INSTRUCTION MANUAL FOR THE AHT-200-02 ABSOLUTE HUMDITY TRANSMITTER



Phone (410) 820-5111 **Toll Free(800) 626-7713** **Fax (410) 822-9633**	**Ohmic Instruments** **3081 Elm Point Industrial Drive** **St. Charles, MO 63301 USA**	**www.ohmicinstruments.com** **Sales: sales@ohmicinstruments.com** **Service: service@ohmicinstruments.com**

SF-SLS-543 (A)

ABSOLUTE HUMIDITY SENSOR PRINCIPLE OF OPERATION

Absolute Humidity is the mass of water vapor per volume of air (or other carrier gases normally) expressed in grams/m^3 or grains/ft^3. When air or gas is dry it has a greater "thermal conductivity" or ability to transfer heat compared to moist air. OHMIC utilizes this principle to measure absolute humidity with the ABS Series sensors.

ABS sensors use two matched thermistors, connected in a bridge circuit, located on a common stainless-steel heat sink. One thermistor (the reference) is glass encapsulated in dry nitrogen while the other thermistor is exposed to the environment. The bridge is balanced at the reference humidity, 0 g/m^3. When voltage is applied, the thermistors are heated to a high temperature, 200°C or higher; the temperature difference between the thermistors, resulting from humidity level, unbalances the bridge and generates an output voltage proportional to the moisture level of the atmosphere.

INSTALLATION AND CONNECTION

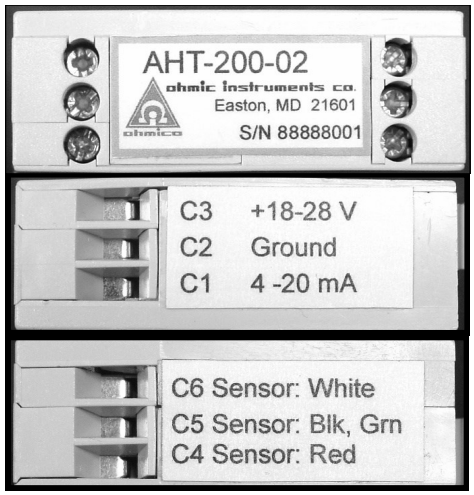


Fig. 1

Installation of the AHT-200-02

1. The transmitter and sensor are supplied as a matched set and are to be used together.
2. Mount the AHT-200-02 sensor securely in an area with good air circulation and minimum vibration.
3. Using the integral connector, mount the transmitter to your 35 mm DIN rail. Orientation is not important.
4. The AHT-200-02 is designed for power supply voltages of 18- 28 VDC . Reverse polarity protection is provided. *(See Fig. 1)
5. Connect current loop: C1: loop + C2: loop - (ground)
6. Connect sensor leads: C4: red C5: black C6: white
7. Connect power supply: C2: ground C3: +18- 28 VDC
8. The 4- 20 mA output varies as a function of absolute humidity (0- 130 g /m^3@ 60°C) and sensor temperature, to a maximum of 200°C.

Max mA out for temp in C.

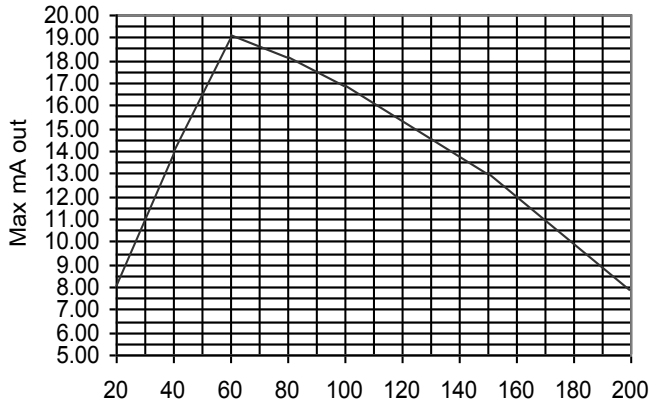


Fig. 2

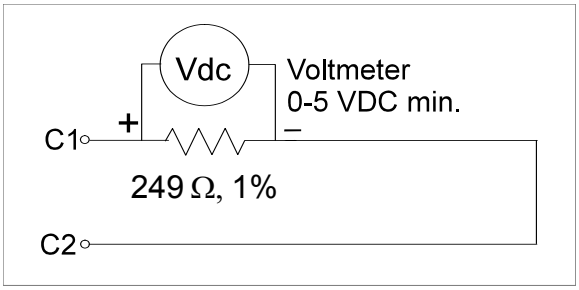
The transmitter/sensor output voltage varies with the temperature (Fig. 2), with a useful range of 25 to 200°C and a maximum mA out at 60°C.

The following equation (Fig.3) shows the relationship between Absolute Humidity (grams/m^3), Relative Humidity (%) and Temperature (°C):

$$RH = \frac{(AbsH)(273.3+T)}{13.243e^{[17.269T \div (237.16+T)]}}$$

Fig. 3

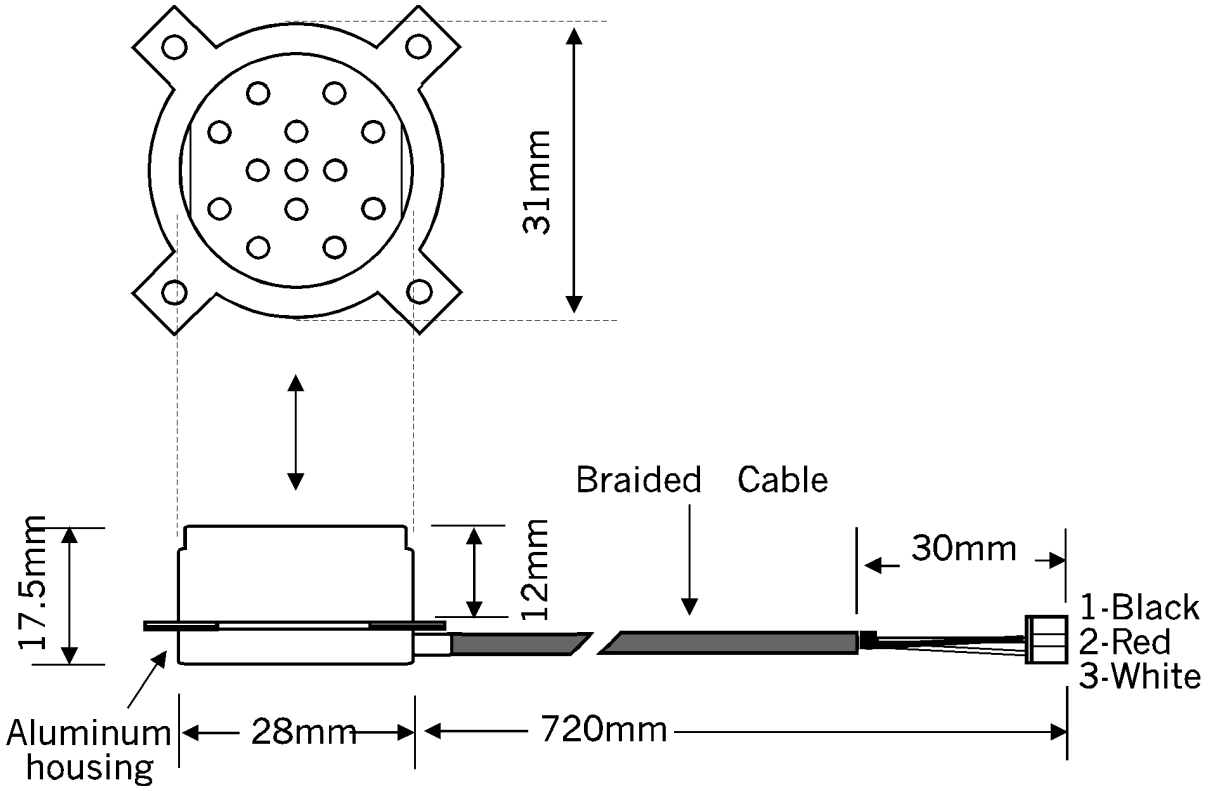
The alternate connection to the right may be used to supply a 1 to 5 VDC output. The voltage is read across the resistor.



APPLICATIONS

Absolute Humidity Sensors are widely used in appliances such as clothes dryers and microwave ovens. There has been an increase in the number of industrial and process applications for absolute humidity detectors ***due to their ability to operate at high temperatures, recover from condensation and their excellent immunity to many chemical and physical contaminants.*** Absolute humidity measurement is an economical way of monitoring and controlling many industrial processes such as drying, fuel cell operation, combustion, catalytic converters, material curing, catalyst production, cooking, sterilization, desiccant heat recovery, etc. Due to the low signal levels from the sensor Ohmic has developed a chopper stabilized amplifier circuit to provide control signals. Model AHT-200-01, produces a 0-5 or 0-10 Vdc output. The data sheet for the unit can be viewed at www.ohmicinstruments.com .

ABS- 300 Sensor Dimensions



AHT-200-02 User Instructions.

Where: AH is in g/m^3 and T is temp. in Deg. C.

mA out = (((a * AH * AH + b * AH) * (c * T * T + d * T + e) * f) * 1.23) + 4.

Constants: a = -0.00067742 b = 0.17704445 c = -0.000017156
d = -0.00088115 e = 1.11463 f = 1.062806

The maximum mA out is at 130 g/m^3 at 60 Deg. C. The mA out will be a lower value for others temperatures.

The max AHT out (130 g/m^3) is at 60 Deg. C. . The AHT is lower at other temperatures.

mA Out given AH and TEMP in C.

AH g/m3	0C	5c	10c	15C	20C	25C	30C	35C	40C	45C	50C	60C	70C	80C	90C	100C	150C	200C
1.0	4.26	4.26	4.25	4.25	4.25	4.25	4.25	4.25	4.24	4.24	4.24	4.23	4.22	4.22	4.21	4.20	4.14	4.06
2.0	4.51	4.51	4.51	4.50	4.50	4.50	4.49	4.49	4.48	4.48	4.47	4.46	4.45	4.43	4.41	4.39	4.27	4.12
3.0	4.77	4.76	4.76	4.75	4.75	4.74	4.74	4.73	4.72	4.71	4.71	4.69	4.67	4.64	4.62	4.59	4.41	4.17
4.0	5.02	5.01	5.01	5.00	4.99	4.99	4.98	4.97	4.96	4.95	4.94	4.91	4.88	4.85	4.82	4.78	4.54	4.23
5.0	SAT	5.26	5.25	5.25	5.24	5.23	5.22	5.21	5.19	5.18	5.17	5.14	5.10	5.06	5.02	4.97	4.68	4.29
6.0		5.51	5.50	5.49	5.49	5.47	5.46	5.44	5.43	5.41	5.40	5.36	5.32	5.27	5.22	5.16	4.81	4.34
7.0		SAT	5.74	5.73	5.72	5.71	5.69	5.68	5.66	5.64	5.62	5.58	5.53	5.47	5.41	5.35	4.94	4.40
8.0			5.98	5.97	5.96	5.94	5.93	5.91	5.89	5.87	5.85	5.80	5.74	5.68	5.61	5.54	5.07	4.45
9.0			6.22	6.21	6.19	6.18	6.16	6.14	6.12	6.09	6.07	6.01	5.95	5.88	5.80	5.72	5.20	4.51
10.0			SAT	6.44	6.43	6.41	6.39	6.37	6.34	6.32	6.29	6.23	6.16	6.08	6.00	5.90	5.33	4.56
11.0				6.68	6.66	6.64	6.62	6.59	6.57	6.54	6.51	6.44	6.36	6.28	6.19	6.09	5.46	4.62
12.0				6.91	6.89	6.87	6.84	6.82	6.79	6.76	6.72	6.65	6.57	6.48	6.38	6.27	5.58	4.67
13.0				SAT	7.12	7.10	7.07	7.04	7.01	6.98	6.94	6.86	6.77	6.67	6.56	6.45	5.71	4.72
14.0					7.35	7.32	7.29	7.26	7.23	7.19	7.15	7.07	6.97	6.87	6.75	6.62	5.83	4.77
15.0					7.57	7.54	7.51	7.48	7.44	7.41	7.37	7.27	7.17	7.06	6.94	6.80	5.95	4.83
16.0					7.79	7.76	7.73	7.70	7.66	7.62	7.57	7.48	7.37	7.25	7.12	6.97	6.07	4.88
17.0					8.01	7.98	7.95	7.91	7.87	7.83	7.78	7.68	7.57	7.44	7.30	7.15	6.20	4.93
18.0					SAT	8.20	8.16	8.13	8.08	8.04	7.99	7.88	7.76	7.63	7.48	7.32	6.32	4.98
19.0						8.41	8.38	8.34	8.29	8.24	8.19	8.08	7.95	7.81	7.66	7.49	6.43	5.03
20.0						8.63	8.59	8.55	8.50	8.45	8.40	8.28	8.14	8.00	7.83	7.66	6.55	5.08
21.0						8.84	8.80	8.75	8.70	8.65	8.60	8.47	8.33	8.18	8.01	7.82	6.67	5.13
22.0						9.05	9.01	8.96	8.91	8.85	8.80	8.67	8.52	8.36	8.18	7.99	6.78	5.18
23.0						9.26	9.21	9.16	9.11	9.05	8.99	8.86	8.71	8.54	8.35	8.15	6.90	5.22
24.0						SAT	9.41	9.36	9.31	9.25	9.19	9.05	8.89	8.72	8.52	8.32	7.01	5.27
25.0							9.62	9.56	9.51	9.45	9.38	9.24	9.07	8.89	8.69	8.48	7.12	5.32
26.0							9.82	9.76	9.70	9.64	9.57	9.42	9.25	9.07	8.86	8.64	7.23	5.37
27.0							10.01	9.96	9.90	9.83	9.76	9.61	9.43	9.24	9.03	8.79	7.34	5.41
28.0							10.21	10.15	10.09	10.02	9.95	9.79	9.61	9.41	9.19	8.95	7.45	5.46
29.0							10.41	10.35	10.28	10.21	10.14	9.97	9.79	9.58	9.35	9.10	7.56	5.51
30.0							10.60	10.54	10.47	10.40	10.32	10.15	9.96	9.75	9.51	9.26	7.67	5.55
31.0							SAT	10.72	10.66	10.58	10.50	10.33	10.13	9.91	9.67	9.41	7.77	5.60
32.0								10.91	10.84	10.77	10.68	10.50	10.30	10.08	9.83	9.56	7.88	5.64
33.0								11.10	11.02	10.95	10.86	10.68	10.47	10.24	9.99	9.71	7.98	5.68
34.0								11.28	11.21	11.13	11.04	10.85	10.64	10.40	10.14	9.86	8.09	5.73
35.0								11.46	11.38	11.30	11.21	11.02	10.80	10.56	10.29	10.00	8.19	5.77
36.0								11.64	11.56	11.48	11.39	11.19	10.97	10.72	10.44	10.15	8.29	5.81
37.0								11.82	11.74	11.65	11.56	11.36	11.13	10.87	10.59	10.29	8.39	5.85
38.0								11.99	11.91	11.82	11.73	11.52	11.29	11.03	10.74	10.43	8.49	5.90

mA Out given AH and TEMP in C.

AH g/m3	0C	5c	10c	15C	20C	25C	30C	35C	40C	45C	50C	60C	70C	80C	90C	100C	150C	200C
39.0								12.17	12.08	11.99	11.90	11.68	11.45	11.18	10.89	10.57	8.58	5.94
40.0								SAT	12.25	12.16	12.06	11.85	11.60	11.33	11.03	10.71	8.68	5.98
41.0									12.42	12.33	12.23	12.01	11.76	11.48	11.18	10.84	8.77	6.02
42.0									12.59	12.49	12.39	12.16	11.91	11.63	11.32	10.98	8.87	6.06
43.0									12.75	12.65	12.55	12.32	12.06	11.77	11.46	11.11	8.96	6.10
44.0									12.91	12.82	12.71	12.47	12.21	11.92	11.60	11.25	9.05	6.14
45.0									13.08	12.97	12.87	12.63	12.36	12.06	11.73	11.38	9.15	6.18
46.0									13.23	13.13	13.02	12.78	12.50	12.20	11.87	11.50	9.24	6.21
47.0									13.39	13.29	13.17	12.93	12.65	12.34	12.00	11.63	9.32	6.25
48.0									13.55	13.44	13.33	13.07	12.79	12.48	12.13	11.76	9.41	6.29
49.0									13.70	13.59	13.48	13.22	12.93	12.61	12.26	11.88	9.50	6.32
50.0									13.85	13.74	13.62	13.36	13.07	12.75	12.39	12.01	9.59	6.36
51.0									14.00	13.89	13.77	13.51	13.21	12.88	12.52	12.13	9.67	6.40
52.0									SAT	14.03	13.91	13.65	13.35	13.01	12.65	12.25	9.75	6.43
53.0										14.18	14.06	13.78	13.48	13.14	12.77	12.37	9.84	6.47
54.0										14.32	14.20	13.92	13.61	13.27	12.89	12.48	9.92	6.50
55.0										14.46	14.34	14.06	13.74	13.40	13.01	12.60	10.00	6.54
56.0										14.60	14.47	14.19	13.87	13.52	13.13	12.71	10.08	6.57
57.0										14.74	14.61	14.32	14.00	13.64	13.25	12.82	10.16	6.60
58.0										14.87	14.74	14.45	14.13	13.76	13.37	12.94	10.23	6.64
59.0										15.00	14.87	14.58	14.25	13.88	13.48	13.04	10.31	6.67
60.0										15.14	15.00	14.71	14.37	14.00	13.60	13.15	10.39	6.70
61.0										15.27	15.13	14.83	14.49	14.12	13.71	13.26	10.46	6.73
62.0										15.39	15.26	14.95	14.61	14.23	13.82	13.36	10.53	6.76
63.0										15.52	15.38	15.07	14.73	14.35	13.93	13.47	10.60	6.79
64.0										15.64	15.50	15.19	14.84	14.46	14.03	13.57	10.68	6.82
65.0										15.76	15.62	15.31	14.96	14.57	14.14	13.67	10.75	6.85
66.0										SAT	15.74	15.42	15.07	14.67	14.24	13.77	10.81	6.88
67.0											15.86	15.54	15.18	14.78	14.34	13.86	10.88	6.91
68.0											15.97	15.65	15.29	14.89	14.44	13.96	10.95	6.94
69.0											16.09	15.76	15.39	14.99	14.54	14.05	11.01	6.97
70.0											16.20	15.87	15.50	15.09	14.64	14.15	11.08	6.99
71.0											16.31	15.98	15.60	15.19	14.73	14.24	11.14	7.02
72.0											16.42	16.08	15.70	15.29	14.83	14.33	11.21	7.05
73.0											16.52	16.18	15.80	15.38	14.92	14.42	11.27	7.07
74.0											16.63	16.29	15.90	15.48	15.01	14.50	11.33	7.10
75.0											16.73	16.38	16.00	15.57	15.10	14.59	11.39	7.12
76.0											16.83	16.48	16.09	15.66	15.19	14.67	11.45	7.15
77.0											16.93	16.58	16.19	15.75	15.27	14.75	11.50	7.17

mA Out given AH and TEMP in C.

AH g/m3	0C	5c	10c	15C	20C	25C	30C	35C	40C	45C	50C	60C	70C	80C	90C	100C	150C	200C
78.0											17.02	16.67	16.28	15.84	15.36	14.83	11.56	7.20
79.0											17.12	16.77	16.37	15.93	15.44	14.91	11.61	7.22
80.0											17.21	16.86	16.46	16.01	15.52	14.99	11.67	7.24
81.0											SAT	16.94	16.54	16.09	15.60	15.07	11.72	7.26
82.0												17.03	16.63	16.18	15.68	15.14	11.77	7.29
83.0												17.12	16.71	16.26	15.76	15.21	11.82	7.31
84.0												17.20	16.79	16.33	15.83	15.29	11.87	7.33
85.0												17.28	16.87	16.41	15.91	15.36	11.92	7.35
86.0												17.36	16.95	16.49	15.98	15.42	11.97	7.37
87.0												17.44	17.02	16.56	16.05	15.49	12.02	7.39
88.0												17.52	17.10	16.63	16.12	15.56	12.06	7.41
89.0												17.59	17.17	16.70	16.18	15.62	12.11	7.43
90.0												17.67	17.24	16.77	16.25	15.68	12.15	7.45
91.0												17.74	17.31	16.83	16.31	15.74	12.19	7.46
92.0												17.81	17.38	16.90	16.38	15.80	12.23	7.48
93.0												17.87	17.44	16.96	16.44	15.86	12.27	7.50
94.0												17.94	17.51	17.02	16.49	15.92	12.31	7.51
95.0												18.00	17.57	17.08	16.55	15.97	12.35	7.53
96.0												18.07	17.63	17.14	16.61	16.03	12.39	7.55
97.0												18.13	17.69	17.20	16.66	16.08	12.43	7.56
98.0												18.19	17.74	17.25	16.72	16.13	12.46	7.58
99.0												18.24	17.80	17.31	16.77	16.18	12.49	7.59
100.0												18.30	17.85	17.36	16.82	16.22	12.53	7.61
101.0												18.35	17.90	17.41	16.86	16.27	12.56	7.62
102.0												18.40	17.95	17.46	16.91	16.31	12.59	7.63
103.0												18.45	18.00	17.50	16.95	16.36	12.62	7.64
104.0												18.50	18.05	17.55	17.00	16.40	12.65	7.66
105.0												18.55	18.09	17.59	17.04	16.44	12.68	7.67
106.0												18.59	18.14	17.63	17.08	16.48	12.70	7.68
107.0												18.63	18.18	17.67	17.12	16.51	12.73	7.69
108.0												18.68	18.22	17.71	17.15	16.55	12.75	7.70
109.0												18.72	18.26	17.75	17.19	16.58	12.78	7.71
110.0												18.75	18.29	17.78	17.22	16.61	12.80	7.72
111.0												18.79	18.33	17.82	17.26	16.64	12.82	7.73
112.0												18.82	18.36	17.85	17.29	16.67	12.84	7.74
113.0												18.85	18.39	17.88	17.32	16.70	12.86	7.75
114.0												18.88	18.42	17.91	17.34	16.73	12.88	7.75
115.0												18.91	18.45	17.93	17.37	16.75	12.90	7.76
116.0												18.94	18.48	17.96	17.39	16.77	12.91	7.77

mA Out given AH and TEMP in C.

AH g/m3	0C	5c	10c	15C	20C	25C	30C	35C	40C	45C	50C	60C	70C	80C	90C	100C	150C	200C
117.0												18.97	18.50	17.98	17.41	16.79	12.93	7.77
118.0												18.99	18.52	18.00	17.44	16.81	12.94	7.78
119.0												19.01	18.54	18.02	17.45	16.83	12.95	7.79
120.0												19.03	18.56	18.04	17.47	16.85	12.96	7.79
121.0												19.05	18.58	18.06	17.49	16.87	12.98	7.79
122.0												19.06	18.60	18.08	17.50	16.88	12.99	7.80
123.0												19.08	18.61	18.09	17.52	16.89	12.99	7.80
124.0												19.09	18.62	18.10	17.53	16.90	13.00	7.81
125.0												19.10	18.63	18.11	17.54	16.91	13.01	7.81
126.0												19.11	18.64	18.12	17.55	16.92	13.01	7.81
127.0												19.12	18.65	18.13	17.55	16.93	13.02	7.81
128.0												19.12	18.65	18.13	17.56	16.93	13.02	7.81
129.0												19.13	18.66	18.14	17.56	16.93	13.02	7.81
130.0												19.13	18.66	18.14	17.56	16.94	13.02	7.82

Absolute Humidity (AH) vs. Relative Humidity (RH%)

Absolute Humidity (AH) vs. Relative Humidity (RH%)												
AH (g/m3)	0C	5C	10C	15C	20C	25C	30C	35C	40C	45C	50C	60C
1.0	20.6	14.7	10.6	7.8	5.8	4.3	3.3	2.5	2.0	1.5	1.2	0.8
2.0	41.3	29.4	21.3	15.6	11.6	8.7	6.6	5.0	3.9	3.1	2.4	1.5
3.0	61.9	44.1	31.9	23.4	17.4	13.0	9.9	7.6	5.9	4.6	3.6	2.3
4.0	82.5	58.9	42.6	31.2	23.1	17.4	13.2	10.1	7.8	6.1	4.8	3.0
5.0	SAT	73.6	53.2	39.0	28.9	21.7	16.5	12.6	9.8	7.7	6.0	3.8
6.0		88.3	63.9	46.8	34.7	26.0	19.8	15.1	11.7	9.2	7.2	4.6
7.0		SAT	74.5	54.6	40.5	30.4	23.1	17.7	13.7	10.7	8.5	5.4
8.0			85.1	62.4	46.3	34.7	26.4	20.2	15.7	12.2	9.7	6.2
9.0			95.8	70.2	52.1	39.1	29.7	22.7	17.6	13.8	10.9	6.9
10.0			SAT	78.0	57.9	43.4	33.0	25.3	19.6	15.3	12.7	7.7
15.0				SAT	86.8	65.1	49.4	37.9	29.3	23.0	18.1	11.6
20.0					SAT	86.8	65.9	50.5	39.1	30.6	24.1	15.4
25.0						SAT	82.4	63.1	48.9	38.3	30.2	19.3
30.0							98.9	75.8	58.7	45.9	36.2	23.1
35.0							SAT	88.4	68.5	53.6	42.3	27.0
40.0								SAT	78.3	61.2	48.3	30.8
45.0									88.0	68.9	54.3	34.7
50.0									97.9	76.5	60.4	38.5
55.0									SAT	84.1	66.4	42.4
60.0										91.8	72.5	46.2
65.0										99.4	78.5	50.1
70.0										SAT	84.5	54.0
75.0											90.6	57.8
80.0											96.6	61.7
85.0											SAT	65.5
90.0												69.4
95.0												73.2
100.0												77.1
105.0												80.9
110.0												84.8
120.0												92.5
130.0												SAT

Absolute Humidity (AH) vs. Relative Humidity (RH%)

Absolute Humidity (AH) vs. Relative Humidity (RH%)											
AH (g/m3)	70C	80C	90C	100C	110C	120C	130C	140C	160C	180C	200C
1.0	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0
2.0	1.0	0.7	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0
3.0	1.5	1.0	0.7	0.5	0.4	0.3	0.3	0.1	0.1	0.1	0.0
4.0	2.0	1.4	1.0	0.7	0.5	0.4	0.3	0.2	0.1	0.1	0.0
5.0	2.5	1.7	1.2	0.9	0.6	0.4	0.3	0.3	0.2	0.1	0.1
6.0	3.0	2.1	1.4	1.0	0.7	0.5	0.4	0.3	0.2	0.1	0.1
7.0	3.6	2.4	1.7	1.2	0.8	0.6	0.5	0.4	0.2	0.1	0.1
8.0	4.1	2.8	1.9	1.4	1.0	0.7	0.5	0.4	0.2	0.2	0.1
9.0	4.6	3.1	2.2	1.5	1.1	0.8	0.6	0.5	0.3	0.2	0.1
10.0	5.1	3.4	2.4	1.7	1.2	0.9	0.7	0.5	0.3	0.2	0.1
15.0	7.6	5.2	3.6	2.6	1.8	1.3	1.0	0.8	0.5	0.3	0.2
20.0	10.2	6.9	4.8	3.4	2.4	1.8	1.4	1.0	0.6	0.4	0.3
25.0	12.7	8.6	5.8	4.2	3.0	2.2	1.7	1.3	0.8	0.5	0.3
30.0	15.2	10.3	7.2	5.1	3.6	2.7	2.0	1.5	0.9	0.6	0.4
35.0	17.8	12.0	8.4	5.9	4.3	3.1	2.4	1.8	1.1	0.7	0.5
40.0	20.3	13.7	9.6	6.8	4.9	3.6	2.7	2.0	1.2	0.8	0.5
45.0	22.8	15.5	10.7	7.6	5.5	4.0	3.0	2.3	1.4	0.9	0.6
50.0	25.4	17.2	11.9	8.5	6.0	4.5	3.4	2.6	1.6	1.0	0.7
55.0	27.9	18.9	13.1	9.3	6.7	4.9	3.7	2.8	1.7	1.1	0.7
60.0	30.4	20.6	14.3	10.2	7.3	5.4	4.0	3.0	1.9	1.2	0.8
65.0	33.0	22.3	15.5	11.1	7.9	5.8	4.4	3.3	2.0	1.3	0.9
70.0	35.5	24.1	16.7	11.8	8.5	6.3	4.7	3.6	2.2	1.4	0.9
75.0	38.1	25.8	17.9	12.7	9.1	6.7	5.0	3.9	2.3	1.5	1.0
80.0	40.6	27.5	19.1	13.6	9.7	7.2	5.4	4.1	2.5	1.6	1.1
85.0	43.1	29.2	20.3	14.4	10.3	7.6	5.7	4.4	2.7	1.7	1.1
90.0	45.7	30.9	21.4	15.4	10.9	8.1	6.0	4.6	2.8	1.8	1.2
95.0	48.2	32.6	22.6	16.1	11.6	8.5	6.4	4.9	3.0	1.9	1.3
100.0	50.7	34.4	23.8	17.0	12.2	9.0	6.7	5.1	3.1	2.0	1.3
105.0	53.3	36.0	25.1	17.8	12.8	9.4	7.1	5.4	3.3	2.1	1.4
110.0	55.8	37.8	26.2	18.7	13.4	9.9	7.4	5.7	3.4	2.2	1.5
120.0	60.9	41.2	28.7	20.4	14.6	10.8	8.1	6.2	3.7	2.4	1.6
130.0	66.0	44.7	31.0	22.1	15.8	11.7	8.7	6.7	4.0	2.6	1.7