

HYGRODYNAMICS

HUMISTAT HUMIDITY CONTROLLER/ALARM

6344	6394
6345	6395
6346	6396
6347	6397
6348	6398

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SENSOR CURVES DRAWING No. CURVESH3.DWG	

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INTRODUCTION

Hygrodynamics Humistats are designed to function in conjunction with a Hygrosensor to provide on/off control of humidifiers, dehumidifiers, steam valves, and compressed air dryers. The Humistat can also provide an alarm when humidity conditions exceed or go below a fixed set point.

Humistats are available with an analog output that can be used to monitor existing humidity conditions. This output can be converted to %RH by referring to sensor calibration curves.

Operation of the controller is based on relay actuation at a predetermined Hygrosensor resistance value. The resistance of the HYGROSENSOR humidity sensor (a Dunmore-type lithium chloride element) varies inversely proportional to the relative humidity to which it is exposed. The Humistat supplies a constant excitation voltage to the sensor and the change in resistance is monitored. When the relative humidity exceeds the set point, the Humistat's relay is actuated.

SPECIFICATIONS

Power Requirements	120/240VAC $\pm 10\%$ 50-60Hz or 18-28VDC (for 24V models)
Dimensions	3.5 X 2.75 X 1.1 inches
Connections	Lugless Wire Terminal Block
Circuit Operating Temp.	0°C to 70°C
Circuit Storage Temp.	-40°C to 85°C
Relay Output	Dry contacts , Normally Open and Normally Closed, 5A at 250VAC maximum
Signal Output	0-1V, 0-100uA, or 0-1mA, proportional to Hygrosensor dial reading
Alarm Indication	Red LED indicates sensor reading above setpoint
Humidity Indication	10 position LED Bargraph proportional to sensor dial reading (on models with Bargraph option)
Setpoint Calibration	Hygrodynamics Setplugs or with LED Bargraph (on models with Bargraph option)

MODEL DESCRIPTIONS

Model	Features
6344	Single setpoint, 0-1mA output, in NEMA-1 enclosure
6345	Dual setpoint, 0-1V output, LED bargraph, in NEMA-1 enclosure
6346	Single setpoint, 0-100uA output, in NEMA-1 enclosure
6347	Single setpoint, 0-1V output, in NEMA-1 enclosure
6348	Single setpoint, 0-1V output, for old sensor curves, in NEMA-1 enclosure
6394	Single setpoint, 0-1mA output
6395	Dual setpoint, 0-1V output, LED bargraph
6396	Single setpoint, 0-100uA output
6397	Single setpoint, 0-1V output
6398	Single setpoint, 0-1V output, calibrated for old sensor curves

Add the following powering option suffixes to the model number when ordering or referring to any Humistat product.

Model Suffix

XXXX-24V	Powered from 24VDC nominal source
XXXX-120VAC	Powered from 120VAC source*
XXXX-240VAC	Powered from 240VAC source*

* These models can be jumper selected to operate from either 120VAC or 240VAC.

ACCESSORIES

Narrow Range HYGROSENSOR

HYGROSENSORS are electronic transducers consisting of a bifilar winding of palladium wire on a plastic core, coated with a thin-film mixture of LiCl (or LiBr) and Polyvinyl Alcohol. A perforated metal jacket protects the sensor from physical damage.

Operation of the Hygrosensor is based on the ability of the hygroscopic film to change its resistance instantly with changes in relative humidity. The resistance change is measured in terms of electric current flowing through the sensing element.

See Narrow Range Sensor Bulletin or Manual for additional information.

Setplug

Setplugs are precision resistors installed in a jacket similar to the Hygrosensor. They simulate a desired humidity condition, allowing set point adjustment of the Humistat.

Connecting Cable

Used to connect Hygrosensor to Humistat. Lengths from 2 - 25ft. are available. A cable is not required with enclosed Humistats if sensor will be plugged into enclosure's sensor receptacle.

Sensor Mount

Part number 6146A is available for pipe installation of sensors. Other options are available; consult factory for suggestions. A sensor mount is required if Humistat is not enclosed.

INSTALLATION

Sensor/Setplug Selection

1. Refer to the sensor curves, Dwg.# CURVESH3, and find your desired relative humidity on the horizontal axis.
2. Follow this line vertically until it intersects a sensor curve. Find the sensor part number on this curve (12XX are $\pm 2\%$ RH, 48XX are $\pm 1\%$ RH)
3. Follow this point horizontally to the right and choose the closest setplug.

If your relative humidity condition allows you to choose from two sensor/setplug combinations, select the one that results in a setplug closer to the middle of the curve (near 50 dial).

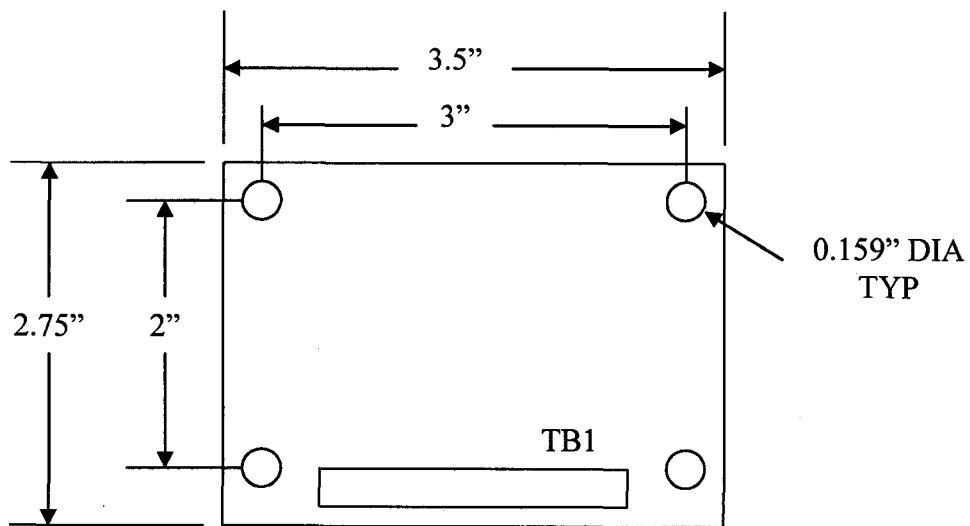
The sensor curves in this manual are calibrated at 80°F dry bulb temperature. For conditions between 70°F and 90°F the correction factor is minimal (less than 2% RH). For high accuracy control or operation at extreme temperatures refer to the narrow range sensor curves (available from Newport Scientific). The curves provide calibration data for other dry bulb temperatures.

Mounting

The Humistat should be mounted on a surface free of excessive vibration, condensation, oil, or dirt.

PC Board Mounting

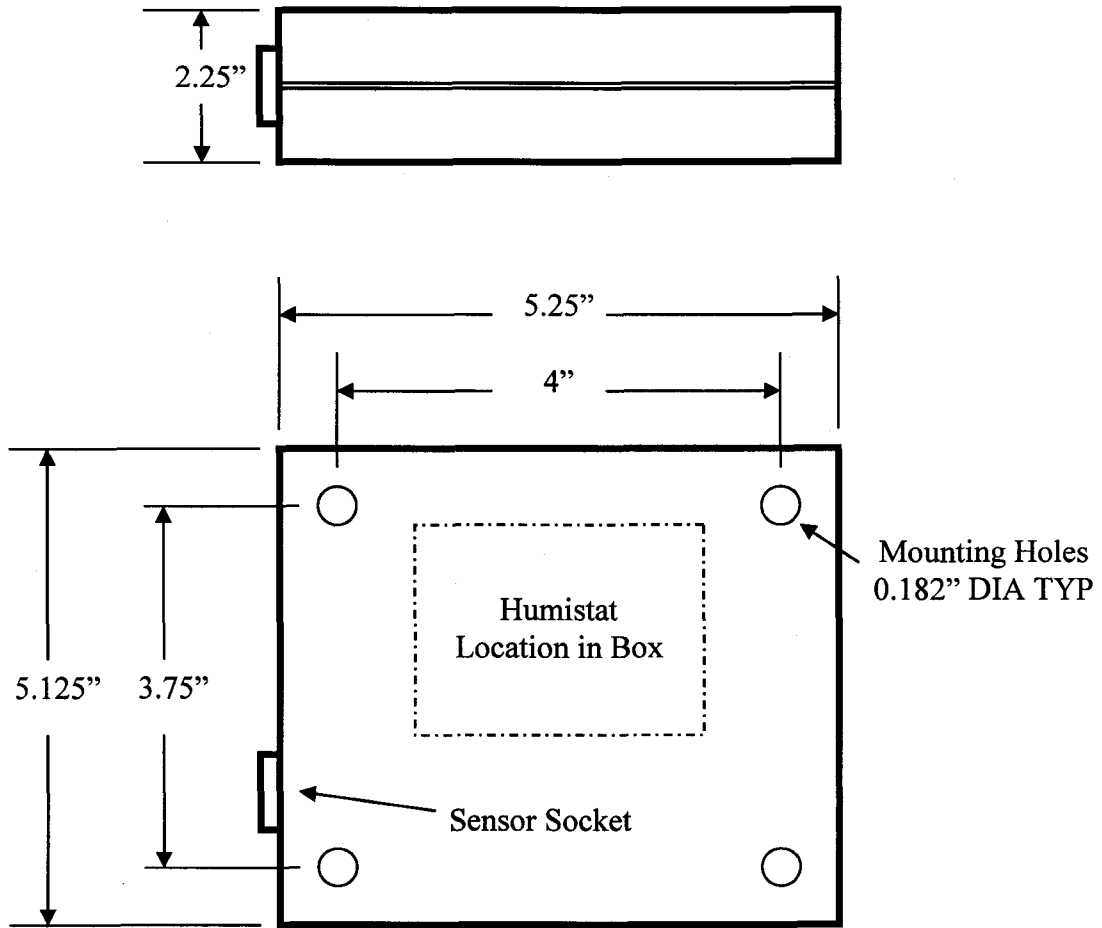
The Humistat PC Board should be mounted to a panel with four #6 screws and four 1/4" long stand-offs. The PC Board mounting holes act as power ground along with terminal no. 3.



Humistat PC Board
Mounting Dimensions

Enclosed Humistat Mounting

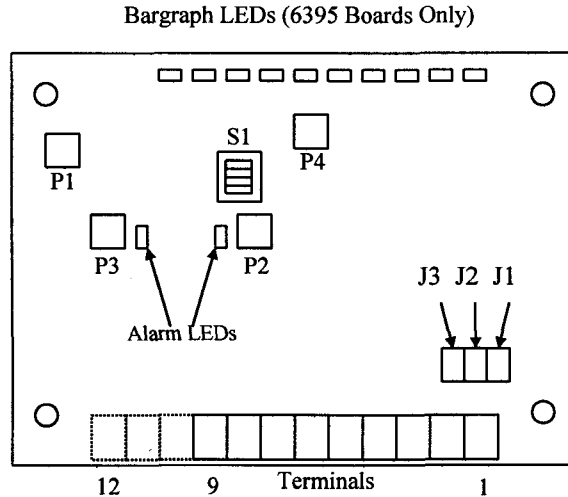
Disassemble the enclosure and locate the four mounting holes near the corners of the enclosure. Use four #6 screws to attach enclosure to a suitable surface.



Enclosed Humistat
Mounting Dimensions

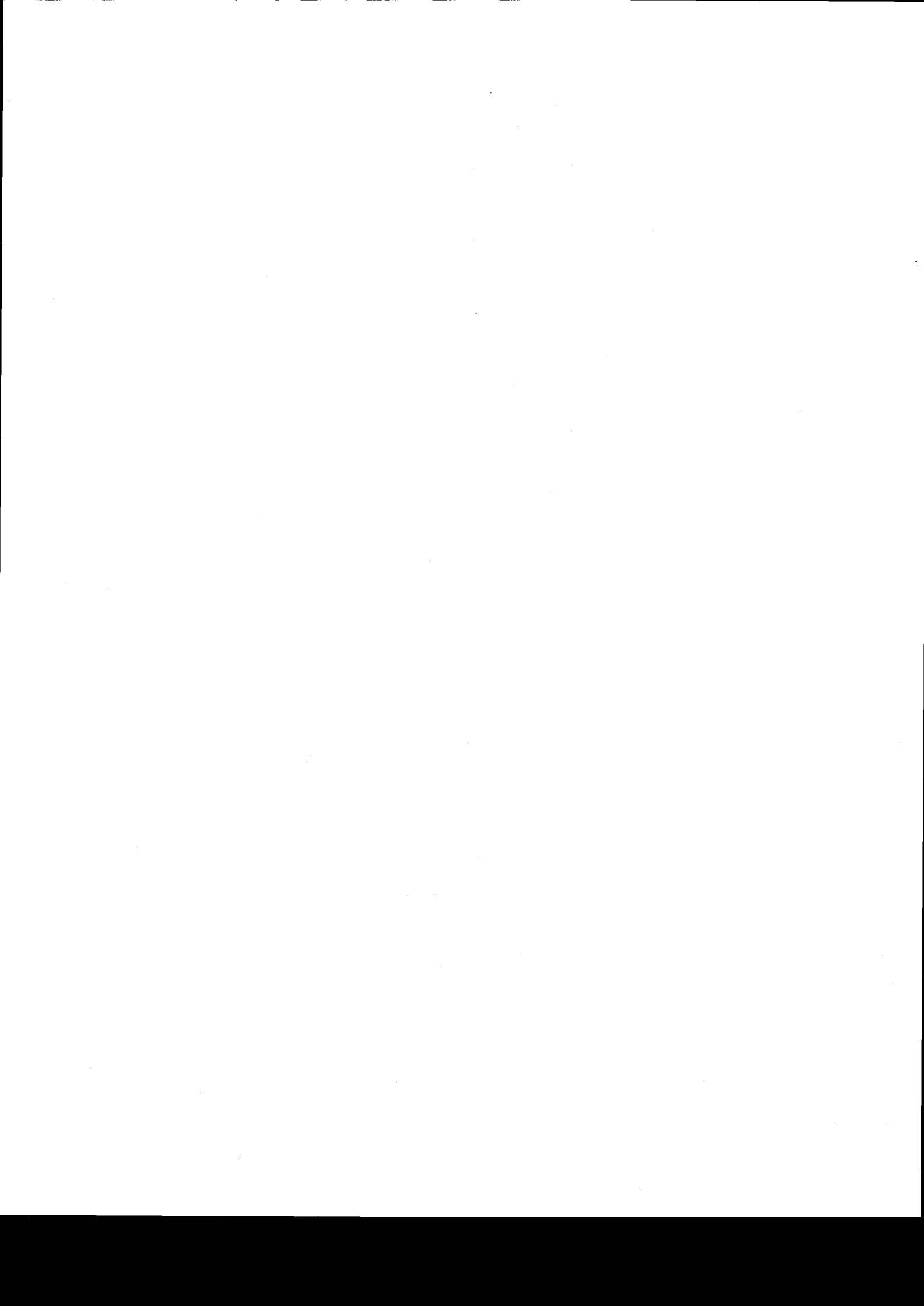
Wiring

1. The Humistat should be wired according to appropriate electrical codes. Be sure to connect the correct voltage.
2. Do not route the sensor cable adjacent to AC power lines, or near inductive sources such as contactors and motors, etc.
3. Make sure to ground the Humistat to a good chassis or earth ground. The mounting holes are the ground connection as well as terminal 3.



Humistat Wiring Diagram
(All items shown are not on every model)

Terminal	Function
1	Line HOT or +24VDC
2	Line Neutral or 0VDC
3	Power/Signal GND
4	Relay #1 NC
5	Relay #1 COM
6	Relay #1 NO
7	Sensor Lead
8	Sensor Lead
9	Analog Signal Output
10	Relay #2 NC(only on dual)
11	Relay #2 COM (only on dual)
12	Relay #2 NO(only on dual)



Power

Power is applied to the Humistat on terminals 1 and 2. For line powered boards, terminal 1 is the HOT line and terminal 2 is NEUTRAL. For 24V powered boards, terminal 1 is positive and terminal 2 is negative or ground.

Terminal 3 is ground for all powering options of the Humistat.

Terminal	120/240VAC Board	24V Board
1	Line HOT	Positive 24VDC
2	Line NEUTRAL	Negative or Ground
3	Ground	Ground

115V to 230V Change

Warning: Disconnect power to the Humistat before changing voltage select jumpers. Remove jumper J1 and J3, install jumper J2.

Relay Output

The maximum relay contact rating is 5A at 250VAC. Use appropriate rated wiring for the load you intend to control. For switching greater loads, use a "slave relay". The relay is form C SPDT. The NC to COM terminals provide continuity when humidity is below the set point. The NO to COM terminals are normally open but provide continuity when humidity exceeds the set point. If power to the Humistat is removed, the relay assumes an alarm state, providing continuity between the NO and COM terminals.

Sensor

The sensor cable connects to the two sensor terminals. The sensor connection is not polarity sensitive.

Signal Output

The analog signal output can be used to monitor the relative humidity with a meter or data acquisition system. The output directly represents the "dial reading" of the sensor. It is a non-linear representation of the relative humidity. Refer to narrow range sensor curves Dwg. # CURVESH3 for dial to relative humidity relationships at various dry bulb temperatures.

Access the signal output between terminals 9 and 3.

Model Number	Output Signal Term. 9
6394 or 6344	0 - 1mA
6395 or 6345	0 - 1V
6396 or 6346	0 - 100uA
6397 or 6347	0 - 1V
6398 or 6348	0 - 1V

OPERATION AND CALIBRATION

Refer to Humistat Wiring Diagram for location of potentiometers and DIP switches.

Humistat Models 6394, 6396, 6397, 6398

Setpoint Calibration

1. Remove the Hygrosensor from the sensor input terminals and replace it with the appropriate setplug.
2. Adjust potentiometer P2 to the mid-point between the relay click ON and OFF. The Alarm LED next to P2 will turn ON and OFF along with the relay as you dial in the setpoint adjustment.
3. If calibrating a Dual Setpoint Humistat, replace the setplug with the second desired value and adjust P3 as in step 2. Above.
4. Replace the setplug with the sensor. The unit is now ready for operation.

Analog Output Calibration

1. Connect a multi-meter to terminal 9 and 3.
2. Place a shorting wire across the sensor input terminals.
3. Adjust potentiometer P1 for the correct full scale output for your model Humistat.
4. Remove the shorting wire. The unit is ready for operation.

Humistat with Bargraph Model 6395

There is a 10 element Bargraph across the top of the Humistat PC Board. Each LED in the Bargraph display represents 10 dial of sensor indication. When no LED's are lit, the sensor reading is less than 10 dial. The position of the 10, 50 and 100 dial LEDs is marked on the PC Board.

Humistats with the Bargraph option have a DIP switch whose setting controls the function of the Bargraph LEDs. These functions are summarized in the table below.

Bargraph Function	DIP Switch Position			
	1	2	3	4
Normal Operation	ON	OFF	OFF	OFF
Setpoint #1 Calibrate	OFF	ON	OFF	OFF
Setpoint #2 Calibrate	OFF	OFF	ON	OFF
Bargraph/Output Calibrate	OFF	OFF	OFF	ON

Note that only one position of the DIP switch should be ON at a time. The Bargraph indication will not be valid if more that one position is ON at a time.

Setpoint Calibration

1. Set DIP switches as shown above for Setpoint #1 Calibrate.
2. Adjust P2 until Bargraph indicates desired setpoint value in dial (each LED represents 10 dial).
3. Set DIP switches as shown above for Setpoint #2 Adjust.
4. Adjust P3 until Bargraph indicates desired setpoint value in dial (each LED represents 10 dial).
5. Return DIP switches to Normal Operation position.

Analog Output Calibration

1. Set DIP switches to Bargraph/Output Calibrate position.
2. Adjust P4 until all 10 Bargraph LEDs fully light. Leave P4 adjusted just clockwise of the point where all 10 LEDs light.
3. Adjust P1 for full scale output on terminal 9.

Warranty Information

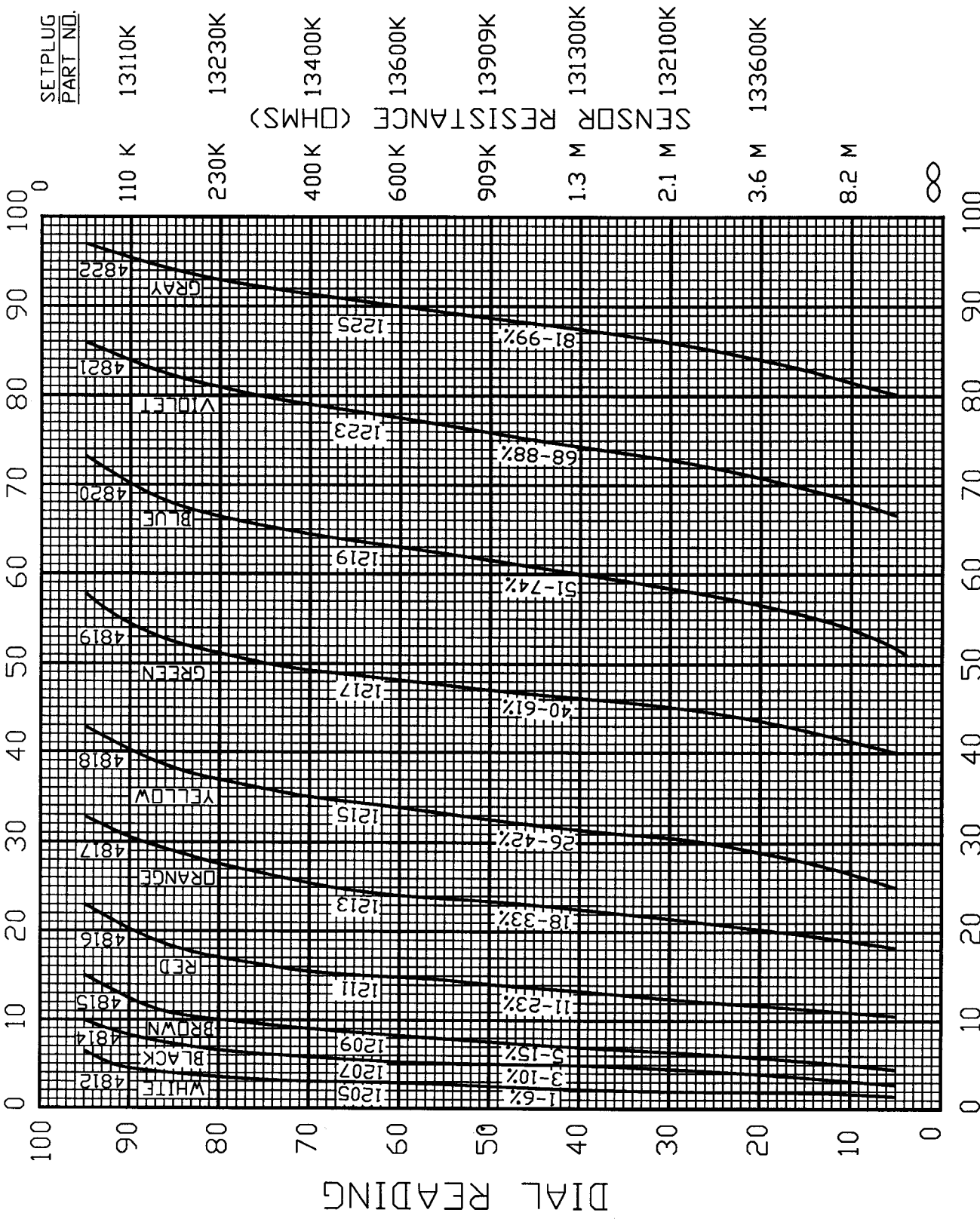
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NOTE:
 THESE CURVES APPLY
 ONLY TO 6395,6396
 AND 6397 BOARDS.
 FOR 6398 SEE DWG #
 CURV6398 .

TITLE: SENSOR CURVES @ 80° F	
DWG NO: CURVES-H3	PART NO: CURVES-H3
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3.6 MG. - LOWER CONTROL LIMIT FOR HUMISTAT ONLY	