### THERMOMETERS

**Overview**

<table>
<thead>
<tr>
<th>Model</th>
<th>Wet Bulb Range</th>
<th>Temperature Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N/A</td>
<td>-40 to 212°F (-40 to 100°C)</td>
<td>±0.5°F (±0.28°C)</td>
</tr>
</tbody>
</table>

### AIR FLOW HOOD PRESSURE MANOMETERS

**Overview**

<table>
<thead>
<tr>
<th>Model</th>
<th>Air Volume Range</th>
<th>Humidity Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>999,999 in selected flow</td>
<td>0 to 100% RH</td>
<td>±0.5 to 2% RH</td>
</tr>
</tbody>
</table>

### PITOT TUBES

**Overview**

<table>
<thead>
<tr>
<th>Model</th>
<th>Diameter</th>
<th>Measuring Distance</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5/16˝ (8 mm)</td>
<td>2 to 20˝ (50.7 to 500 mm)</td>
<td>±0.01%</td>
</tr>
</tbody>
</table>

### THERMO-ANEMOMETERS

**Overview**

<table>
<thead>
<tr>
<th>Model</th>
<th>Variety</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>±0.54°F (±0.3°C)</td>
</tr>
</tbody>
</table>

### OVERVIEW

**Product Approvals**

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

**Memory**

- DC Voltage: 0.1 mV to 600 V
- DC Current: 0.01 A to 10 A
- AC Voltage: 0.1 V to 600 V
- Resistance: 0.1 Ω to 2000 Ω

**Pressure Limits**

- 10 psi (2 to 10 in w.c.)
- 150 psig (100 psi)
- 200 psig (100 psi)
- 5 psig (1 to 10 in w.c.)

**Service**

- Non-corrosive dry gases
- Air and compatible gases
- Air and compatible gases
- Air and compatible gases

**Series**

- Series 160
- Series 160F
- Series 166T
- Series 160G
- Series AQTIA-AP2
- Series AQTIA-VP2
- VT-300
- 473B
- 471B

**Quantity**

- 1.0
- 0.81
- 1.0
- 0.84
- 0.843

**Accuracy**

- Temperature Accuracy: ±0.5°F (±0.28°C) ±0.54°F (±0.3°C) ±1°F (±0.54°F (±0.3°C) ±0.5°F (±0.28°C)

**Material**

- 304 SS
- 304 SS
- 304 SS
- Black polycarbonate
- ABS

**Other Features**

- Volume Flow: ±3% of reading ±10 CFM

**Units**

- Volume Flow: Supply: 40 to 2000 CFM (68 to 3398 m³/h); Exhaust: 80 to 2000 CFM (136 to 3398 m³/h)

**Options**

- Available Lengths: 8 to 216˝ (203 to 5486 mm)
- 18 to 60˝ (457 to 1524 mm)

**Contact Information**

- Return Service Requested

- Fr # 150002-17

- DWYER INSTRUMENTS, INC.

- Michigan City, IN 46360

- 800-872-9141
dwyer-inst.com

- BC-HVAC

- ULTRASONIC FLOWMETER

- MULTIMETERS

- PRODUCT OVERVIEW

- PRESSURE MANOMETERS

- SATURATION MOISTURE METER

- ULTRASONIC FLOWMETER

- THERMOMETERS

- TACHOMETERS
AIR BALANCING

**PROPERTIES OF AIR BALANCING**

1. **Standard Air Balancing** - Primarily focuses on pressure differences between supply and return air streams to achieve the desired airflow rate.
2. **Differential Pressure** - Uses a pressure drop to assess airflow balance, where lower pressure differences indicate balanced airflow.
3. **Standard Air Balancing** - Requires manual calculations and can be time-consuming.
4. **Differential Pressure** - Enables quick and accurate assessments through electronic measurement.

**FEATURES AND BENEFITS**

- **NIST Certificate**
- **Anemometer Probe**
- **Thermo-Hygrometer Probe**
- **12˝ Pitot Tube**
- **18˝ Straight Pitot Tube**

**POPULAR MODELS**

- **AQTIAP-WDPM-005-PKIT**

**PREDICTIVE BALANCING**

Predictive Balancing is a process that guides the balancing technician on how to optimize the airflow rate for each terminal. It involves measuring the flow rates and calculating the ideal settings for each terminal.

1. **Terminal 1 Adjust**
2. **Key Adjust**
3. **Terminal 3 Adjust**
4. **Terminal 4 Adjust**

**SMART AIR HOOD™ BALANCING INSTRUMENT**

- **A-SAH™**
- **ASAH-14S**
- **A-SAH-12P**
- **A-SAH-CK**
- **A-SAH-BK**

**PREDICTAIR™**

PredictAir is a software application that reduces the number of steps in the air flow balancing process.

**APPLICATION SOFTWARE**

The **APPLICATION SOFTWARE** is factory installed into the handheld unit and can be downloaded to any smartphone or tablet. It provides real-time data and guides the technician through the balancing process.

**PDUCT TUBE KITS**

- **ET-4080**
- **490A-6-HKIT**
- **490A-5-HKIT**
- **490A-6-HKIT**

**AIR QUALITY TEST INSTRUMENT KITS**

- **160F-KIT**
- **160F-24**
- **160F-36**
- **160F-48**

**ADAPTER HOOD ACCESSORIES**

- **Cable harness**
- **Cable harness**
- **Cable harness**

**DIGITAL DAMPERING**

Digital dampering for low pressure - high resolution logging stability.

**ASME DESIGN MEETS**

ASME design meets AMCA and ASHRAE codes.

**PROTECTIVE CARRYING CASE**

Protective carrying case prevents damage during transport.

**ETCHED RULER MARKINGS**

Etched ruler markings simplify duct traverse measurements.

**SINGLE OPERATOR BALANCING**

With Predictive Balancing, a single operator can balance a branch in less time than traditional balancing methods.

**NEW FEATURES**

New features added to the Series 490A are a field adjustable damping mechanism and calibrated pressure module.

**ETC**

- **4.5´ to 12´ (1.4 m x 3.7 m) extendable pole (required for terminal 2)**
- **Canvas hood 1´ x 4´ (0.3 m x 1.2 m)**

**APPLICATION SOFTWARE**

Application Software can be downloaded to any smartphone or tablet.

**Wi-Fi DIRECT**

Wi-Fi direct wireless communication provides a range up to 200 yards.

**SMART AIR HOOD™**

Dwyer’s **SMART Air Hood™** Balancing Instrument and guides balancers in the field to optimize the airflow. SMART Air Hood™ can be used with an application software, which reduces the number of steps in the air flow balancing process.

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Air balancing a distribution system is needed to properly direct the air flow and humidity to Key. Are they in proportion? Compare terminal flows for terminals 1, 2, and 4. Balancing calculates the ideal set point for Terminal 3 and predicts the new flows for terminals 1, 2, and 4. Finally, Predictive Balancing calculates the ideal set point for the last terminal under-adjustment (TUA) to the key to gain the correct flow proportion.

Since the technician is estimating where to set the flow rate of the TUA when this is the first damper adjusted in the system, and Terminal 1 is the terminal that the flow is to be directed to. The figure above (Figure 2) shows the traditional proportional balancing method. The SMART AIR HOOD™ Balancing Instrument shows the actual air flow being measured at each register in order to balance the HVAC system accurately and efficiently. Wi-Fi direct wireless communication provides a range up to 200 yards (183 m) between the hood and the handheld test instrument. Communication gives reliable communication with a distance of up to 200 yards (183 m) between the hood and the handheld test instrument.

For traditional proportional balancing, an air flow hood, or capture hood, is used. Air flow hoods can be expensive, time consuming, and not an accepted method of capturing the actual air flow. Another accepted method of capturing the actual air flow is by placing a pitot tube at each register in order to balance the HVAC system accurately and efficiently. Balancing calculates the ideal set point for the last terminal under-adjustment (TUA) to the key to gain the correct flow proportion.
Air balancing is necessary to take accurate air velocity, air flow, temperature, humidity, and duct measurements. Humidity, dew point, and wet bulb temperatures can be measured with digital manometers. A line of digital manometers can be combined with a traditional or wireless measurement device.

**Features/Benefits**

- **NIST Certificate**
- **Anemometer probe, thermo-hygrometer probe, and 12˝ Pitot Tube, 18˝ hose module**

**Wired Professional Kit** includes:
- 10 in w.c. Manometer, 500 psi Hydronic Differential Pressure Manometer Kit with integral 3 way manifold valve and complete hose kit in a hard carrying case.
- Protective carrying case prevents damage during transport.
- Digital damping for low pressure - high resolution logging stability.

**Popular Models**

- **SERIES 47X**
- **UHH2**
- **Thermo-Anemometer**
- **SERIES 490A**
- **Digital manometer**
- **RP1 VP1**

**Test Instrument Kits**

Air balancing a distribution system is needed to properly direct the air flow to maintain a proper balance of the HVAC system. Air balancing a distribution system is needed to properly direct the air flow to maintain a proper balance of the HVAC system.

**Smart Air Hood™ Balancing Instrument**

Predictive Balancing is a process that guides the balancing technician on the key terminal’s flow changes when the TUA damper is adjusted. The key terminal’s flow changes when the TUA damper is adjusted. This will meet the design requirements.

**Adapters and Accessories**

- **160F-KIT**
- **500 psi Hydronic Differential Pressure Manometer Kit**
- **500 psi Hydronic Differential Pressure Manometer Kit**
- **Protective carrying case prevents damage during transport**
- **Digital damping for low pressure - high resolution logging stability**

Air balancing HVAC systems is necessary to take accurate air velocity, air flow, temperature, humidity, and duct measurements. Humidity, dew point, and wet bulb temperatures can be measured with digital manometers. A line of digital manometers can be combined with a traditional or wireless measurement device.

**ADAPTER HOOD ACCESSORIES**

- **A-SAH-BK**
- **SAH-22**
- **A-SAH-12P**

The Smart Air Hood™ Balancing Instrument checks for the ideal flow set point by adjusting the Terminal 2 flow to the ideal flow set point. Then Terminal 2 flow is adjusted to the ideal flow set point. The key terminal’s flow changes when the TUA damper is adjusted. The key terminal’s flow changes when the TUA damper is adjusted. This will meet the design requirements.

**Predictive Balancing**

The Predictive Balancing process goes through the balancing process using Predictive Balancing's Express Balance mode. Predictive Balancing is a process that guides the balancing technician on the key terminal’s flow changes when the TUA damper is adjusted. The key terminal’s flow changes when the TUA damper is adjusted. This will meet the design requirements.

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Air Balancing Test Instrument KITS

Air Balancing HVAC Systems

Dwyer has designed a variation of proportional balancing, which is called Predictive Balancing, to help balance practitioners get to the ideal flow settings they’re seeking. The Predictive Balancing process is a two-part strategy that uses a combination of certain flow measuring devices in a balanced system to achieve optimal flow settings. The Predictive Balancing process can be applied to any balanced system, including systems that do not have a key terminal. Once the Predictive Balancing process is complete, the system is balanced and can tolerate most liquid media compatible with 316LSS.

FEATURES/BENEFITS

• Patent pending Quad Flow Design Technology directs the circulating air through multiple spaces to ensure consistent performance.
• Flow Design Technology for controlling air flow and minimizing back pressure.
• Smart Air Hood™ Balancing Instrument includes the PredictAir™ Application Software which reduces the number of steps in the air flow balancing process.
• The SAH adapter base kit for canvas hood, 2´ x 4´ (0.6 m x 1.2 m) yard (1.83 m) between the hood and the handheld test instrument.
• Canvas hood, 2´ x 4´ (0.6 m x 1.2 m) yards (183 m) between the hood and the handheld test instrument.

ADAPTER HOOD ACCESSORIES

• Kit containing 160-18, 160-24, 160-36, 160-48, and carrying case in hard carrying case; one (1) each per kit.

AIR QUALITY TEST INSTRUMENT KITS

Air Quality Test Instrument Kit with UHH2 base

Applicable when an air flow hood, or capture hood, is used to capture and test the air from a system. In order to ensure the proper flow to each terminal, the technician must open and close each terminal’s damper to achieve the design flow rate. This process requires the technician to use a combination of air flow measuring devices (e.g., digital manometer, anemometer probe, thermo-hygrometer probe, and 12˝ Pitot Tube) to measure the flow to each terminal. The technician must use these devices in a balanced system to achieve optimal flow settings. The Predictive Balancing process is a two-part strategy that uses a combination of certain flow measuring devices in a balanced system to achieve optimal flow settings. The Predictive Balancing process can be applied to any balanced system, including systems that do not have a key terminal. Once the Predictive Balancing process is complete, the system is balanced and can tolerate most liquid media compatible with 316LSS.

Dwyer Instruments, Inc. is the largest manufacturer of traditional and digital manometers. Dwyer makes tabletop, mobile, and handheld manometers in various models and configurations. A selection of these manometers are included in the SMART Air Hood™ Balancing Instrument, which includes the PredictAir™ Application Software. The PredictAir™ Application Software includes a set of tools that allows users to quickly and easily capture air data and flow rates from a balanced system.

The SMART Air Hood™ Balancing Instrument and guides balancers through the balancing process using Predictive Balancing. Predictive Balancing is a method of predicting the optimal flow setting for each terminal in a balanced system. Predictive Balancing allows for balancers to perform the balancing process using a combination of air flow measuring devices and a computer program. The PredictAir™ Application Software allows users to quickly and easily capture air data and flow rates from a balanced system. The SMART Air Hood™ Balancing Instrument includes the PredictAir™ Application Software, which reduces the number of steps in the air flow balancing process. The PredictAir™ Application Software includes a set of tools that allows users to quickly and easily capture air data and flow rates from a balanced system.

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<table>
<thead>
<tr>
<th>SERIES</th>
<th>AIR FLOW</th>
<th>HOOD PRESSURE</th>
<th>MANOMETERS</th>
<th>THERMO-ANEMOMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>999,999</td>
<td>999,999</td>
<td>999,999</td>
<td></td>
</tr>
<tr>
<td>160F</td>
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<td>166T</td>
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<tr>
<td>160G</td>
<td>999,999</td>
<td>999,999</td>
<td>999,999</td>
<td></td>
</tr>
</tbody>
</table>

**Product Overview**

**K-Factor:**
- Series 160: 1.0
- Series 160F: 0.81
- Series 166T: 1.0
- Series 160G: 0.84
- Series ANE-1: 0.843

**Humidity Range:**
- 999,999 in selected flow
- 0 to 100% RH
- 0.1 to 99.9% RH
- 0 to 100% RH
- N/A

**Temperature Accuracy:**
- ±2% FS ±2% FS ±2% FS ±2% FS N/A
- ±0.5°F (±0.28°C) ±0.54°F (±0.3°C) ±1°F (±0.6°C) ±0.54°F (±0.3°C) ±0.5°F (±0.28°C)

**Temperature Range:**
- 304 SS 304 SS 304 SS Black polycarbonate ABS
- 36˝ (29 to 91 mm)
- 4-23/64˝ (111 mm) diameter
- -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)

**Volume Flow:**
- ±3% of reading ±10 CFM
- 999,999 units Non-contact: 2.5 to 98.4 to 3937 FPM
- 99,999 in selected flow
- 40 to 2000 CFM (68 to 3398 units)
- 36˝ (203 to 5486 mm)
- 18 to 60˝ (457 to 1524 mm)

**Contacting:**
- 1/8˝ (3 mm)
- 8 to 216˝ (203 to 5486 mm)

**Measuring Distance:**
- 25´ and up to 70° from perpendicular.

**Measuring Distance Accuracy:**
- ±2% of reading; Timer: ±0.2 reading; Contact: ±0.05%

**Memory:**
- RAM 1 GB & ROM 4 GB
- 40 readings
- N/A Up to 40 readings

**Approvals:**
- Non-corrosive dry gases
- Air and compatible gases
- Air and compatible gases
- Air and compatible gases
- RAM 1 GB & ROM 4 GB

**Service:**
- DC Voltage: 0.1 mV to 600 V (0.8% + 2 digits)
- AC Voltage: 0.1 mV to 600 V (0.8% + 3 digits)
- DC Current: 0.01 A to 10 A (1.2% + 0.001 V to 600 V (1.3% + 5 digits)
- AC Current: 0.1 A to 10 A (1.5% + 5 digits)

**Protection:**
- 600 Vrms
- 1000 Vrms
- N/A
- N/A

**Accuracy:**
- 10 psi (2 to 10 in w.c.);
- ±0.5% FS ±0.5% FS ±0.1% FS ±0.5% FS ±0.5% FS
- 2 to 350 in w.c.
- 0.33 to 65.62 ft/s (0.1 to 20 m/s)
- ±0.5 to 2% of flow reading for flow rate > 0.66 ft/s (0.2 m/s)
- ±6% 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)

**Ranges:**
- Input Type J, K, T thermocouples
- Resistance: 0.1 to 40 MΩ
- Resistance: 0.1 to 2000 Ω
- Resistance: 0.1 to 2000 Ω
- Resistance: 0.1 to 400 Ω
- Resistance: 0.1 to 2000 Ω

**Volts:**
- DC Voltage: 0.1 mV to 1000 V (1.0% + 2 digits)
- DC Voltage: 0.1 mV to 750 V (1.3% + 5 digits)
- DC Current: 10 mA to 400 A ± (1.0% + 3 digits)
- AC Current: 0.1 A to 400 A ± (1.0% + 3 digits)
- AC Current: 0.1 A to 10 A (1.0% + 2 digits)
- AC Current: 0.1 A to 10 A (1.2% + 0.001 V to 600 V (1.3% + 5 digits)

**Pressure:**
- 30 psig (200 in w.c. to 10 psig (20 to 40 in w.c.);
- 10 psig (20 to 40 in w.c.);
- 5 psig (1 to 10 in w.c.);
- 3 psig (20 to 40 in w.c.);
- 15 to 200 psi
- 20 in w.c. to 100 psi

**Accuracy:**
- ±0.1°F (±0.06°) ±0.13% reading + 1.4°F + .006°/°F below 1000°F
- T-type: -328 to 734°F (-200 to 390°C)
- K-type: -328 to 2498°F (-200 to 1370°C);
- ± (1.0% + 3 digits)
- ± (2.0% + 10 digits); AC Current: 0.1 A to 400 A ± (1.0% + 3 digits)
- ± (0.8% + 2 digits); AC Voltage: ± (0.8% + 2 digits); AC Voltage: ± (2.0% + 2 digits); AC Voltage: ± (2.0% + 10 digits); AC Current: 0.1 uA to 10 A (1.0% + 10 digits); AC Current: 0.1 uA to 10 A (1.0% + 10 digits)
- ± (0.5% + 2 digits); AC Voltage: ± (0.8% + 2 digits); AC Voltage: ± (0.8% + 2 digits); AC Voltage: ± (0.8% + 2 digits)