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AIRDATA™ MULTIMETER ADM-870

ELECTRONIC MICROMANOMETER

AIR FLOW • VELOCITY • PRESSURE • TEMPERATURE

OPERATING INSTRUCTIONS

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1.0 INTRODUCTION

You will find these instructions much easier to follow if you have the meter in front of you as you read through them. You can note the various connections and press the keys, observing the displayed results as you read through the various procedures. The operation of the meter is quite simple and straightforward, as will become apparent after a little practice.

The AirData Multimeter performs the following essential functions. This meter measures air velocity when used with a Dwyer Series 160 standard pitot tube, an AirFoil probe, or a VelGrid and automatically corrects for density variations due to barometric pressure. The meter also corrects for density variations due to temperature if the TemProbe is connected. Velocity ranges are 25-29,000 fpm using a pitot tube, 25-5,000 fpm using the AirFoil probe, and 25-2500 fpm using the VelGrid.

Absolute pressure measurements range from 10-40 in Hg. Temperatures can be measured from -67° F to 250° F, either individually, or in conjunction with an air flow or velocity measurement.

When used with the Series 8400 FlowHood System, this unit measures air flow and may compensate for density and backpressure effects, allowing direct air flow readings from 25-2500 cfm. Accurate differential pressure measurements can be obtained from 0.0001 in wc to 60.00 in wc.

Internal calibration and zeroing of the AirData Multimeter are fully automatic. No external adjustments are ever needed. This instrument is extremely tolerant of overpressure, and is unaffected by position or by ambient temperatures from 40° F to 140° F.

It is recommended that the AirData Multimeter kit be returned to the factory at least every two years for recalibration and software update. This preventive maintenance program will assure that the original accuracy of the meter is maintained throughout the life of the meter.

2.0 SPECIFICATIONS

AIR VELOCITY: Measured in feet per minute (fpm), or meters per second (m/s), corrected for local or standard air density. The measurement range is 25 to 29,000 fpm with a Dwyer Series 160 standard pitot tube, and 25 to 5,000 fpm with the Shortridge Instruments, Inc. AirFoil probe. The measurement range using the VelGrid is 25 to 2500 fpm. Accuracy is ± 3% of reading ± 7 fpm from 50 to 8000 fpm. Pitot tube velocity readings from 8,000 fpm to 29,000 fpm are based on compressible isentropic flow theory and are not certified NIST traceable.

DIFFERENTIAL PRESSURE: Measured in inches of water column (in wc) or Pascals (Pa). The measurement range is from 0.0001 to 60.00 in wc. Maximum safe pressures are 20 psid (900% full scale) and 60 psia common mode. Accuracy is ± 2% of reading ± 0.001 in wc from 0.0500 to 50.00 in wc.

ABSOLUTE PRESSURE: Measured in inches of mercury (in Hg) or bars with reference to a vacuum. The measurement range is 10-40 in Hg. Maximum safe pressure is 60 psia. Accuracy is ± 2% of reading ± 0.1 in Hg from 14 to 40 in Hg.

TEMPERATURE: Accuracy is ± 0.5° F from 32° F to 158° F with a resolution of 0.1° F using the ADT442, ADT443, ADT444, ADT445 or ADT446 TemProbes. Meter will display readings from -67.0° F to 250.0° F. Safe exposure range for TemProbe is -100° F to 250° F. Do not expose the plastic base of the TemProbe or the extension wand to temperatures above 200° F.

AIR FLOW: Measured in cubic feet per minute (cfm) or litres per second (L/s), corrected for air density. This function requires the use of the Shortridge Instruments' Series 8400 Backpressure Compensating FlowHood System. The measurement range is 25 to 2500 cfm supply and 25 to 1500 cfm exhaust. Accuracy is ± 3% of reading ± 7 cfm from 100 to 2000 cfm (nonbackpressure compensated readings).

NOTE: The FlowHood may require the development and use of correction factors when used on swirl diffusers, or on other types of diffusers with uneven air throw. The FlowHood may not be appropriate for use on small supply outlets at high jet velocities or “nozzle” type outlets. These outlets cause an extreme concentration of air velocity on portions of the flow sensing grid. The FlowHood readings may be inaccurate under such conditions.

Consideration must be given to other system components, such as may be encountered on some **single** supply air outlet applications, where the FlowHood's slight backpressure may directly affect fan performance.

AIR DENSITY CORRECTION: The air density correction range is 14-40 in Hg and 32° F to 158° F for correction of air flow and velocity measurements. The readings represent **either** local density air flow **or** standard density sea level equivalent (mass flow) for air flow or velocity. Readings are corrected for the density effects of temperature and absolute pressure.

MEMORY: 100 readings with sequential recall of each reading with average and sum.

RESPONSE TIME: Five seconds or less at pressures greater than .002 in wc (180 fpm), and up to eight seconds at less than .0003 in wc (70 fpm). SPEED-READ mode provides continuous readings in as little as two second intervals. (Accuracy specifications do not apply).

READOUT: Eight digit, 0.5 inch, liquid crystal display (LCD).

METER HOUSING: High impact, molded, "T" grade ABS.

WEIGHT: 36 ounces, (1.02 kg) including batteries.

SIZE: 6.0" x 6.4" x 2.7" (15.2 x 16.3 x 6.9 cm).

BATTERY LIFE: Normally two working days of heavy use, or 3000 readings per charge. A set of rechargeable type AA NiCad batteries is supplied in each meter. Batteries may be recharged up to 500 times before replacement. If rechargeable batteries are not available in a field situation, the batteries may be replaced with 12 non-rechargeable "AA" pen cell batteries. WARNING: Do not plug the charger in if **any** non-rechargeable batteries are in the meter. The meter may be seriously damaged along with the batteries and charger.

BATTERY CHARGER: The battery charger requires 120V, 60Hz, 6W. Batteries recharge in a maximum of 10 hours, and **may be left on charge for an unlimited time without harm**. The temperature of the instrument during charge should be kept between 40° F and 113° F (5° C to 45° C). The meter is fully operational during recharge.

OPERATIONAL TEMPERATURE LIMITS: The specified accuracy for measurements is maintained over a meter exposure temperature range of 40° F to 140° F (5° C to 60° C).

STORAGE TEMPERATURE LIMITS: -4° F to 140° F (-20° C to 60° C).

AIR BLEED: Each pressure measurement allows a small volume of air to pass through the meter. The pressure source must be capable of supplying this volume without significant depletion to assure accurate measurements. Bleedthrough (typ) 0.0004 cu in/in wc/measurement. Quiescent bleedthrough (max) 0.0005 cu in/in wc/minute.

TUBING: The maximum recommended length of pneumatic tubing for the measurement of air flow, velocity, or differential pressure is 18 feet. Minimum tubing size is 3/16 inch internal diameter. The VelGrid is used with the two eight foot lengths of 3/16 inch ID tubing furnished with the kit.

3.0 EXTERNAL FEATURES

3.1 KEYPAD

The meter keypad has eight keys. Each key may include multiple functions that may be activated, either alternately, or by pressing the shift key followed by the function key. The instructions will often refer to a key by only one of the functions shown on the key.

A. **Upper half of keys** SILVER - active only after pressing "SHIFT" key.

Control name	Function
SHIFT	Shifts control from lower to upper half of keys and vice versa.
UNITS	Alternate action for English or metric units.
DENS	Alternate action for local or standard density.
CLEAR	Clears memory, auto-read and average functions.
OFF	Turns the meter off.
AUTO	Automatic repeat reading.

B. **Lower half of keys** BLACK - always active except following SHIFT.

Control Name	Function
MODE	Sequential action for all measurement modes (air flow, velocity, pressure and temperature).
ASSOC	Recalls associated temperature and pressure for flow and velocity
STORE	Activates memory mode, then alternate action for average and for total. (This key was labeled "MEM" prior to May, 1993).
ON	Turns the meter on.
◂ RCL	Recalls stored readings in reverse order.
RCL ▸	Recalls stored readings in entry order.
READ	Initiate measurement, and SPEED-READ or halt automatic readings.

3.2 FEATURES ON SIDES AND BACK OF METER

BATTERY CHARGER JACK
When viewed from the front, the battery charger jack is on the right side of the meter toward the top. The battery charger plug is to be connected here.

EXTERNAL READ JACK
When viewed from the front, the external read jack is on the left side of the meter toward the top. The plug for the external thumbswitch is connected here. This feature allows the operator to trigger air flow measurements from the FlowHood or VelGrid handgrip while working overhead or in awkward circumstances. The thumbswitch performs exactly the same function as the READ key.

FLAPS JACK
The flaps jack is on the back of the meter, in the upper right hand corner. The flaps plug on the FlowHood is connected here.

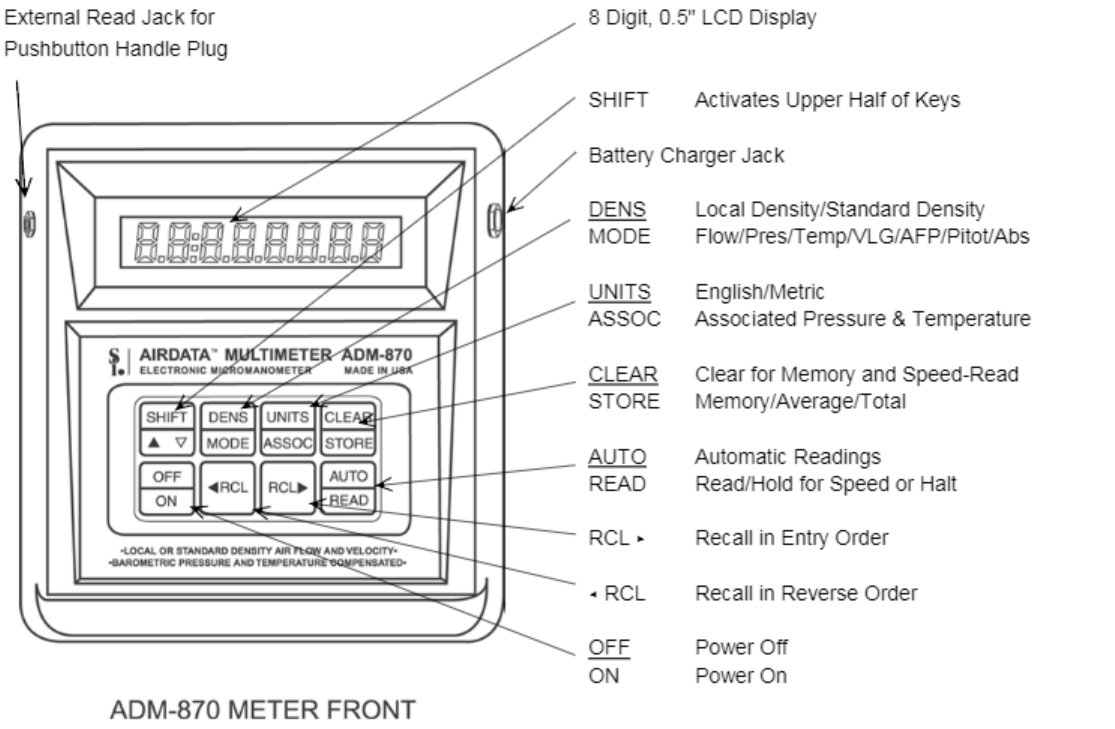
TEMPERATURE INPUT JACK
The temperature input jack is centered on the back of the meter, slightly toward the top. The flexible TemProbe sensor must be connected to this receptacle whenever temperature density correction is desired for either flow or velocity measurements. A retractile cord connects the TemProbe or the MultiTemp to the temperature input jack for remote temperature sensing.

OFF/RESET SWITCH

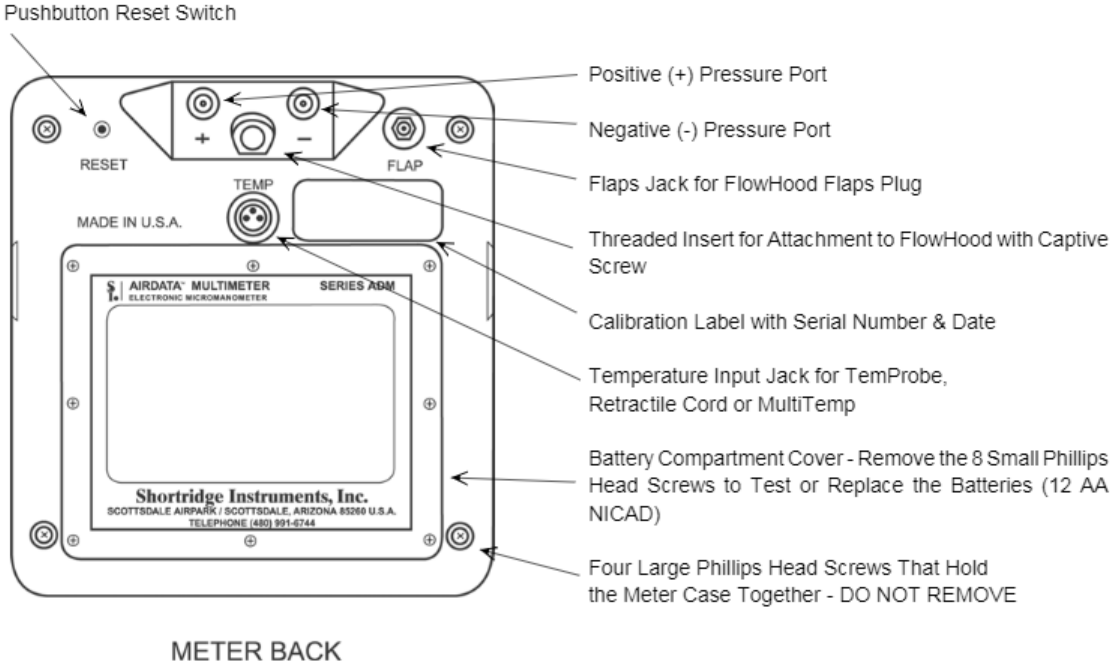
The off/reset pushbutton switch is on the back of the meter in a recess near the upper left corner. This switch is used to reset the meter in the unlikely event that the microprocessor becomes lost in its program. This may occur if the meter is dropped, and may cause the keypad to become nonfunctional until the meter is reset. If the meter continues to fall into "lockout", it may have been damaged, and should be returned for repair.

PNEUMATIC PRESSURE INLETS

Two pneumatic pressure inlets positive (+) and negative (-) are centered on the back of the meter at the top edge and may be connected to various pressure sources for the measurement of air velocity, flow, or pressure. Sources include the FlowHood, AirFoil probe, VelGrid, pitot tubes, static pressure probes, or any other pressure source not exceeding the safe limits for the meter. The negative (-) inlet senses the static pressure during flow or velocity measurements, and also is used for direct absolute pressure measurements.



ADM-870 METER FRONT



METER BACK

FIGURE 3.1 ADM-870 METER FRONT AND BACK

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