

Model 5230/5231 Assmann Psychrometer

User's Manual



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INTRODUCTION

The Assmann Psychrometer Models 5230 and 5231 are designed to give precision wet and dry bulb measurements in a convenient yet durable, portable case. The psychrometer includes a spring driven fan for forced aspiration, and the measuring thermo meters. Accessories include a carrying case to protect the instrument during transport, a permanent mount support arm, a carrying handle, a syringe, and a psychrometric chart.

The psychrometer gives accurate readings due to the construction of the housing, the precision of the thermometers and the constant ventilation of the fan. Since the fan is driven by a spring motor, no power source is required and the instrument can provide reliable service.

The measuring portion of the instrument is constructed of ventilating tubes and protective covers. The psychrometer uses two thermometers, one for wet bulb measurements and one for dry bulb measurements. Ambient temperature measurements can be made by reading only the dry bulb thermometer.

The Model 5230 Psychrometer provides measurements from -30°C to $+50^{\circ}\text{C}$ with a precision of 0.2 degrees. The Model 5231 Psychrometer provides measurements from -20°F to $+130^{\circ}\text{F}$ with a precision of 0.5 degrees.

SPECIFICATIONS

Measuring Range	
Model 5230	-30°C to $+50^{\circ}\text{C}$
Model 5231	-20°F to $+130^{\circ}\text{F}$
Accuracy	
Model 5230	0.2 $^{\circ}\text{C}$ typical
Model 5231	0.3 $^{\circ}\text{F}$ typical
Resolution	
Model 5230	0.2 $^{\circ}\text{C}$
Model 5231	0.5 $^{\circ}\text{F}$
Fan Aspiration	8 minutes per winding
Size	16-1/2" x 4" dia.
Weight	3 lbs.
Case size	17-1/2 x 5 x 4-1/2
Case weight	3 lbs.
Shipping Weight	8 lbs.

OPERATION

This instrument is thoroughly tested and fully calibrated at the factory and is ready for use. Please refer to the return authorization card included in the packing box if damage has occurred. Also, notify All Weather Inc.

To use the psychrometer, care must be taken to select a location for the measurement that is representative of the area of interest. Avoid sources of heat and cold and especially avoid direct solar radiation.

Measurements can be made both indoors and out of doors. Use the instrument hanger provided to prevent thermal conduction from the hands or hang the instrument from a stable support.

Prior to making any measurements, inspect the psychrometer for broken thermometers, stained or soiled wicks, free rotation of the fan. The thermometers should provide the same temperature measurement prior to wetting the wick.

Upon completion of the preliminary inspection, moisten the wick. Use only clean distilled water or soft water. Use only the syringe to moisten the wick. **NEVER TOUCH THE WICK WITH FINGERS OR HANDS.** Human body oils will soil the wick and cause inaccuracies in the data. Insert the syringe into the air intake cylinder and moisten the wick completely. Avoid excessive moistening which causes water droplets to appear at the end of the wick. Prevent water from standing inside the wet bulb cylinder. For extremely dry climates, moistening of the wick may require several repetitions. If the wick is stained or old, replace it with a new, clean wick.

To take the actual measurement, wind the motor using the key provided. Release the fan key and hold or support the psychrometer perfectly vertical. Watch the tops of the mercury columns. When there is no further drop in the wet bulb column the reading can be made. Read the mercury column at an angle of 90 degrees from the thermometer tube. A quick reading of the thermometer is necessary because of the variable nature of the humidity. It is suggested that the user reads the tenths of degrees first and then degree units.

When taking readings with the wet bulb frozen, try to use water that is 75°F (25°C). Melt any accumulated ice on the bulb by moistening with the warmed water and wait 15 minutes before operating the fan. The reading will appear to be near 32°F (0°C) and a thin thoroughly cooled coating will be seen. Due to surface evaporation, the wet bulb temperature will gradually read below 32°F (0°C). Read the thermometer at this point.

For temperatures below 32°F (0°C) but without freezing, take the reading and note that the temperature is without freezing for use with the psychrometric tables. If the temperature is near 32°F (0°C), inspect the wick for frozen water.

In dense fog, if the wet bulb reading appears higher than the dry bulb, read the dry bulb temperature and adjust the wet bulb reading to that of the dry bulb.

Calibration certificates are provided with each thermometer set. Use the correction values supplied on the certificate to correct the actual readings. Avoid incorrect use of the correction factors.

EXAMPLE

Positive corrections +0.1, +0.2, +0.3
for a reading of +15.2
and a correction of +0.1
the corrected reading is +15.3

Negative corrections -0.1, -0.2, -0.3
for a reading of +15.2
and a correction of -0.1
the corrected reading is +15.1

Zero corrections - readings are the same as the corrected value

To compute relative humidity, align the wet bulb temperature and the dry bulb temperature on a psychrometric slide rule and read the humidity directly.

The psychrometric tables are also used for determining humidity when wet and dry bulb temperatures are known. From conventional meteorological tables, compute evaporation pressures (e & E (saturated)) from the dry and wet bulb temperatures, and obtain the humidity by its percentage formula $e/E \times 100$.

THEORY OF OPERATION

The Assmann Psychrometer is designed to measure relative humidity and dew point temperature by using wet bulb and dry bulb thermometers. The depression of the wet bulb reading is compared to the dry bulb reading and the result is looked up on psychrometric tables.

The psychrometer consists of two thermometers, one used as a wet bulb thermometer with a gauze wick and one as a dry bulb thermometer without a wick. The wick is made of cotton fiber and is moistened with distilled water.

The psychrometer operates on the principle of forced aspiration to give a good sample of ambient air around the thermometer bulbs. The thermometers are supported by metal shields which form ventilation tubes around the bulb ends of the thermometers. A spring driven fan pulls air through a central tube which connects to the two ventilation tubes. The air intake ports have no sharp edges or obstructions.

The thermometer bulbs enter the ventilation tubes through special insulated fittings. A double cylinder design increases accuracy by decreasing errors from external radiation.

CALIBRATION

Calibration of the thermometers is accomplished at the time of manufacture. A certificate is issued to each psychrometer with the correction factors listed for each thermometer. Should the thermometer change from the indicated values on the certificate then the thermometer should be replaced.

MAINTENANCE

To insure accurate data, routine maintenance and care must be performed on the psychrometer. The thermometer bulbs and scales must be cleaned to prevent accumulation of dust. Use a soft moist cloth to remove dust and moisture.

The wet bulb thermometer accuracy depends upon the correct functioning of the wick on the bulb. The wick will not perform well when it is soiled or aged. Replace the wick with new material at least twice monthly or more often in dirty environments. Never place a new wick over an old wick. Always remove and discard the old wick. The wick is constructed of cotton fiber and should be similar to muslin gauze. The wick material must be thin and of good quality and should be boiled before wrapping to remove oils. During long periods of use, the wick may develop a fur coating. Remove the wick and wash it in thin hydrochloric acid and rinse in distilled water. Do not touch the wick material with bare hands. The oils in the human skin will contaminate the wick.

To clean the ventilation cylinders, covers and aspiration tube, wipe with a siliconed cloth to prevent rust. Rust and corrosion on any of the metal surfaces will cause errors due to heat from radiation.

Store the psychrometer in a polyethylene bag when the instrument is not used.

WARRANTY

Unless specified otherwise, All Weather Inc. (the Company) warrants its products to be free from defects in material and workmanship under normal use and service for one year from date of shipment, subject to the following conditions:

- (a) The obligation of the Company under this warranty is limited to repairing or replacing items or parts which have been returned to the Company and which upon examination are disclosed, to the Company's satisfaction, to have been defective in material or workmanship at time of manufacture.
- (b) The claimant shall pay the cost of shipping any part or instrument to the Company. If the Company determines the part to be defective in material or workmanship, the Company shall prepay the cost of shipping the repaired instrument to the claimant. Under no circumstances will the Company reimburse claimant for cost incurred in removing and/or reinstalling replacement parts.
- (c) This warranty shall not apply to any Company products which have been subjected to misuse, negligence or accident.
- (d) This warranty and the Company's obligation thereunder is in lieu of all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, consequential damages and all other obligations or liabilities.

No other person or organization is authorized to give any other warranty or to assume any additional obligation on the Company's behalf, unless made in writing and signed by an authorized officer of the Company.



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