

# Model DP 2000 Portable Digital Dew Point Analyzer



## OPERATIONS MANUAL

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## **INTRODUCTION –**

Thank you for selecting Super Systems Inc. and the DP2000 as your source for accurate dew point measurements of:

- Endothermic Atmosphere
- Endothermic Generators
- Nitrogen / Methanol Atmosphere
- Nitrogen / Hydrogen Atmosphere
- Plant Air Systems

We have taken every precaution to protect this unit during shipment. It has been packed in a customized foam carrier to protect it against mishandling during shipment. Please retain this packing material to use when returning the instrument to SSi for calibration or service. Carefully unpack the Model DP2000 Dew Point Analyzer, and if there are any signs of shipping damage, notify SSi and the shipper immediately.

Keep this instruction book in a secure place and refer to it when there is a question about the analyzer. An electronic version of this manual can be downloaded for free from our website: [www.supersystems.com](http://www.supersystems.com).

## **SPECIFICATIONS**

Dew Point Range:	0 to 80°F (-18 to 27°C)
Temperature Range:	0 to 120°F (-18 to 49°C)
Power Supply:	Factory set to 115 or 240 VAC
Display Type:	LED Digital
Display Resolution:	+/- 1°F (+/- 0.1°C)
Retransmission Output:	4-20 mA (range is -50 to 80°F)
Battery Specifications:	12V Rechargeable
Battery Life:	Approx. 8 hours
Size (Closed Case):	11" x 10" x 7"
Weight:	8.2lbs (3.7 kg)

### **WARNINGS –**

Although it is intended for use in an industrial environment, the DP2000 is a sensitive piece of analysis equipment. Care should be taken not to drop the analyzer or to operate it in a manner inconsistent with its intended use.

- Open all sample ports and remove all soot and/or moisture from the lines prior to attaching the sample tubing.
- The analyzer must be stored at ambient temperature (65-80°F) for at least four hours prior to operation.
- When the unit is to be returned to SSI for service or any other reason, it should be shipped in its original protective packaging. If this packaging is not available, protect the instrument with at least four inches of foam or other impact-absorbing material.
- For maximum battery life, do not charge the unit until the “battery low” indicator on the display is illuminated.
- This unit is not designed to measure the dew points in corrosive gasses, such as Ammonia, SO<sub>3</sub>, Chlorine, and HCL.
- Please read and understand this Product Manual before operating the unit.

Failure to comply with these conditions may cause damage to the unit that will not be covered under the warranty. Super Systems, Inc. is not responsible for damage to this unit caused by disregard of these warnings, neglect, or misuse.

### **STARTUP –**

The DP2000 Dew Point Analyzer has been calibrated and fully charged before it was shipped from Super Systems, Inc. You can begin typical operation as soon as the unit has been allowed to stabilize in a temperature similar to the temperature in the heat-treating department. This is particularly important for units that may have been sitting overnight in a delivery van in sub-zero weather, since the rapid temperature change can cause condensation on the sensor which will cause the unit to temporarily display inaccurate readings.

### **OPERATION –**

The use of the DP2000 is somewhat dependent upon the application. Although they are fundamentally alike, the operation procedures are different for sampling

heat treating furnaces and endothermic generators. Regardless of the application, allow the DP2000 to operate for two to three minutes before recording any data. This assures that the sensor has achieved equilibrium in the sample gas. Also, **make sure that the in-line filter (P/N 31033 or equivalent) is clean and functional.** Not only will this ensure that the sample reading is not abnormally high (since soot tends to trap moisture), but it will also prevent soot and other contaminants from entering the unit and damaging the sensor. The optimum flow rate of the sample gas should be between 1.5 and 2.0 Standard Cubic Feet per Hour (SCFH), although a flow rate as low as 1.0 SCFH is acceptable. If the unit is reading less than 1.0 SCFH, verify that there are no obstructions to the flow such as a clogged sample line or a poorly adjusted knob on the DP2000's flow meter. If these conditions do not exist, the unit may need to be returned to SSi for replacement of the pump. The pump's life is dependent upon how frequently it is used as well as the cleanliness of the sample gas. Insufficient filtration will significantly reduce the operating life of the pump.

*Heat Treat Furnace Sampling:* A gas sample may be extracted from a process using the built-in pump. The sample tube from which the sample is taken out of the furnace should extend into the furnace past the HOT face of the refractory. For accurate results, a designated sample port should be used to extract the sample. SSi offers a sample port assembly (part number 20263) which is ideal for this purpose. If a designated sample port is not available, then a clean "burn-off" port on a Gold Probe™, an industry leading oxygen sensor for atmosphere control, can be used. Readings taken from the burnoff port on a probe may be artificially high due to the presence of soot in the probe sheath.

*Endothermic Generator Sampling:* For applications under pressure, the pump should be switched off and the flow controlled by the small restriction valve on the flow meter. A flow rate between 1.5 and 2.0 SCFH is ideal. The sample should be taken from the endothermic gas manifold after the gas has been cooled. **NOTE: Allow the sample port to blow out any soot and / or water before connecting the sample tube.** Failure to do so will result in inaccurate readings and expose the sensor to potential damage.

### **INSTRUMENT DAMAGE**

The two main causes of damage to the DP2000 are the ingestion of soot and water. Both of these contaminants will cause erroneous readings in the short term, and cause long-term damage to the sensor and internal components.

### Soot / Particulate Contaminants

When taking a sample from a furnace or a generator, care should be taken to reduce the amount of soot that enters the instrument. The in-line filter will trap these particles, but cleaning the sample line before attaching the DP2000 will increase the life of the filter. Furnace ports can be burned off by pumping air through them while hot, or by removing them from the heat and mechanically cleaning them. Generator ports should be opened before the instrument is attached to allow any particulate buildup to be blown out. It is also helpful to tap on the port while it is being blown out to eject any loose particles before the instrument is attached.

If soot is allowed to collect on the dew point sensor in the instrument, it could result in higher readings. This soot will also retain moisture than can corrode the sensor over time. The sensor tip can be cleaned by carefully removing it from the sample block (see Section 2.3 of the Field Calibration instructions) and rinsing it in isopropyl alcohol. The power should be off while this is done, and the power should remain off for at least 30 minutes after this procedure to allow all of the alcohol to completely evaporate.

### Water / Moisture Contamination

When a furnace or generator is being started up or cooled down, the resulting gases will contain unusually high amounts of CO<sub>2</sub>. When these gases cool, moisture will precipitate out and become condensation inside the sample tubing assembly. Even if the furnace or generator is operating normally, residual moisture may still be present in the sample tube or plumbing system. In the same way that the ports are checked for soot (see above) they should be checked for moisture before attaching the instrument. This is especially important when taking a sample from a generator, since the sample port is usually preceded by a significant amount of plumbing. All traces of moisture should be eliminated before attaching the instrument. Failure to do so will result in erroneous measurements and could result in damage to the analyzer.

The first signs of moisture in the instrument will be visible condensation in the sample tubing and an unusually high dew point. The upper range of the sensor is +80°F, so if that value is displayed on the instrument it is probably due to the presence of moisture. If this moisture is not removed, it will cause the sensor tip to corrode and will eventually require the sensor to be replaced.

To remove moisture from the instrument, the sample tubing and filter should be removed from the instrument since they will probably be wet. An inert gas such as Nitrogen or Argon should then be flowed through the instrument (with the pump off) for as much time as it takes to dry out. This dry-out time will depend on the amount of moisture present in the instrument. The condition of the sensor can be monitored by periodically reading the dew point from the display and watching the value decrease over time. To test if it is operating properly,

verify the ambient dew point against a web-based weather station that will report the ambient dew point for your area. If the displayed reading is within three degrees of the reported dew point when the instrument is taken outside, then all of the moisture has probably been successfully removed. The wet filter and sample tubing can be re-attached after they have been completely dried out. To prevent the possibility of moisture damaging the instrument, be sure that the measured dew point is below ambient levels before it is stored. If necessary, Nitrogen or Argon can be used to dry out the instrument after use.

### **WHAT IS DEW POINT?**

Dew point can be defined as the temperature at which the water vapor pressure of the gas equals the saturated water vapor pressure. In other words, it is the temperature at which condensation will just begin to occur as the gas is cooled. Dew point and relative humidity are not the same measurement. Relative humidity is the amount of water vapor in the air compared to the amount the air could hold if it was totally saturated, and it is expressed as a percentage, not a temperature. To determine dew point, two main variables are required: Relative Humidity and Temperature. The DP2000 measures both variables to compute the displayed dew point.

### **HOW IT WORKS –**

The dew point sensor is a “dielectric ceramic” that varies its electrical capacitance with changes in relative humidity. The sensor is mounted in a short probe, which is installed in a T-fitting that allows the sample gas to flow past the sensor. The tip of this probe contains the dielectric ceramic relative humidity (RH) sensor, as well as a built in temperature sensor to determine its dry bulb temperature. Information from both of these sensors is used to compute the resultant dew point, which is displayed on the digital LED display.

### **MAINTENANCE / SAFETY ISSUES –**

One of the added features of the DP2000 is the ability to monitor the sensor’s operating temperature through the built-in thermister in the probe tip. The temperature of the sample gas can be determined by pressing the switch labeled “Sensor Temp”. It is spring loaded, so it will automatically return to displaying dew point.

Maintaining proper sensor temperature will prevent the premature failure of the sensor. The operating temperature of the sensor should remain below 140° F (60°C) at all times. Periodic checks of the sensor temperature will verify that the sensor is not being exposed to excessive heat. If these periodic checks show a



high sensor temperature, then the length of sample tubing should be increased to allow for adequate cooling of the sample before it passes the sensor tip. Continuous operation of the DP2000 Dew Point Analyzer will lead to premature failure, since many the internal components are not designed for uninterrupted use. If continuous monitoring of Dew Points is required, please contact Super Systems, Inc. at (800) 666-4330 to inquire about products intended specifically for this application.

### **FACTORY CALIBRATION –**

Factory calibration is recommended every six months if the unit is used regularly. SSi's calibration is NIST traceable and includes a numbered "Certificate of Calibration". This certificate also indicates the accuracy of the analyzer before and after calibration. Please contact Super Systems, Inc. at (800) 666-4330 for more information regarding this service.

### **FIELD CALIBRATION –**

It is also possible to calibrate the DP2000 in the field, which will require the optional calibration kit (Part Number 31030). The instructions for a field calibration are shown here, however please feel free to contact Super Systems at 800-666-4330 if you would like to review the process with us before you begin.

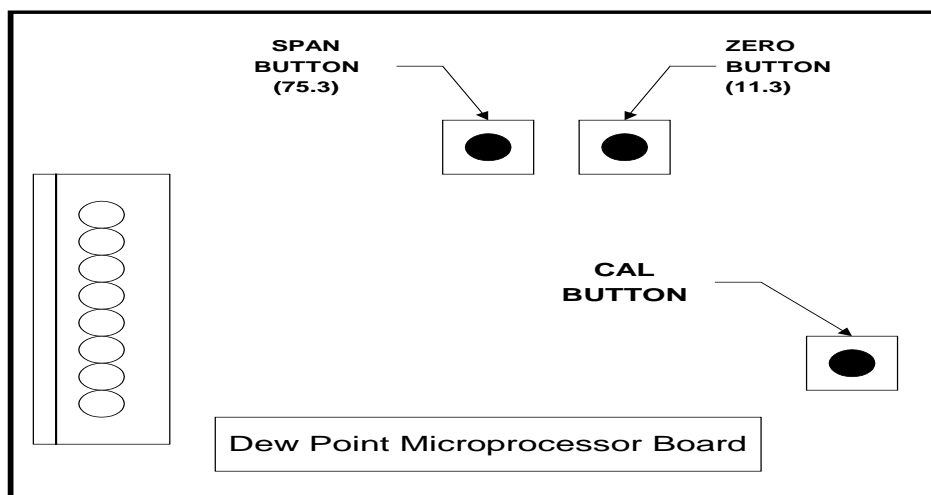
The calibration kit consists of two bottles of saturated salt solution in which each bottle generates a precise relative humidity percentage (R.H.%) value. One bottle is 11.3% R.H., and the other is 75.3% R.H. These two specific calibration points are already pre-programmed into the microprocessor board.

#### **1.0 Open the unit**

- 1.1 Remove the aluminum faceplate of the DP2000 by removing the single allen-head cap screw located at the bottom front of the faceplate. After the screw has been removed, carefully lift the front of the faceplate and slide it towards you about an inch. After the faceplate has been removed, it can temporarily be rested in the lid of the open case, to allow access to the components inside. This plate will still be connected to the interior circuit boards, so care should be taken to maintain all existing connections.

2.0 Locate the key components within the unit

2.1 The **microprocessor board** is located in the front left side of the unit. This board contains three very small buttons that are used for calibration. Two are next to one another, and they are marked “75.3%” and “11.3%”, while the other has no label. The unmarked button is the “Calibrate” button. The approximate locations of each button are shown on this diagram:



2.2 The **sensor-sampling chamber** is located in the back left of the unit. It is the gray rectangular box with brass barb fittings on either side with a black plastic gland protruding from the center.

2.3 The **sensor probe** is positioned in the sensor-sampling chamber. It is held in place by the nut on the black plastic gland.

3.0 Remove the sensor probe from the sensor sampling chamber.

3.1 Loosen the black plastic gland nut and slowly slide the sensor probe out through the airtight seal. Care must be taken when removing this sensor probe, since the tip is very delicate and can be easily damaged if it is mishandled. Note that the probe has white mark at the wire entry point, which must be aligned with corresponding white mark in plastic gland when it is re-inserted in the sampling chamber.

- 4.0 Install the sensor probe into the 75.3% salt solution.
  - 4.1 Slip the black sensor gland (supplied in the calibration kit) over the sensor probe with the sensor tip protruding from the threaded end of the gland and the sensor wires being flush with the top of the rubber o-ring in the gland. Tighten the gland around the sensor. This does not need to be done with a wrench or other tools, but it does need to be tight enough to prevent ambient air from contaminating the humidity level of the sampling chamber.
  - 4.2 Remove the cap of the 75.3% salt solution and install the sensor gland (with the sensor) into the salt solution. To increase the life of the calibration salts, an effort should be made to minimize the amount of time that the salt solution is exposed to the ambient air.
  
- 5.0 Allow the sensor to reach equilibrium with the calibration salt.
  - 5.1 With the power to the unit still turned off, leave the sensor in the calibration salt for a minimum of eighteen (18) hours. It is acceptable to leave the sensor in the salt solution for a longer period of time, even a few days, if desired.
  
- 6.0 Begin the 75.3% (Span) calibration process.
  - 6.1 After leaving the sensor in the salt for at least eighteen (18) hours, turn the unit on. The reading on the display is not important at this point.
  - 6.2 Simultaneously press the "75.3%" and "Calibration" buttons on the microprocessor board.
  
- 7.0 Verify the 75.3% (Span) calibration.
  - 7.1 Do not be concerned if the unit does not display 75.3, since it is not supposed to match the value of the calibration salt.
  - 7.2 Use the "Sensor Temp" switch on the faceplate of the unit to determine and record the sensor temperature.

- 7.3 Look up this temperature on the “Theoretical Dew Point Values for Calibration Verification” chart located in the back of this manual. Appendix “A” will show the temperature values in Fahrenheit, and Appendix B will show the temperature values in Celsius.
- 7.4 Next to the appropriate temperature, note the number in the corresponding column titled “75.3%”. This should match with the dew point that is shown on the display of the DP2000.

8.0 Determine the acceptability of the reading.

- 8.1 The value printed on the chart in Appendix A is a theoretical value, and some variation can be expected. When a calibration is performed at SSi, we certify (in writing) that the unit displays within +/- 1 degree of the theoretical value after it has been calibrated. We would not consider a calibration to be successful unless it is within +/- 1 degree, however in the case of a field calibration, this degree of accuracy may or may not be required. The degree of accuracy that is acceptable is determined by the policy of the person performing the calibration.

NOTE: Keep in mind that the DP2000 only displays even numbers, and not tenths of a degree. Therefore, a reading of 65°F could be as low as 64.50 or as high as 65.49.

9.0 Allow the sensor to achieve equilibrium at ambient atmosphere.

- 9.1 After the 75.3% (Span) calibration has been completed, remove the sensor from the calibration salt and replace the cap on the salt.
- 9.2 Leave the sensor probe in the gland and while the unit is still on, allow it to achieve equilibrium at the ambient atmosphere in the room. This is accomplished by simply leaving the sensor exposed to ambient air for between two and three minutes. You will know when this has been accomplished when the numbers on the display begin to stabilize.

10.0 Install the sensor probe into the 11.3% salt solution.

- 10.1 Remove the cap of the 11.3% salt solution and install the sensor gland (with the sensor) into the salt solution. To increase the life of the

calibration salts, an effort should be made to minimize the amount of time that the salt solution is exposed to the ambient air.

10.2 Turn the unit off.

11.0 Allow the sensor to reach equilibrium with the calibration salt.

11.1 With the power to the unit still turned off, leave the sensor in the calibration salt for a minimum of 24 hours. It is acceptable to leave the sensor in the salt solution for a longer period of time, even a few days, if desired.

12.0 Begin the 11.3% (Zero) calibration process

12.1 After leaving the sensor in the salt for at least twenty-four (24) hours, turn the unit on. The reading on the display is not important at this point.

12.2 Simultaneously press the "11.3%" and "Calibration" buttons on the microprocessor board.

13.0 Verify the 11.3% (Zero) calibration

13.1 Do not be concerned if the unit does not display 11.3, since it is not supposed to match the value of the calibration salt.

13.2 Use the "Sensor Temp" switch on the faceplate of the unit to determine and record the sensor temperature.

13.3 Look up this temperature on the "Theoretical Dew Point Values for Calibration Verification" chart located in the back of this manual. Appendix "A" will show the temperature values in Fahrenheit, and Appendix B will show the temperature values in Celsius.

13.4 Next to the appropriate temperature, note the number in the corresponding column titled "11.3%". This should match with the dew point that is shown on the display of the DP2000.

14.0 Determine the acceptability of the reading

14.1 The value printed on the chart in Appendix A is a theoretical value, and some variation can be expected. When a calibration is performed at SSi, we certify (in writing) that the unit displays within +/- 1 degree of the theoretical value after it has been calibrated. We would not consider a calibration to be successful unless it is within +/- 1 degree, however in the case of a field calibration, this degree of accuracy may or may not be required. The degree of accuracy that is acceptable is determined by the policy of the person performing the calibration.

NOTE: Keep in mind that the DP2000 only displays even numbers, and not tenths of a degree. Therefore, a reading of 18°F could be as low as 17.50 or as high as 18.49.

15.0 Allow the sensor to achieve equilibrium at ambient atmosphere

15.1 After the 11.3% (Zero) calibration has been completed, remove the sensor from the calibration salt and replace the cap.

15.2 Leave the sensor probe in the gland and while the unit is still on, allow it to achieve equilibrium at the ambient atmosphere in the room. This should take between two and three minutes. You will know when this has been accomplished when the numbers on the display begin to stabilize.

16.0 Re-assemble the unit

16.1 After the calibration process has been completed, remove the sensor probe from the gland and return it to the sensor-sampling chamber, taking care to position it properly. The white mark on the sensor probe should face towards the right of the sensor-sampling chamber (at 3:00 if it were the face of a clock.). If the white mark is not visible, then it should be placed so the sample flow directly strikes the face of the mirror on the sensor tip (the sample flows from right-to-left). In other words, the mirror should face the incoming gas stream.

16.2 Hand-tighten the black sensor gland to prevent air from leaking out of the sampling chamber.

- 16.3 Slide the faceplate into position with the back posts going into the corresponding holes as the faceplate slides back.
- 16.4 Verify that the system is leak proof by turning on the pump and placing a finger over the sample inlet port. The flow meter on the side of the unit will drop to zero if there are no leaks. If a leak is detected, make sure that all tubing connections are tight, especially the black sensor gland.
- 16.5 After the unit has passed the leak test, re-fasten the screw into the faceplate and tighten it.
- 17.0 Make sure that all caps are replaced on the calibration salts, and return the DP2000 to service.

#### **RECHARGING THE MODEL DP2000 –**

The internal 12V gel cell battery has enough power to run the analyzer for approximately 8 hours, although after many charge/discharge cycles some loss of battery life can be expected. When it is time to recharge the unit, a red “Battery Low” light will illuminate. When this light comes on, the unit will operate for an additional one to two hours before the battery is unable to power the unit and it shuts off.

A full recharge will take 16 hours, however the analyzer can be used while it is recharging. It can also be left on charge for as long as you want, with no harm to the battery. A green “Recharging” light will come on to verify that the unit is charging, and this light will go out automatically when it is completely charged.

For maximum battery life, it is recommended that the battery be discharged before it is recharged. The battery does not need to be completely discharged however, there is a correlation between the number of times that a battery is charged and the life span of the battery. By keeping the number of times the battery is recharged to a minimum, the battery life can be increased.

To charge the analyzer, plug the power cord into any 110 VAC outlet.

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The instrument is not intended for use with 220 VAC power unless it has been specifically set up accordingly at the factory. If this has been done, the serial number plate will indicate 220VAC operation.



**RETURNING THE UNIT TO SSI –**

This analyzer contains some components that may require periodic replacement based on the amount of use that the unit experiences and the methods in which it is used. If service on the unit is necessary, it should be sent back to Super Systems, Inc. in the original packaging for repair. If the original packaging is not available, the analyzer should be surrounded by impact-absorbing materials and placed in a box. It is the responsibility of the shipper to ensure that the DP2000 arrives at SSI undamaged.

Before shipping the analyzer, please call (800) 666-4330 to receive a Return Materials Authorization (RMA) number. The shipping address that should be used for returns is:

**Super Systems, Inc.  
ATTN: RMA #XXXX  
7245 Edington Drive  
Cincinnati, OH 45249**

## WARRANTY

### *Limited Warranty for Super Systems Products:*

The Limited Warranty applies to new Super Systems Inc. (SSI) products purchased direct from SSI or from an authorized SSI dealer by the original purchaser for normal use. SSI warrants that a covered product is free from defects in materials and workmanship, with the exceptions stated below.

The limited warranty does not cover damage resulting from commercial use, misuse, accident, modification or alteration to hardware or software, tampering, unsuitable physical or operating environment beyond product specifications, improper maintenance, or failure caused by a product for which SSI is not responsible. There is no warranty of uninterrupted or error-free operation. There is no warranty for loss of data—you must regularly back up the data stored on your product to a separate storage product. There is no warranty for product with removed or altered identification labels. SSI DOES NOT PROVIDE ANY OTHER WARRANTIES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME JURISDICTIONS DO NOT ALLOW THE LIMITATION OF IMPLIED WARRANTIES, SO THIS LIMITATION MAY NOT APPLY TO YOU. SSI is not responsible for returning to you product which is not covered by this limited warranty.

If you are having trouble with a product, before seeking limited warranty service, first follow the troubleshooting procedures that SSI or your authorized SSI dealer provides.

SSI will replace the PRODUCT with a functionally equivalent replacement product, transportation prepaid after PRODUCT has been returned to SSI for testing and evaluation. SSI may replace your product with a product that was previously used, repaired and tested to meet SSI specifications. You receive title to the replaced product at delivery to carrier at SSI shipping point. You are responsible for importation of the replaced product, if applicable. SSI will not return the original product to you; therefore, you are responsible for moving data to another media before returning to SSI, if applicable. Data Recovery is not covered under this warranty and is not part of the warranty returns process. SSI warrants that the replaced products are covered for the remainder of the original product warranty or 90 days, whichever is greater.

**SPARE PARTS –**

To simplify the ordering of replacement parts, the following is a list of some of the components that may be requested:

Description	Part Number
Factory Calibration	13045
Calibration Kit	31030
Filter	31033
Rechargeable Battery	31037
Dew Point Sensor	31038
Microprocessor Display Board	31501
Power Cord	33018
Flow meter	36033
Sample Pump	37119
Flexible Sample Tubing Assembly w/Filter	A20315
Cell Sampling Block	20192
Sample Tube (wand and valves)	20263

**APPENDIX “A” –**

**Theoretical Dew Point Values For Calibration Verification (Fahrenheit)**

Temp (°F)	Percent RH	
	11.3%	75.3%
69.00	12.94	60.86
69.10	13.01	60.96
69.20	13.09	61.06
69.30	13.17	61.16
69.40	13.25	61.25
69.50	13.33	61.35
69.60	13.40	61.45
69.70	13.48	61.54
69.80	13.56	61.64
69.90	13.63	61.74
70.00	13.71	61.83
70.10	13.79	61.93
70.20	13.87	62.03
70.30	13.95	62.12
70.40	14.02	62.22
70.50	14.10	62.32
70.60	14.18	62.41
70.70	14.26	62.51
70.80	14.33	62.60
70.90	14.41	62.70
71.00	14.49	62.80
71.10	14.57	62.89
71.20	14.65	62.99
71.30	14.72	63.09
71.40	14.80	63.18
71.50	14.88	63.28
71.60	14.96	63.38
71.70	15.03	63.47
71.80	15.11	63.57
71.90	15.19	63.67
72.00	15.27	63.76
72.10	15.34	63.86
72.20	15.42	63.96
72.30	15.50	64.05
72.40	15.58	64.15
72.50	15.65	64.25
72.60	15.73	64.34

Temp (°F)	Percent RH	
	11.3%	75.3%
72.70	15.81	64.44
72.80	15.89	64.54
72.90	15.97	64.63
73.00	16.04	64.73
73.10	16.12	64.82
73.20	16.20	64.92
73.30	16.28	65.02
73.40	16.35	65.11
73.50	16.43	65.21
73.60	16.51	65.31
73.70	16.59	65.40
73.80	16.66	65.50
73.90	16.74	65.60
74.00	16.82	65.69
74.10	16.90	65.79
74.20	16.97	65.89
74.30	17.05	65.98
74.40	17.13	66.08
74.50	17.21	66.18
74.60	17.28	66.27
74.70	17.36	66.37
74.80	17.44	66.47
74.90	17.52	66.56
75.00	17.59	66.66
75.10	17.67	66.76
75.20	17.75	66.85
75.30	17.83	66.95
75.40	17.90	67.04
75.50	17.98	67.14
75.60	18.06	67.24
75.70	18.14	67.33
75.80	18.21	67.43
75.90	18.29	67.53
76.00	18.37	67.62
76.10	18.44	67.72
76.20	18.52	67.82
76.30	18.60	67.91

Temp (°F)	Percent RH	
	11.3%	75.3%
76.40	18.68	68.01
76.50	18.75	68.11
76.60	18.83	68.20
76.70	18.91	68.30
76.80	18.99	68.40
76.90	19.06	68.49
77.00	19.14	68.59
77.10	19.22	68.69
77.20	19.30	68.78
77.30	19.37	68.88
77.40	19.45	68.97
77.50	19.53	69.07
77.60	19.61	69.17
77.70	19.68	69.26
77.80	19.76	69.36
77.90	19.84	69.46
78.00	19.91	69.55
78.10	19.99	69.65
78.20	20.07	69.75
78.30	20.14	69.84
78.40	20.22	69.94
78.50	20.30	70.04
78.60	20.38	70.13
78.70	20.46	70.23
78.80	20.53	70.33
78.90	20.61	70.42
79.00	20.69	70.52
79.10	20.76	70.61
79.20	20.84	70.71
79.30	20.92	70.81
79.40	21.00	70.90
79.50	21.07	71.00
79.60	21.15	71.10
79.70	21.23	71.19
79.80	21.31	71.29
79.90	21.38	71.39
80.00	21.46	71.48

**APPENDIX “B” –**

**Theoretical Dew Point Values For Calibration Verification (Celsius)**

Temp (°C)	Percent RH	
	11.3%	75.3%
20.56	-10.59	16.03
20.61	-10.55	16.09
20.67	-10.51	16.14
20.72	-10.46	16.20
20.78	-10.42	16.25
20.83	-10.37	16.31
20.89	-10.33	16.36
20.94	-10.29	16.41
21.00	-10.24	16.47
21.06	-10.21	16.52
21.11	-10.16	16.57
21.17	-10.12	16.63
21.22	-10.07	16.68
21.28	-10.03	16.73
21.33	-9.99	16.79
21.39	-9.94	16.84
21.44	-9.90	16.89
21.50	-9.86	16.95
21.56	-9.82	17.00
21.61	-9.77	17.06
21.67	-9.73	17.11
21.72	-9.68	17.16
21.78	-9.64	17.22
21.83	-9.60	17.27
21.89	-9.56	17.32
21.94	-9.51	17.38
22.00	-9.47	17.43
22.06	-9.43	17.48
22.11	-9.38	17.54
22.17	-9.34	17.59
22.22	-9.29	17.64
22.28	-9.26	17.70
22.33	-9.21	17.76
22.39	-9.17	17.81
22.44	-9.12	17.86
22.50	-9.08	17.92
22.56	-9.04	17.97

Temp (°C)	Percent RH	
	11.3%	75.3%
22.61	-8.99	18.02
22.67	-8.95	18.08
22.72	-8.91	18.13
22.78	-8.87	18.18
22.83	-8.82	18.23
22.89	-8.78	18.29
22.94	-8.73	18.34
23.00	-8.69	18.39
23.06	-8.65	18.45
23.11	-8.61	18.51
23.17	-8.56	18.56
23.22	-8.52	18.61
23.28	-8.48	18.67
23.33	-8.43	18.72
23.39	-8.39	18.77
23.44	-8.35	18.83
23.50	-8.31	18.88
23.56	-8.26	18.93
23.61	-8.22	18.99
23.67	-8.18	19.04
23.72	-8.13	19.09
23.78	-8.09	19.15
23.83	-8.04	19.20
23.89	-8.01	19.26
23.94	-7.96	19.31
24.00	-7.92	19.36
24.06	-7.87	19.42
24.11	-7.83	19.47
24.17	-7.79	19.52
24.22	-7.74	19.58
24.28	-7.70	19.63
24.33	-7.66	19.68
24.39	-7.62	19.74
24.44	-7.57	19.79
24.50	-7.53	19.84
24.56	-7.49	19.90
24.61	-7.44	19.95

Temp (°C)	Percent RH	
	11.3%	75.3%
24.67	-7.40	20.01
24.72	-7.36	20.06
24.78	-7.32	20.11
24.83	-7.27	20.17
24.89	-7.23	20.22
24.94	-7.19	20.27
25.00	-7.14	20.33
25.06	-7.10	20.38
25.11	-7.06	20.43
25.17	-7.02	20.49
25.22	-6.97	20.54
25.28	-6.93	20.59
25.33	-6.88	20.65
25.39	-6.84	20.70
25.44	-6.80	20.76
25.50	-6.76	20.81
25.56	-6.72	20.86
25.61	-6.67	20.92
25.67	-6.63	20.97
25.72	-6.59	21.02
25.78	-6.54	21.08
25.83	-6.50	21.13
25.89	-6.46	21.18
25.94	-6.41	21.24
26.00	-6.37	21.29
26.06	-6.33	21.34
26.11	-6.28	21.40
26.17	-6.24	21.45
26.22	-6.20	21.51
26.28	-6.16	21.56
26.33	-6.11	21.61
26.39	-6.07	21.67
26.44	-6.03	21.72
26.50	-5.98	21.77
26.56	-5.94	21.83
26.61	-5.90	21.88
26.67	-5.86	21.93

REVISION HISTORY -

Rev.	Description	Date	MCO
A	Initial Release	04-24-2001	
B	Added Revision History Page	07-11-2001	2016
C	Updated calibration information, added warnings	06-26-2002	2027
D	Revised Warnings	06-16-2003	2030
E	SSi address update, general update	04-12-2005	2035
F	Added additional warnings and performed general update	03-26-2007	2038
G	Updated manual to current format, added warranty text, changed shipping address	11-17-2016	2201
H	Updated Spare Parts list (A20315)	07-14-2017	2221