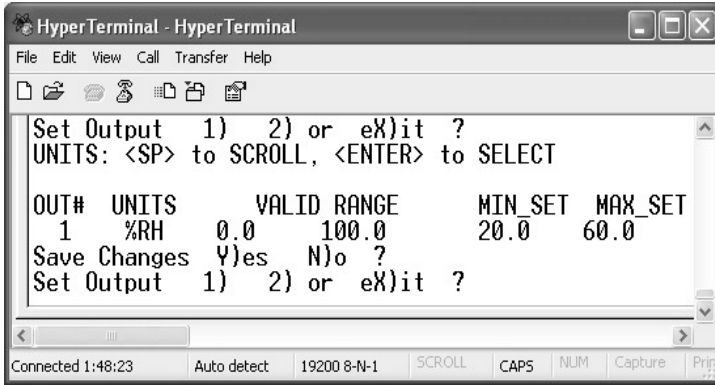
Perhaps you would like additional resolution on the Relative Humidity analog output. So, for this example, you will change the output scaling from 0 to 100 %RH to 20 to 60%RH. Press 1 on the keyboard in order to change Parameter 1. Set the MIN SET to 20. Press Enter. Set the MAX SET to 60. Press Enter. 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, 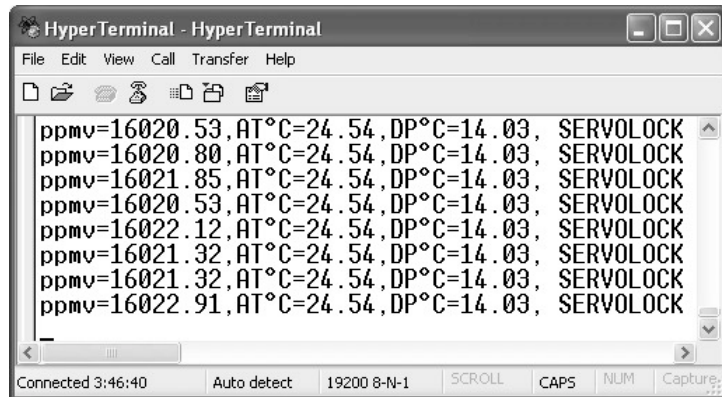the first parameter has been changed from %RH to ppmv. A meter on the analog output would show that the first output is on

%RH, with scaling of 0 to 100% corresponding to 20 to 60%RH.

4.4.4 RELAY OUTPUTS

Two relays, K1 and K2, are built into the RHCM-40. 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 is used as the Clean Mirror signal. 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 is the ServoLock signal. ServoLock is an Omega Engineering 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 by the RHCM-40. 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.

4.4.4.1 CONFIGURING THE RELAYS AS ALARMS

Using the RS-232 Port, relays K1 and K2 may be set as Alarm Relays. 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."
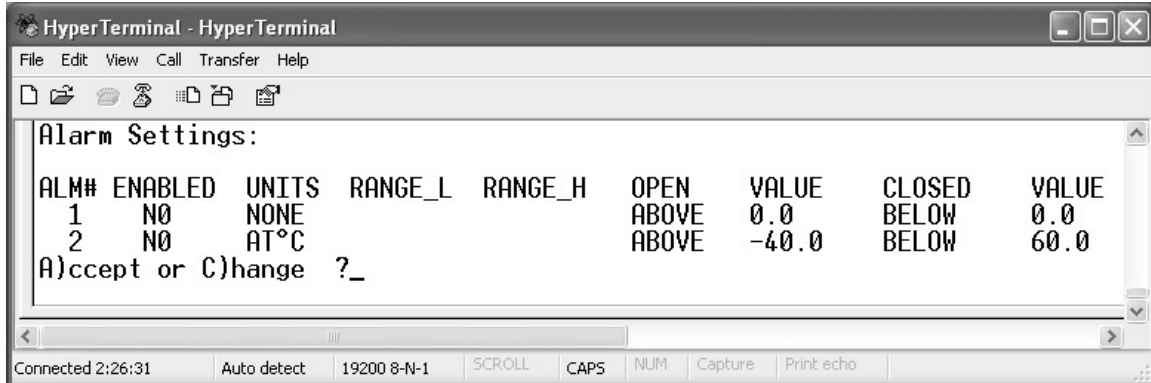
You can press D for D)isplay until the above picture appears. If you do not wish to use the Alarm Relays, A for A)ccept, then X to eX)it.

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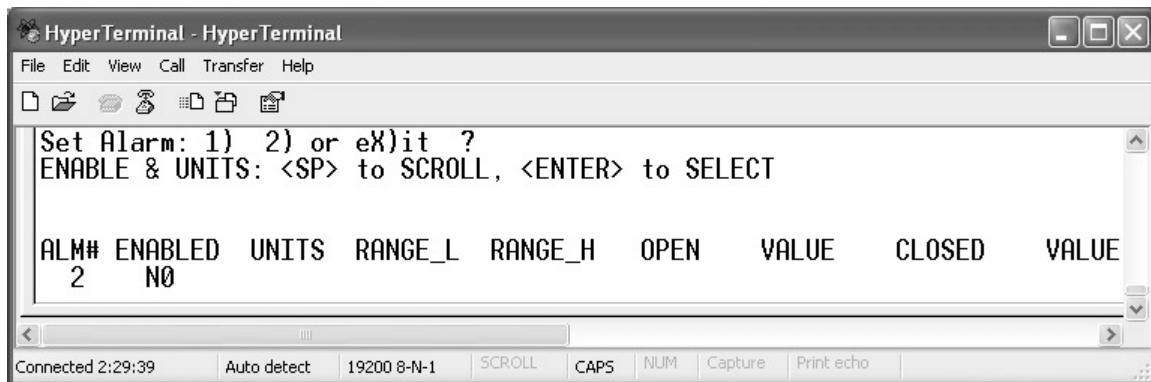
In this case, enable Alarm2 by scrolling with the space bar and selecting YES. See the picture shown below.

```
HyperTerminal - HyperTerminal                                    _ □ X
File  Edit  View  Call  Transfer  Help

Set Alarm: 1)  2) or  eX)it  ?
ENABLE & UNITS: <SP> to SCROLL, <ENTER> to SELECT


ALM#  ENABLED   UNITS    RANGE_L   RANGE_H    OPEN      VALUE      CLOSED     VALUE
  2    YES      AT°C     -100.0    200.0 _

Connected 2:30:43    Auto detect    19200 8-N-1    SCROLL    CAPS    NUM    Capture    Print echo
```
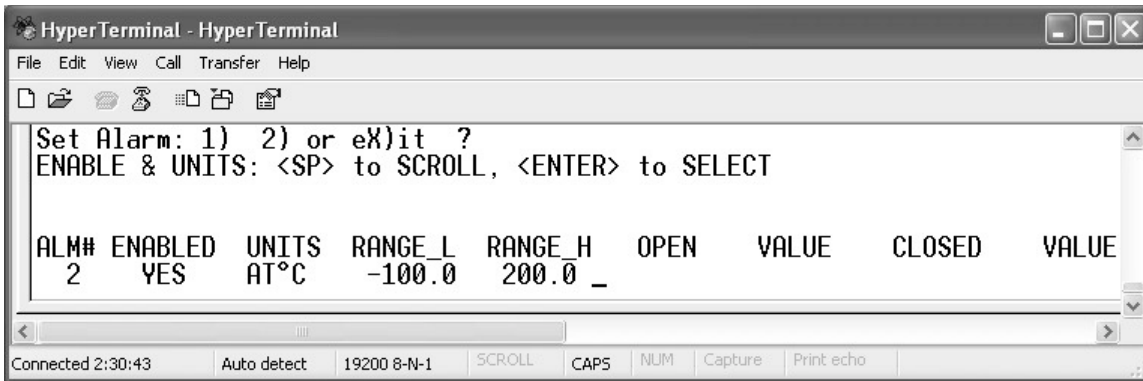
You will then be able to select the values for the OPEN and CLOSED conditions.
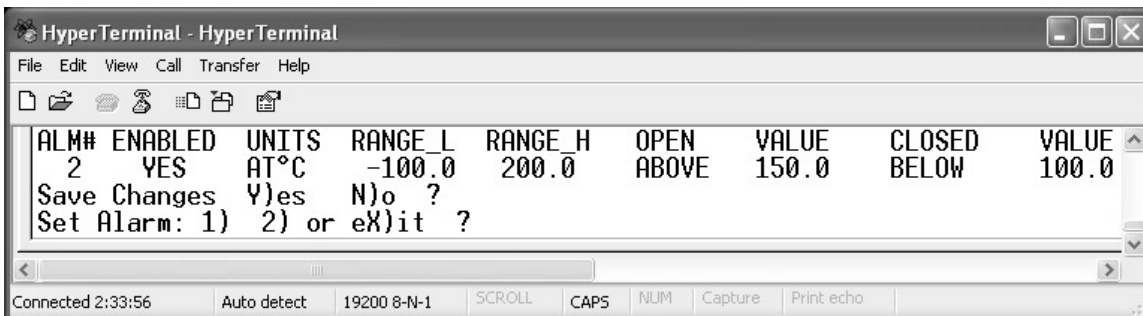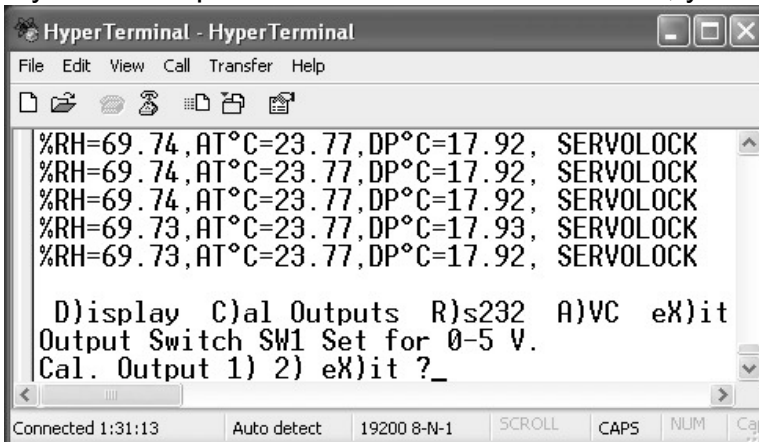In this case, you would like Alarm2 to OPEN at an Air Temperature reading of
150, and to remain open above that value. You would like the relay to CLOSE at
a reading of 100, and to remain closed below that value. You can then save the

```
HyperTerminal - HyperTerminal                                    _ □ X
File  Edit  View  Call  Transfer  Help

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
```

changes, and then proceed to program Alarm1 or press X for eX)it.

4.4.5   CALIBRATING THE ANALOG OUTPUTS

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

```
HyperTerminal - HyperTerminal                    _ □ X
File  Edit  View  Call  Transfer  Help

%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 ¼ 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 ¾ 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.

4.4.6 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 Rate. If you select T for the output T)ime Stamp, you will see the window shown here.
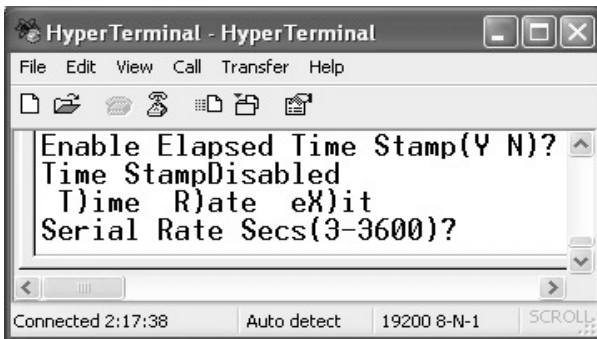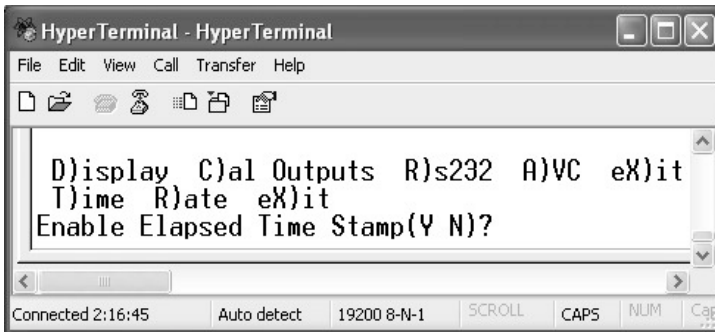

You can now select Y for YES, or N for NO. If you select R for Update R)ate, you will see the window shown here. It allows you to select the Serial Port update rate in seconds, from 3 to 3600 seconds, or 1 hour maximum.

4.4.7 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
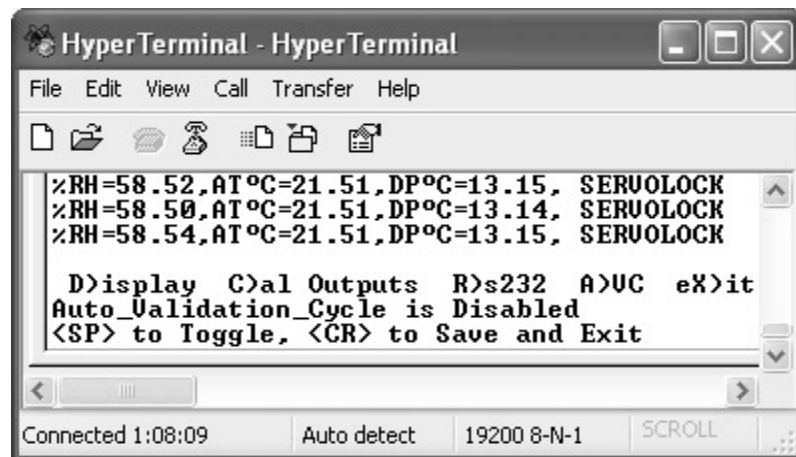
proceeds to grow a new dew layer and continues to take measurements. If contaminants are excessive, it initiates the Clean Mirror alarm. During the periodic cycle, the analog outputs are held for 30 seconds at the value that existed *just before* the cycle started.   Press the Space Bar to Enable or Disable the Auto Validation cycle, and then Save and Exit.

5.0 MAINTENENACE

5.1 ROUTINE MAINTENANCE

The only maintenance required by the RHCM-40 is periodic mirror cleaning. The rate of contamination, and therefore the frequency of mirror cleaning, varies from user to user. It depends upon flow rate of the gas being measured, the quantity of contaminants in the gas, and how wide the sensor aperture is opened.

5.1.1 MIRROR CLEANING SCHEDULE

To maintain the optimum in accurate and reliable operation of any optical chilled mirror system, a periodic maintenance program should be established. Depending on the application, you may want to "schedule" mirror cleaning on a routine basis. It is recommended that the time internal 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, a CLEAN MIRROR warning will be generated. 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:

5.1.2 CLEANING THE MIRROR
To gain access to the mirror, slide the black sensor cover up approximately an inch to allow access to the mirror surface.

1. Shut off the 24VDC power supply, allowing the mirror to equilibrate to room temperature, evaporating the dew layer.

2. Moisten a clean cotton swab with isopropyl alcohol. Cotton swabs and cleaning bottle are provided in the Cleaning Kit supplied.

3. Wipe the mirror surface and the optics surface in a circular motion.

4. Dry the surface with a clean cotton swab.

5. Next, moisten a clean swab with clean, preferably distilled water and lightly wipe the mirror and optics areas.

6. Dry these areas thoroughly with a clean, dry swab.

7. Slide the sensor cover back into position. Be sure you push it down all the way down, past the O-ring, as far as it can go.

8. Turn the power supply back on, and wait for the RHCM-40 to come back into control.
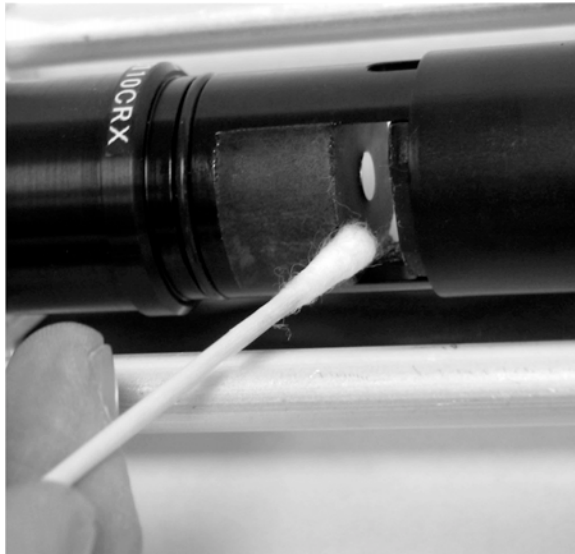
Figure 5-1 Cleaning the Mirror

6.0 SPECIFICATIONS

Measurement Range:
    Dew Point: -40°C to 60°C (-40°F to 140°F)
    Ambient Temperature: -40°C to 60°C (-40°F to 140°F)

    Equivalent %RH: 1% to 95%

Depression Range: 60°C (108°F)

Accuracy: ±0.2°C (±0.36°F)

Operating Temperature:
    Sensor: -40°C to 65°C (-40°F to 149°F)
    Control Unit: 0°C to 50°C (32°F to 122°F)

Pressure: 100 psig maximum (Higher pressures available on special order)

Flow Rate: Static to 3,000 linear ft/min.

Analog Outputs: 4 to 20 mA/0 to 5VDC/0 to 10VDC (selectable)
    Load: 4 to 20 mA : 400 ohms or lower
                        0 to 5/10VDC: 1K ohm or higher

Standard Output Ranges: Dew Point: -40°F to 140°F (-40°C to 60°C)
    (Programmable)   Temperature: -40°F to 140°F (-40°C to 60°C)
                        Percent RH: 0 to 100%

Serial Outputs: RS-232C, bidirectional

Relay Outputs:
    K1:   Clean Mirror/Alarm 1
    K2:   ServoLock/Alarm 2
    Contact Rating: Normally Open (Form A)
                        3A at 250VAC, or 30VDC

Remote Cables:
    Dew Point: 6 ft. standard, 50 ft. maximum
    Air Temperature: 10 ft. standard, 50 ft. maximum

Power Supply: 24VDC ±20%, 1A maximum

7.0 APPENDIX

7.1 NIST Traceability
7.2 Overall and Mounting Dimensions
    7.2.1 Wall Mounting Dimensions
    7.2.2 Duct Mounting Dimensions

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

This precision measuring instrument is certified by Omega Engineering 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 instrument measures Dew Point using the Optical Chilled Mirror (OCM) technique, which provides a primary rather then a secondary measurement of Dew Point temperature. In addition, Dew Point is a fundamental measurement of humidity. It is not affected by temperature.
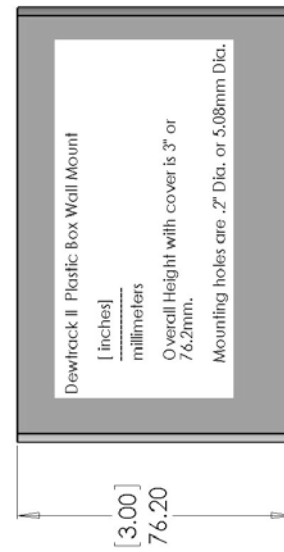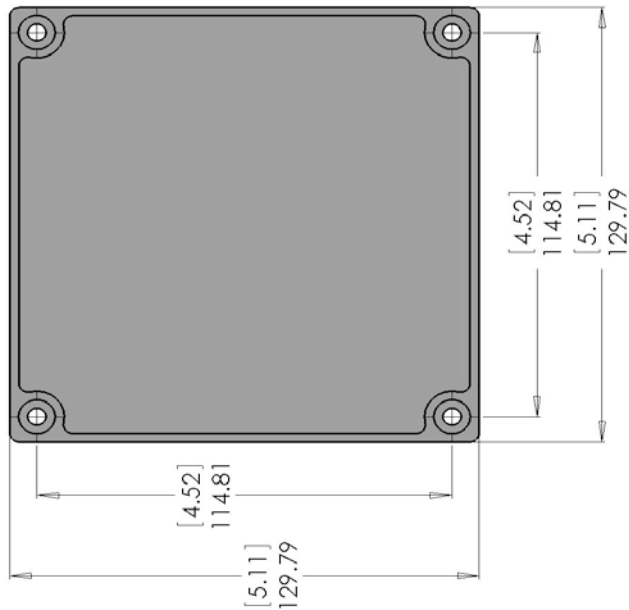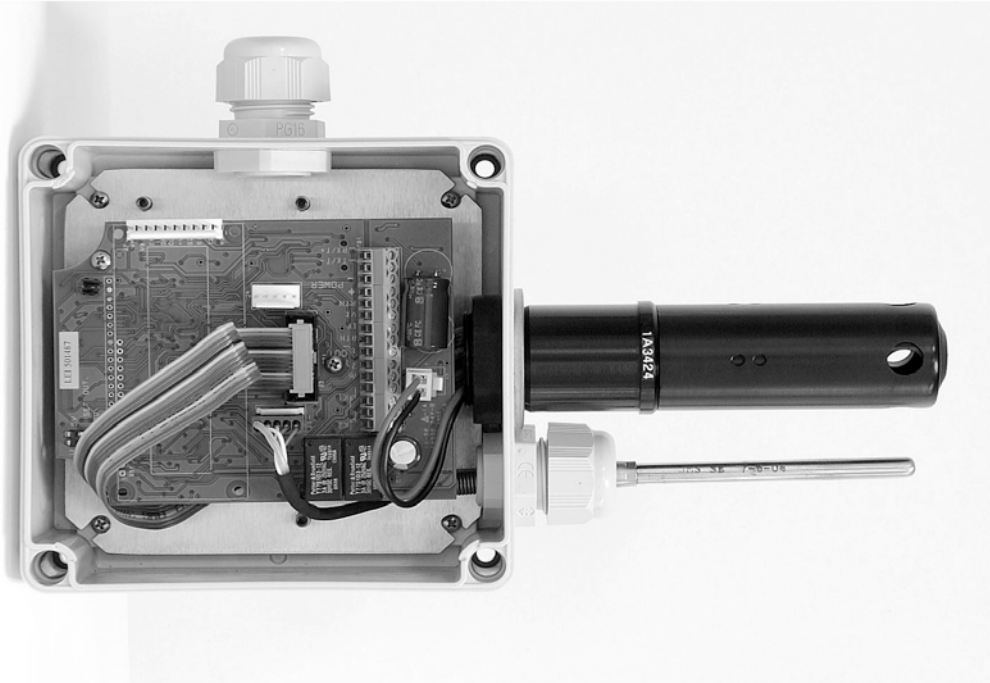
The Dew Point temperature is measured using a Platinum Resistance Thermometer (PRT). This device is a coil of nearly pure platinum, where the rate of change of resistance with temperature is precisely known. Resistance is accurately measured and is automatically converted to temperature information within 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 Omega'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.

7.2 OVERALL AND MOUNTING DIMENSIONS

7.2.1 WALL MOUNT DIMENSIONS

[4.52]
114.81

[5.11]
129.79

[4.52]
114.81

[5.11]
129.79

[3.00]
76.20

Dewtrack II Plastic Box Wall Mount

[inches]
millimeters

Overall Height with cover is 3" or 76.2mm.

Mounting holes are .2" Dia. or 5.08mm Dia.

7.2.2 DUCT MOUNT DIMENSIONS
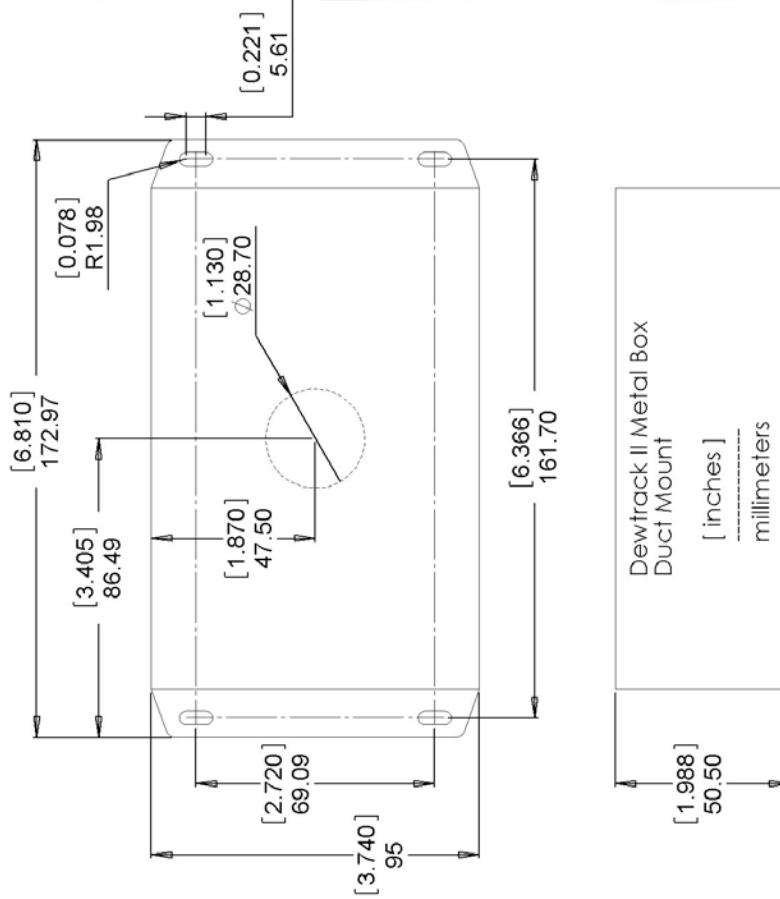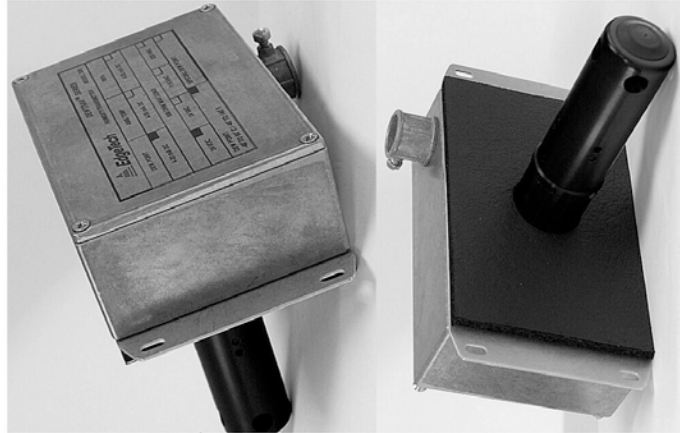
Notes

Notes

WARRANTY/DISCLAIMER

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

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

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

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

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

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

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

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

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

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

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

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