Ohmic Instruments
3081 Elm Point Industrial Drive
St. Charles, MO 63301 USA

Phone (410) 820-5111
Toll Free(800) 626-7713
Fax (410) 822-9633

www.ohmicinstruments.com
Sales: sales@ohmicinstruments.com
Service: service@ohmicinstruments.com

AMM-20 Manual 24 VDC
AIR-LINE MOISTURE MONITOR

SF-SLS-548 (A)

WARRANTY

Not withstanding any provision of any agreement the following warranty is exclusive.

Ohmic Instruments warrants each instrument it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1-year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses or any product or parts which have been subjected to misuse, neglect, accident, or abnormal conditions of operation.

In the event of failure of a product covered by this warranty, Ohmic Instruments will repair and recalibrate an instrument returned within 1 year of the original purchase: provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any instrument returned within 1 year of the original purchase, said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident, or abnormal conditions of operations, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS, OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. OHMIC INSTRUMENTS SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE.

If any failure occurs, the following steps should be taken:

1. Notify Ohmic Instruments giving full details of the difficulty, and include the model, type, and serial numbers (where applicable). On receipt of this information, service data, or shipping instructions will be forwarded to you.

2. On receipt of shipping instructions, forward the instrument, transportation prepaid. Repairs will be made and the instrument returned, transportation prepaid.

SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT

All shipments of Ohmic Instruments products should be made via United Parcel Service or "Best Way" prepaid. The instrument should be shipped in the original packing carton, or if it is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER

The instrument should be thoroughly inspected immediately upon delivery to purchaser. All material in the shipping container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact Ohmic Instruments.) Final claim and negotiations with the carrier must be completed by the customer.

Ohmic Instruments will be pleased to answer all application or use questions, which will enhance your use of this instrument. Please address your requests or correspondence to:

Ohmic Instruments
3081 Elm Point Industrial Drive
St. Charles, MO 63301 USA
ATTN: Technical Support

Or call Ohmic Technical Support at 410-820-5111.

www.ohmicinstruments.com
Sales: sales@ohmicinstruments.com
Service: service@ohmicinstruments.com

Phone (410) 820-5111
Toll Free(800) 626-7713
Fax (410) 822-9633

PC Board Features:

Calibration Adjustments……..….None
(The only adjustment is a display contrast pot PR1 on the main circuit board)

Real Time Clock (RTC)……..Continuous w/Battery Backup
Selectable Date Format……...mm/dd/yy or mm/dd/yyyy
Selectable Time Format……AM/PM or 24 Hour
Battery Backup (1 - 3 Yr Life)……..CR2032 Lithium Coin Cell
Selectable Temperature Units……°F, °C, °K, or °R
Analog Voltage Outputs……...2-Channel, 12-Bit MCP4922 DAC, 0 – 4.096V
Channel 1……...Selectable: %RH or DB Temp (°F or °C)
DB Temp Resolution……...18.2044 mv/°F, 32.768 mv/ °C
RH Resolution……40.96 mv/%
Channel 2……....Fixed: Dew/Frost Point (°F or °C)
DP Resolution (-40 to 30°C)……...58.5142 mv/°C
DP Resolution (-40 to 85°F)…….….32.768 mv/°F
Analog Current Loop Output…….....Dew/Frost Point Only: 4 to 20 ma, (°F or °C)
XTR116 Precision Loop Transmitter.....Span Error: 0.05%, Non-Linearity: 0.003%
External DC Loop Voltage Required……..7.5 to 36 volts
DP Resolution (-40 to 30°C)……..0.2285174 ma/°C
DP Resolution (-40 to 85°F)…….0.128 ma/°F
Dew/Frost Point Alarm……...°F to +80°F, -40°C to +27.7°C
Selectable in 0.1° Increments
Selectable Dead Band……..…….....0.5° to 5 °F in 0.5° Increments
0.25° to 2.5°C in 0.25° Increments
Relay Output w/Optional Latch……...N.O. or N.C. contact, 2 amps max
Data Logging……CSV File Stored on USB Flash Memory
Log Interval……...1 to 255 minutes
Auto-File Naming with Date (mmddyy) and Version (A-Z)i.e. D*mmddyy*A.CSV
System Setup and Calibration Data….Stored on Removable SD Card. Calibration data can be externally stored on the SD using a PC and USB Memory Card Reader.
3-Button Menu Function Control……..……Setup, Alarm On/Off, Logger On/Off
On-Display Setup for: Temp Units, Display Refresh Rate, 4th Line Display Option, Alarm Set point, Alarm Hysteresis, Set Date/Time, Time Format, Data Logging Interval, Data Logging Time Unit, Ch. 2 DAC Voltage Output, RS232 Baud rate

CONTENTS

Specifications and Features

Electrical:

Primary Power Source……...……..24 VDC
Fuse……...1/2 A, 250V, Fast-Acting
Circuit Operating Voltage……5 VDC regulated

Input Sensors:

Humidity Sensor……..…..HC-610 (Integrated Thin Film Polymer)
Humidity Sensor Calibration……...……...9-point correction, NIST-traceable
Temperature Sensor……..……..10K3A1 NTC Thermistor
Sensor Response Times……...……..10 sec. @ 63% Change

Measured Psychrometric Data:

Relative Humidity……..0.5% to 99.5% (Temperature Compensated)
Relative Humidity Accuracy……..……...±2%
Dry Bulb Temperature……..-40°F to 185°F (-40°C to 85°C)
Dry Bulb Temperature Accuracy……...…….±1° F (±0.56°C)

Calculated Psychrometric Data:

Dew/Frost Point Temperature…....Hyland-Wexler Equation (Corrected for ITS-90)
Range……..……–40°F to +80°F (-40°C to +27.7°C)
°F Accuracy…….-40°F to +20°F (±4°F), +20°F to +80°F (±2°F)
°C Accuracy……..-40°C to –6.67°C (±2.2°C), -6.67°C to +27.7°C (±1.1°C)
Saturation Vapor Pressure……0.1 to 300 mbar (hPa)
Partial (Actual) Vapor Pressure……..……....0.05 to 298 mbar (hPa)
Absolute Humidity……...0 to 130 grams/cubic meter

Electronics:

Microcontrollers……Microchip 18F4553 and 18F2455
Processor Clock Rate..……..20 Mhz
A/D Conversion……16-bit Resolution (Over Sampled 12-bit)

Computer Interfaces:

USB Computer Interface……..……..SB Type B Connector, Full Speed USB 2.0
Display, Plotting, and Logging requires a Windows Application Program (Included)
RS-232 Interface……...Half-Duplex, 8N1

LCD Display:

Display Type…….4 Line x 20 Character Alphanumeric LCD with LED Backlight
Displayed Values Line 1: Dry Bulb Temperature
Line 2: Relative Humidity
Line 3: Dew/Frost Point Temperature
Line 4: Menu selectable: Date & Time, Absolute Humidity, Saturation Vapor Pressure, Partial Vapor Pressure, or no displayed value.

RECALIBRATION

The AMM-20 is a microprocessor-based instrument with no user adjustable components for calibration. To maintain accuracy, Ohmic recommends the AMM-20 be returned to our facility for recalibration on a yearly basis. The unit is certified using NIST traceable standards. Calibration consists of a computer based system to program a 9-point calibration curve which is stored in the unit's SD card. A NIST traceable certificate of calibration is issued with each calibration.

If down time is critical a second calibrated (drop in replaceable) probe can be purchased and installed, the "PDPS-610TH-SD". A second probe may be kept as a quick replacement as needed.

INTRODUCTION

Ohmic's **Airline Moisture Monitor, Model AMM-20,** is a direct readout moisture monitor with Dew Point monitoring, alarm, control, USB (Requires a USB 2.0 or newer) and RS-232 interfaces, and a custom computer program. It is designed to meet the requirements for air-line moisture control (ANSI/NFPA-99 Standard for Health Care Facilities), where compressed air "shall be delivered at a dew point not to exceed +39°F". Measurement range is: Dew Point Temperature from -40 to +80 degrees Fahrenheit, Relative Humidity from 0 to 100 percent, and Dry Bulb Temperature from 0 to 185°F, in still or flowing air or gas. This range also allows for usage in dryer applications and process air used in manufacturing. The instrument is shipped with the alarm point preset to +39°F DP. This set point is fully adjustable. The units are intended to offer the user a reliable and accurate system that is simple to install and operate, and virtually maintenance free.

The Model AMM-20 is housed in a steel NEMA-12 rated enclosure intended for vertical mounting on a wall or equipment surface.

PRINCIPLE OF OPERATION

Model AMM-20 uses microprocessor-based electronics designed for use with Ohmic Polymer RH and NTC thermistor sensors. The basic system provides sensor excitation, direct analog to digital conversion in the microprocessor, psychrometric calculations to determine dew point (and compensate the relative humidity measurements for temperature variations), programmed set point comparison for alarm and relay output, analog and digital data outputs. The RH and temperature sensors determine local environmental conditions by attaining passive equilibrium with their surroundings. The RH sensor provides a DC voltage signal to an A/D input on the microprocessor, where it is conditioned, amplified, and then output in analog form to the display. The temperature signal is monitored in a similar fashion and is used for compensation of the RH measurement as well as for display. Dew point is then calculated from the measured parameters using psychrometric equations developed especially for the AMM-20. The dew point value is also compared to a set point value for the audio and visual alarms.

PSYCHROMETRIC MONITOR PROGRAM

Model AMM-20 Airline Moisture Monitor comes with a custom Psychrometric Monitor Program which works with the following operating systems: Windows 2000, Windows XP, Windows Vista, Windows 7.

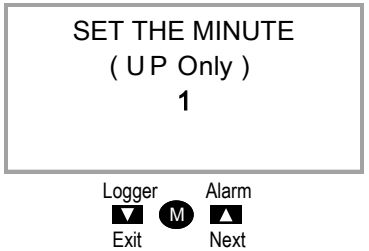
To Install the Psychrometric Monitor Program on your computer: Place the Psychrometric Monitor Program CD into your computer's CD drive. If AutoRun does not start this CD automatically, select the **Start** button, then select **Run** and browse CD to run *PMSetup.exe*. This will load a Setup Wizard. Click **Next** to continue. When Information Box appears, click **Next**. Destination Folder box will appear; click **Next**. Menu Folder box will appear; click **Next**. Additional Options box will then appear. The program requires .NET Framework to run. Click **Install** to allow. Installing box appears; wait. Completing the Psychrometric Monitor box appears. Click **Finish** to exit. If a Net Framework box appears exit out and close. The program disc may now be removed from the computer. Keep and store in a safe place.

Connecting the AMM-20 to a computers USB port: The AMM-20 is connected to a computer via the USB jack on the bottom. Connect the AMM-20 using the supplied USB cable to your computer's USB jack.

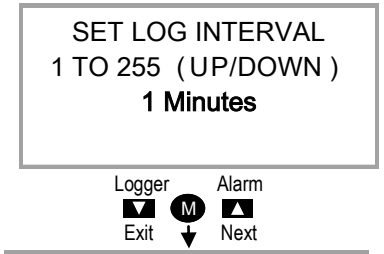
To Use With Computer and Program: Once connected apply power to the AMM-20, allow it to load information and show the normal display screen. Then double-click the "Psychrometric Monitor" icon on your desktop. If the AMM-20 is detected the program will run and display current data. See the HELP menu at the top of the program to learn how to configure and use the functions of the program. If the AMM -20 is not detected an error box appears giving the user 3 options. Click **Abort** to exit, **Retry** to try again and **Ignore** to open program and display with no data. This is useful when learning about the program. *If the AMM-20 will not communicate with your computer you can:* Try the reset switch (Red Button) inside the AMM-20. Press and hold for 10 seconds and release. Or close program and disconnect and reapply power to the AMM-20 and try starting the program again. If communication is lost while using the program, try the reset switch (Red Button) in the AMM-20.

RS-232 INTERFACE: The AMM-20 can also connect to your computer through the 9-pin PC serial (COM) port, if your computer has one, using a 9-pin serial cable, available from most computer stores. If your computer has a 25-pin COM port, 25-pin to 9-pin serial adapters are also available from most computer stores and can be used with the cable [Serial data is transmitted using Pin 5 (ground) and Pin 2 (receive)]. Some computer COM ports and serial adapters are not fully implemented (not all pins are used). If the AMM-20 is connected to a partially implemented serial port, functions may be erratic or the unit may fail to communicate.

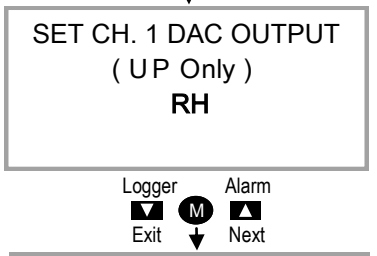
SET THE MINUTE selects the real time clock minute by pressing or holding the up arrow button. Minutes can be from 0 to 59.



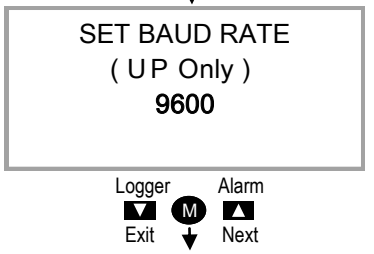
SET LOG INTERVAL. Select the logging rate from 1 to 255 minutes by pressing or holding the up or down arrow buttons.



SET CH.1 DAC OUTPUT. Select the Output of CH.1 by pressing the up arrow Button. May be set to RH or Temp.

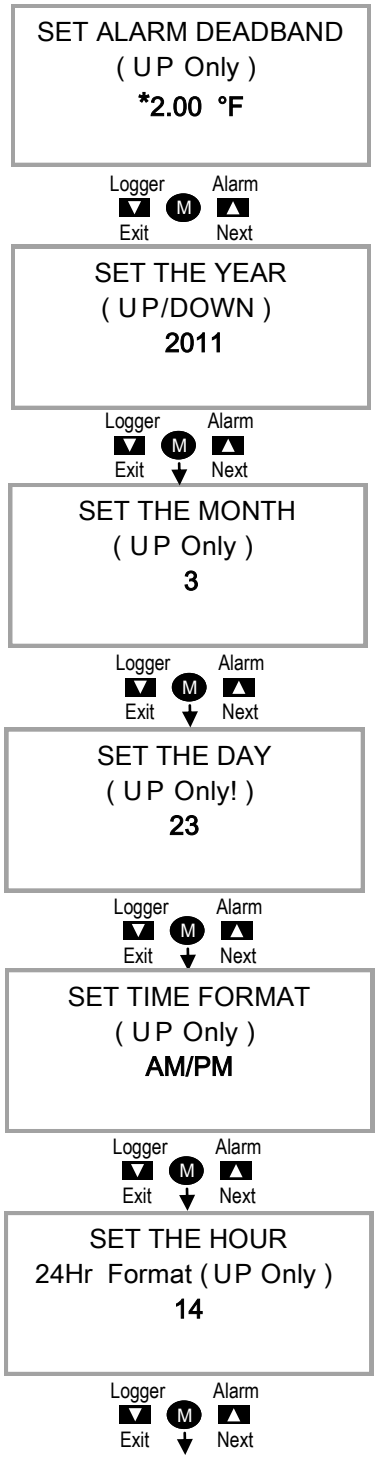


SET BAUD RATE. Select the baud rate by pressing or holding the up arrow button. Baud rate may be 9600, 19200, or 38400.



After setting all parameters pressing the M menu button once again will Exit Setup and Save. Wait until normal display screen returns before continuing.

SET ALARM DEADBAND. Select the hysteresis in increments of 0.5°F from 0.5 to 5.0°F and 0.25°C from 0.25 to 2.5°C by pressing or holding the up arrow button.



SET THE YEAR. Select the year on real time clock by pressing or holding the up or down arrow buttons.

SET THE MONTH. Select the month on the real time clock by pressing or holding the up arrow button.

SET THE DAY. Select the day on the real time clock by pressing or holding the up arrow button.

SET TIME FORMAT. Select the time format on the real time clock by pressing or holding the up arrow button. Format can be AM/PM or 24Hr.

SET THE HOUR. Select the hour on the real time clock by pressing or holding the up arrow button. Set 0 to 23 set in 24Hr format.

RS-232 INTERFACE (Cont'd)

The AMM-20 serial output requires a terminal emulation program. We recommend **Tera Term**; it is easy to use, free, and available from www.download.cnet.com. When you reach that page, type "Tera Term" in the Search box; you will then be able to download the installation program. Then:

1. Install the program and run it.
2. A *New Connection* window will open. Click the "Serial" button, then select the COM port you will be using, and click OK.
3. Tera Term should now be ready to receive data from the AMM-20. Make sure they are connected, and power up the AMM-20.
4. Three numbers will be displayed in Tera Term:

   Temperature, Dew Point, Humidity (in %)

   New readings will be displayed quickly and are in a comma delimited format that can be copied and pasted into a spreadsheet program, if desired. The units for Temperature and Dew Point can be changed from Fahrenheit to Celsius and vice versa by changing them on the AMM-20 display as shown on Page 17.

If readings are not displayed, turn the AMM-20 off, and in Tera Term click on *Setup* in the menu bar, then select *Serial Port*. This will open a window where you can check several parameters:

- *Port:* Try another port until you find the right one.
- *Baud rate:* Should be 9600.
- *Data:* 8 bit
- *Parity:* None
- *Stop:* 1 bit
- *Flow Control:* Off

Once you get a working display you may want to save your settings. Refer to Tera Term's help file for information on this and other functions.

Other communications programs can also be used; some older versions of Windows include one called HyperTerminal. Refer to its help file for information on using it and applying the parameters above.

Commands cannot be given to the AMM-20 through the RS-232 interface.

ANALOG OUTPUTS

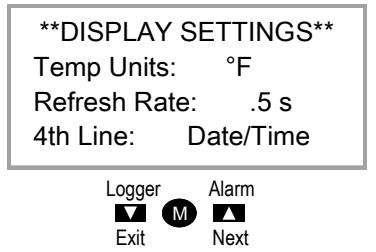
Connect using the internal barrier strip. The following Analog outputs are available:

Analog Voltage Outputs……...….2-Channel, 12-Bit MCP4922 DAC, 0 – 4.096V
Channel 1……...Selectable: %RH or DB Temp (°F or °C)
DB Temp Resolution……...18.2044 mv/°F, 32.768 mv/ °C
RH Resolution…….40.96 mv/%
Channel 2……..……..Fixed: Dew/Frost Point (°F or °C)
DP Resolution (-40 to 30°C)……...58.5142 mv/°C
DP Resolution (-40 to 85°F)……..…..…32.768 mv/°F
Analog Current Loop Output……..Dew/Frost Point Only: 4 to 20 ma, (°F or °C)
XTR116 Precision Loop Transmitter...Span Error: 0.05%, Non-Linearity: 0.003%
External DC Loop Voltage Required……..……7.5 to 36 volts
DP Resolution (-40 to 30°C)……..0.2285174 ma/°C
DP Resolution (-40 to 85°F)……..…..0.128 ma/°F

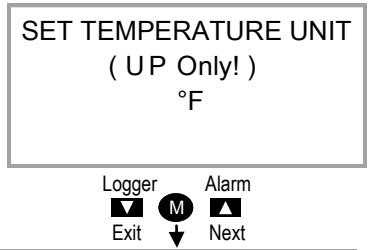
SETUP USING THREE BEZEL MENU BUTTONS

The following parameters can be set using the three buttons on the display's bezel. Default settings are in ***BOLD**.
PRESS THE BUTTONS FIRMLY

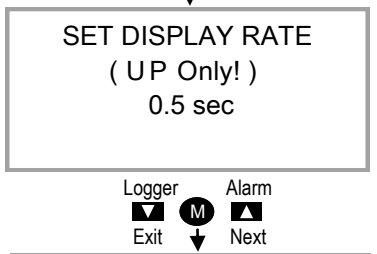
From the Normal Display, press the Menu (M) button once to enter the set up mode showing "Display Settings", and push once again to change current settings as follows. Each additional press cycles through the setup screens.



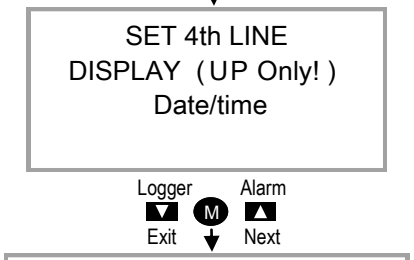
SET TEMPERATURE UNITS. Select ***°F**, °C, °K, or °R using the up arrow button ▲ on the right. Pressing and holding the up arrow button cycles through all choices. NOTE: When set up box shows the UP ONLY function the down arrow button ▼ on the left will EXIT the setup menu.



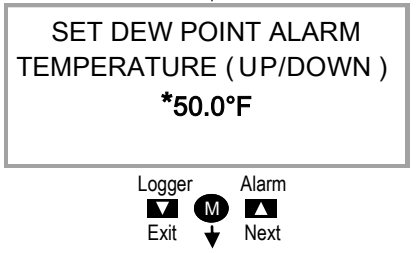
SET DISPLAY RATE. Select the display refresh rate from ***0.5** to 5 seconds by pressing the up arrow button. Pressing and holding the up arrow button cycles through all choices.



SET 4th LINE DISPLAY. Select parameter displayed on line 4 by pressing the up arrow button. Selections: **None**, **Abs**olute **Humid**ity, **Sat**uration **V**apor **P**ressure, **Actual V**apor **P**ressure, ***Date/Time.**



SET DEWPOINT ALARM TEMPERATURE. Select the alarm point in 0.1 °F increments by pressing or holding the up or down arrow buttons.



AMM-20 DISPLAY

The AMM-20 will display the following when power is first applied:

OHMIC INSTRUMENTS CO Model DPM-USB Dew point Monitor

Loading Setup…….. [■■■□□□□□□□□□□□]

Followed by Loading NIST Data…… and various other information, followed by “SYSTEM STATUS”. The display will then show one of five possible sets of 4 line information:

Normal 3 line display with no 4th line parameter.

DB Temp:	74.59	°F
Humidity:	30.90	%
Dew Pt:	41.95	°F

Normal 3 line display with Date & Time.
(AM/PM or 24 Hr Time)

DB Temp:	74.59	°F
Humidity:	30.90	%
Dew Pt:	41.95	°F
3/22/11	3:00 PM	

Normal 3 line display with Absolute Humidity.

DB Temp:	74.59	°F
Humidity:	30.90	%
Dew Pt:	41.95	°F
Abs Humid:	6.1	g/m3

Normal 3 line display with Saturation Vapor Pressure (If °F or °R then mb units; if °C or °K then hPa).

DB Temp:	74.59	°F
Humidity:	30.90	%
Dew Pt:	41.95	°F
Sat. VP:	27.92	mb

Normal 3 line display with Actual Vapor Pressure (If °F or °R then mb units; if °C or °K then hPa).

DB Temp:	74.59	°F
Humidity:	30.90	%
Dew Pt:	41.95	°F
Actual VP:	28.85	mb

Analog Voltage Output for Dry Bulb Temperature in °F

-40°F to +185°F

Voltage Range: 0 to 4.096 v.
Resolution: 18.2044 mv/°F
Vout = (Temp + 40) * 0.0182044

°F	Vout	°F	Vout	°F	Vout	°F	Vout	°F	Vout	°F	Vout	°F	Vout
-40	0.00000	-7	0.60075	26	1.20149	59	1.80224	92	2.40298	125	3.00373	158	3.60447
-39	0.01820	-6	0.61895	27	1.21969	60	1.82044	93	2.42119	126	3.02193	159	3.62268
-38	0.03641	-5	0.63715	28	1.23790	61	1.83864	94	2.43939	127	3.04013	160	3.64088
-37	0.05461	-4	0.65536	29	1.25610	62	1.85685	95	2.45759	128	3.05834	161	3.65908
-36	0.07282	-3	0.67356	30	1.27431	63	1.87505	96	2.47580	129	3.07654	162	3.67729
-35	0.09102	-2	0.69177	31	1.29251	64	1.89326	97	2.49400	130	3.09475	163	3.69549
-34	0.10923	-1	0.70997	32	1.31072	65	1.91146	98	2.51221	131	3.11295	164	3.71370
-33	0.12743	0	0.72818	33	1.32892	66	1.92967	99	2.53041	132	3.13116	165	3.73190
-32	0.14564	1	0.74638	34	1.34713	67	1.94787	100	2.54862	133	3.14936	166	3.75011
-31	0.16384	2	0.76458	35	1.36533	68	1.96608	101	2.56682	134	3.16757	167	3.76831
-30	0.18204	3	0.78279	36	1.38353	69	1.98428	102	2.58502	135	3.18577	168	3.78652
-29	0.20025	4	0.80099	37	1.40174	70	2.00248	103	2.60323	136	3.20397	169	3.80472
-28	0.21845	5	0.81920	38	1.41994	71	2.02069	104	2.62143	137	3.22218	170	3.82292
-27	0.23666	6	0.83740	39	1.43815	72	2.03889	105	2.63964	138	3.24038	171	3.84113
-26	0.25486	7	0.85561	40	1.45635	73	2.05710	106	2.65784	139	3.25859	172	3.85933
-25	0.27307	8	0.87381	41	1.47456	74	2.07530	107	2.67605	140	3.27679	173	3.87754
-24	0.29127	9	0.89202	42	1.49276	75	2.09351	108	2.69425	141	3.29500	174	3.89574
-23	0.30947	10	0.91022	43	1.51097	76	2.11171	109	2.71246	142	3.31320	175	3.91395
-22	0.32768	11	0.92842	44	1.52917	77	2.12991	110	2.73066	143	3.33141	176	3.93215
-21	0.34588	12	0.94663	45	1.54737	78	2.14812	111	2.74886	144	3.34961	177	3.95035
-20	0.36409	13	0.96483	46	1.56558	79	2.16632	112	2.76707	145	3.36781	178	3.96856
-19	0.38229	14	0.98304	47	1.58378	80	2.18453	113	2.78527	146	3.38602	179	3.98676
-18	0.40050	15	1.00124	48	1.60199	81	2.20273	114	2.80348	147	3.40422	180	4.00497
-17	0.41870	16	1.01945	49	1.62019	82	2.22094	115	2.82168	148	3.42243	181	4.02317
-16	0.43691	17	1.03765	50	1.63840	83	2.23914	116	2.83989	149	3.44063	182	4.04138
-15	0.45511	18	1.05586	51	1.65660	84	2.25735	117	2.85809	150	3.45884	183	4.05958
-14	0.47331	19	1.07406	52	1.67480	85	2.27555	118	2.87630	151	3.47704	184	4.07779
-13	0.49152	20	1.09226	53	1.69301	86	2.29375	119	2.89450	152	3.49524	185	4.09600
-12	0.50972	21	1.11047	54	1.71121	87	2.31196	120	2.91270	153	3.51345		
-11	0.52793	22	1.12867	55	1.72942	88	2.33016	121	2.93091	154	3.53165		
-10	0.54613	23	1.14688	56	1.74762	89	2.34837	122	2.94911	155	3.54986		
-9	0.56434	24	1.16508	57	1.76583	90	2.36657	123	2.96732	156	3.56806		
-8	0.58254	25	1.18329	58	1.78403	91	2.38478	124	2.98552	157	3.58627		

Analog Voltage Output for Dry Bulb Temperature in °C

-40°C to +85°C

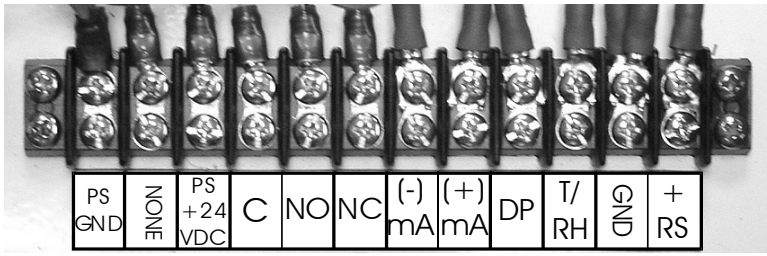
Voltage Range: 0 to 4.096 v.
Resolution: 32.768 mv/°C
Vout = (Temp +40) * 0.032768

°C	V_{out}	°C	V_{out}	°C	V_{out}	°C	V_{out}	°C	V_{out}	°C	V_{out}	°C	V_{out}
-40	0.00000	-22	0.58982	-4	1.17965	14	1.76947	32	2.35930	50	2.94912	68	3.53894
-39	0.03277	-21	0.62259	-3	1.21242	15	1.80224	33	2.39206	51	2.98189	69	3.57171
-38	0.06554	-20	0.65536	-2	1.24518	16	1.83501	34	2.42483	52	3.01466	70	3.60448
-37	0.09830	-19	0.68813	-1	1.27795	17	1.86778	35	2.45760	53	3.04742	71	3.63725
-36	0.13107	-18	0.72090	0	1.31072	18	1.90054	36	2.49037	54	3.08019	72	3.67002
-35	0.16384	-17	0.75366	1	1.34349	19	1.93331	37	2.52314	55	3.11296	73	3.70278
-34	0.19661	-16	0.78643	2	1.37626	20	1.96608	38	2.55590	56	3.14573	74	3.73555
-33	0.22938	-15	0.81920	3	1.40902	21	1.99885	39	2.58867	57	3.17850	75	3.76832
-32	0.26214	-14	0.85197	4	1.44179	22	2.03162	40	2.62144	58	3.21126	76	3.80109
-31	0.29491	-13	0.88474	5	1.47456	23	2.06438	41	2.65421	59	3.24403	77	3.83386
-30	0.32768	-12	0.91750	6	1.50733	24	2.09715	42	2.68698	60	3.27680	78	3.86662
-29	0.36045	-11	0.95027	7	1.54010	25	2.12992	43	2.71974	61	3.30957	79	3.89939
-28	0.39322	-10	0.98304	8	1.57286	26	2.16269	44	2.75251	62	3.34234	80	3.93216
-27	0.42598	-9	1.01581	9	1.60563	27	2.19546	45	2.78528	63	3.37510	81	3.96493
-26	0.45875	-8	1.04858	10	1.63840	28	2.22822	46	2.81805	64	3.40787	82	3.99770
-25	0.49152	-7	1.08134	11	1.67117	29	2.26099	47	2.85082	65	3.44064	83	4.03046
-24	0.52429	-6	1.11411	12	1.70394	30	2.29376	48	2.88358	66	3.47341	84	4.06323
-23	0.55706	-5	1.14688	13	1.73670	31	2.32653	49	2.91635	67	3.50618	85	4.09600

OPERATING INSTRUCTIONS

Note: Install Logging Memory in AMM-20 to store logging points.

1. Mount the AMM-20 enclosure and install the dew point probe in an appropriate location for sensing the moisture level in the controlled environment. The probe can be mounted in a 1/2" NPT pipe "Tee", the single leg in an up position is best, or in a 1/2" NPT fitting. Use Teflon tape on the connection for a good fitting. Install probe in system before connecting to AMM-20 to avoid twisting the cable. Avoid wet or dusty areas if possible since these conditions can shorten the usable life of the sensor.
2. Plug the male 7-pin connector on the dew point probe into the sensor input connector on the bottom of the AMM-20. This connector has a twist-to-lock retainer which provides a secure connection.
3. Connect a 24 VDC power supply to the AMM-20. The 24 VDC line should be connected to the correct terminals on the barrier strip. If you are using external monitoring or control equipment, connect them to the appropriate terminals on the barrier strip.
4. After starting the AMM-20 set up the parameters as described in the following pages.



AMM-20 Internal Barrier Strip

Note: The AMM-20 can be connected to a computer via the USB jack on the bottom panel. We recommend using the left bottom access hole for running AC wiring using 1/2" conduit. All other connections to the internal barrier strip can be made using the bottom right hole and another 1/2" conduit.

COMPONENT FUNCTIONAL DESCRIPTION

Sensor / Probe:
Model AMM-20 is designed for use with Ohmic's Polymer type humidity sensors. The basic humidity sensing element provides a DC voltage output varying in proportion to the amount of moisture in the surrounding environment. Temperature sensing is performed via an NTC thermistor which varies its resistance inversely proportional to the changing temperature in the surrounding environment. The standard probe houses both sensing elements in a ½" NPT stainless steel pipe fitting with a 100 x 100 mesh screen. It has a maximum working pressure of 175 psi. The probe should never be used without its protective screen. Never sample the air of gases with oil mist or separated water. Exposure to corrosive or reactive chemicals should be avoided.

Display Bezel:
Three button menu selection. Alarm and logging activation.

Visual Alarm Indicator:
A red Light-Emitting-Diode (LED) comes on when the set point level is exceeded. This light does not turn off until the Dew Point drops below the set point.

Audible Alarm Annunciator:
A 90-dB Piezo buzzer type annunciator (Sonalert) sounds when the set point level is exceeded.

Silence Push Button:
When the AMM-20 is in alarm mode, pressing this button will silence the audible alarm (Sonalert). The Sonalert will automatically reset to sound with the next alarm occurrence. Silencing the audible alarm will not affect the visual alarm indicator (LED).

Analog Voltage Output for Relative Humidity in %
0% to 100%

Voltage Range: 0 to 4.096 v.
Resolution: 40.96 mv/%
Vout = RH * 0.04096

%RH	V_{out}	%RH	V_{out}	%RH	V_{out}	%RH	V_{out}	%RH	V_{out}
0	0.00000	21	0.86016	41	1.67936	61	2.49856	81	3.31776
1	0.04096	22	0.90112	42	1.72032	62	2.53952	82	3.35872
2	0.08192	23	0.94208	43	1.76128	63	2.58048	83	3.39968
3	0.12288	24	0.98304	44	1.80224	64	2.62144	84	3.44064
4	0.16384	25	1.02400	45	1.84320	65	2.66240	85	3.48160
5	0.20480	26	1.06496	46	1.88416	66	2.70336	86	3.52256
6	0.24576	27	1.10592	47	1.92512	67	2.74432	87	3.56352
7	0.28672	28	1.14688	48	1.96608	68	2.78528	88	3.60448
8	0.32768	29	1.18784	49	2.00704	69	2.82624	89	3.64544
9	0.36864	30	1.22880	50	2.04800	70	2.86720	90	3.68640
10	0.40960	31	1.26976	51	2.08896	71	2.90816	91	3.72736
11	0.45056	32	1.31072	52	2.12992	72	2.94912	92	3.76832
12	0.49152	33	1.35168	53	2.17088	73	2.99008	93	3.80928
13	0.53248	34	1.39264	54	2.21184	74	3.03104	94	3.85024
14	0.57344	35	1.43360	55	2.25280	75	3.07200	95	3.89120
15	0.61440	36	1.47456	56	2.29376	76	3.11296	96	3.93216
16	0.65536	37	1.51552	57	2.33472	77	3.15392	97	3.97312
17	0.69632	38	1.55648	58	2.37568	78	3.19488	98	4.01408
18	0.73728	39	1.59744	59	2.41664	79	3.23584	99	4.05504
19	0.77824	40	1.63840	60	2.45760	80	3.27680	100	4.09600
20	0.81920								

Analog Outputs for Dewpoint in °F

-40°F to +85°F

Output Range: 0 to 4.096 v. 4 to 20 ma

Resolution: 32.768 mv/°F 0.128 ma/°F

V_{out} = (DP + 40) * 0.032768 $I_{out(ma)}$ = ((DP + 40) * 0.128) + 4

°F	V_{out}	I_{out} (ma)	°F	V_{out}	I_{out} (ma)	°F	V_{out}	I_{out} (ma)	°F	V_{out}	I_{out} (ma)
-40	0.00000	4.000	-8	1.04858	8.096	24	2.09715	12.192	56	3.14573	16.288
-39	0.03277	4.128	-7	1.08134	8.224	25	2.12992	12.320	57	3.17850	16.416
-38	0.06554	4.256	-6	1.11411	8.352	26	2.16269	12.448	58	3.21126	16.544
-37	0.09830	4.384	-5	1.14688	8.480	27	2.19546	12.576	59	3.24403	16.672
-36	0.13107	4.512	-4	1.17965	8.608	28	2.22822	12.704	60	3.27680	16.800
-35	0.16384	4.640	-3	1.21242	8.736	29	2.26099	12.832	61	3.30957	16.928
-34	0.19661	4.768	-2	1.24518	8.864	30	2.29376	12.960	62	3.34234	17.056
-33	0.22938	4.896	-1	1.27795	8.992	31	2.32653	13.088	63	3.37510	17.184
-32	0.26214	5.024	0	1.31072	9.120	32	2.35930	13.216	64	3.40787	17.312
-31	0.29491	5.152	1	1.34349	9.248	33	2.39206	13.344	65	3.44064	17.440
-30	0.32768	5.280	2	1.37626	9.376	34	2.42483	13.472	66	3.47341	17.568
-29	0.36045	5.408	3	1.40902	9.504	35	2.45760	13.600	67	3.50618	17.696
-28	0.39322	5.536	4	1.44179	9.632	36	2.49037	13.728	68	3.53894	17.824
-27	0.42598	5.664	5	1.47456	9.760	37	2.52314	13.856	69	3.57171	17.952
-26	0.45875	5.792	6	1.50733	9.888	38	2.55590	13.984	70	3.60448	18.080
-25	0.49152	5.920	7	1.54010	10.016	39	2.58867	14.112	71	3.63725	18.208
-24	0.52429	6.048	8	1.57286	10.144	40	2.62144	14.240	72	3.67002	18.336
-23	0.55706	6.176	9	1.60563	10.272	41	2.65421	14.368	73	3.70278	18.464
-22	0.58982	6.304	10	1.63840	10.400	42	2.68698	14.496	74	3.73555	18.592
-21	0.62259	6.432	11	1.67117	10.528	43	2.71974	14.624	75	3.76832	18.720
-20	0.65536	6.560	12	1.70394	10.656	44	2.75251	14.752	76	3.80109	18.848
-19	0.68813	6.688	13	1.73670	10.784	45	2.78528	14.880	77	3.83386	18.976
-18	0.72090	6.816	14	1.76947	10.912	46	2.81805	15.008	78	3.86662	19.104
-17	0.75366	6.944	15	1.80224	11.040	47	2.85082	15.136	79	3.89939	19.232
-16	0.78643	7.072	16	1.83501	11.168	48	2.88358	15.264	80	3.93216	19.360
-15	0.81920	7.200	17	1.86778	11.296	49	2.91635	15.392	81	3.96493	19.488
-14	0.85197	7.328	18	1.90054	11.424	50	2.94912	15.520	82	3.99770	19.616
-13	0.88474	7.456	19	1.93331	11.552	51	2.98189	15.648	83	4.03046	19.744
-12	0.91750	7.584	20	1.96608	11.680	52	3.01466	15.776	84	4.06323	19.872
-11	0.95027	7.712	21	1.99885	11.808	53	3.04742	15.904	85	4.09600	20.000
-10	0.98304	7.840	22	2.03162	11.936	54	3.08019	16.032			
-9	1.01581	7.968	23	2.06438	12.064	55	3.11296	16.160			

Analog Outputs for Dewpoint in °C

-40°C to +30°C

Output Range: 0 to 4.096 v. 4 to 20 ma

Resolution: 58.5142 mv/°C 0.2285174 ma/°C

V_{out} = (DP +40) * 0.0585142 Iout(ma) = ((DP + 40) * .2285174) + 4

°C	V_{out}	I_{out} (ma)	°C	V_{out}	I_{out} (ma)	°C	V_{out}	I_{out} (ma)
-40	0.00000	4.000	-16	1.40434	9.486	8	2.80868	14.971
-39	0.05851	4.229	-15	1.46286	9.714	9	2.86720	15.200
-38	0.11703	4.457	-14	1.52137	9.943	10	2.92571	15.429
-37	0.17554	4.686	-13	1.57988	10.171	11	2.98422	15.657
-36	0.23406	4.914	-12	1.63840	10.400	12	3.04274	15.886
-35	0.29257	5.143	-11	1.69691	10.629	13	3.10125	16.114
-34	0.35109	5.371	-10	1.75543	10.857	14	3.15977	16.343
-33	0.40960	5.600	-9	1.81394	11.086	15	3.21828	16.571
-32	0.46811	5.829	-8	1.87245	11.314	16	3.27680	16.800
-31	0.52663	6.057	-7	1.93097	11.543	17	3.33531	17.029
-30	0.58514	6.286	-6	1.98948	11.771	18	3.39382	17.257
-29	0.64366	6.514	-5	2.04800	12.000	19	3.45234	17.486
-28	0.70217	6.743	-4	2.10651	12.229	20	3.51085	17.714
-27	0.76068	6.971	-3	2.16503	12.457	21	3.56937	17.943
-26	0.81920	7.200	-2	2.22354	12.686	22	3.62788	18.171
-25	0.87771	7.429	-1	2.28205	12.914	23	3.68639	18.400
-24	0.93623	7.657	0	2.34057	13.143	24	3.74491	18.629
-23	0.99474	7.886	1	2.39908	13.371	25	3.80342	18.857
-22	1.05326	8.114	2	2.45760	13.600	26	3.86194	19.086
-21	1.11177	8.343	3	2.51611	13.829	27	3.92045	19.314
-20	1.17028	8.571	4	2.57462	14.057	28	3.97897	19.543
-19	1.22880	8.800	5	2.63314	14.286	29	4.03748	19.771
-18	1.28731	9.029	6	2.69165	14.514	30	4.09600	20.000
-17	1.34583	9.257	7	2.75017	14.743			