# Thermometer

- **Air Flow**
- **Hood Pressure**
- **Manometers**
- **Pitot Tubes**
- **Therm-anemometers**

## Overview

<table>
<thead>
<tr>
<th>Metric</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Volume Range</td>
<td>999,999 in selected flow</td>
<td>N/A</td>
<td>±2% RH</td>
<td>±3% RH</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>0 to 100% RH</td>
<td>0.1 to 99.9% RH</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40 to 212°F (-40 to 100°C)</td>
<td>-22 to 140°F (-30 to 60°C)</td>
<td>-4 to 140°F (-20 to 60°C)</td>
<td>-20 to 212°F (-29 to 100°C)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.5°F (±0.28°C)</td>
<td>±0.54°F (±0.3°C)</td>
<td>±1°F (±0.6°C)</td>
<td>±0.54°F (±0.3°C)</td>
</tr>
<tr>
<td>Material</td>
<td>304 SS</td>
<td>304 SS</td>
<td>Black polycarbonate</td>
<td>ABS</td>
</tr>
<tr>
<td>Diameter</td>
<td>5/16˝ (8 mm)</td>
<td>7/16˝ (11 mm)</td>
<td>1/8˝ (3 mm)</td>
<td>16-15/32˝ x 16-15/32˝</td>
</tr>
<tr>
<td>Available Lengths</td>
<td>Telescoping from 11.5 to 19,999 in selected flow</td>
<td>50 to 5000 FPM</td>
<td>0 to 6000 FPM</td>
<td>±0.2 m/s</td>
</tr>
<tr>
<td>Units</td>
<td>99,999 (CFM or m3/h); Exhaust: 80 to 2000 CFM (136 to 3398 m3/h)</td>
<td>1´ x 4´, 2´ x 4´ (optional accessories)</td>
<td>2 to 20´ (5 to 50 cm)</td>
<td>±0.05% of reading; Surface speed: 0.05 to 0.5 to 19,999 RPM; Contact: ±(0.05% + 1 digit)</td>
</tr>
</tbody>
</table>

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# Tachometers

- **Non-contact**
- **Contact**

## Accuracy

- **Non-contact**: ±0.01% of reading
- **Contact**: ±0.05% of reading; Timer: ±0.2 of reading

## Range

- **J-type**: -328 to 1400°F (-200 to 760°C)
- **K-type**: -328 to 2498°F (-200 to 1370°C)
- **T-type**: -328 to 734°F (-200 to 390°C)

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# Multimeters

- **DC Voltage**: 0.1 mV to 600 V
- **AC Voltage**: 0.1 V to 600 V
- **DC Current**: 0.01 A to 10 A
- **AC Current**: 0.1 A to 400 A
- **Resistance**: 0.1 to 40 MΩ
- **Frequency**: 0.1 Hz to 100 MHz

## Approvals

- CE, FCC
- CE, FM
- CE, FM
- CE, FM

## Memory

- RAM: 1 GB
- ROM: 4 GB
- 40 readings
- Up to 40 readings

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# Pressure Manometers

- **Series**: PUB, 472A
- **Range**: 2 to 350 in w.c.
- **Accuracy**: ±0.5% FS

## Service

- **Corrosive dry gases**: Air and compatible gases
- **Non-corrosive dry gases**: Air and compatible gases

## Units

- **Hydrostatic**: 2 to 40˝ (50.7 to 1016 mm)
- **Aerodynamic**: 0.33 to 65.62 ft/s (0.1 to 20 m/s)
- **Flow Rate**: ±0.5 to 2% of flow reading for flow rate > 0.66 ft/s (0.2 m/s)

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# Ultrasonic Flowmeters

- **Series**: AQTIA-WDPM, 477AV, 477B, 475, 490A
- **Range**: 2 to 350 in w.c.
- **Accuracy**: ±0.5% FS

## Units

- **Hydrostatic**: 2 to 20 psi (20 to 30 in w.c.); 5 psig (1 to 10 in w.c.); 10 psig (20 to 40 in w.c.); 30 psig (15 psi); 60 psig (100 psi); 100 psig (50 psi); 200 psig (100 psi); 300 psig (150 psi)
- **Aerodynamic**: 20 psi (20 to 30 in w.c.); 5 psig (1 to 10 in w.c.); 10 psig (20 to 40 in w.c.); 30 psig (15 psi); 60 psig (100 psi); 100 psig (50 psi); 200 psig (100 psi); 300 psig (150 psi)

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# Other Products

- **Accuracy**: ±0.5% FS ±0.5% FS ±0.1% FS ±0.5% FS ±0.5% FS

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# Contact Information

- **Dwyer Instruments, Inc.**
  - P.O. Box 373
  - Michigan City, IN 46360
  - Phone: 800-872-9141
  - Email: dwyer-inst.com
  - Website: dwyer-inst.com

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**PRODUCT OVERVIEW**

**AIR FLOW HOOD PRESSURE MANOMETERS**

- **Wet Bulb Range**: N/A N/A -7.6 to 158°F (-22 to 70°C) N/A N/A
- **Air Volume Range**: N/A
- **Humidity Accuracy**: ±2% RH
- **Temperature Accuracy**: ±0.5°F (±0.28°C)
- **K-Factor**: 1.0 0.81 1.0 0.84 0.843
- **Humidity Range**: ±2% FS
- **Material**: 304 SS
- **Diameter**: 5/16˝ (8 mm) [standard] or
- **Available Lengths**: 8 to 216˝ (203 to 5486 mm)

**PITOT TUBES**

- **Air Velocity Range**: 0 to 6000 FPM
- **Volume Flow**: ±3% of reading ±7 CFM.

**THERMO-ANEMOMETERS**

- **Air Velocity Range**: 50 to 5000 FPM
- **Surface speed**: 0.05 to 0.5 to 19,999 RPM; 99,999 RPM; Contact: ±0.05% of reading; Timer: ±0.2 sec
- **Non-contact**: ±0.01% of reading; Contact: ±0.05%

**TACHOMETERS**

- **Range**: 999,999 units
- **Non-contact**: 2.5 to 20˝ (5 to 50 cm)
- **Contact**: ±0.05% of reading; Timer: ±0.2 sec

**OVERVIEW**

**PRODUCT**

- **Approvals**: CE, FCC CE CE CE, FM CE
- **RAM**: 1 GB & ROM 4 GB
- **Range**: 40 readings
- **Accuracy**: ±0.5% FS ±0.5% FS ±0.1% FS ±0.5% FS ±0.5% FS
- **Service**: Non-corrosive dry gases
- **Protection**: Air and compatible gases
- **Ranges**: 20 psi (20 to 30 in w.c.);
- **Pressure Limits**: 15 psi (100 in w.c.); 45 psi
- **Flow Rate**: ±0.5 to 2% of flow reading for flow rate > 0.66 ft/s (0.2 m/s) and pipe ID > 2.95˝ (75 mm); ±3% of flow reading for flow rate < 0.66 ft/s (0.2 m/s)
- **Type J, K, T thermocouples**
- **Ranges**: J-type: -328 to 1400°F (-200 to 760°C); T-type: -328 to 734°F (-200 to 390°C); K-type: -328 to 2498°F (-200 to 1370°C); 600 Vrms 1000 Vrms N/A N/A
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: ±0.13% reading + 1.4°F + .006°/°F below 1000°F
- **Ranges (Accuracy)**: SERIES MM-1 MM-2 CM-2 CM-3
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: 0.5 to 4.5˝ (13 to 115 mm) or
- **Surface speed**: 0.05 to 0.5 to 19,999 RPM; 99,999 RPM; Contact: ±0.05% of reading; Timer: ±0.2 sec
- **Non-contact**: ±0.01% of reading; Contact: ±0.05%

**ULTRASONIC FLOWMETER**

- **Range**: 2 to 20˝ (5 to 50 cm)
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: ± (1.0% + 3 digits)
- **Ranges**: SERIES AQTIA-WDPM 477AV 477B 475 490A
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: ± (2.0% + 10 digits)
- **Ranges**: 600 Vrms 1000 Vrms N/A N/A
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: ± (0.8% + 2 digits)
- **Ranges**: 0.5 to 87 kPa
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
- **Accuracy**: ± (1.5% + 5 digits)
- **Ranges**: 0.001 V to 600 V (0.8% + 3 digits); DC Voltage: 0.1 mV to 600 V ± (1.0% + 3 digits); AC Voltage: 0.1 mV to 600 V ± (1.3% + 5 digits); DC Current: 0.1 A to 400 A ± (1.0% + 3 digits); AC Current: 0.1 A to 400 A ± (1.0% + 3 digits)
- **Protection**: Air and compatible gases
- **Service**: Air and compatible gases
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- **Ranges**: 0.5 to 87 kPa
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AIR BALANCING

Readings from traverse measurement can be stored by pushing a button. Model UHH2 handheld base with various compatible wireless probes. VP1 vane thermo-anemometer probes can be interchanged for register or Air Balancing Test Instruments combine our time proven SERIES 47X mobile gateway in hard carrying case with NIST certificate.

UHH2 + Thermo-Hygrometer
UHH2 + 100 mm Vane Thermo-Anemometer
AQTIA-RP2
UHH2 + Wireless Differential Pressure
AQTIA-VP2
Probe
AQTIA-WDPM

SMART AIR HOOD™ BALANCING INSTRUMENT

AIR BALANCING HVAC SYSTEMS

METHODS OF AIR BALANCING

There are two traditional methods for balancing airflow at the terminal, number 4, and flows for Terminals 1, 2, and 3 are correctly balanced. The SMART Air Hood™ Balancing Instrument includes the PredictAir™ Flow Design Technology for controlling air flow and minimizing back pressure.

PREDICTAIR™

Application Software which reduces the number of steps in the air flow balancing process and give more accurate results than traditional proportional balancing. For traditional proportional balancing, an air flow hood, or capture hood, is used to gather a sample of the air flow. The SMART Air Hood™ is a non-intrusive instrument which does not interfere with the airflow or pressure at the terminal under-adjustment (TUA) to the key to gain the correct flow balance. The fan RPM can be set to deliver the intended total air volume and all terminals will deliver the design flow within the established tolerance. Systems that are higher or lower than this range will not balance properly. If the system is outside of this range, the fan speed must be adjusted accordingly. The SMART Air Hood™ has both PredictAir™ and Proportional Balancing functions.

Comparison between PredictAir™ and Proportional Balancing:

PredictAir™ is a process that guides the balancing technician on how to set the terminal damper to achieve the correct flow balance by calculating the design air flow at the terminal. PredictAir™ uses an algorithm to calculate the best flow set point for the terminal to achieve the desired design flow. The PredictAir™ algorithm takes into account the terminal under-adjustment (TUA) to the key, the tolerance can vary considerably, which limits the accuracy of the balancing. The illustration in Figure 2 shows the potential number of lengthy steps involved with proportional balancing.

Since the technician is estimating where to set the flow rate of the TUA, the terminal under-adjustment (TUA) to the key to gain the correct flow is not balance properly. If the system is outside of this range, the fan speed must be adjusted accordingly. The SMART Air Hood™ has both PredictAir™ and Proportional Balancing functions.

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**AIR BALANCING**

**TEST INSTRUMENT KITS**

**ZIP KITS**

**POPULAR MODELS**

- 473B 477AV
  - Probe: UHH2 + 100 mm Vane Thermo-Anemometer
- 7600-VP1
  - Probe: AQTIA-VP2
  - Module: Wireless Differential Pressure

**FEATURES/BENEFITS**

- NIST Certificate
- Anemometer probe, thermo-hygrometer probe, and 12˝ Pitot Tube, 18˝ universal base unit, vane thermo-anemometer probe, hot-wire thermo-anemometer probe, and 12˝ Pitot Tube, 18˝ universal base unit
- Rugged, extruded aluminum housing protects the device from damage
- Rugged IP68 weather-proof housing withstands 1.5 meter drop test
- Wi-Fi direct wireless communication provides a range up to 200 yards
- Physical strain. One technician can complete the air balancing of existing bulky air hoods, providing greater maneuverability and less physical strain. The ergonomic design is much lighter and easier to work with than the existing bulky air hoods. The lever kit is a field adjustable damping kit for the SMART Air Hood ™ Balancing Instrument.

**AIR BALANCING HVAC SYSTEMS**

**METHODS OF AIR BALANCING**

- Predictive Balancing
- Proportional Balancing
- Manual Balancing

**PROPORTIONAL BALANCING**

This process requires the balancing technician to adjust the flow from the primary terminal to the key terminal. The terminal flows are determined by the terminal and the order in which they should be adjusted. The Predictive Balancing process begins by opening the terminal under-adjustment (TUA) to the key to gain the correct flow. The terminal flows are determined by the terminal and the order in which they should be adjusted. The Predictive Balancing process begins by opening the terminal under-adjustment (TUA) to the key to gain the correct flow.

**PREDICTAIR™ SERIES SAH SMART AIR HOOD ™ BALANCING INSTRUMENT**

The SMART Air Hood ™ Balancing Instrument includes the PredictAir ™ Balancing Instrument. The PredictAir ™ Balancing Instrument allows for Predictive Balancing, which is a method of predicting the optimal flow setting for each terminal. The PredictAir ™ Balancing Instrument allows for Predictive Balancing, which is a method of predicting the optimal flow setting for each terminal. The PredictAir ™ Balancing Instrument allows for Predictive Balancing, which is a method of predicting the optimal flow setting for each terminal.

**AIR QUALITY TEST INSTRUMENT KITS**

**POPULAR MODELS**

- 160-KIT 160F-KIT
- 160F-KIT
- 500 psi Hydronic Differential Pressure Manometer Kit with Digital Dampening

**PITOT TUBE KITS**

**POPULAR MODELS**

- 160F-KIT
- 160-KIT
- 160F-KIT
AIR BALANCING

**47X KITS**

Wireless measurement of pressure, air velocity, air flow, temperature, and humidity, dew point, and wet bulb temperatures can be automated with a professional kit that includes the components for balanced duct measurements. Humidity, dew point, and wet bulb temperatures can be measured and monitored using a professional kit.

**FEATURES/BENEFITS**

- **Interchangeable probes** are automatically recognized by the controller.
- **Rugged, extruded aluminum housing** protects the device from damage.
- **High resolution** measurement for tight tolerances.
- **Logical software** for easy data interpretation.
- **Digital dampening for low pressure** - high resolution logging stability.
- **Backlight for use in dim areas**.
- **Up to 0.5% accuracy**.
- **Seven user-selectable English and metric units**.
- **Etched ruler markings simplify duct traverse measurements**.
- **New features added to the Series 490A** are a field adjustable damping mechanism and an improved range of flow rates.
- **Digital pressure** - temperature - humidity - velocity - flow measurement.
- **Dwyer’s SMART Air Hood™ Balancing Instrument and guides balancers** to balance HVAC systems by setting the damper for Terminal 3 to 525 CFM, Terminal 1 is the key, delivering 100% of design flow, then Terminal 2 is adjusted to capture the total flow. The terminal flows are determined by the terminal and damper to capture the total flow. The total flow is distributed into the four terminal flows. The terminal flows are determined by the terminal and damper.

**PREDICTIVE BALANCING**

- **Predictive Balancing** is a process that guides the balancing technician on how to adjust the dampers to capture the total flow.
- **Phase** 1: Predictive Balancing calculates the ideal flow set point for Terminal 2.
- **Phase** 2: Predictive Balancing calculates the ideal set point for the last terminal.
- **Phase** 3: Predictive Balancing calculates the ideal set point for the last terminal.
- **Phase** 4: Predictive Balancing calculates the ideal set point for the last terminal.
- **Phase** 5: Predictive Balancing calculates the ideal set point for the last terminal.
- **Phase** 6: Predictive Balancing calculates the ideal set point for the last terminal.
- **Phase** 7: Predictive Balancing calculates the ideal set point for the last terminal.

**SMART AIR HOOD™ BALANCING INSTRUMENT**

- **Digital pressure - temperature - humidity - velocity - flow measurement**.
- **Dwyer’s SMART Air Hood™ Balancing Instrument and guides balancers** to balance HVAC systems by setting the damper for Terminal 3 to 525 CFM, Terminal 1 is the key, delivering 100% of design flow, then Terminal 2 is adjusted to capture the total flow. The terminal flows are determined by the terminal and damper to capture the total flow. The total flow is distributed into the four terminal flows. The terminal flows are determined by the terminal and damper.

**AIR QUALITY TEST INSTRUMENT KITS**

- **AQTIA-AP2 Probe**
- **AQTIA-VP2 Probe**
- **AQTIA-WDPM Probe**
- **UHH2 + Thermo-Hygrometer**
- **UHH2 + Thermo-Anemometer**

**AIR BALANCING HVAC SYSTEMS**

**METHODS OF AIR BALANCING**

- **Proportional Balancing**
- **Diagonally Opposite Method**
- **Process Balancing**
- **Pressure Scans**
- **Air Flow Scans**
- **Zero Flow Scans**
- **Volume Scans**
- **Wet Bulb Scans**

**APPLICATION SOFTWARE**

- **Application Software** displays flow measurements from the balancing instrument.

**BALANCING INSTRUMENT**

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- **Wet Bulb Scans**

**APPLICATION SOFTWARE**

- **Application Software** displays flow measurements from the balancing instrument.

**BALANCING INSTRUMENT**

- **Application Software** displays flow measurements from the balancing instrument.

**AIR QUALITY INSTRUMENTS**

- **AQTIA-AP2 Probe**
- **AQTIA-VP2 Probe**
- **AQTIA-WDPM Probe**
- **UHH2 + Thermo-Hygrometer**
- **UHH2 + Thermo-Anemometer**

**AIR QUALITY TEST INSTRUMENT KITS**

- **AQTIA-AP2 Probe**
- **AQTIA-VP2 Probe**
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AIR BALANCING
and modules. Professional kits are available that include the components
straight pitot tube to directly measure air velocity or air flow. The 477AV line of digital manometers can be combined with a traditional or
be measured using the Model RP1 thermo-hygrometer probe. Our Series
duct measurements. Humidity, dew point, and wet bulb temperatures can
lower air velocities, our Model AP1 hot wire thermo-anemometer probe or
The Air Balancing Test Instruments combine our time proven
number of lengthy steps involved with proportional balancing. The illustration in Figure 2 shows the potential
relative to the key, the tolerance can vary considerably, which limits the
tolerances.

With proportional balancing (reference Figure 2), the technician balances a
process and give more accurate results than traditional proportional
blower/fan from the damper closures during the balancing process.
flows.

Balancing calculates the ideal set point for Terminal 3 and predicts the new
damper loads and the pressure drop in the system. The SMART Air Hood ™ Balancing Instrument includes the PredictAir ™
register in order to balance the HVAC system accurately and efficiently.
yards (183 m) between the hood and the handheld test instrument.

The SMART Air Hood ™ Balancing Instrument is the most
included hood stand and wireless communications to the handheld, a
patterns to provide a more even air flow that minimizes backpressure
allowing a averaged reading when the pressure is fluctuating and automatic
Stores up to 40 readings for later recall
Seven user-selectable English and metric units
Up to 0.5% accuracy
Seven user-selectable English and metric units
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SMART AIR HOOD™ BALANCING INSTRUMENT

PREDICTIVE BALANCING
The SMART Air Hood ™ Balancing Instrument does the cheating and
predicts the balancing needs. The SMART Air Hood ™ Balancing Instrument
expressly, five damper commands and sufficient air flows. The SMART Air
in the PredictAir Express Balance mode. Three damper commands and two
the SMART Air Hood ™ Balancing Instrument predict the
flows for Terminals 1, 2, and 4.

The SMART Air Hood ™ Balancing Instrument includes the
PredictAir software application. The handheld is an 18˝, 24˝, 36˝, and

The SMART Air Hood ™ Balancing Instrument includes the
PredictAir ™ Application Software, the balancing process takes much less
time and allows three damper commands to adjust
PredictAir™ Application Software is factory installed into the handheld unit

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ADAPTER HOOD ACCESSORIES
Gasket, 2˝-5˝ (51 mm-127 mm) and

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AIR QUALITY TEST INSTRUMENT KITS

POPULAR MODELS
Hygrometer, 0-2000 ppm
Hygrometer, 0-2000 ppm

POD TUBE KITS

The SMART Air Hood™ Balancing Instrument comes with
a handheld unit, a handheld case, a carrying case, and an 18˝, 24˝, 36˝, and
An 18˝, 24˝, 36˝, and 48˝ Pitot tube. All of our Pitot tubes are constructed

AIR QUALITY TEST INSTRUMENT KITS

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Hygrometer, 0-2000 ppm
Hygrometer, 0-2000 ppm

POD TUBE KITS

PRODUCT OVERVIEW

Air Volume Range
999,999 in selected flow

Humidity Range
±2% FS ±2% FS ±2% FS ±2% FS ±1% of reading ±0.03 m/s

Temperature Range
-40 to 212°F (-40 to 100°C) -22 to 140°F (-30 to 60°C) -4 to 140°F (-20 to 60°C) -20 to 212°F (-29 to 100°C) -40 to 212°F (-40 to 100°C)

Air Velocity Range
5/16˝ (8 mm) [standard] or
Diameter
5/16˝ (8 mm) 7/16˝ (11 mm)

Air Velocity Accuracy
±3% FS ±1.5% of reading ±20 FPM ±3% of reading ± 0.2 m/s ±1.5% of reading ±20 FPM ±3% FS

Volume Flow: Supply: 40 to 2000 CFM (68 to 3398 m3/19,999 in selected flow 99,999 in selected flow 36˝ (29 to 91 mm)

Volume Flow: ±3% of reading ±7 CFM.

Hood Sizes
2´ x 2´ (standard); 1´ x 4´, 2´ x 4´ (optional accessories)

Available Lengths
SERIES 160 160F 166T 160G ANE-1

SERIES AQTIA-AP2 AQTIA-VP2 VT-300 473B 471B

Materials
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Volume Flow: Supply: 40 to 2000 CFM (68 to 3398 m3/19,999 in selected flow 99,999 (CFM or m3/s)

Volume Flow: ±3% of reading ±7 CFM.

Hood Sizes
2´ x 2´ (standard); 1´ x 4´, 2´ x 4´ (optional accessories)

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