



Model DHM200



User Manual

Warranty

This product is fully warranted against defective materials and/or workmanship for a period of one year after purchase, provided it was not improperly used. For your protection, please use this product as soon as possible. If returned, it must be securely wrapped, sent prepaid and insured to:

Pacer Industries, Inc.
1450 First Avenue
Chippewa Falls, WI 54729
PH: 715-723-1141
FX: 715-723-7890

Please include a note with name, address, telephone number and description of the problem. Although we provide assistance on Pacer products both personally and through our literature, it is still the total responsibility of the customer to determine the suitability of the product for use in their application.

This manual is provided by Pacer Industries without any kind of warranty. Precautions have been taken in accurately preparing this manual; however, we neither assume responsibility for any omissions or errors that may appear nor assume liability for any damages that result from the use of the products in accordance with the information contained in the manual.

INTRODUCTION

Pacer's model DHM200 digital hygro-thermometer-datalogger is a versatile instrument for measuring and logging relative humidity, temperature and calculated dew point in HVAC or process air environments. Included are an RS232C output port with 9-pin serial cable and an analog output port with cable. Units are switchable between metric and English.

Temperature sensors are platinum resistance elements (RTD) and the humidity sensor is a fast, accurate, capacitive thin-film ceramic model.

A sintered metallic filter is available for the RH probe to protect it from dust. Optional special-purpose temperature-only probes may be purchased from factory.

SECTION 1 - SPECIFICATIONS

Range:

Relative Humidity: 5% to 95% RH
Temperature – RH probe: -4° to 176°F (-20° to 80°C)
Temperature-only probes (optional):
-100° to 575°F (-100° to 300°C)

Accuracy:

Temperature: $\pm 0.2\%$ of Reading ± 1 digit
Relative Humidity: $\pm 2\%RH \pm 1$ digit

Resolution:

Temperature: 0.2°F or 0.1°C
%RH: 0.1%RH

Response time:

Temperature: Approximately 60 seconds
%RH: Up to 90% of change in 15 sec.

%RH temperature drift: $\pm 0.5\%RH$ per 10°C (18°F)

Operating temperature:

Instrument: 32° to 125°F (0° to 50°C)
%RH probe: -4° to 176°F (-20° to 80°C)

Power supply: 9V alkaline battery (optional 9V NiMH battery with charger)

Battery life: Approximately 30 hours

Battery check: Automatic low battery display

Data acquisition:

Storage capacity up to 999 double measurements of humidity and temperature with manual "SAVE".

Data link:

Standard RS-232C at 1200 baud, including handshake signals CTS and RTS.

Display: 0.5" LCD, 4 digits

Weight: 13.6 ounces with probe

Dimensions:

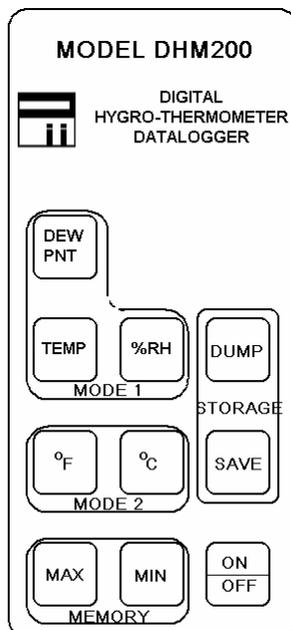
Instrument: 7.5" x 3.2" x 1.2"
HTP201 RH probe: 7" length x 1" diameter

Options:

Model CG-3 charger: PN 6043 NiMH battery/charger
Printer MD IMP2600: PN 6233 DC/ PN 6238 AC power
Extension cable: PN 3833 for HTP201 probe
Sinter filter for HTP201: PN 3901 for harsh environments
Special-purpose temperature probes:
PT201S: PN 6301 GP immersion probe
PT202S: PN 6303 air probe
PT203S: PN 6304 surface probe

Included:

1 piece: PN 6060 HTP201 RH probe
1 piece: PN 3843 5' RS-232C cable
1 piece: PN 3838 5' analog output cable
1 piece: 9V alkaline battery
1 piece: PN 6002 hard-shell carrying case
1 piece: M2956 Operation manual

SECTION 2 – SWITCH FUNCTIONS

- ON/OFF** Pressing “ON/OFF” key switches unit ON. Pressing the key a second time turns it OFF.
- %RH** Pressing “%RH” key displays relative humidity with 0.1%RH resolution updated 2.5 times/second.
- TEMP** Pressing “TEMP” key displays temperature in °F or °C.
- °F** Pressing the “°F” key displays temperature in degrees Fahrenheit (°F).
- °C** Pressing the “°C” key displays temperature in degrees Celcius (°C).
NOTE: Temperature readings are updated 2.5 times/second.
- DEW/PNT** Pressing “DEW PNT” key displays calculated dew point temperature in °F with 0.1 °F resolution. Pressing the key a second time displays dew point in °C with 0.1 °C resolution.
- SAVE** Pressing “SAVE” during a measurement mode will store a data double consisting of the %RH and temperature values being measured at that instant, for a maximum of 999 data doubles.
- MAX** Pressing “MAX” key displays the highest reading since turn-on for the parameter being measured in the units being used, independent of any SAVED values. A flashing “H” is displayed, followed by the value.

MIN Pressing “MIN” key displays the lowest reading since turn-on for the parameter being measured in the units being used, independent of any SAVED values. A flashing “L” is displayed, followed by the value.

NOTE: Press “TEMP” or “%RH” key to return to measurement mode.

DUMP Pressing the “DUMP” key will transfer the SAVED measurements to a connected printer or PC. Measurements will be retained for at least 1 year or until memory is cleared by holding the “DUMP” key when turning unit on.

ANALOG OUTPUT Analog outputs for temperature and %RH provide 0-2V FS. See APPENDIX D for details.

SECTION 3 – OPERATION

NOTE: Unit should be “OFF” before changing batteries or attaching cables.

- 1) Remove battery compartment lid and insert battery; replace lid.
- 2) Attach the RH probe cable by aligning the keyway, inserting the connector and turning the collar to tighten. See APPENDIX A for connector pinouts.
NOTE: Please carefully align the mating connectors by means of the keyway. Failure to do so may damage the connector(s) and void the warranty.
- 3) Press the “ON/OFF” key to turn unit ON. The display will show all elements followed by the remaining battery capacity (“8.2” means the battery is at 8.2V), followed by “P” and a 3 digits (i.e. “P025 which means 24 data points are stored). If the “DUMP” key is held when pressing “ON/OFF” key at turn-on, the data point memory will be cleared.
NOTE: If the battery drops below 6V during use, an “L” displayed in the leftmost digit indicates the need to replace (or recharge) the battery.
- 4) Measure temperature by pressing the “TEMP” key and placing the probe at the measurement location. Use “°F” or “°C” key to change units.
- 5) Measure %RH by pressing the “%RH” key and placing the probe at the measurement location.
NOTE: See APPENDIX B if “E-xx” is displayed.
- 6) To get maximum readings since turn-on, press “MAX” key; to get minimum readings, press “MIN” key. For explanation of the display view, see “MAX” and/or “MIN” paragraph in SECTION 2.
- 7) To SAVE the displayed reading (see SAVE in SECTION 2), press the “SAVE” key.
- 8) To dump data to a PC, see SECTION 4.

SECTION 4 – INSTRUCTIONS FOR DUMPING MEMORY

For use with Win 95, 98, NT4, 2000 and Win XP computers using resident HyperTerminal (See APPENDIX E for data explanation).

- A. Open HyperTerminal**
 - 1) Click “Start” button on task bar.
 - 2) Highlight “Programs”
 - 3) Highlight “Accessories”
 - 4) Highlight “Communications” or open “HyperTerminal” folder (Win 95)
 - 5) Choose and open “HyperTerminal” program
- B. The “Connection Description” window comes up**
 - 1) Under “Name” type: “Pacer”
 - 2) Choose (click on) an icon or accept default
 - 3) Click “OK”
- C. The “Connect To” or “Phone Number” (Win 95) window comes up**
 - 1) In “Connect using:” box select the Com port you will use (probably “Com1” if not presently in use)
 - 2) Click “OK”
- D. The “Com() Properties” window comes up**
 - 1) Set “Bit per second:” to “1200”
 - 2) Set “Data bits:” to “7”
 - 3) Set “Parity:” to “odd”
 - 4) Set “Stop bits:” to “1”
 - 5) Set “Flow control:” to “Hardware”, click “Apply” and “OK”
 - 6) Under “File” menu click “Properties”
 - 7) In “Pacer Terminal Properties” window click “Settings” tab
 - 8) Click “ASCII Setup...” box at bottom right
 - 9) Check “Force incoming data to 7-bit ASCII” under “ASCII Receiving”
 - 10) Click “OK” in “Properties” windows, then click “Save” under “File” menu
- E. Under the “Transfer” menu select “Capture Text...”**
 - 1) The “Capture Text” window appears
 - 2) Type in a name for the file you want the data placed into
 - 3) Click “Start”
- F. Connect the cable from the data logger**
 - 1) Connect the RS232 cable to the serial port.
 - 2) Turn on the DHM200
- G. Transfer the data**
 - 1) Press the “°F/°C” key on the data logger
 - 2) Press the “DUMP” key
 - 3) The flowing data will now appear in the “Pacer – HyperTerminal” window
 - 4) Wait until the data has finished transferring
 - 5) Highlight “Capture Text” under the “Transfer” menu
 - 6) Select “Stop”
 - 7) The data is now in the file named in step E2

H. Select “Exit” under the “File” menu

- 1) Note message “You are currently connected. Are you sure you want to disconnect now?”
- 2) Click “Yes”
- 3) If the message “Do you want to Save Session ()?” appears, click “Yes”
- 4) Your data is now downloaded and saved

I. Instructions for moving transferred data into an Excel spread sheet

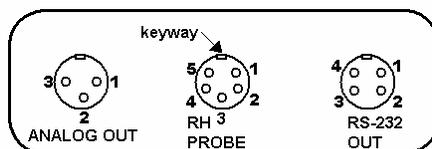
- 1) Find and double-click the file name of the data file you created in G above.
- 2) The “Open With” window should appear
- 3) Select “Notepad” and open the file
- 4) Select any amount of data and execute “Copy”
- 5) Open a new Excel spreadsheet, select “Paste”
- 6) The A column now contains the data.

J. Split data into temperature and humidity

- 1) Under “Data” menu select “Text to columns...” and click “Next” in the open window
- 2) Follow the directions to separate the data
- 3) After the column breaks are in place, click “Finish”

APPENDIX A – CONNECTOR DIAGRAM

Connector Pinouts/Wire Code
(top view)

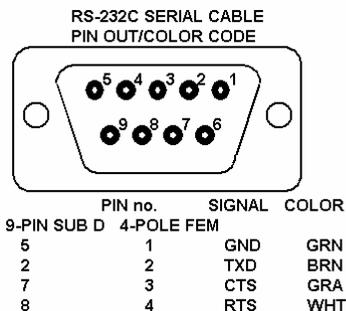


ANALOG CABLE	RH PROBE	RS-232 CABLE
PIN 1 GND GRN	PIN 1 RTD1a GRN	PIN 1 GND GRN
PIN 2 TEMP OUT BRN	PIN 2 GND BRN	PIN 2 TXD BRN
PIN 3 %RH OUT GRA	PIN 3 %RH IN GRA	PIN 3 CTS GRA
	PIN 4 V+ WHT	PIN 4 RTS WHT
	PIN 5 RTD2a YEL	

APPENDIX B – ERROR CODES

- “E-02” Data logger is filled to maximum capacity of 999 SAVED measurements.
- “E-03” Storage is empty. No measurements have been SAVED since last time memory was cleared
- “E-04” No communication is occurring through the RS232 data link with the printer or PC.
- “E-06” Relative humidity is below range (<3.0%RH).
- “E-07” Relative humidity is above range (>97.0%RH).
- “E-08” Temperature is below range (<-99.9 °C or °F).
- “E-09” Temperature is above range (>300.0°C or >575°F).
- “E-10” Relative humidity is not within the range of 3.0% to 97.0%RH necessary for calculating dew point.
- “E-11” Temperature is not within the range of -5° to 175°F or -20° to 80°C necessary for calculating dew point.
- “E-XX” Error codes of 50 or higher are internal errors. In this case, contact the manufacturer.

APPENDIX C – RS-232C CABLE WIRING



APPENDIX D – ANALOG OUTPUTS

TEMPERATURE:

Range: -148° to 572°F (-100° to 300°C)

Scale: 360°F/V (200°C/V)

Offset: -0.4111V for °F; -0.5V for °C

Example: For $V_{out} = 1V$:

°F temp is: $(1-0.4111)V \times 360^\circ F/V = 212^\circ F$

°C temp is: $(1-0.5)V \times 200^\circ C/V = 100^\circ C$

RELATIVE HUMIDITY:

Range: 0% to 100%RH

Scale: 50%RH/V

Example: For $V_{out} = 1V$:

%RH is: $1V \times 50\%RH/V = 50\%RH$

APPENDIX E – DATA COMMUNICATIONS

The instrument provides an RS-232 data output. The voltage levels are plus and minus 9V. A voltage of +9V represents a space (logical “0”). A voltage of -9V represents a mark (logical “1”). The protocol is: 1 start bit, 7 data bits, 1 odd parity bit, 1 stop bit, ASCII data format, 1200 baud.

Sample data items:

001 76.9 dgF 34.7 %RH

002 24.9 dgC 34.7 %RH

RS-232 Data Pin-out Connections:

Signal	4P-Female	9-pin	Printer
Gnd	1	5	7
Transmit - TXD	2	2	2
Clear/send-CTS	3	7	5
Ready/send-RTS	4	8	4

After pressing the “DUMP” key an RTS (1) appears on the RS-232 cable. The PC or printer must respond with a CTS (0) within 1 second; if not, an “E-04” shows and DUMP mode ends. If hand-shaking occurs, ASCII data transfers at 1200 baud.

Each data line (record) is terminated with a CR (carriage return) and LF (line feed).

At the end of transmission the instrument generates an EOF (end of file) character. The PC can then return to the OS.

Notes: