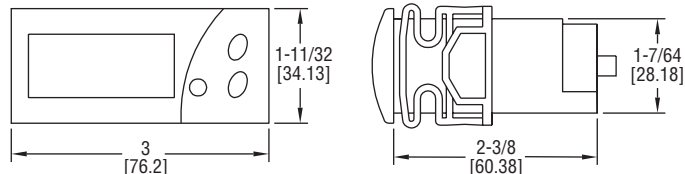


# TEMPERATURE/PROCESS INDICATOR

Low Cost, 3-Digit Display, 1% Accuracy



The **SERIES TID** displays temperature or a process value measured by a PTC or NTC thermistor or a 4 to 20 mA transmitter.

## FEATURES/BENEFITS

- Thermistor or transmitter input models available
- 3 digit bright LED

## APPLICATIONS

- Panel process indication
- Refrigerators, walk in coolers

MODEL CHART			
Model	Input	Supply Power	Unit
TID-1110	PTC thermistor	115 VAC	°F
TID-1120	PTC thermistor	115 VAC	°C
TID-1410	PTC thermistor	24 VAC/DC	°F
TID-3100	4 to 20 mA	115 VAC	None
TID-3200	4 to 20 mA	230 VAC	None
TID-3400	4 to 20 mA	24 VAC/DC	None

## SPECIFICATIONS

**Range:** -58 to 302°F (thermistor); -999 to 999 counts (4 to 20 mA).  
**Input:** PTC/NTC thermistor or 4 to 20 mA.  
**Power Requirements:** 115 VAC, 230 VAC, 24 VAC/DC.  
**Accuracy:** > 1%.  
**Display:** 3-digits; red, green or blue display.  
**Resolution:** 1° or 0.1 count.  
**Front Panel Rating:** IP64 (NEMA 3R).  
**Weight:** 2.3 oz (65 g).  
**Agency Approvals:** CE, cUR, UR.

## ACCESSORIES

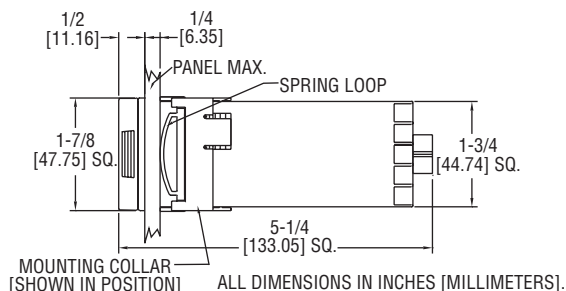
See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES 16L

# LIMIT CONTROL

FM Approved, Large Dual Display, Universal Input



Panel Cutout 1.77" + 0.02" [45 mm + 0.6 mm] Square

The **SERIES 16L** Temperature/Process Control offers FM approved limit control with universal input, single set point or dual set point control.

## FEATURES/BENEFITS

- Remote or integral reset button
- Peak and valley temperature indication
- Open sensor protection

## APPLICATIONS

- Gas fired heater limit control

MODEL CHART		
Model	Output A	Output B
16L2030	N.O. relay	None
16L2034	N.O. relay	N.C. relay

Note: For other configurations, see website

ACCESSORY	
Model	Description
A-600	R/C snubber

## SPECIFICATIONS

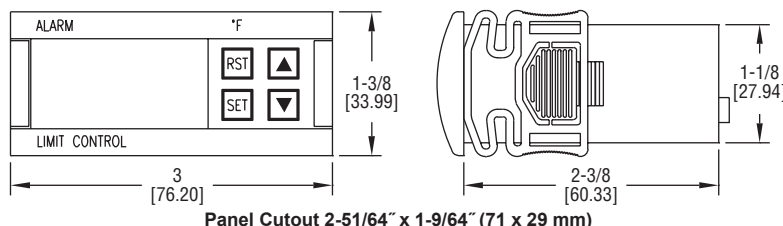
**Selectable Inputs:** 10 thermocouple, 4 RTD, DC voltage, or DC current selectable.  
**Display:** Two 4 digit, 7 segment 0.3" (7.62 mm) high LEDs.  
**Accuracy:** ±0.25% of span, ±1 least significant digit.  
**Power Requirements:** 100 to 240 VAC, nominal, +10 -15%, 50 to 400 Hz. single phase; 132 to 240 VDC, nominal, +10 -20%.  
**Power Consumption:** 5 VA maximum.  
**Temperature Limits:** 14 to 131°F (-10 to 55°C).  
**Memory Backup:** Nonvolatile memory. No batteries required.  
**Output:** Relay: SPST, 3 A @ 240 VAC resistive; 1.5 A @ 240 VAC inductive.  
**Weight:** 8 oz (227 g).  
**Front Panel Rating:** NEMA 4X (IP66).  
**Agency Approvals:** FM, cULus.

## OPTIONS

To order add suffix:	Description
-934	Process signal output, isolated 0 to 20 mADC
-936	Process signal output, isolated 0 to 10 VDC
-992	RS-RS-485 serial communications
-993	RS-RS-232 serial communications

# THERMOCOUPLE LIMIT CONTROL

## FM Approved Temperature Limit Control



The **SERIES TSF** Thermocouple FM Approved Limit Control provides audible alarm status along with a relay output. Unit allows the user to easily select automatic or manual reset via a built in reset button on the front panel or an external contact.

### FEATURES/BENEFITS

- FM approved temperature limiting control
- Integral and remote reset capabilities

### APPLICATIONS

- Gas fired oven and burner control

MODEL CHART		
Model	Supply Power	Unit
TSF-4010	115 VAC	°F
TSF-4011	115 VAC	°C
TSF-4021	230 VAC	°C
TSF-4040	24 VAC/VDC	°F

### SPECIFICATIONS

**Probe Range:** 32 to 999°F (0 to 700°C) for Type J thermocouple; 32 to 999°F (0 to 999°C) for type K or S thermocouples.  
**Input:** Type J, K or S thermocouple.  
**Output:** SPDT relay rated 16 A @ 240 VAC resistive.  
**Horsepower Rating (HP):** 1 HP.  
**Control Type:** ON/OFF; manual/automatic reset.  
**Power Requirements:** 115 VAC, 230 VAC, 12 VAC/VDC or 24 VAC/VDC (depending on model).

**Power Consumption:** 4 VA.  
**Accuracy:** ±1% FS.  
**Display:** 3-digit, red, 1/2" (12.7 mm) digits, plus sign.  
**Resolution:** 1°.  
**Memory Backup:** Nonvolatile memory.  
**Temperature Limits:** Ambient: 32 to 150°F (0 to 65°C); Storage: -4 to 176°F (-20 to 80°C).  
**Weight:** 2.3 oz (65 g).  
**Front Panel Rating:** IP64 (NEMA 3R).  
**Agency Approvals:** CE, FM, cURus.

### ACCESSORIES

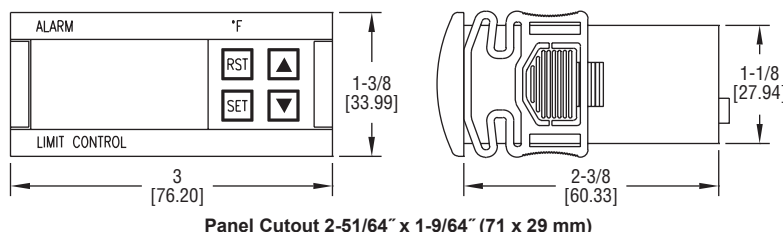
See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES TSF-DF

# THERMOCOUPLE LIMIT CONTROL

## UL Approved Temperature Limit Control



The **SERIES TSF-DF** Digital Thermocouple Limit Alarm is a UL approved temperature limit control that provides visual alarm status along with a relay output. The Series TSF-DF controls have a built in reset button on the front panel or can accept an external reset signal.

Program settings on model TSF-DF controls cannot be changed through the buttons on the device. It is necessary to purchase a model TSF-MDF and a model TS2-K in addition to the model TSF-DF. Desired program parameters are entered on a TSF-MDF programming control. Using the TS2-K configuration key, the parameters can be easily copied from the TSF-MDF and transferred to the TSF-DF Limit Alarms.

### FEATURES/BENEFITS

- UL approved limit control

### APPLICATIONS

- Gas fired oven and burner control

MODEL CHART			
Model	Control	Supply Power	Unit
TSF-4010-DF	Limit alarm	115 VAC	°F
TSF-4011-DF	Limit alarm	115 VAC	°C
TSF-4021-DF	Limit alarm	230 VAC	°C
TSF-4040-DF	Limit alarm	24 VAC/VDC	°F
TSF-4010-MDF	Programming control	115 VAC	°F
TSF-4011-MDF	Programming control	115 VAC	°C
TSF-4021-MDF	Programming control	230 VAC	°C
TSF-4040-MDF	Programming control	24 VAC/VDC	°F

### SPECIFICATIONS

**Probe Range:** 32 to 999°F (0 to 700°C) for thermocouple J type; 32 to 999°F (0 to 999°C) for thermocouple K or S type.  
**Input:** Type J, K, or S thermocouple.  
**Output:** NO SPST relay rated 16 A @ 240 VAC resistive.  
**Horsepower Rating (HP):** 1 HP.  
**Control Type:** ON/OFF; manual/automatic reset.  
**Power Requirements:** See model chart.  
**Power Consumption:** 4 VA @ 230 VAC.  
**Accuracy:** ±1% FS.  
**Display:** 3-digit, red, 1/2" (12.7 mm) digits, plus sign.  
**Resolution:** 1°.  
**Memory Backup:** Nonvolatile memory.  
**Ambient Operating Temperature:** 32 to 140°F (0 to 60°C).  
**Storage Temperature:** -4 to 176°F (-20 to 80°C).  
**Weight:** 2.3 oz (65 g).  
**Front Panel Rating:** IP64.  
**Agency Approvals:** CE, cUR, UR (DF models only).

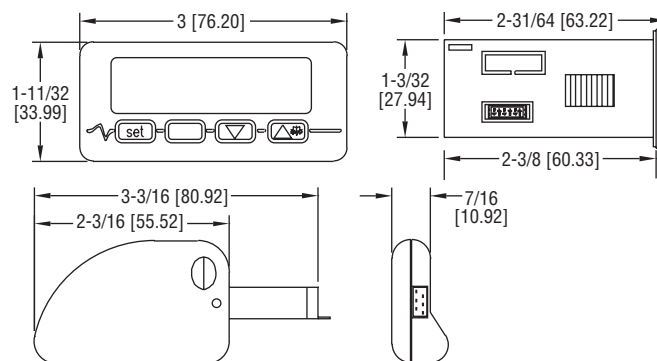
### ACCESSORIES

See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

# DIGITAL TEMPERATURE SWITCH

## 3-1/2 Digit Display, Programming Configuration Key



The **SERIES 40T/40M** Digital Temperature Switch accepts a variety of inputs to allow temperature measurements and set points up to 1999°F (1300°C).

### FEATURES/BENEFITS

- Field selectable °F or °C
- Universal temperature sensor or transmitter input on 40M models
- Configuration key to quickly load parameters from one unit to another
- Heating or cooling models

### APPLICATIONS

- Food service equipment
- Industrial process control

### MODEL CHART

Thermocouple/ RTD Input Model	Supply Power	Universal Input Model	Supply Power
40T-10	115 VAC	40M-10	115 VAC
40T-20	230 VAC	40M-20	230 VAC
40T-40	12-24 VAC/VDC	40M-40	12-24 VAC/VDC

### SPECIFICATIONS

**Probe Range:** K T/C: -140 to 1999°F (-100 to 1300°C); J T/C: -140 to 1450°F (-100 to 800°C); RTD: -320 to 1200°F (-200 to 650°C); PTC: -58 to 300°F (-50 to 150°C); NTC: -40 to 230°F (-40 to 110°C); N. RTD: -110 to 570°F (-80 to 300°C).

**Output:** 16 A @ 250 VAC SPDT relay (max current allowed is 10 A).

**Control Type:** On/off.

**Power Requirements:** 12 to 24 VAC/VDC, 115 VAC or 230 VAC depending on model.

**Accuracy:** ±1% FS.

**Display:** 3-1/2 digit red display.

**Resolution:** 0.1°C.

**Memory Backup:** Non-volatile memory.

**Ambient Temperature:** 32 to 131°F (0 to 55°C).

**Weight:** 2.3 oz (65 g).

**Front Panel Rating:** IP65.

**Agency Approvals:** CE, cULus.

### ACCESSORIES

Model	Description
40X-K	Configuration key

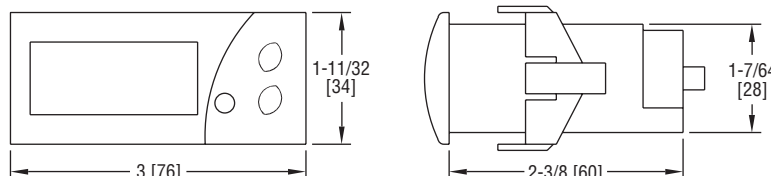
For sensor accessories, see page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES TCS

# THERMOCOUPLE TEMPERATURE SWITCH

Heating and Cooling Control, 16 Amp Rating, Two Alarms



Panel Cutout 2-51/64" x 1-9/64" (71 mm x 29 mm)

The **SERIES TCS** thermocouple Temperature Switch monitors and controls temperature while offering a wide temperature range, two selectable alarm sets, and an internal buzzer indicating alarm condition or error.

### FEATURES/BENEFITS

- Heating or cooling modes
- Internal alarm buzzer
- Configuration key to quickly load parameters from one unit to another

### APPLICATIONS

- Food service equipment
- Industrial process control

### MODEL CHART

Model	Supply Power	Unit	Model	Supply Power	Unit
TCS-4010	115 VAC	°F	TCS-4030	12 VAC/VDC	°F
TCS-4011	115 VAC	°C	TCS-4031	12 VAC/VDC	°C
TCS-4020	230 VAC	°F	TCS-4040	24 VAC/VDC	°F
TCS-4021	230 VAC	°C			

### SPECIFICATIONS

**Probe Range:** 32 to 999°F (0 to 700°C) for Type J thermocouple; 32 to 999°F (0 to 999°C) for Type K or S thermocouples.

**Input:** Type J, K or S thermocouple.

**Output:** SPDT relay rated 16 A @ 240 VAC resistive.

**Horsepower Rating (HP):** 1 HP.

**Control Type:** ON/OFF.

**Power Requirements:** 115 VAC, 230 VAC, 12 VAC/VDC or 24 VAC/VDC (depending on model).

**Accuracy:** ±1% FS.

**Display:** 3-digit, red, 1/2" (12.7 mm) digits, plus sign.

**Resolution:** 1°.

**Memory Backup:** Nonvolatile memory.

**Temperature Limits:** Ambient: 32 to 158°F (0 to 70°C); Storage: -4 to 176°F (-20 to 80°C).

**Weight:** 2.3 oz (65 g).

**Front Panel Rating:** IP64.

**Agency Approvals:** CE, cURus.

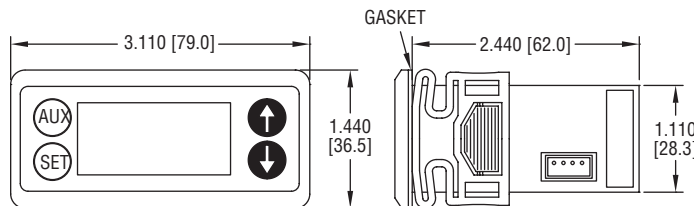
### ACCESSORIES

See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

# DIGITAL TEMPERATURE SWITCH

## Heating and Cooling Control, 16 Amp Rating



Panel Cutout 2-51/64" x 1-9/64" (71 x 29 mm)

The **SERIES TST** Digital Temperature Switch is designed with many heating and cooling applications in mind. This low cost switch is simple to set up with one probe input and SPDT switch output. Programming performed using either the front keypad or through a TS2-K programming key.

### FEATURES/BENEFITS

- Buzzer indicates probe/memory error or high/low temperature alarm conditions
- Capacitive buttons offer clean panel face design
- Modbus® communication protocol through TTL serial connection

### APPLICATIONS

- Refrigeration
- Holding ovens
- Boilers
- Brewing systems

MODEL CHART	
Model	Supply Power
TST-011	115 VAC
TST-021	230 VAC
TST-031	12 VAC/VDC
TST-041	24 VAC/VDC

### SPECIFICATIONS

<b>Probe Range:</b> PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C). <b>Input:</b> PTC (1000 Ω @ 25°C) or NTC (10 KΩ @ 25°C) thermistor. <b>Output:</b> SPDT relay rated 16 A @ 240 VAC resistive, 10 FLA, 60 LRA. <b>Horsepower Rating (HP):</b> 1 HP. <b>Control Type:</b> On/Off. <b>Power Requirements:</b> 115 VAC, 230 VAC, 24 VAC/VDC, or 12 VAC/VDC. <b>Power Consumption:</b> 4 VA @ 115/230 VAC; 1.5 VA @ 12/24 VAC/VDC.	<b>Accuracy:</b> ±1% FS. <b>Display:</b> 3-digit, plus sign. <b>Resolution:</b> 0.1°. <b>Memory Backup:</b> Nonvolatile memory. <b>Ambient Temperature:</b> 32 to 131°F (0 to 55°C). <b>Storage Temperature:</b> -4 to 176°F (-20 to 80°C). <b>Weight:</b> 115 and 230 V models: 7.2 oz (204 g); 12 and 24 V models: 4.8 oz (136 g). <b>Front Panel Rating:</b> IP65. <b>Agency Approvals:</b> CE, cULus.
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### ACCESSORIES

See page reference 1 below.

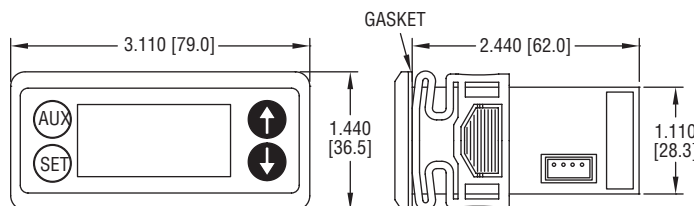
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1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES TSXT

# DIGITAL TEMPERATURE SWITCH

## Refrigeration Control, Up To 3 Probe Inputs and 3 Relay Outputs



Panel Cutout 2-51/64" x 1-9/64" (71 x 29 mm)

The **SERIES TSXT** Digital Temperature Switch is designed for refrigeration control. It accepts PTC or NTC temperature probe types and can control the compressor, defrost, fan, alarm, and light in a refrigeration system. Master/slave configurations allow synchronization of defrost cycles between different units. Programming is performed through the front keypad, or by using the TS2-K programming key.

### FEATURES/BENEFITS

- Models available with 1, 2, or 3 relay outputs
- 3 temperature inputs and one digital input for complete refrigeration control
- Configuration key available for programming multiple units
- Capacitive buttons offer clean panel face design
- Modbus® communication protocol through TTL serial connection

### APPLICATIONS

- Refrigerated cabinets
- Walk in coolers
- Applications requiring defrost cycles

MODEL CHART					
Model	Supply Power	Outputs	Model	Supply Power	Outputs
TSXT-211	115 VAC	1	TSXT-232	12 VAC/VDC	2
TSXT-221	230 VAC	1	TSXT-242	24 VAC/VDC	2
TSXT-231	12 VAC/VDC	1	TSXT-213	115 VAC	3
TSXT-241	24 VAC/VDC	1	TSXT-223	230 VAC	3
TSXT-212	115 VAC	2	TSXT-233	12 VAC/VDC	3
TSXT-222	230 VAC	2	TSXT-243	24 VAC/VDC	3

### SPECIFICATIONS

<b>Probe Range:</b> PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C). <b>Input:</b> PTC (1000 Ω @ 25°C) or NTC (10 KΩ @ 25°C) thermistor. <b>Output:</b> Relay 1: SPST relay rated 16 A @ 240 VAC resistive, 10 FLA, 60 LRA; Relay 2: SPST relay rated 5 A @ 240 VAC resistive; Relay 3: SPST relay rated 8 A @ 240 VAC resistive. <b>Horsepower Rating (HP):</b> 1 HP (Relay 1). <b>Control Type:</b> On/off with defrost options. <b>Power Requirements:</b> 115 VAC, 230 VAC, 24 VAC/VDC, or 12 VAC/VDC.	<b>Power Consumption:</b> 3.6 VA @ 115/230 VAC; 1.5 VA @ 12/24 VAC/VDC. <b>Accuracy:</b> ±1% FS. <b>Display:</b> 3-digit, plus sign. <b>Resolution:</b> 0.1°. <b>Memory Backup:</b> Nonvolatile memory. <b>Ambient Operating Temperature:</b> 32 to 131°F (0 to 55°C). <b>Storage Temperature:</b> -4 to 176°F (-20 to 80°C). <b>Weight:</b> 115 and 230 V models: 7.2 oz (204 g); 12 and 24 V models: 4.8 oz (136 g). <b>Front Panel Rating:</b> IP65. <b>Agency Approvals:</b> CE, cURus.
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### ACCESSORIES

See page reference 1 below.

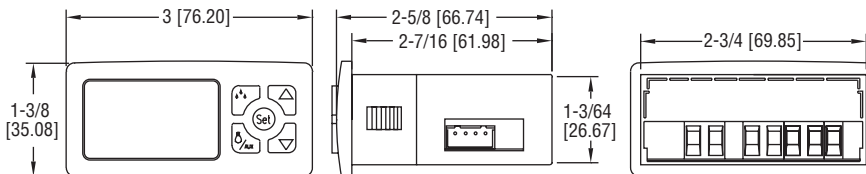
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1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)



# DIGITAL TEMPERATURE SWITCH

Field Selectable Engineering Units, Real Time Clock



The **SERIES TS3** Digital Temperature Switch is the ideal control for on/off heating or cooling applications.

## FEATURES/BENEFITS

- Field selectable °F or °C
- Real time clock
- HACCP alarm logging
- Configuration key

## APPLICATIONS

- Refrigerators
- Chillers
- Food service equipment
- Medical sterilizers or equipment

## SPECIFICATIONS

**Probe Range:** PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).  
**Input:** PTC (1000Ω @ 25°C); NTC (10KΩ @ 25°C).  
**Output:** R1 SPDT relay resistive load 16 A, inductive load 10 FLA, 60 LRA @ 240 VAC.  
**Horsepower Rating:** 1HP @ 240 VAC.  
**Control Type:** On/off.  
**Power Requirement:** 115 VAC, 230 VAC, 12 VAC/VDC, 24 VAC/DC (±10%) depending on model.

**Power Consumption:** 3.6 VA (115/230/24 V), 1.5 VA (12V).  
**Accuracy:** ±1% FS.  
**Display:** 3 digits plus sign.  
**Resolution:** 0.1°.  
**Memory Backup:** Non-volatile memory.  
**Ambient Temperature:** 32 to 131°F (0 to 55°C).  
**Weight:** 2.3 oz (65 g).  
**Front Panel Rating:** IP65.  
**Agency Approvals:** CE, cURus.

MODEL CHART	
Model	Supply Power
TS3-50010	115 VAC
TS3-50020	230 VAC
TS3-50030	12 VAC/VDC
TS3-50040	24 VAC/VDC

## ACCESSORIES

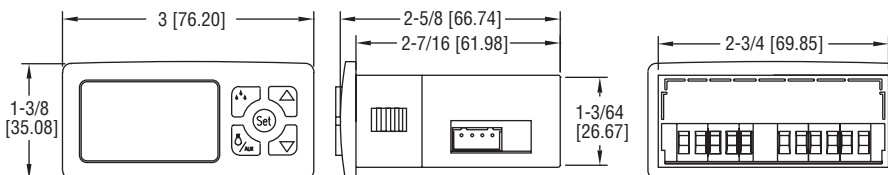
See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES TSX3

# DIGITAL REFRIGERATION TEMPERATURE SWITCH

Intelligent Defrost, HACCP Alarm Logging



The **SERIES TSX3** Digital Temperature Switch was designed to control the compressor, fan, and defrost in refrigeration applications.

## FEATURES/BENEFITS

- Field selectable °F or °C
- Real time clock
- HACCP alarm logging
- Configuration key
- 2 or 3 output models for complete refrigerator control
- 2 temperature sensor and 1 digital contact inputs

## APPLICATIONS

- Refrigerators

MODEL CHART			
Model	Supply Power	# of Outputs	Display Color
TSX3-520122	115 VAC	2	Blue
TSX3-520222	230 VAC	2	Blue
TSX3-520322	12 VAC/VDC	2	Blue
TSX3-520422	24 VAC/VDC	2	Blue
TSX3-520132	115 VAC	3	Blue
TSX3-520232	230 VAC	3	Blue
TSX3-520332	12 VAC/VDC	3	Blue
TSX3-520432	24 VAC/VDC	3	Blue

## SPECIFICATIONS

**Probe Range:** PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).  
**Input:** PTC (1000Ω @ 25°C); NTC (10KΩ @ 25°C); Digital input contact.  
**Output:** All models SPST NO relay resistive load 16 A, inductive load 5 A, 10 FLA, 60 LRA @ 240 VAC; dual output models also include 8 A resistive, 3 A inductive SPDT @ 240 VAC; three output models also include 8 A resistive SPST NO @ 240 VAC, 5 A resistive SPST NO @ 240 VAC.  
**Horsepower Rating:** 1HP @ 240 VAC.  
**Control Type:** On/off.

**Power Requirement:** 115 VAC, 230 VAC, 12 VAC/VDC, 24 VAC/DC (±10%) depending on model.  
**Power Consumption:** 3.6 VA (115/230/24 V), 1.5 VA (12 V).  
**Accuracy:** ±1% FS.  
**Display:** 3 digits plus sign.  
**Resolution:** 0.1°.  
**Memory Backup:** Non-volatile memory.  
**Ambient Temperature:** 32 to 131°F (0 to 55°C).  
**Weight:** 2.3 oz (65 g).  
**Front Panel Rating:** IP65 (NEMA 4X).  
**Agency Approvals:** CE, cURus.

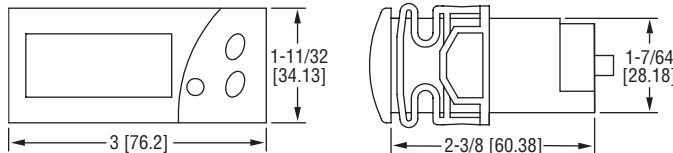
## ACCESSORIES

See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

# DIGITAL TEMPERATURE SWITCH

Easy Multi-Unit Programming, 16A SPDT Relay Output



Panel Cutout 2-51/64" x 1-9/64" (71 mm x 29 mm)

The **SERIES TS2** Digital Temperature Switch offers an easy to use OEM friendly solution to monitor and control temperature in heating or cooling applications.

## FEATURES/BENEFITS

- Simple to use temperature control device
- Configuration key

## APPLICATIONS

- Refrigerators
- Chillers
- Food service equipment
- Medical sterilizers or equipment

## MODEL CHART

Model	Supply Power	Unit
TS2-010	115 VAC	°F
TS2-011	115 VAC	°C
TS2-020	230 VAC	°F
TS2-030	12 VAC/VDC	°F
TS2-040	24 VAC/VDC	°F
TS2-041	24 VAC/VDC	°C

## SPECIFICATIONS

**Probe Range:** -58 to 302°F (-50 to 150°C).  
**Input:** PTC (1000Ω @ 25°C).  
**Output:** 16 A SPDT relay @ 250 VAC resistive, 5 A inductive.  
**Horsepower Rating (HP):** 1 HP.  
**Control Type:** On/off.  
**Power Requirements:** 115 VAC, 230 VAC, 12 VAC/VDC or 24 VAC/VDC.  
**Accuracy:** ±1% FS.  
**Display:** 3-digit, red, 1/2" digits.  
**Resolution:** 1°.  
**Memory Backup:** Nonvolatile memory.  
**Temperature Limits:** Ambient: 32 to 158°F (0 to 70°C).  
**Storage Temperature:** -4 to 176°F (-20 to 80°C).  
**Weight:** 2.3 oz (65 g).  
**Front Panel Rating:** IP64.  
**Agency Approvals:** CE, cURus.

## ACCESSORIES

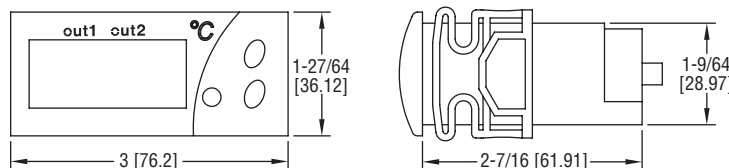
See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## SERIES TSS2

# DUAL STAGE TEMPERATURE SWITCH

Two Independent Relay Outputs, Heating or Cooling Control



Panel Cutout 2-51/64" x 1-9/64" (71 mm x 29 mm)

The **SERIES TSS2** Dual Stage Temperature Switch features two independent sensor inputs and control outputs in one device.

## FEATURES/BENEFITS

- Simple to use dual temperature control device
- Configuration key

## APPLICATIONS

- Refrigerators
- Chillers
- Food service equipment
- Medical sterilizers or equipment

## MODEL CHART

Model	Supply Power	Unit
TSS2-2100	115 VAC	°F
TSS2-2110	115 VAC	°C
TSS2-2210	230 VAC	°C
TSS2-2300	12 VAC/DC	°F
TSS2-2400	24 VAC/DC	°F

## SPECIFICATIONS

**Probe Range:** PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).  
**Input:** PTC (1000Ω @ 25°C); NTC (10KΩ @ 25°C).  
**Outputs:** OUT1=SPDT relay rated 16 A @ 240 VAC resistive; OUT2=SPDT relay rated 8 A @ 240 VAC resistive.  
**Horsepower Rating (HP):** 1 HP (OUT1).  
**Power Requirements:** 115 VAC, 230 VAC, 12 VAC/VDC or 24 VAC/VDC (depending on model).  
**Accuracy:** ±1% FS.  
**Display:** 3-digit and sign, red LED.  
**Resolution:** 0.1° (< 100°); 1° (≥ 100°).  
**Memory Backup:** Nonvolatile memory.  
**Temperature Limit:** Ambient: 32 to 158°F (0 to 70°C).  
**Storage Temperature:** -4 to 176°F (-20 to 80°C).  
**Dimensions:** 3 x 1-27/64 x 2-7/16 in.  
**Front Panel Rating:** IP64.  
**Weight:** 2.3 oz (65 g).  
**Agency Approvals:** CE, cURus.

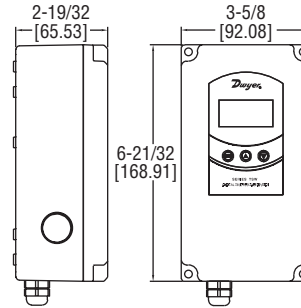
## ACCESSORIES

See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

# WEATHER PROOF DIGITAL TEMPERATURE SWITCH

NEMA 4X Housing, Single or Dual Stage, 20 A Contact Rating



The **SERIES TSW** Digital Temperature Switch combines the trusted, reliable TS family of temperature controls and an installation friendly weatherproof enclosure. The bright, easy-to-read LED display shows the current output status and the temperature measurement.

## FEATURES/BENEFITS

- Weatherproof housing
- Single or dual stage models
- Configuration key
- Physical and passcode parameter setting protection
- TS-1 temperature probe included

## APPLICATIONS

- Chillers
- Walk in cooler
- Woodboilers
- Brewing systems

MODEL CHART		
Model	Description	Supply Power
TSW-150	Single stage	90 to 255 VAC
TSW-160	Single stage	12 to 24 VAC/VDC
TSW-250	Dual stage	90 to 255 VAC
TSW-260	Dual stage	12 to 24 VAC/VDC

## SPECIFICATIONS

**Probe Range:** PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).  
**Input:** PTC (1000Ω @ 25°C); NTC (10K Ω @ 25°C).  
**Output:** R1 SPDT relay resistive load: 20 A @ 240 VAC; R2 SPDT relay resistive load: 8 A @ 240 VAC; Inductive load: 3 A @ 240 VAC.  
**Horsepower Rating:** R1 2HP @ 240 VAC.  
**Control Type:** On/off.

**Power Requirements:** 90 to 255 VAC or 12 to 24 VAC/VDC (±10%) depending on model.  
**Power Consumption:** 3.6 VA.  
**Accuracy:** ±1% FS.  
**Display:** 3 digits plus sign.  
**Resolution:** 0.1° < 100°; 1° ≥ 100°.  
**Memory Backup:** Non-volatile memory.  
**Ambient Temperature:** 32 to 104°F (0 to 40°C).  
**Weight:** 1.2 lb (544 g).  
**Enclosure Rating:** NEMA 4X (IP66).  
**Agency Approvals:** CE, cURus.

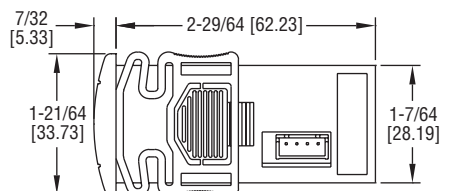
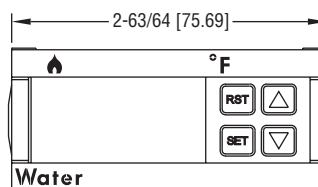
## ACCESSORIES

Model	Description
CC1-N	Temperature sensor clip, neutral
CC1-GY	Temperature sensor clip, grey

## SERIES TSWB

# DIGITAL TEMPERATURE/WATER LEVEL SWITCH

Two Temperature Set Points, Low Water Level Alarm



The **SERIES TSWB** Digital Temperature Switch offers complete boiler control for outdoor wood boilers and other similar heating equipment.

## FEATURES/BENEFITS

- 3 outputs for high temp, low temp or input alarm
- Conductivity probe input for water level monitoring
- Configuration key

## APPLICATIONS

- Wood or pellet boilers

MODEL CHART		
Model	Supply Power	Unit
TSWB-010	115 VAC	°F
TSWB-011	115 VAC	°C

## SPECIFICATIONS

**Probe Range:** PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).  
**Probe Temperature Input:** PTC (1000Ω @ 25°C); NTC (10KΩ @ 25°C).  
**Probe Level Input:** Conductivity probe: Max voltage 12 VAC. Sensitivity established from factory at 100KΩ.  
**Output:** R1 SPST NO relay resistive load 5 A @ 250 VAC; R2 SPST NC relay resistive load 5 A @ 250 VAC; R3 SPDT relay resistive load 16 A @ 240 VAC.  
**Horsepower Rating:** 1HP -- 10FLA, 60LRA 250 VAC.  
**Control Type:** On/off.

**Power Requirements:** 115 VAC ± 10%, 230 VAC ± 10%, 24 VAC/DC ± 10%, 12 VAC/DC ± 10%.  
**Power Consumption:** 4VA (230V/115V), 1.5VA (24V/12V).  
**Accuracy:** > 1% of full-scale.  
**Display:** 3-digit, red 1/2" digits.  
**Resolution:** 1° (3 digits).  
**Memory Backup:** Nonvolatile memory.  
**Ambient Operating Temperature:** 32 to 158°F (-30 to 70°C).  
**Storage Temperature:** -4 to 176°F (-30 to 80°C).  
**Weight:** 3.5 oz.  
**Front Protection:** IP64.  
**Agency Approvals:** CE, cULus.

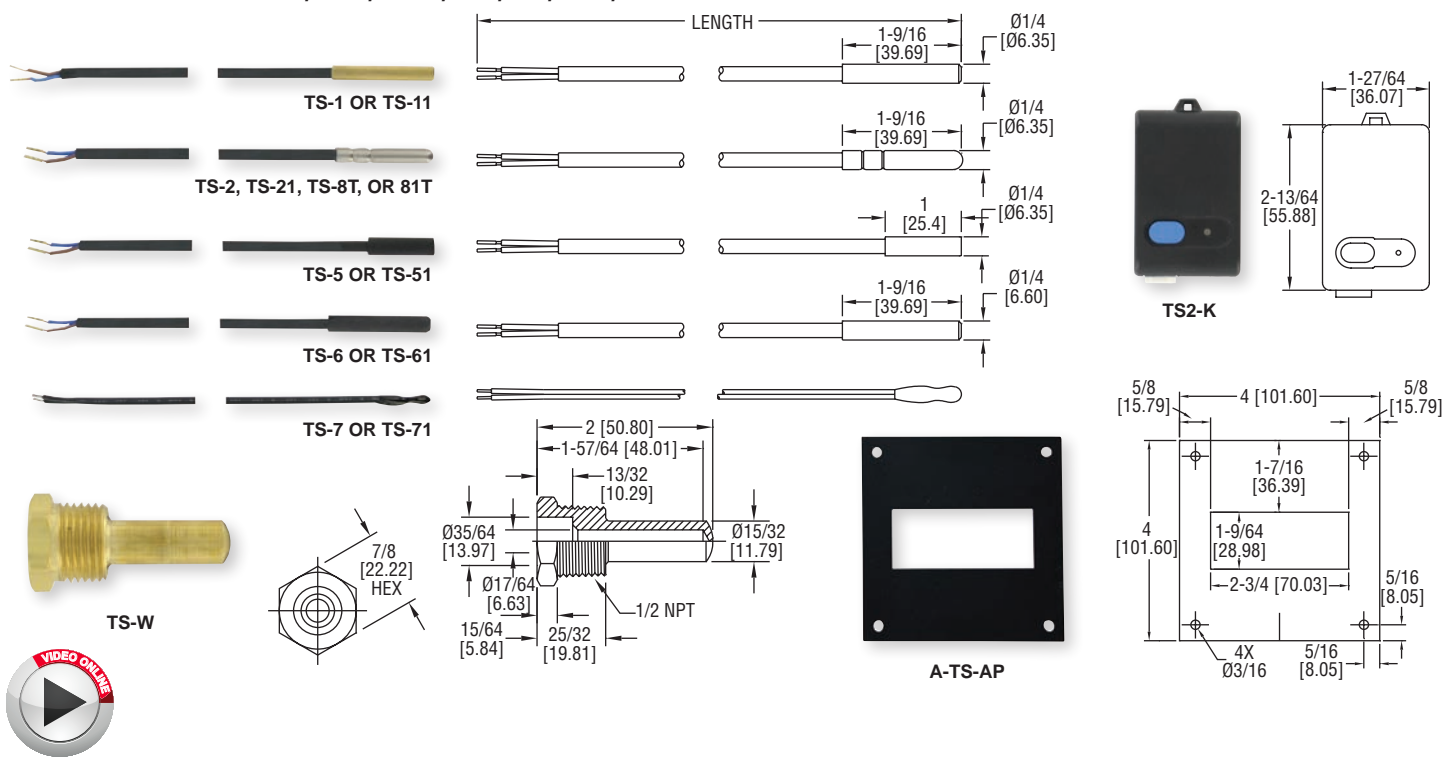
## ACCESSORIES

See page reference 1 below.

1 Digital Temperature Switch Probes and Accessories: See page 138 (Series TS-Probes)

## DIGITAL TEMPERATURE SWITCH PROBES &amp; ACCESSORIES

Probes to Be Used with TS2, TSS2, TSWB, TSW, TS3, TSX3, and 40M



## MODEL CHART - SENSORS

Model	Sensor	Cap Material	Length ft (m)
TS-1	PTC	Brass	5 (1.5)
TS-11	PTC	Brass	10 (3)
TS-2	PTC	Stainless steel	5 (1.5)
TS-21	PTC	Stainless steel	10 (3)
TS-5	PTC	PVC	5 (1.5)
TS-51	PTC	PVC	10 (3)
TS-6	PTC	Polyamide resin coated brass	5 (1.5)
TS-61	PTC	Polyamide resin coated brass	10 (3)
TS-7	NTC	None	5 (1.5)
TS-71	NTC	None	10 (3)
TS-8T	NTC	Stainless steel	5 (1.5)
TS-81T	NTC	Stainless steel	10 (3)
TCS-J	J-type	Stainless steel	4 (1.21)
TCS-K	K-type	Stainless steel	4 (1.21)

## SPECIFICATIONS

**Sensor:** See model chart.**Operating Temperature:** PTC or NTC: -58 to 221°F (-50 to 105°C); J-type: 32 to 1400°F (0 to 760°C); K-type: 32 to 2300°F (0 to 1200°C).**Cable:** PTC and NTC models: PVC; J-type and K-type models: FEP.

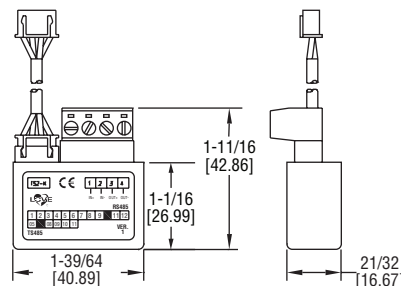
## ACCESSORIES

Model	Description
A-TS-AP	1/4 DIN adapter plate
TS-W	Brass thermowell (for use with TS-1, TS-11, TS-2, TS-21)
TS2-K	Configuration key

## MODEL TS485

## RS-485 SERIAL COMMUNICATIONS MODULE

Connects to Configuration Key Port



The **MODEL TS485** Serial Communications Module allows users to read the current temperature and parameter settings of the Love Controls family of temperature switches. The configuration key port on the temperature switch provides the data signal and power for the RS-485 module. For applications with multiple temperature switches, the modules can be daisy chained together so that only two wires need to be brought to the PC. The Model TS485 is compatible with Series TS3, TSX3, TCS, TS2, TSS2 and TSW.

## SPECIFICATIONS

**Compatible Devices:** TS3, TSX3, TCS, TS2, TSS2 and TSW.**Communication Type:** RS-485 full duplex.**Electrical Isolation:** 2500 VAC.**Agency Approvals:** CE.

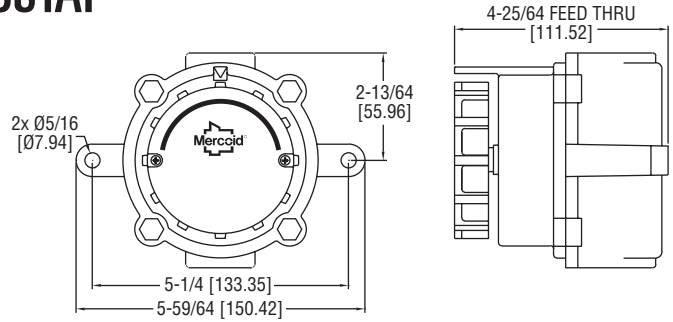
## MODEL CHART

Model	Description
TS485	Serial Communications Module



# EXPLOSION-PROOF, HEAVY-DUTY THERMOSTAT

Line or Low Voltage, Heating or Cooling



Explosion-proof, heavy duty, the **MODEL 862E** Thermostat is designed for hazardous-location temperature control of heating, cooling, or ventilation systems and features an adjustable set point knob for easy and convenient setpoint adjustment.

## FEATURES/BENEFITS

- Explosion-proof construction
- Lightweight and durable

## APPLICATIONS

- Oil rigs or refineries
- Petrochemical plants
- Grain processing and storage facilities
- HVAC control

## MODEL CHART

Model	Description
862E	Explosion-proof, heavy-duty thermostat

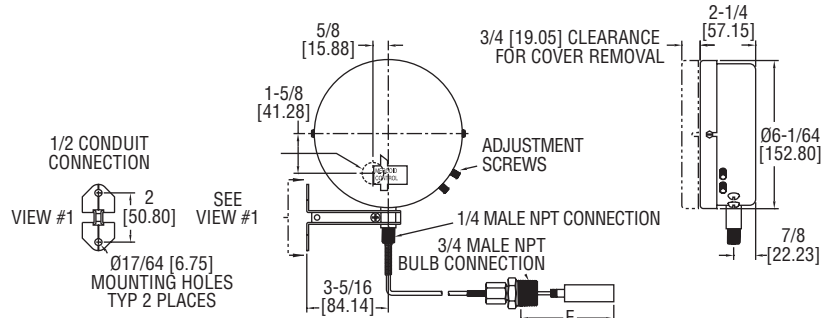
## SPECIFICATIONS

**Service:** Compatible gases.  
**Temperature Limit:** -49 to 176°F (-45 to 80°C).  
**Enclosure Rating:** Explosion-proof NEMA 7 & 9, Class I, Divisions 1 & 2, Groups C & D; Class II, Division 1, Groups E, F & G; Class II, Division 2, Groups F & G; Class III; Class I, Zones 1 & 2, Groups IIA & IIB.  
**Switch Type:** SPDT snap action switch.  
**Electrical Rating:** 22 A @ 480 VAC (res.), 1/2 HP @ 125 VAC, 1 HP @ 250 VAC.  
**Electrical Connection:** Screw terminal.  
**Conduit Connection:** 3/4" female NPT.  
**Set Point Adjustment:** External knob.  
**Adjustable Range:** 36 to 82°F (2 to 28°C).  
**Deadband:** 2.5°F (1.5°C).  
**Weight:** 2.1 lb (0.95 kg).  
**Agency Approvals:** CSA, UL.

## SERIES DA-7035N | MERCOLD BY DWYER

# TEMPERATURE SWITCHES

Bulb and Capillary, Inert Gas Fill



The **SERIES DA-7035N** Temperature Switches include the same time-proven switching mechanism used in our Series DA pressure switches. Bourdon tube ensures high sensitivity and long life.

## FEATURES/BENEFITS

- Adjustable deadband
- No cross ambient temperature effects
- Visible dial calibrated in both °F and °C
- Visible on/off indication

## APPLICATIONS

- Mechanical process temperature monitoring

## MODEL CHART

Model	Range °F (°C)	Max. Temp. °F (°C)	Min. Deadband °F (°C)	Min. Insertion Depth "E" in. (mm)
DA-7035-153-1N	-60 to +30 (-50 to 0)	150 (65)	23 (13)	2-7/8 (73)
DA-7035-153-3N	0 to 100 (-18 to 40)	240 (115)	25 (14)	2-7/8 (73)
DA-7035-153-4N	50 to 150 (10 to 65)	250 (120)	25 (14)	2-7/8 (73)
DA-7035-153-5N	100 to 200 (40 to 95)	300 (150)	25 (14)	2-7/8 (73)
DA-7035-153-7N	140 to 300 (60 to 150)	500 (260)	41 (23)	2-7/8 (73)
DA-7035-153-8N	250 to 415 (120 to 215)	550 (290)	42 (23)	2-7/8 (73)
DA-7035-153-9N	350 to 550 (175 to 290)	600 (315)	50 (28)	4-7/8 (124)
DA-7035-153-10N	100 to 300 (40 to 150)	500 (260)	50 (28)	2-7/8 (73)
DA-7035-153-11N	100 to 500 (40 to 260)	600 (315)	100 (56)	2-7/8 (73)

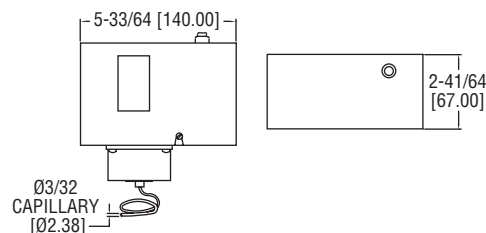
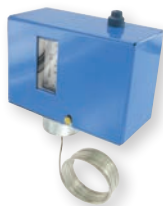
**Note:** Insertion depth can be increased through use of bulb supports or wells. Consult factory.

## SPECIFICATIONS

**Service:** Compatible liquids or gases.  
**Wetted Materials:** Bulb and connection: 304 SS.  
**Temperature Limit:** Process: See model chart; Ambient: 180°F (82°C).  
**Pressure Limit:** 300 psi (20.6 bar).  
**Enclosure Rating:** General purpose. Optional weatherproof and explosion-proof.  
**Repeatability:** ±1% FS.  
**Switch Type:** SPDT snap switch. Optional DPDT snap and a variety of mercury switches.  
**Electrical Rating:** 10 A @ 120/240/480 VAC.  
**Electrical Connections:** Screw terminal.  
**Conduit Connection:** 7/8" (22.23 mm) hole for 1/2" (12.7 mm) conduit hub.  
**Process Connection:** 3/4" male NPT. Other sizes available.  
**Set Point Adjustment:** External knobs for set point and reset point.  
**Weight:** 5 lb (2.3 kg).  
**Deadband:** Adjustable from minimum in model chart to full range. Optional low fixed deadband.  
**Capillary:** 6' (1.8 m) standard. Ranges 1N to 7N, and 10N: copper. Ranges 8N, 9N, 11N: 304 SS.  
**Set Point Scale:** Indication in °F and °C.  
**Options:** See web page for additional option models such as: switch type enclosures, fixed deadband, longer or shorter capillary, armored capillary, wells, two stage, 1/2" or 1" connection sizes, manual reset.

# LOW LIMIT FREEZE PROTECTION SWITCH

Manual and Auto Reset, DPDT Output



The **SERIES DFS** Low Limit Freeze Protection Switch protects cooling coils in air handler systems by sensing frost build up on the coils.

## FEATURES/BENEFITS

- DPDT switch feedback
- Setpoint as low as 34°F (1°C)
- Mounting clips included

## APPLICATIONS

- Cooling coil frost monitoring
- HVAC systems

MODEL CHART		
Model	Reset Action	Capillary Length
DFS-DM20	Manual	20' (609 cm)
DFS-DA20	Automatic	20' (609 cm)
DFS-DM10	Manual	10' (305 cm)
DFS-DA10	Automatic	10' (305 cm)

## SPECIFICATIONS

**Wetted Material:** Vapor-filled copper capillary, 10' or 20'.

**Housing Material:** Plated steel case, painted steel cover, plastic set point window.

**Temperature Limit:** Operating: -60 to 160°F (-51 to 71°C); Sensing element: 300°F (149°C) max.

**Switch Type:** DPDT snap acting.

**Electrical Ratings:** Inductive: 14 FLA, 84 LRA, 3/4 hp @ 120 VAC; 12 FLA, 72 LRA, 2 hp @ 240 VAC; Pilot Duty: 720 VA max. @ 120 to 600 VAC; 144 VA max. @ 24 VAC.

**Reset Action:** Manual or automatic.

**Adjustable Range:** 34 to 70°F (1 to 21°C).

**Deadband:** 4.5°F (2.5°C), fixed.

**Agency Approvals:** cULus.

## SERIES BTT-E/N

# TEMPERATURE TRANSMITTER

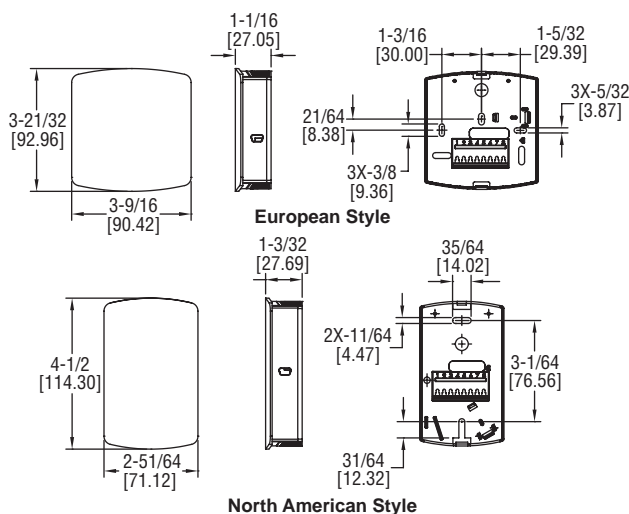
Wall Mount for Building Applications



European Style



North American Style



The **SERIES BTT-E/N** Wall Mount Temperature Transmitter offers transmitter output signals with the same form and fit as our popular Series TE-E/N thermistor and RTD sensors for Building Automation and HVAC installations..

## FEATURES/BENEFITS

- Transmitter signal offers reliable accuracy for installations with long wire runs between the transmitter and the receiver/controller

## APPLICATIONS

- Room or indoor building space temperature monitoring

MODEL CHART		
Model	Housing	Output
BTT-N00-3	North American Style	4 to 20 mA
BTT-N00-4	North American Style	0 to 10 VDC
BTT-E00-3	European Style	4 to 20 mA
BTT-E00-4	European Style	0 to 10 VDC

## SPECIFICATIONS

**Temperature Sensor:** Pt 1000 Ω RTD DIN Class A 0.00385Ω/°C.

**Range:** 32 to 122 °F (0 to 50 °C).

**Temperature Limits:** 32 to 122 °F (0 to 50 °C).

**Accuracy:** ±0.5 °C @ 25 °C.

**Thermal Effect:** ±0.01%/°C.

**Response Time:** 100 ms.

**Power Requirements:** 13 to 36 VDC.

**Output Signal:** 4 to 20 mA or 0 to 10 VDC (depending on model).

**Electrical Connections:** Screw terminal block.

**Enclosure Rating:** IP20.

**Weight:** 2.6 oz (73.7 g).

**Agency Approvals:** CE.

# TEMPERATURE TRANSMITTER

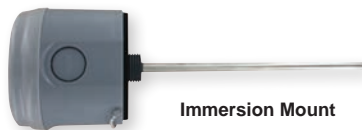
Current or Voltage Output, NEMA 4X Enclosures



Duct Mount



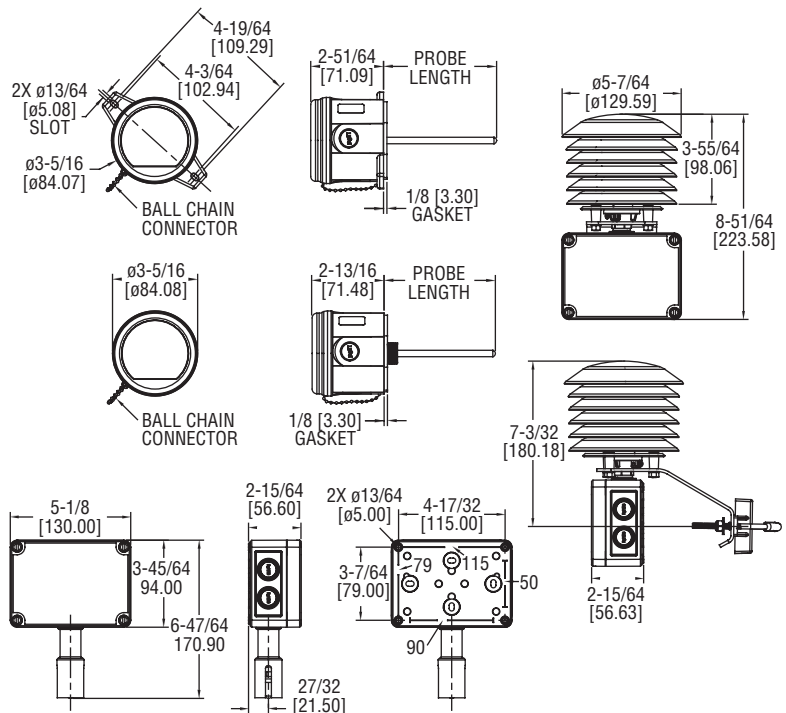
Outside Air with Radiation Shield



Immersion Mount



Outside Air without Radiation Shield



The **SERIES BTT** Temperature Transmitter offers transmitter output signals with the same form and fit as our popular TE thermistor and RTD sensors for building HVAC applications. Thermowells are required when using immersion models in liquid applications.

## FEATURES/BENEFITS

- Duct, immersion, and outside air models available
- Radiation shield available for mounting in direct sunlight
- Transmitter output allows for longer wire runs than standard thermistor sensors

## APPLICATIONS

- Building automation system temperature monitoring

MODEL CHART					
Example	BTT	-D	04	-1	BTT-D04-1
Series	BTT				Temperature transmitter
Mounting Configuration		D I O R			Duct mount Immersion mount Outside air Outside air with radiation shield
Probe Length*			25 04 06 08 12 18		2.5" (required for "O" and "R" models) 4" 6" 8" 12" 18"
Output				1 2	4 to 20 mA 0 to 10 V
Options				Blank FC NIST	None Factory calibration certificate NIST calibration certificate

\*For BTT-I models, actual probe length is approximately 0.75" longer than listed probe length to ensure maximum immersion into thermowells.

## SPECIFICATIONS

**Temperature Sensor:** Pt1000 RTD.  
**Range:** -40 to 140°F (-40 to 60°C).  
**Temperature Limits:** -40 to 140°F (-40 to 60°C).  
**Accuracy:**  $\pm 0.5^\circ\text{C}$  @ 25°C.  
**Thermal Effect:**  $\pm 0.01\%/^\circ\text{C}$ .  
**Response Time:** 100 ms.  
**Wetted Materials:** All models: 304 SS (probe), polycarbonate (housing); Duct and immersion models: Neoprene (gasket); Outside air models: Nylon (insert), silicone (O-ring).  
**Process Connection:** 1/2" NPT (immersion models only).  
**Electrical Connection:** Removable terminal block, knocks out for conduit fitting.  
**Conduit Connection:** 1/2" NPT.  
**Probe Lengths:** 2.5 to 18" (depending on configuration).  
**Power Requirements:** 13 to 36 VDC.  
**Output Signal:** 4 to 20 mA or 0 to 10 VDC (depending on model).  
**Enclosure Rating:** NEMA 4X (IP66) (immersions models require thermowell).  
**Weight:** 5.11 oz (145 g) (duct/immersion); 8.4 oz (238 g) (OSA without radiation shield); 1 lb 7.4 oz (663.4 g) (OSA with radiation shield).  
**Agency Approvals:** CE.

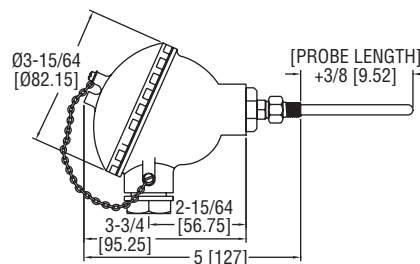
THERMOWELLS - WELDED			
Model	Material	Connection (Internal/External)	Insertion Length
TE-TNS-N253N-00	304 SS	1/2" NPSM/1/2" NPT	2.5"
TE-TNS-N043N-00	304 SS	1/2" NPSM/1/2" NPT	4"
TE-TNS-N063N-00	304 SS	1/2" NPSM/1/2" NPT	6"
TE-TNS-N083N-00	304 SS	1/2" NPSM/1/2" NPT	8"
TE-TNS-N123N-00	304 SS	1/2" NPSM/1/2" NPT	12"
TE-TNS-N183N-00	304 SS	1/2" NPSM/1/2" NPT	18"

**Dwyer**

SERIES TTW

# WEATHERPROOF IMMERSION TEMPERATURE TRANSMITTER

Pt100 RTD, PC Programmable Transmitter



The **SERIES TTW** Immersion Temperature Transmitter offers a field adjustable temperature transmitter pre-assembled with an RTD sensor and weatherproof enclosure.

**FEATURES/BENEFITS**

- Preset to 32 to 212°F (0 to 100°C) output range
- USB port for easy output scale adjustment in the field

**APPLICATIONS**

- Immersion temperature sensing in HVAC systems

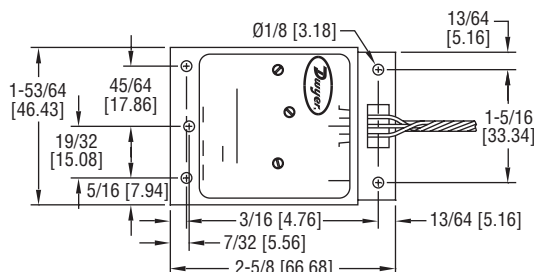
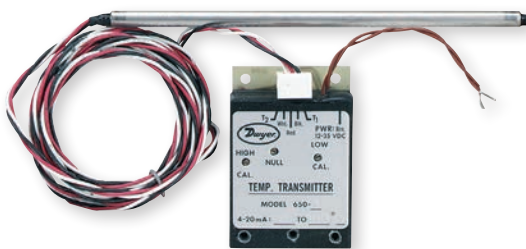
**MODEL CHART**

Model	Probe Length
TTW-104	4"
TTW-106	6"
TTW-108	8"
TTW-112	12"
TTW-118	18"

**SPECIFICATIONS****TEMPERATURE SENSOR****Accuracy:**  $\pm 3^\circ\text{F}$  ( $\pm 1.7^\circ\text{C}$ ).**Temperature Limits:** Operating: -40 to 302°F (-40 to 150°C).**Sensor Curves:** Pt100 RTD (TE Series Curve D).**Power Requirements:** 12 to 35 VDC.**Accuracy:**  $\pm 0.2\%$  FS.**Temperature Limits:** -40 to 185°F (-40 to 85°C).**Response Time:** <100 ms.**TEMPERATURE TRANSMITTER****Input Range:** -328 to 986°F (-200 to 530°C).**Output:** Two-wire 4 to 20 mA.**Output Impedance:** 600  $\Omega$  @ 24 VDC.**ENCLOSURE****Temperature Limits:** -40 to 212°F (-40 to 100°C).**Rating:** NEMA 4X (IP65).**Material:** Painted aluminum housing.**SERIES 650**

# TEMPERATURE TRANSMITTER

4 to 20 mA Signal, Two Wire Operation, Temperatures from -55 to 180°C



The **SERIES 650** Temperature Transmitter is ideal for a wide variety of HVAC, industrial and commercial multi-point temperature monitoring applications. Three models are stocked in popular ranges factory calibrated within 0.3% of span.

**FEATURES/BENEFITS**

- Field adjustable span
- Low profile transmitter housing
- Non-polarized wiring

**APPLICATIONS**

- HVAC system monitoring

**MODEL CHART**

Model	Range As Stocked	Low Range Limits		Span Limits	
		Min.	Max.	Min.	Max.
650-1	-23° to +10°C	-32°C	-14°C	24°C	48°C
650-2	-7° to +49°C	-12°C	+6°C	37°C	150°C
650-3	0° to +100°C	-12°C	+6°C	37°C	150°C

Consult factory for special ranges calibrated within the limits of -55°C and +180°C.

**SPECIFICATIONS****Input:** Silicone-junction transistor.**Output Signal:** 4 to 20 mA DC.**Power Requirements:** 12 to 35 volts DC.**Accuracy:**  $\pm 0.3\%$  FS @ 20°C (68°F).**Linearity:** Within 0.25% of span.**Thermal Drift:** Less than 0.5% of span over ambient temperature range of 0 to 50°C (32 to 122°F).**Probe Construction:** 6" long, 0.25" OD Type 304 SS.**Temperature Limits:** Ambient: 0 to 70°C (32 to 158°F).**Temperature Limits:** (Probe): 204°C (400°F).**Probe Cable Length:** 7 ft (2.1 m).**Voltage Stability:** Output error less than 0.01% of span over the specified supply voltage range.**ACCESSORY**

Model	Description
A-325	Duct mounting kit with flange, fitting and hardware

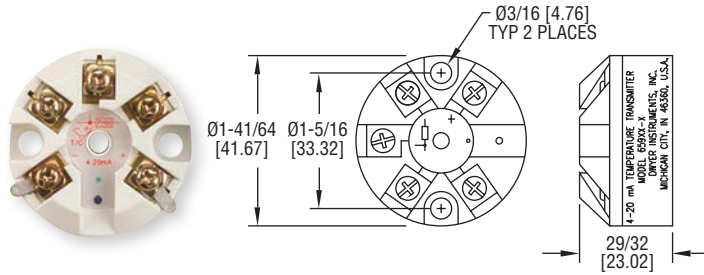
**OPTION**

Use order code:	Description
NISTCAL-TT1	NIST traceable calibration certificate

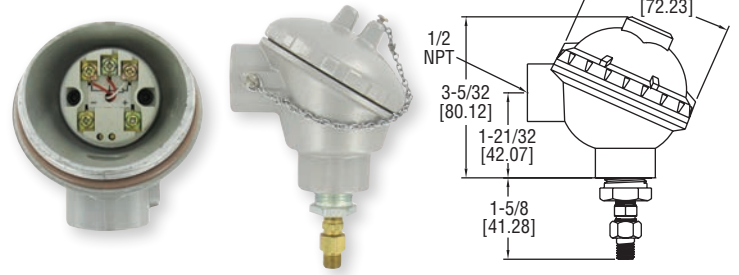


# PUSH-BUTTON TEMPERATURE TRANSMITTER

Programmable, RTD, Thermistor or Thermocouple Input, In-Head Mounting



659 Transmitter



Accessory A-709 Transmitter Enclosure

The **SERIES 659** Push-Button Temperature Transmitters accept thermocouple (J, K, T), RTD (Pt100 $\Omega$ ) or thermistor input and provide a linearized 4 to 20 mA output. The transmitter is quickly ranged and calibrated by using a single on-board switch.

## FEATURES/BENEFITS

- Push button calibration adjustment
- Reverse polarity protection
- Standard temperature sensor head enclosure mounting
- Sensor fault LED

## APPLICATIONS

- Process applications where a 4 to 20 mA signal is required

MODEL CHART	
Model	Input
659TC-1	Thermocouple (Type J, K, T)
659RTD-1	3-wire (RTD Pt100)
659TH-1	Thermistor (2252 $\Omega$ )

ACCESSORIES	
Model	Description
A-709	NEMA 4X Aluminum Transmitter Enclosure

## SPECIFICATIONS

**Input Range:** Type J T/C: -328 to 2192°F (-200 to 1200°C); Type K T/C: -328 to 2498°F (-200 to 1370°C); Type T T/C: -328 to 752°F (-200 to 400°C); Pt100  $\Omega$  RTD: -328 to 1562°F (-200 to 850°C); Thermistor: -13 to 257°F.

**Accuracy:** T/C models:  $\pm 0.04\%$  FS.,  $\pm 0.04\%$  of reading or  $\pm 0.5^\circ\text{C}$  whichever is greater; RTD:  $\pm 0.2^\circ\text{C} \pm 0.1\%$  of rdg; Thermistor:  $\pm 0.25^\circ\text{F} (\pm 0.1^\circ\text{C})$ .

**Output:** Linearized 4 to 20 mA, 2-wire loop powered.

**Sample Rate:** 500 ms.

**Loop Resistance:** T/C: 700  $\Omega$  @ 24 VDC; RTD: 800  $\Omega$  @ 24 VDC; Thermistor: 24 VDC.

**Output Thermal Drift:** Zero: 0.2 $\mu\text{A}/^\circ\text{C}$ ; Span: 0.5 $\mu\text{A}/^\circ\text{C}$ .

**Temperature Limits: Ambient:** -4 to 158°F (-20 to 70°C), 80% RH max.

**Burnout:** Upscale 22 mA.

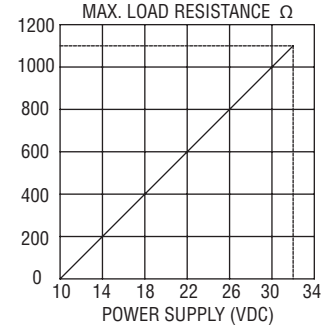
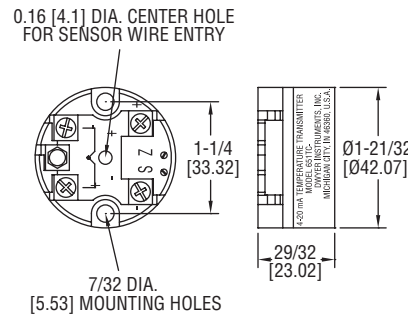
**Weight:** 0.92 oz (26 g).

**Agency Approvals:** CE.

## SERIES 651

# TEMPERATURE TRANSMITTER

RTD or Thermocouple Input, Zero and Span Adjust, Linearized 4 to 20 mA Signal



The **SERIES 651** Temperature Transmitters are designed for use with 2 or 3 wire Pt100 RTDs or ungrounded Type K thermocouples. Thermocouple models 651TC are cold junction compensated, automatic 32 to 160°F (0 to 70°C) with upscale burnout.

## FEATURES/BENEFITS

- Various preset ranges available
- Pt100 or K type thermocouple models
- Standard temperature sensor head enclosure mounting

## APPLICATIONS

- Process applications where a 4 to 20 mA signal is required

MODEL CHART					
Model	Input Type	Range, °F (°C)	Model	Input Type	Range, °F (°C)
651A-10	Pt100 RTD	32 to 212 (0 to 100)	651TC-01	Type K thermocouple	32 to 212 (0 to 100)
651A-20	Pt100 RTD	32 to 392 (0 to 200)	651TC-02	Type K thermocouple	32 to 392 (0 to 200)
651A-40	Pt100 RTD	32 to 752 (0 to 400)	651TC-04	Type K thermocouple	32 to 752 (0 to 400)
			651TC-06	Type K thermocouple	32 to 1112 (0 to 600)

## SPECIFICATIONS

**Input:** 2 or 3-wire Pt100 RTD (models 651A), or ungrounded Type K thermocouple (models 651TC).

**Output:** 4 to 20 mA DC, linearized.

**Transmitter Type:** 2-wire.

**Output Impedance:** 700  $\Omega$  @ 24 VDC.

**Power Requirements:** 10 to 32 VDC, reverse connection protected.

**Accuracy:**  $\pm 0.2^\circ\text{C}$  plus 0.2% reading (models 651A),  $\pm 0.1\%$  FS plus cold junction errors (models 651TC).

**Temperature Drift:** ZERO drift typical 0.02%/°C (0.09°F); SPAN typical 0.005%/°C (0.0036°F).

**Temperature Limits: Ambient:** 32 to 122°F (0 to 50°C).

**Maximum Storage Temperature:** 160°F (70°C).

**Response Time:** 10 to 90% in 200 ms (models 651A), 70% in 2 ms (models 651TC).

**Agency Approvals:** CE.

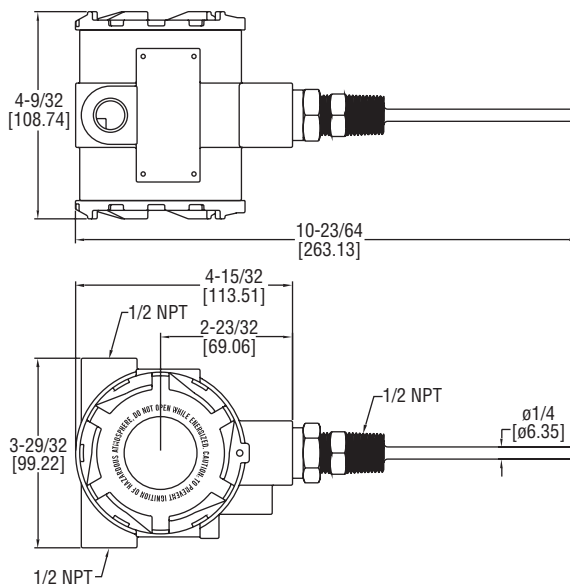
ACCESSORIES	
Model	Description
A-709	NEMA 4X Aluminum Transmitter Enclosure

# EXPLOSION-PROOF RTD TEMPERATURE TRANSMITTER

User Selectable Ranges, Optional LCD Display



\*Shown with optional LCD display



The **SERIES TTE** Explosion-Proof RTD Temperature Transmitter is the ideal product for hazardous temperature measurement applications. The TTE series has seven pre-programmed temperature ranges that are selectable via an internal dip switch.

## FEATURES/BENEFITS

- FM approved for Class I, Groups B, C, D; Class II, Groups E, F, G classified explosive environments
- Optional LCD
- Output span selected from seven common ranges or user determined

## APPLICATIONS

- Explosive process environments
- Offshore HVAC monitoring

## SPECIFICATIONS

**Temperature Sensor:** Pt1000, 0.00385 DIN.  
**Output Temperature Ranges:** User selectable – any range between -30 to 250°F with a minimum span of 40°F.  
**Temperature Limits:** Ambient: 0 to 158°F (-18 to 70°C); Process: -30 to 250°F (-34.4 to 121.1°C).  
**Accuracy:** Transmitter  $\pm 0.1\%$  FS; Probe  $\pm 0.3\%$  FS.  
**Thermal Drift Effects:**  $\pm 0.02\%/^{\circ}\text{C}$  max.  
**Response Time:** 250 ms.  
**Wetted Materials:** 316 SS.  
**Process Connection:** 1/2" male NPT.  
**Conduit Connection:** 1/2" female NPT.  
**Probe Length:** 2" to 18" (depending on model).  
**Pressure Limits:** 2000 psi (137.9 bar).  
**Power Requirements:** 10 to 35 VDC.  
**Output Signal:** 4 to 20 mA (two wire loop powered).  
**Optional Display:** 2 lines X 8 character LCD.  
**Enclosure Rating:** NEMA 4X (IP66) and explosion-proof for Class I, Groups B, C, D; Class II, Groups E, F, G; Class III.  
**Weight:** 2 lb 8 oz (1134 g).  
**Agency Approvals:** CE, FM.

## MODEL CHART

Model	Stem Length	LCD Display
TTE-104-W	4"	No
TTE-106-W	6"	No
TTE-109-W	9"	No
TTE-112-W	12"	No
TTE-115-W	15"	No
TTE-118-W	18"	No
TTE-104-W-LCD	4"	Yes
TTE-106-W-LCD	6"	Yes
TTE-109-W-LCD	9"	Yes
TTE-112-W-LCD	12"	Yes
TTE-115-W-LCD	15"	Yes
TTE-118-W-LCD	18"	Yes

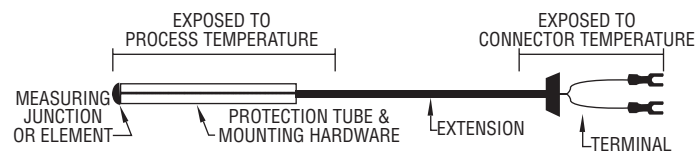
## FIELD-SELECTABLE RANGES

40 to 90°F (4.4 to 32.2°C)  
 -20 to 140°F (-28.9 to 60°C)  
 0 to 100°F (-17.8 to 37.8°C)  
 30 to 240°F (-1.1 to 115.6°C)  
 32 to 212°F (0 to 100°C)  
 32 to 122°F (0 to 50°C)  
 -30 to 65°C (-1.1 to 18.3°C)  
 Custom range between -30 to 250°F (-34.4 to 121.1°C)

## ACCESSORY

Model	Description
A-287	Mounting bracket for pipe or surface mounting (Includes bracket and two 2" U-bolts)

# TEMPERATURE SENSORS



Thermocouple Types	Wire Types	Temperature Range (°F)	Temperature Range (°C)
J	Iron/constantan	32 to 1400	0 to 760
K	Chromel/alumel	32 to 2300	0 to 1200
E	Chromel/constantan	-300 to 1600	-184 to 871
T	Copper/constantan	-300 to 700	-184 to 371
R	Plat. 13%/rhod./plat.	32 to 2700	0 to 1482
S	Plat. 10%/rhod./plat.	32 to 2700	0 to 1482
RTD Types		Temperature Range (°F)	Temperature Range (°C)
Low range thin film		-58 to 392	-50 to 200
Medium range thin film		-58 to 896	-50 to 480
High range wire wound		-328 to 1112	-200 to 600

## ORDERING SENSORS

Sensors are constructed with various types of protection/mounting hardware, extensions, and wire terminations. The sensor types and their temperature ranges are shown in the table. See "Temperature Limits" for maximum service temperatures applicable to the protection tube, mounting hardware, wire extensions, etc.

This section shows only a limited selection of the available sensors. The sensors are organized by hardware type. Most hardware can house any type thermocouple or RTD. Terminations are usually either lug type or standard plugs, but many other types are available. Various 'head enclosures' are also available. Dimensions can be custom designed to meet your specifications.

## SERVICE TEMPERATURES

304/316 SS tubing/protection/mounting hardware	1600°F
Inconel® 600 tubing/protection/mounting hardware	2100°F
Alumina	3400°F
Mullite	2700°F
Fiberglass insulated extension wire	842°F
FEP insulated extension wire	392°F
Junction box (BX) connector	400°F
Plug	400°F

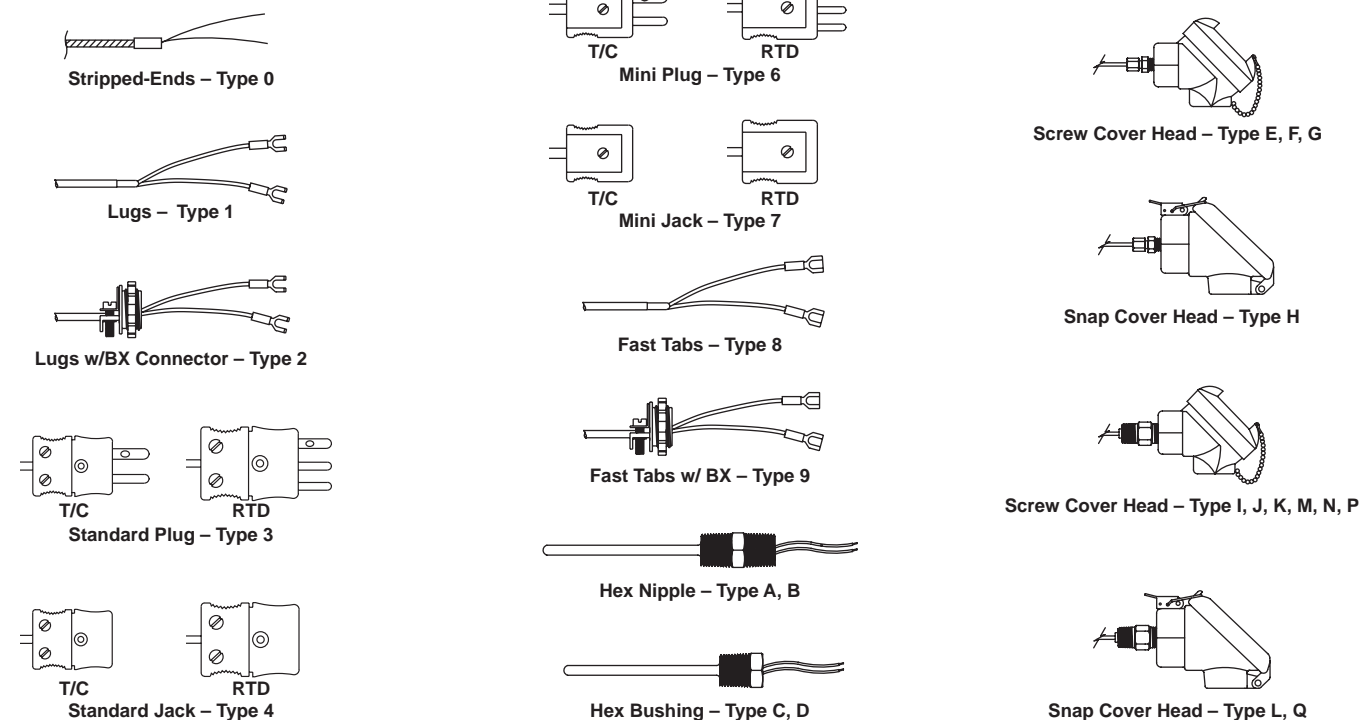
## TEMPERATURE LIMITS

Sensor selection depends on two separate temperatures: process temperature and connector temperature. Make sure the local temperature at each component does not exceed the maximum rated service temperature for that component. Note that extension wire must withstand the process temperature.

## HARDWARE TYPE



## TERMINALS

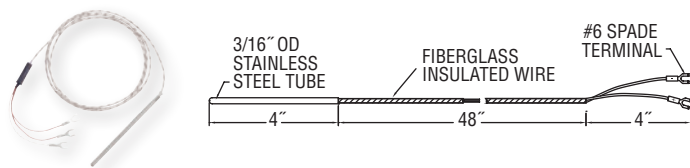


Inconel® is a registered trademark of Huntington Alloys Corporation

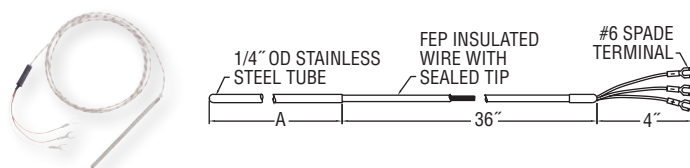
## THERMOCOUPLES &amp; RTD'S



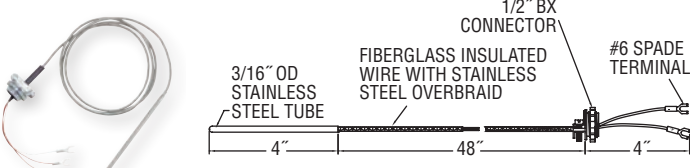
## GENERAL PURPOSE



MODEL CHART - BASIC		
Model	Sensor Type	Terminal
122095-84	J	#6 spade
122095-01	K	#6 spade
122095-04	(3-wire) 100 $\Omega$ RTD	#6 spade

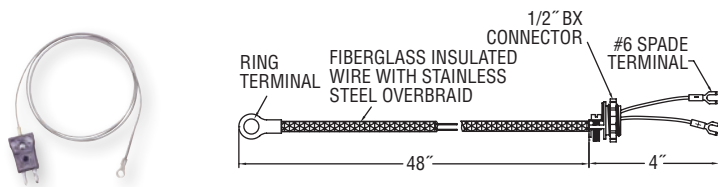


MODEL CHART - FEP INSULATION EXTENSION			
Model	Sensor Type	A Length	Terminal
122087-00	100 $\Omega$ RTD	6"	#6 spade

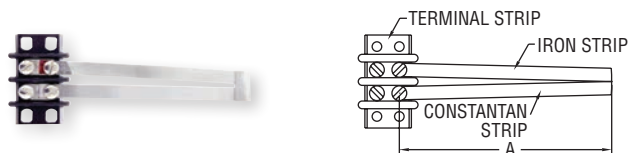


MODEL CHART - SS OVERBRAID EXTENSION			
Model	Sensor Type	Bend	Terminal
122095-19	J	0°	#6 spade
122095-25	100 $\Omega$ RTD	0°	#6 spade

## SPECIAL PURPOSE

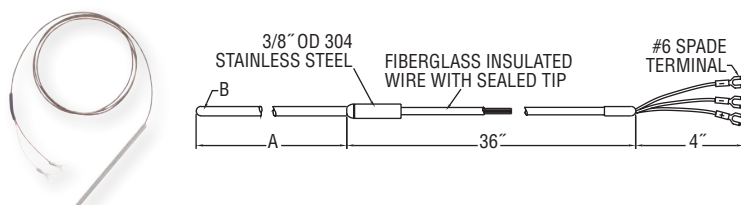


MODEL CHART - SURFACE THERMOCOUPLE (900°F MAX.)			
Model	Sensor Type	Ring Terminal ID	Terminal
122095-24	J	13/32"	#6 spade
122095-32	J	13/64"	#6 spade



MODEL CHART - WEB STYLE		
Model	A Length	Terminal
122095-86	2.75"	No

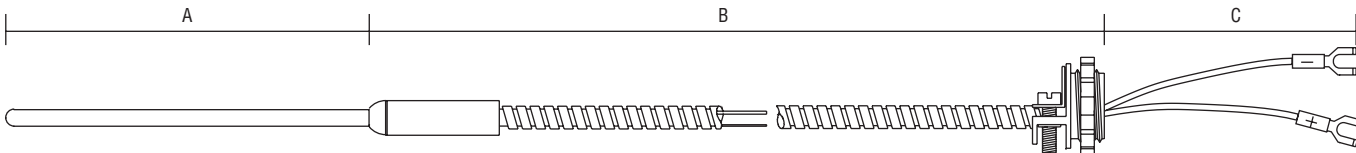
## MINERAL INSULATED



MODEL CHART				
Model	Sensor Type	A Length	B Diameter	Terminal
122088-00	100 $\Omega$ RTD	6"	1/4"	#6 spade
122088-01	100 $\Omega$ RTD	12"	1/4"	#6 spade
122086-00	100 $\Omega$ RTD	6"	1/8"	#6 spade

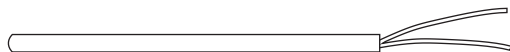


# MINERAL INSULATED THERMOCOUPLES AND RTD'S

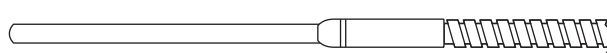


## MINERAL INSULATED TRANSITIONS

Due to the varying size of connection wire and cable, a transition fitting is used between the cold end of the sheath and the connecting wires. This fitting measures 1-1/4" long by 1/4" OD for 1/8" or smaller sheaths, and 1-1/2" long by 3/8" OD for 3/16" and 1/4" sheaths. Larger sheaths and sheaths terminating in connectors other than wire or cable do not require transition fittings.



Basic Sheath Configuration



Sheath and Transition Fitting (when made with Flex Hose)



Sheath and Transition Fitting (when made with SS Overbraid Wire)



Sheath and Transition Fitting (when made with Fiberglass Wire)



**SERIES R & 8** Mineral Insulated Thermocouples and RTDs are known for their excellent mechanical durability and resistance to electrical breakdown. Mineral Insulated Thermocouples can be bent to most any angle without special equipment.

## MODEL CODING

Fill in the appropriate numbers or letters to specify the probe of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.

SENSOR TYPE				RTD TYPE				A			AA			B			C	
6 – 100 Ω RTD: 0.00385 Ω/°C 4 – 100 Ω RTD: 0.00392 Ω/°C				2 – 2-Wire; Class B 3 – 3-Wire; Class B 4 – 4-Wire; Class B 5 – 2-Wire; Class A 6 – 3-Wire; Class A 7 – 4-Wire; Class A				IN 1/10 INCH			IN 1/10 INCH			IN INCHES			IN INCHES	
R																		
8																		

SENSOR TYPE	HARDWARE TYPE	EXTENSION TYPE	SENSOR TERMINALS	ELEMENTS	JUNCTION TYPE	SENSOR O.D.	BEND
J – T/C	1 – Plain Sheath (304SS)	1 – Fiberglass Insulation	0 – Stripped Ends	1 – Single	1 – Grounded	1 – 1/16"	1 – None
K – T/C	2 – Plain Sheath (316SS)	2 – Fiberglass Insulation w/ SS Flex Hose	1 – Leads With #6 Spade Lugs	2 – Dual	2 – Ungrounded	2 – 1/8"	2 – 45°
E – T/C	3 – Inconel® 600 Sheath	3 – Fiberglass Insulation w/ SS Overbraid	2 – Leads With #6 Spade Lugs & 1/2 BX		3 – Exposed Tip	3 – 3/16"	3 – 90°
T – T/C			3 – Standard Plug			4 – 1/4"	
			4 – Standard Jack			5 – 3/8"	
			6 – Mini Plug				
			7 – Mini Jack				
			8 – Leads With 1/4" Fastabs				
			9 – Leads With 1/4" Fastabs 1/2" BX				
			A – 1/2" NPT Hex Nipple (316SS)				
			B – 3/4" NPT Hex Nipple (316SS)				
			C – 1/2" NPT Hex Bushing (316SS)				
			D – 3/4 NPT Hex Bushing (316SS)				

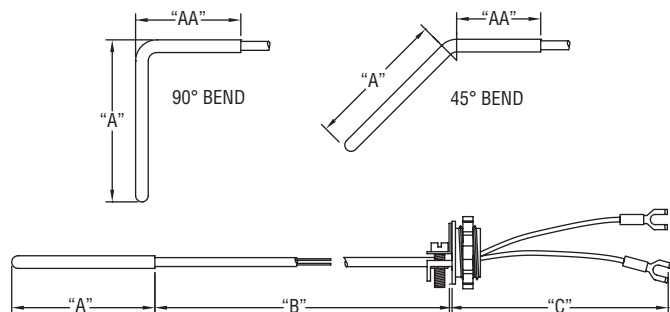
## HEAD ASSEMBLY OPTIONS (3/4" NPT Conduit Connection)

- E – Screw Cover Head, AL w/ No Process Connection
- F – Screw Cover Head, Plastic w/ No Process Connection
- G – Screw Cover Head, SS w/ No Process Connection
- H – Snap Cover Head, AL w/ No Process Connection
- I – Screw Cover Head, AL w/ 1/2" NPT Process Connection
- J – Screw Cover Head, Plastic w/ 1/2" NPT Process Connection
- K – Screw Cover Head, SS w/ 1/2" NPT Process Connection
- L – Snap Cover Head, AL w/ 1/2" NPT Process Connection
- M – Screw Cover Head, AL w/ 3/4" NPT Process Connection
- N – Screw Cover Head, Plastic w/ 3/4" Process Connection
- P – Screw Cover Head, SS w/ 3/4" Process Connection
- Q – Snap Cover Head, AL w/ 3/4" Process Connection

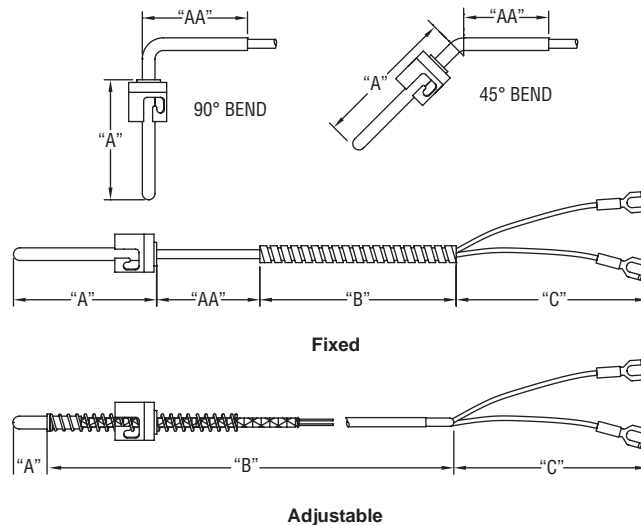
See table for **HEAD ASSEMBLY OPTIONS**

## GENERAL PURPOSE AND BAYONET TYPE THERMOCOUPLES &amp; RTD'S

## GENERAL PURPOSE



## BAYONET



**SERIES 4 & 5** General Purpose Type RTD and Thermocouple tip temperatures can be as high as 842°F (450°C) for fiberglass insulated wire, and 392°F (200°C) for FEP insulated wire. Models can be specified with lead wires or head assembly construction. For higher temperatures see the Series R & 8 Mineral Insulated Probes. ❶

## MODEL CODING

Fill in the appropriate numbers or letters to specify the probe of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.

SENSOR TYPE				RTD TYPE				A			AA			B			C				
TYPE				TYPE				IN 1/10 INCH			IN 1/10 INCH			IN INCHES			IN INCHES				
6	100 Ω	RTD	0.00385 Ω/°C	2	2-Wire	Class B															
Z	1000 Ω	RTD	0.00385 Ω/°C	3	3-Wire	Class B															
4	100 Ω	RTD	0.00392 Ω/°C	5	2-Wire	Class A															
				6	3-Wire	Class A															

SENSOR TYPE	HARDWARE TYPE	EXTENSION TYPE	SENSOR TERMINALS	ELEMENTS	JUNCTION TYPE	SENSOR O.D.	BEND
J – T/C	1 – Plain Sheath (316SS)	1 – Fiberglass Insulation 842°F/450°C	0 – Stripped Ends	1 – Single	1 – Grounded	2 – 1/8"	1 – None
K – T/C	2 – Plain Sheath w/ FEP Coating	2 – Fiberglass Insulation w/ SS Flex Hose	1 – Leads With #6 Spade Lugs	2 – Dual	2 – Ungrounded	3 – 3/16"	2 – 45°
E – T/C	4 – Back Filled Sheath*	3 – Fiberglass Insulation w/ SS Overbraid	2 – Leads With #6 Spade Lugs 1/2 BX		3 – Exposed Tip	4 – 1/4"	3 – 90°
T – T/C	5 – Back Filled Sheath w/ FEP Coating*	4 – FEP Insulation 392°F/200°C	3 – Standard Plug			5 – 3/8"	
	6 – Bayonet Mount Adjustable Length	5 – FEP Insulation w/ SS Overbraid	4 – Standard Jack				
	7 – Bayonet Mount Fixed Length	6 – FEP Insulation w/ FEP Coated Flex Hose	6 – Mini Plug				
			7 – Mini Jack				
			8 – Leads With 1/4" Fastabs				
			9 – Leads With 1/4" Fastabs 1/2" BX				
			A – 1/2" NPT Hex Nipple (316SS)*				
			B – 3/4" NPT Hex Nipple (316SS)*				
			C – 1/2" NPT Hex Bushing (316SS)*				
			D – 3/4" NPT Hex Bushing (316SS)*				
			See list for <b>HEAD ASSEMBLY OPTIONS*</b>				

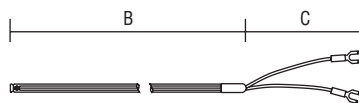
**HEAD ASSEMBLY OPTIONS\* (3/4" NPT Conduit Connection)**

E – Screw Cover Head, AL w/ No Process Connection  
 F – Screw Cover Head, Plastic w/ No Process Connection  
 G – Screw Cover Head, SS w/ No Process Connection  
 H – Snap Cover Head, AL w/ No Process Connection  
 I – Screw Cover Head, AL w/ 1/2" NPT Process Connection  
 J – Screw Cover Head, Plastic w/ 1/2" NPT Process Connection  
 K – Screw Cover Head, SS w/ 1/2" NPT Process Connection  
 L – Snap Cover Head, AL w/ 1/2" NPT Process Connection  
 M – Screw Cover Head, AL w/ 3/4" NPT Process Connection  
 N – Screw Cover Head, Plastic w/ 3/4" Process Connection  
 P – Screw Cover Head, SS w/ 3/4" Process Connection  
 Q – Snap Cover Head, AL w/ 3/4" Process Connection

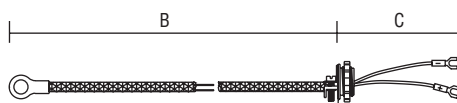
\*Options only available on Series 4 RTD's

# SPECIAL APPLICATION THERMOCOUPLES AND RTD'S

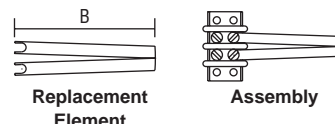
## SERIES 9 SPECIALTY SENSOR STYLES



Flexible FEP Covered Bead Junction

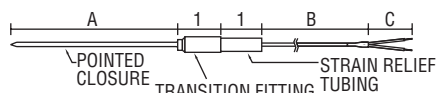


Ring Type Surface Thermocouples and RTD's

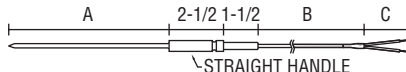


Web Type Surface Thermocouples

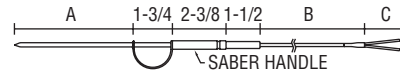
## SERIES P PENETRATION PROBE STYLES



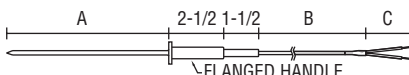
1. Transition Fitting



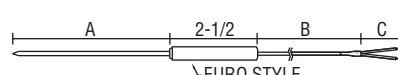
2. Straight Handle



3. Saber Handle



4. Flanged Handle



6&7. Euro Style Handle (FEP or SS)

**SERIES 9 & P** Special Application Thermocouples and RTD's cover a wide variety of types and configurations. This section covers FEP covered thermocouples and RTD's, ring type thermocouples and RTD's for surface measurement, web type thermocouples for surface measurement of moving objects such as rollers, and penetration thermocouples and RTD's with sharp tips for measurement of viscous liquids and semisolids such as plastic compounds, rubber and slightly frozen food products.

## MODEL CODING

Fill in the appropriate numbers or letters to specify the probe of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.

**9**     - **1**  **0** -   -

**B**  
IN INCHES      **C**  
IN INCHES

<b>SENSOR TYPE</b> J - T/C K - T/C E - T/C T - T/C 6 - RTD DIN 4 - RTD NIST Z - RTD DIN 1K	<b>HARDWARE TYPE</b> 5 - Bead Junction w/ FEP Coating 6 - Ring #10 (0.196" ID) 7 - Ring #8 (0.144" ID) 8 - Ring 3/8" (0.390" ID) 9 - Web	<b>EXTENSION TYPE</b> 0 - None 1 - Fiberglass Insulation 842°F/450°C 2 - Fiberglass Insulation w/ SS Flex Hose 3 - Fiberglass Insulation w/ SS Overbraid 4 - FEP Insulation 392°F/200°C 5 - FEP Insulation w/ SS Overbraid 6 - FEP Insulation w/ FEP Coated Flex Hose	<b>SENSOR TERMINALS</b> 0 - None 1 - Lugs 2 - Lugs With BX 3 - Standard Plug 4 - Standard Jack 6 - Mini Plug 7 - Mini Jack 8 - Fastabs 9 - Fastabs With BX	<b>JUNCTION TYPE</b> 1 - T/C 2 - 2-Wire RTD; Class B 3 - 3-Wire RTD; Class B 6 - 2-Wire RTD; Class A 7 - 3-Wire RTD; Class A
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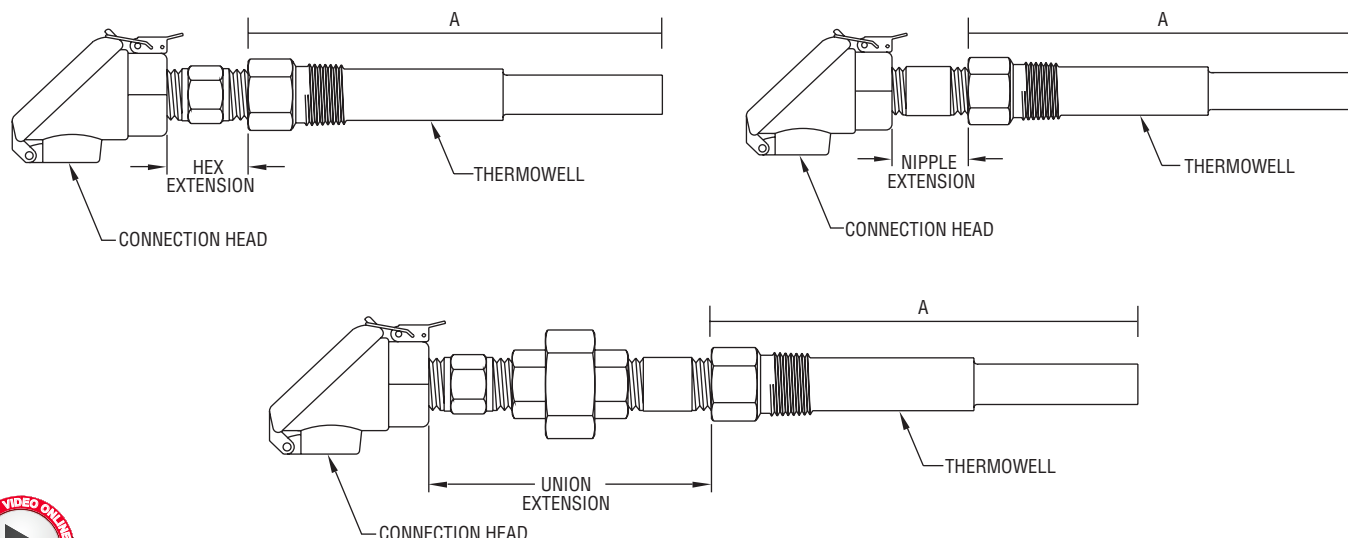
**P**     -   -    -    -

**A\***  
IN 1/10 INCH      **B**  
IN INCHES      **C**  
IN INCHES

<b>SENSOR TYPE</b> J - T/C T - T/C 6 - RTD DIN 4 - RTD NIST Z - RTD DIN 1K	<b>PROBE STYLE</b> 1 - Transition Fitting, SS 2 - Straight Handle, SS 3 - Saber Handle, SS 4 - Flanged Handle, SS 6 - Euro Style, FEP 7 - Euro Style, SS	<b>EXTENSION TYPE</b> 4 - FEP Insulation 6 - FEP Over SS Flex Hose	<b>SENSOR TERMINALS</b> 0 - Stripped Ends 1 - Lugs 2 - Lugs With BX 3 - Standard Plug 4 - Standard Jack 6 - Mini Plug 7 - Mini Jack	<b>JUNCTION TYPE</b> 1 - Grounded 2 - Ungrounded	<b>SENSOR O.D.</b> 7 - 0.134 O.D. Hypodermic 8 - 0.180 O.D. Hypodermic
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\*"A" Dimension maximum length is 12" (30 cm)

# TEMPERATURE SENSOR ASSEMBLIES WITH THERMOWELLS



**SERIES T** Sensor Assemblies are available in a variety of head styles and thermowell materials. All elements are spring loaded to ensure positive contact in the thermowell. Thermowells are non-lagging. The sensor sheath material is constructed of 316 SS regardless of the well material specified.

## MODEL CODING

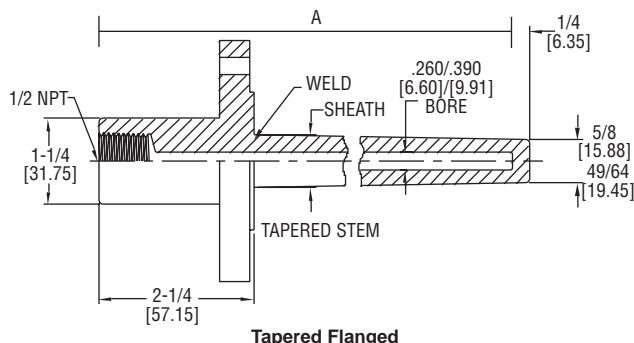
Fill in the appropriate numbers or letters to specify the probe of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.

<div style="text-align: center;"> <b>A</b>  <b>IN INCHES</b> </div>						
<b>T</b> <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>SENSOR TYPE</b>	<b>WELL MATERIAL</b>	<b>TAPER/BORE</b>	<b>EXTENSION</b>	<b>ELEMENTS</b>	<b>HEAD</b>	<b>PROCESS CONNECTION (NOMINAL/REDUCED O.D.)</b>
J – T/C	0 – None	0 – None	1 – Steel	1 – Single (Ungrounded/RTD)	0 – Aluminum Screw Cover	0 – None*
K – T/C	1 – 304 SS	1 – Step/0.260	1/2 NPT 1 in hex	2 – Dual (Ungrounded/RTD)	1 – Aluminum Snap Cover	1 – 1/2" NPT (5/8" to 1/2" Step)
E – T/C	2 – 316 SS	2 – Straight/0.385	4 – Steel	3 – Single (Grounded)	2 – Polypropylene Snap Cover	4 – 3/4" NPT (3/4" to 1/2" Step)
T – T/C	3 – Brass	3 – Taper/0.260	1/2 NPT 4 in nipple	4 – Dual (Grounded)	3 – Polypropylene Snap Cover	6 – 1" NPT (7/8" to 1/2" Step)
6 – 100 Ω RTD:	4 – Carbon Steel	4 – Taper/0.385	7 – Steel		4 – Dual (Grounded)	7 – 3/4" NPT (7/8" to 5/8" Taper)
3-Wire 0.00385 Ω/°C		5 – Straight/0.260	1/2 NPT 4 in union		5 – 304 SS Screw Cover	8 – 1" NPT (1-1/16" to 5/8" Taper)
Z – 1000 Ω RTD:			K – 316 SS			9 – 3/4" NPT (7/8" to 49/64" Taper)
3-Wire 0.00385 Ω/°C			1/2 NPT 1 in hex			A – 1" NPT (1-1/16" to 49/64" Taper)
4 – 100 Ω RTD:			N – 316 SS			B – 1/2" NPT (5/8" Straight)
3-Wire 0.00392 Ω/°C			1/2 NPT 4 in nipple			E – 3/4" NPT (3/4" Straight)
			S – 316 SS			D – 1" NPT (7/8" Straight)
			1/2 NPT 4 in union			

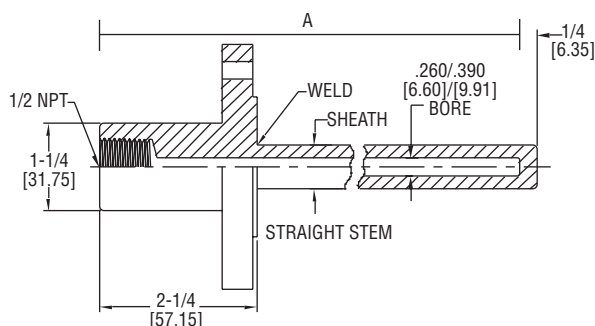
\*For replacement sensors, specify "0" for well material, taper and bore, and process connections



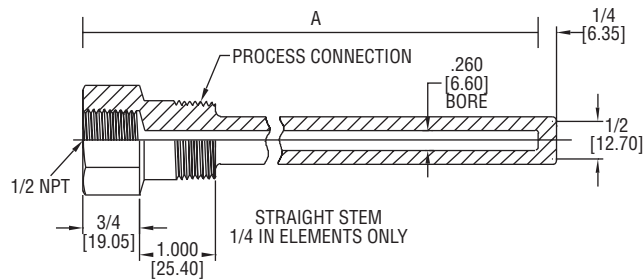
# THERMOWELLS



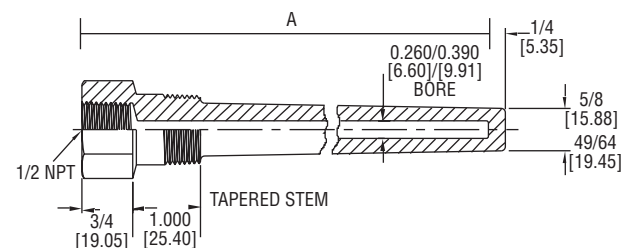
**Tapered Flanged**



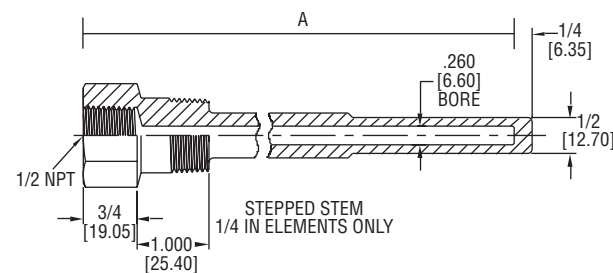
**Straight Flanged**



**Straight Stem**



**Tapered Stem**



**Stepped Stem**



Select bore as 0.260 for 1/4" diameter elements and 0.390 for 3/8" diameter elements. Specify heavy duty mounting for tapered sheaths.

## MODEL CODING

Fill in the appropriate numbers or letters to specify the thermowell of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.

W     -    -

### HARDWARE

- TYPE**  
1 - 304 SS Sheath  
2 - 316 SS Sheath  
3 - Brass  
4 - Carbon Steel

### TAPER/BORE

- 0 - Straight/0.260  
1 - Step/0.260  
2 - Straight/0.390  
3 - Taper/0.260  
4 - Taper/0.390

### INSIDE THREAD

- 1 - 1/2" Female NPT

### PROCESS CONNECTION

- 1 - 1/2 NPT  
2 - 3/4 NPT  
3 - 1 NPT  
4 - 1" 150# Flange  
5 - 1-1/2" 150# Flange  
6 - 2" 150# Flange  
7 - 1" 300# Flange  
8 - 1-1/2" 300# Flange  
9 - 2" 300# Flange  
A - 1" 600# Flange  
B - 1-1/2" 600# Flange  
C - 2" 600# Flange

### MOUNTING

- 1 - Threaded  
2 - Heavy Duty Threaded  
3 - Heavy Duty Flanged  
4 - Flanged

### LAG

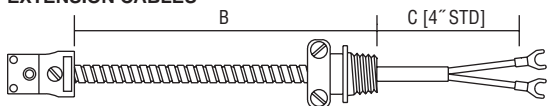
- 0 - None  
2 - 2"  
3 - 3"

### SHEATH O.D. BASE / TAPER

- 1 - 5/8" / 1/2" Step  
4 - 3/4" / 1/2" Step  
6 - 7/8" / 1/2" Step  
7 - 7/8" / 5/8" Taper  
8 - 1-1/16" / 5/8" Taper  
9 - 7/8" / 49/64" Taper  
A - 1-1/16" / 49/64" Taper  
B - 5/8" Straight  
D - 7/8" Straight  
E - 3/4" Straight

## THERMOCOUPLE ACCESSORIES

## EXTENSION CABLES



## MODEL CODING

Fill in the appropriate numbers or letters to specify the extension cable of your choice. Fill in all boxes. If an item or dimension does not apply, fill those boxes with zeros '0'.



**EC** — [ ] [ ] [ ] [ ] — [ ] [ ] [ ] [ ] — [ ] [ ] [ ] [ ] — [ ] [ ] [ ] [ ]

**SENSOR TYPE**  
 J – T/C  
 K – T/C  
 E – T/C  
 T – T/C  
 2 – RTD 2-Wire  
 3 – RTD 3-Wire

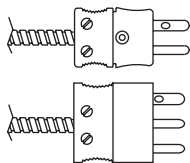
**EXTENSION TYPE**  
 0 – No Extension  
 1 – Fiberglass Insulation  
 3 – Stainless Steel Overbraid  
 4 – FEP Insulation  
 5 – Stainless Steel Flex Hose  
 6 – FEP Over SS Flex Hose

**TERMINAL #1**  
 0 – Stripped Ends  
 1 – Lugs  
 2 – Lugs With BX  
 3 – Standard Plug  
 4 – Standard Jack  
 6 – Mini Plug  
 7 – Mini Jack  
 9 – Fastabs  
 A – Fastabs With BX

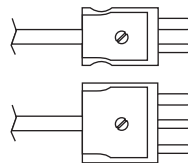
**TERMINAL #2**  
 0 – Stripped Ends  
 1 – Lugs  
 2 – Lugs With BX  
 3 – Standard Plug  
 4 – Standard Jack  
 6 – Mini Plug  
 7 – Mini Jack  
 9 – Fastabs  
 A – Fastabs With BX

**ELEMENTS**  
 1 – Single  
 2 – Dual

## PLUGS (MALE)

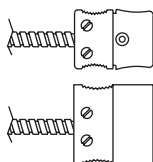


MODEL CHART - STANDARD SIZE SINGLE	
Model	Type
481-0001	J
481-0002	K
481-0003	T
481-0004	Cu11 (2-wire)
481-0015	E
481-0134	Cu (3-wire)

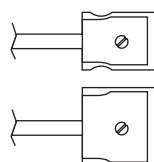


MODEL CHART - MINIATURE SIZE SINGLE	
Model	Type
481-0093	J
481-0095	K
481-0094	T
481-0098	R
481-0097	S
481-0096	E
481-0099	Cu (2-Wire)
481-0175	Cu (3-Wire)

**JACKS (FEMALE)**

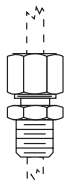


MODEL CHART - STANDARD SIZE SINGLE	
Model	Type
481-0006	J
481-0007	K
481-0008	T
481-0009	Cu11 (2-Wire)
481-0016	E
481-0135	Cu (3-Wire)



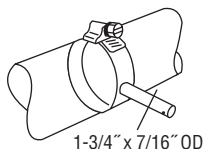
MODEL CHART - MINIATURE SIZE SINGLE	
Model	Type
481-0100	J
481-0102	K
481-0101	T
481-0105	R
481-0104	S
481-0103	E
481-0106	Cu (2-Wire)
481-0174	Cu (3-Wire)

## COMPRESSION FITTINGS



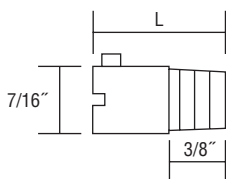
MODEL CHART							
Model	Type OD	Thread Size	Material	Model	Type OD	Thread Size	Material
<b>144-0012</b>	1/8"	1/8-27 NPT	Brass	<b>144-0014</b>	1/4"	1/4-18 NPT	Brass
<b>144-0020</b>	1/8"	1/8-27 NPT	Stainless steel	<b>144-0024</b>	1/4"	1/8-27 NPT	Stainless steel
<b>144-0009</b>	3/16"	1/8-27 NPT	Brass	<b>144-0037</b>	.260 - .275"	1/4-18 NPT	FEP
<b>144-0022</b>	3/16"	1/8-27 NPT	Stainless steel				

## PIPE ADAPTERS



MODEL CHART					
Model	Fits Pipe Diameters	Model	Fits Pipe Diameters	Model	Fits Pipe Diameters
1568-0007	1/2" to 7/8"	1568-0013	4-5/16" to 5-1/4"	1568-0024	15-3/4" to 16-1/4"
1568-0008	7/8" to 1-1/2"	1568-0020	6-1/4" to 6-3/4"	1568-0025	17-3/4" to 18-1/4"
1568-0009	1-5/16" to 2-1/4"	1568-0021	7-3/4" to 8-1/4"	1568-0027	19-3/4" to 20-1/4"
1568-0011	2-1/4" to 3-5/16"	1568-0022	9-3/4" to 10-1/4"	1568-0028	23-3/4" to 24-1/4"
1568-0012	3-5/8" to 4-1/4"	1568-0023	11-3/4" to 12-1/4"	1568-0029	29-3/4" to 30-1/4"

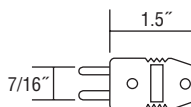
## BAYONET ADAPTERS



MODEL CHART		
Model	L	Thread Size
1568-0001	7/8"	1/8-27 UNF
1568-0002	7/8"	3/8-24 UNF
1568-0003	1-3/8"	1/8-27 UNF
1568-0004	1-3/8"	3/8-24 UNF
1568-0005	2-1/2"	1/8-27 UNF
1568-0006	2-1/2"	3/8-24 UNF
1568-0016	2-1/2"	10 x 1.5 mm

## TRANSITION ADAPTERS

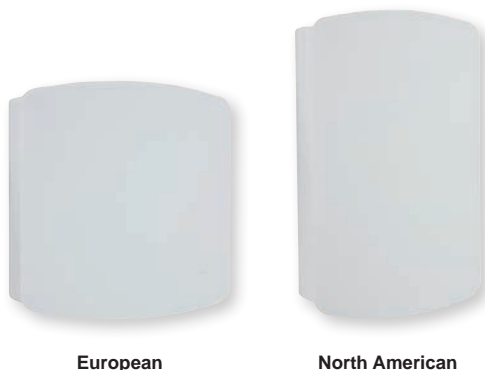
These adapters convert the miniature plug on the end of the coiled cable on the Master Probe Handle to a standard lug. Simply plug the cord into the adapter.



MODEL CHART	
Model	Type
481-0127	K
481-0126	J
481-0128	T

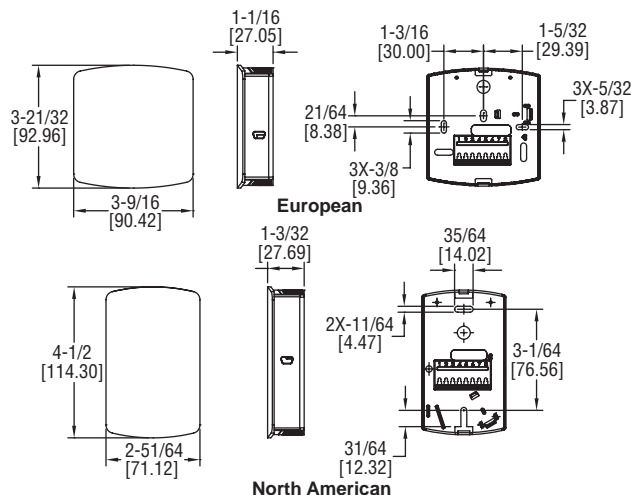
# WALL MOUNT TEMPERATURE SENSOR

## Discrete Wall Mount Housing



European

North American



The **SERIES TE-E/N** Wall Mount Temperature Sensor provides a low cost temperature input for any building management system.

### FEATURES/BENEFITS

- North American or European housing aesthetic options
- Uniform look matches other Dwyer wall mount devices
- Universal mounting plate meets various installation requirements

### APPLICATIONS

- Building automation
- Room temperature monitoring

MODEL CHART			
North American Model	Sensor Type	European Model	Sensor Type
TE-NND-A	10k $\Omega$ type III thermistor	TE-END-A	10k $\Omega$ type III thermistor
TE-NND-B	10k $\Omega$ type II thermistor	TE-END-B	10k $\Omega$ type II thermistor
TE-NND-C	3k $\Omega$ thermistor	TE-END-C	3k $\Omega$ thermistor
TE-NND-D	Pt100 $\Omega$ RTD	TE-END-D	Pt100 $\Omega$ RTD
TE-NND-E	Pt1000 $\Omega$ RTD	TE-END-E	Pt1000 $\Omega$ RTD
TE-NND-F	20k $\Omega$ thermistor	TE-END-F	20k $\Omega$ thermistor

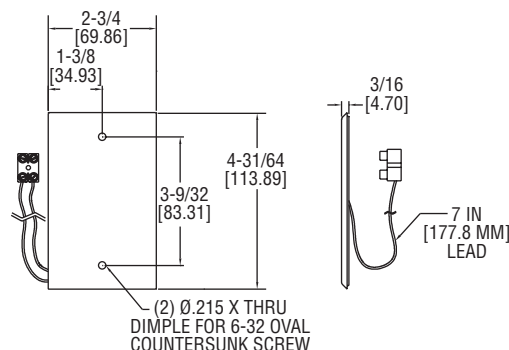
### SPECIFICATIONS

**Accuracy:** Thermistor temp sensor:  $\pm 0.22^\circ\text{C}$  @  $25^\circ\text{C}$  ( $\pm 0.4^\circ\text{F}$  @  $77^\circ\text{F}$ ); RTD temp sensor: DIN class B;  $\pm 0.3^\circ\text{C}$  @  $0^\circ\text{C}$  ( $\pm 0.5^\circ\text{F}$  @  $32^\circ\text{F}$ ).  
**Temperature Limits:** -40 to  $140^\circ\text{F}$  (-40 to  $60^\circ\text{C}$ ).  
**Housing Material:** ABS plastic.  
**Weight:** 0.3 lb (136 g).

## SERIES TE-WSS

# STAINLESS STEEL WALL PLATE TEMPERATURE SENSOR

Screw Terminal Connection, Suitable for Wash Down Applications



The **SERIES TE-WSS** Stainless Steel Wall Plate Temperature Sensor measures the ambient air temperature in classrooms and industrial environments.

### FEATURES/BENEFITS

- SS flush plate design
- Standard single gang junction box cover plate mounting

### APPLICATIONS

- Building automation
- Room temperature monitoring
- Wash down environments

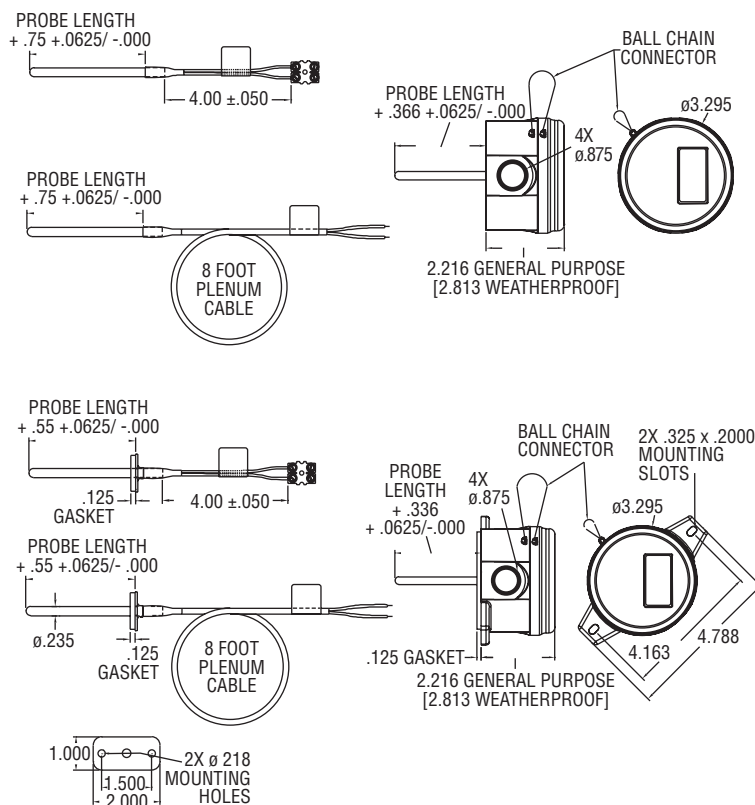
### SPECIFICATIONS

**Accuracy:** Thermistor:  $\pm 0.22^\circ\text{C}$  @  $25^\circ\text{C}$  ( $\pm 0.4^\circ\text{F}$  @  $77^\circ\text{F}$ ); RTD: DIN Class B  $\pm 0.3^\circ\text{C}$  @  $0^\circ\text{C}$ .  
**Temperature Limits:** Operating -40 to  $140^\circ\text{F}$  (-40 to  $60^\circ\text{C}$ ).  
**Sensor Curves:** See page reference 1 below.  
**Housing Material:** 304 SS wall plate.  
**Weight:** 2.3 oz (65 g).

MODEL CHART	
Model	Sensor Type
TE-WSS-A	10k $\Omega$ type III thermistor
TE-WSS-B	10k $\Omega$ type II thermistor
TE-WSS-C	3k $\Omega$ thermistor
TE-WSS-D	PT100 $\Omega$ RTD
TE-WSS-E	PT1000 $\Omega$ RTD
TE-WSS-F	20k $\Omega$ thermistor

# DUCT AND IMMERSION BUILDING AUTOMATION TEMPERATURE SENSORS

Available up to 18" Probe Length, Thermistor or RTD Outputs



The **SERIES TE** Duct and Immersion Temperature Sensor can be used to monitor air or water temperature throughout a building management system or an air handler unit. Duct or immersion options available with or without an enclosure.

## FEATURES/BENEFITS

- Easy to mount external tab housing and flange options for duct applications
- 1/4 turn housing cover with chain to prevent dropping
- Multiple conduit knockouts for easy installation positioning
- 8" plenum rated cable option
- Terminal connector eliminates need for wire nuts

## APPLICATIONS

- Building automation
- VAV temperature sensing
- Chiller or boiler loops
- AHU monitoring

MODEL CHART									
Example	TE	-DFN	-A	04	4	8	-00	TE-DFN-A0448-00	
Series	TE							Temperature sensor	
Mounting Configuration		DFN						Duct mount probe only	
		DFG						Duct mount probe in general purpose housing	
		DFW						Duct mount probe in NEMA 4X housing	
		IBN						Immersion probe only	
		IBG						Immersion probe in general purpose housing	
Sensor Type								Immersion probe in NEMA 4X housing	
			A					10k $\Omega$ type III thermistor	
			B					10k $\Omega$ type II thermistor	
			C					3k $\Omega$ thermistor	
			D					Pt100 $\Omega$ RTD	
Probe Length			E					Pt1000 $\Omega$ RTD	
			F					20k $\Omega$ thermistor	
			G					10k $\Omega$ type III with 11k $\Omega$ shunt	
			H					2.5"	
			I					4"	
Probe Diameter			J					6"	
			K					8"	
			L					12"	
			M					18" (DFN/DFG only)	
			N					1/4"	
Termination			O					4" leads with spade connectors	
			P					4" leads	
			Q					8" plenum rated cable with spade connectors	
			R					8" plenum rated cable	
			S					None (probe only)	
Fittings			T					1/2" NPT compression fitting	
			U					1/4" NPT compression fitting	
			V					1/2" NPT compression fitting	

## SPECIFICATIONS

**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ); RTD temperature sensor: DIN class A:  $\pm 0.15^{\circ}\text{C}$  @  $0^{\circ}\text{C}$  ( $\pm 0.28^{\circ}\text{F}$  @  $32^{\circ}\text{F}$ ).  
**Temperature Limits:** Operating:  $-40$  to  $302^{\circ}\text{F}$  ( $-40$  to  $150^{\circ}\text{C}$ ).  
**Sensor Curves:** See page reference 1 below.  
**Cable Rating:** Plenum option includes UL listed plenum cable.  
**Housing Material:** Meets UL, 94 V-0 polycarbonate plastic.  
**Housing Rating:** NEMA 4X (IP66) (DFW, IBW only).  
**Weight:** 5.3 oz (150.3 g).

THERMOWELLS - MACHINED			
Model	Material	Length	Connection (Internal/External) (NPT)
TE-TNS-N044N-14	304 SS	4"	1/4" / 1/2"
TE-TNS-N044N-12	304 SS	4"	1/2" / 3/4"
TE-TNS-N064N-14	304 SS	6"	1/4" / 1/2"
TE-TNS-N064N-12	304 SS	6"	1/2" / 3/4"
TE-TNS-N094N-14	304 SS	9"	1/4" / 1/2"
TE-TNS-N094N-12	304 SS	9"	1/2" / 3/4"
TE-TNS-N124N-14	304 SS	12"	1/4" / 1/2"
TE-TNS-N124N-12	304 SS	12"	1/2" / 3/4"



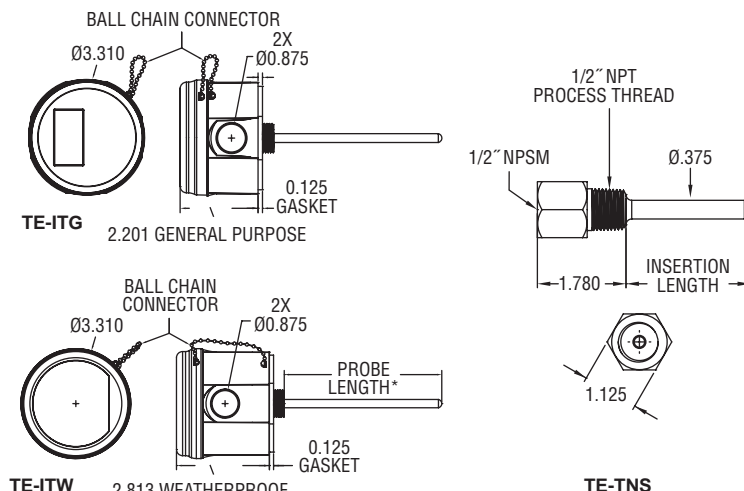
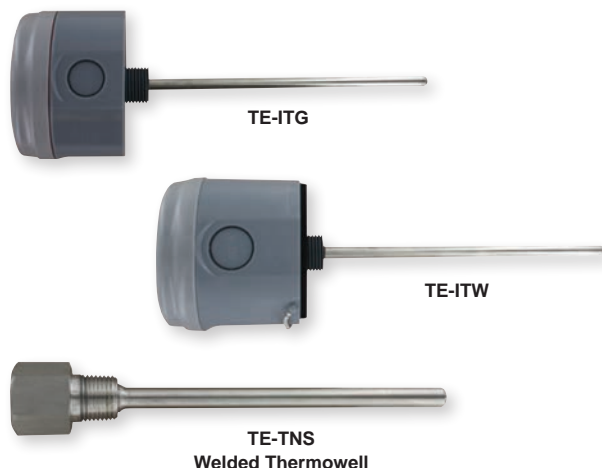
Machined Thermowell

For Straight Thermowell Dimensions: See page 151 (Series W)

1 Resistance vs. Temperature Table: See page 156 (Series TE-OND/RND/OSA)

# IMMERSION TEMPERATURE SENSORS

Integral Mounting Connection, Welded Thermowells



The **SERIES TE-I** Immersion Style Temperature Sensors accurately measure water temperature inside chilled and hot water loops in HVAC systems. Thermowells are required to protect the electrical connection from the process water and to allow replacement of the sensors without draining the system.

## FEATURES/BENEFITS

- 1/4 turn housing cover with chain to prevent dropping
- Multiple conduit knockouts for easy installation positioning
- Integral 1/2" NPSM connection for direct mounting to a thermowell
- General purpose or weatherproof enclosure options
- Terminal connection eliminates need for wire nuts

## APPLICATIONS

- Chiller or boiler loops
- Building automation

## SPECIFICATIONS

**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ); RTD temperature sensor DIN Class A:  $\pm 0.15^{\circ}\text{C}$  @  $0^{\circ}\text{C}$  ( $\pm 0.28^{\circ}\text{F}$  @  $32^{\circ}\text{F}$ ).

**Temperature Limits:** Operating:  $-40$  to  $302^{\circ}\text{F}$  ( $-40$  to  $150^{\circ}\text{C}$ ).

**Sensor Curves:** See page reference **●** below.

**Housing Material:** Meets UL, 94 V-O polycarbonate plastic.

**Thermowell Material:** 304 SS.

**Thermowell Connections:** Internal = 1/2" NPSM; External = 1/2" NPT.

**Weight:** 5.3 oz (150.3 g).

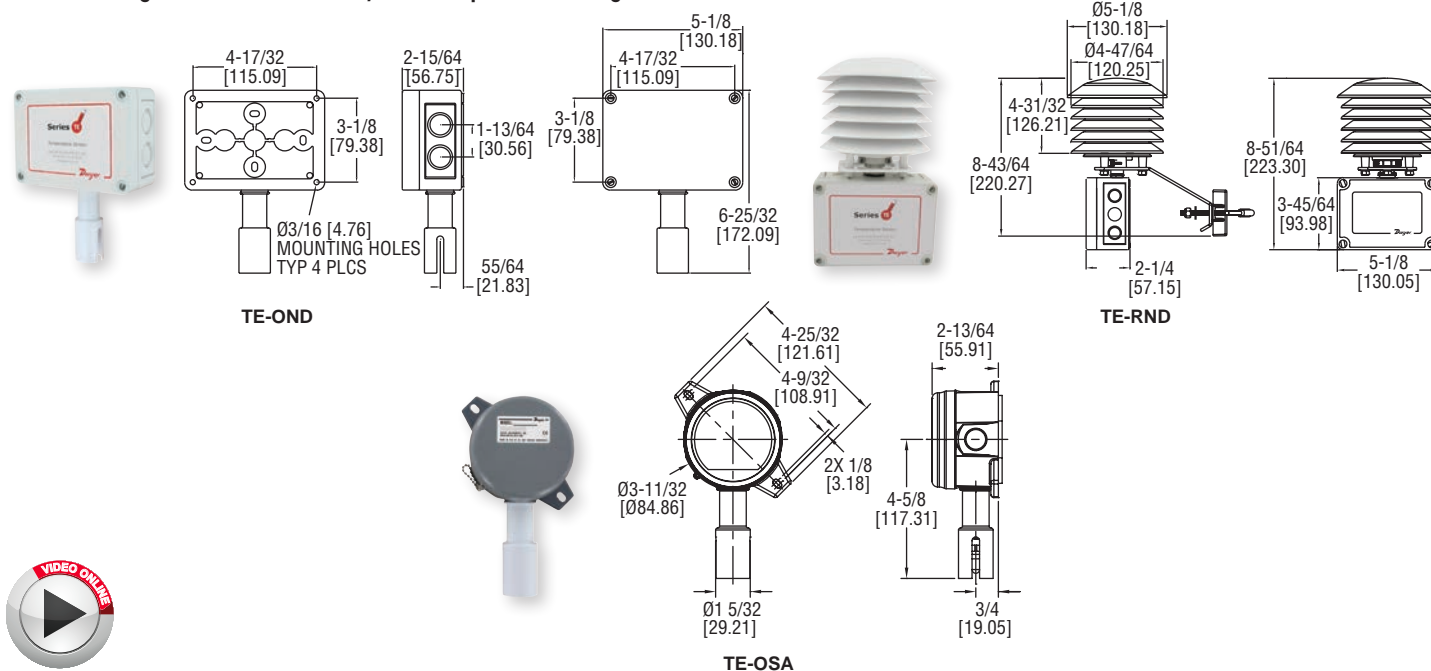
MODEL CHART									
Example	TE	-ITG	-A	25	4	4	-00	TE-ITG-A2544-00	
Series	TE							Duct and immersion building automation temperature sensor	
Mounting		ITG						Immersion in general purpose housing	
Configuration		ITW						Immersion in NEMA 4X housing	
Sensor Type			A					10k $\Omega$ type III thermistor	
			B					10k $\Omega$ type II thermistor	
			C					3k $\Omega$ thermistor	
			D					Pt100 $\Omega$ RTD	
			E					Pt1000 $\Omega$ RTD	
			F					20k $\Omega$ thermistor	
			Q					10k $\Omega$ type III with 11k $\Omega$ shunt	
Probe Length*				25				2.5"	
				04				4"	
				06				6"	
				08				8"	
				12				12"	
				18				18"	
Probe Diameter					4			1/4"	
Termination						4		4" flying leads terminal block	
Fittings							00	None (integral)	
*Actual probe length is approximately 0.75" longer than listed probe length to ensure maximum immersion into thermowells.									

THERMOWELLS - WELDED	
Model	Insertion Length
TE-TNS-N253N-00	2.5"
TE-TNS-N043N-00	4"
TE-TNS-N063N-00	6"
TE-TNS-N083N-00	8"
TE-TNS-N123N-00	12"
TE-TNS-N183N-00	18"



# OUTDOOR TEMPERATURE SENSORS

Protection Against Radiated Heat, Weatherproof Housing



The **SERIES TE-OND/TE-RND/TE-OSA** Outdoor Air Temperature Sensors are offered different configurations to increase measurement accuracy by reducing radiated heat effects. For applications where the north side of the building is accessible, the TE-OND/TE-OSA can be used to protect against low levels of radiated heat.

## FEATURES/BENEFITS

- Weatherproof for outdoor installation
- Radiation shield available to eliminate heating effects following installation in direct sunlight
- Terminal connector eliminates need for wire nuts

## APPLICATIONS

- Building automation
- Outdoor temperature reference

## MODEL CHART

Model	Sensor Type
TE-OND-A	10k $\Omega$ type III thermistor
TE-OND-B	10k $\Omega$ type II thermistor
TE-OND-C	3k $\Omega$ thermistor
TE-OND-D	PT100 $\Omega$ RTD
TE-OND-E	PT1000 $\Omega$ RTD
TE-OND-F	20k $\Omega$ thermistor
TE-OND-Q	10k $\Omega$ type III thermistor with 11k $\Omega$ shunt
TE-RND-A	10k $\Omega$ type III thermistor
TE-RND-B	10k $\Omega$ type II thermistor
TE-RND-C	3k $\Omega$ thermistor
TE-RND-D	PT100 $\Omega$ RTD
TE-RND-E	PT1000 $\Omega$ RTD
TE-RND-F	20k $\Omega$ thermistor
TE-RND-Q	10k $\Omega$ type III thermistor with 11k $\Omega$ shunt
TE-OSA-A	10k $\Omega$ type III thermistor
TE-OSA-B	10k $\Omega$ type II thermistor
TE-OSA-C	3k $\Omega$ thermistor
TE-OSA-D	PT100 $\Omega$ RTD
TE-OSA-E	PT1000 $\Omega$ RTD
TE-OSA-F	20k $\Omega$ thermistor
TE-OSA-Q	10k $\Omega$ type III thermistor with 11k $\Omega$ shunt

## SPECIFICATIONS

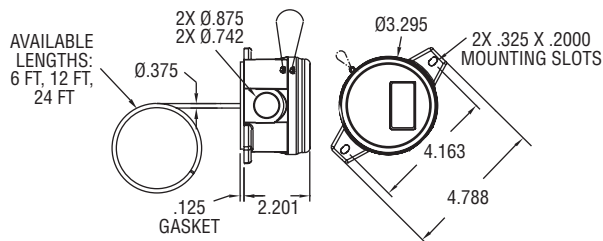
**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ); RTD temperature sensor: DIN class A:  $\pm 0.15^{\circ}\text{C}$  @  $0^{\circ}\text{C}$  ( $\pm 0.28^{\circ}\text{F}$  @  $32^{\circ}\text{F}$ ).  
**Temperature Limits:** Operating:  $-40$  to  $302^{\circ}\text{F}$  ( $-40$  to  $150^{\circ}\text{C}$ ).  
**Sensor Curves:** See Resistance vs. Temperature Table.  
**Housing Material:** Polycarbonate.  
**Enclosure Rating:** TE-OND/TE-RND: NEMA 4X (IP65); TE-OSA: NEMA 3R (IP54).  
**Weight:** 0.65 lb (295 g).

## RESISTANCE VS TEMPERATURE TABLE

Temperature		Resistance Curves ( $\Omega$ )					
$^{\circ}\text{C}$	$^{\circ}\text{F}$	A Green/Green	B Red/Green	C Black/Black	D Yellow/Yellow	E Red/Red	F Green/Blue
-55	-67.0	607800.00	963849.00	289154.70	78.32	783.2	2394000.00
-50	-58.0	441200.00	670166.00	201049.80	80.31	803.1	1646200.00
-45	-49.0	323600.00	471985.00	141595.50	82.29	822.9	1145800.00
-40	-40.0	239700.00	336479.00	100943.70	84.27	842.7	806800.00
-35	-31.0	179200.00	242681.00	72804.30	86.25	862.5	574400.00
-30	-22.0	135200.00	176974.00	53092.20	88.22	882.2	413400.00
-25	-13.0	102900.00	130421.00	39126.30	90.19	901.9	300400.00
-20	-4.0	78910.00	97081.00	29124.30	92.16	921.6	220600.00
-15	5.0	61020.00	72957.00	21887.10	94.12	941.2	163500.00
-10	14.0	47540.00	55329.00	16598.70	96.09	960.9	122280.00
-5	23.0	37310.00	42327.00	12698.10	98.04	980.4	92240.00
0	32.0	29490.00	32650.00	9795.00	100.00	1000.0	70160.00
5	41.0	23460.00	25392.00	7617.60	101.95	1019.5	53780.00
10	50.0	18780.00	19901.00	5970.30	103.90	1039.0	41560.00
15	59.0	15130.00	15712.00	4713.60	105.85	1058.5	32340.00
20	68.0	12260.00	12493.00	3747.90	107.79	1077.9	25360.00
25	77.0	10000.00	10000.00	3000.00	109.74	1097.4	20000.00
30	86.0	8194.00	8057.00	2417.10	111.67	1116.7	15892.00
35	95.0	6752.00	6531.00	1959.30	113.61	1136.1	12704.00
40	104.0	5592.00	5326.00	1597.80	115.54	1155.4	10216.00
45	113.0	4655.00	4368.00	1310.40	117.47	1174.7	8264.00
50	122.0	3893.00	3602.00	1080.60	119.40	1194.0	6722.00
55	131.0	3271.00	2986.00	895.80	121.32	1213.2	5498.00
60	140.0	2760.00	2488.00	746.40	123.24	1232.4	4520.00
65	149.0	2339.00	2083.00	624.90	125.16	1251.6	3734.00
70	158.0	1990.00	1752.00	525.60	127.08	1270.8	3100.00
75	167.0	1700.00	1480.00	444.00	128.99	1289.9	2586.00
80	176.0	1458.00	1255.00	376.50	130.90	1309.0	2166.00
85	185.0	1255.00	1070.00	321.00	132.80	1328.0	1822.60
90	194.0	1084.00	915.50	274.65	134.71	1347.1	1540.00
95	203.0	939.30	786.60	235.98	136.61	1366.1	1306.40
100	212.0	816.80	678.60	203.58	138.51	1385.1	1112.60
105	221.0	712.60	587.60	176.28	140.40	1404.0	951.00
110	230.0	623.60	510.60	153.18	142.29	1422.9	815.80
115	239.0	547.30	445.30	133.59	144.18	1441.8	702.20
120	248.0	481.80	389.60	116.88	146.07	1460.7	606.40
125	257.0	425.30	341.90	102.57	147.95	1479.5	525.60
130	266.0	376.40	301.00	90.30	149.83	1498.3	N/A
135	275.0	334.00	265.80	79.74	151.71	1517.1	N/A
140	284.0	297.20	235.30	70.59	153.58	1535.8	N/A
145	293.0	265.10	208.90	62.67	155.46	1554.6	N/A
150	302.0	237.00	186.10	55.83	157.33	1573.3	N/A

# AVERAGING TEMPERATURE SENSORS

Available in 6', 12' and 24' Lengths



The **SERIES TE-A** Averaging Temperature Sensors feature a long bendable aluminum capillary to measure the average temperature in large ducts and air handler units.

## FEATURES/BENEFITS

- Easy to mount external tab housing
- 1/4 turn housing cover with chain
- Multiple conduit knockouts for easy installation positioning

## APPLICATIONS

- Building automations
- Air handler unit monitoring
- Large air duct temperature monitoring

## SPECIFICATIONS

**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ).  
**Temperature Limits:** -40 to  $302^{\circ}\text{F}$  (-40 to  $150^{\circ}\text{C}$ ).  
**Capillary Lengths:** 6, 12 or 24' (depending on model).  
**Cable Length:** 4".  
**Sensor Curves:** See page reference 1 below.  
**Probe Material:** Bendable aluminum probe.  
**Housing Material:** Meets UL, 94 V-0 polycarbonate plastic.  
**Weight:** 14 oz (397 g).

## MODEL CHART

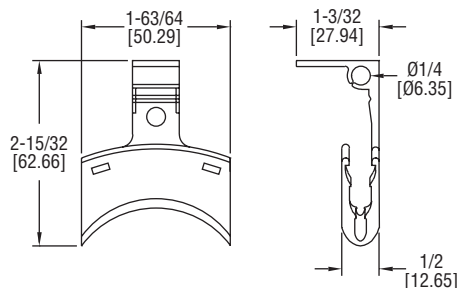
Model	Sensor Type	Capillary Length	Model	Sensor Type	Capillary Length
TE-AAG-A0634-00	10k type III NTC thermistor	6'	TE-AAG-C0634-00	3k NTC thermistor	6'
TE-AAG-A1234-00	10k type III NTC thermistor	12'	TE-AAG-C1234-00	3k NTC thermistor	12'
TE-AAG-A2434-00	10k type III NTC thermistor	24'	TE-AAG-C2434-00	3k NTC thermistor	24'
TE-AAG-B0634-00	10k type II NTC thermistor	6'	TE-AAG-F0634-00	20k NTC thermistor	6'
TE-AAG-B1234-00	10k type II NTC thermistor	12'	TE-AAG-F1234-00	20k NTC thermistor	12'
TE-AAG-B2434-00	10k type II NTC thermistor	24'	TE-AAG-F2434-00	20k NTC thermistor	24'

1 Resistance vs. Temperature Table: See page 156 (Series TE-OND/RND/OSA)

## SERIES CC1

# AVERAGING TEMPERATURE SENSOR CLIPS

3/8", 1/4", or 1/8" Sensor Diameters



The **SERIES CC1** Averaging Temperature Sensor Clips are used to mount the capillary of an averaging temperature sensor to the wall of the duct or air handler. Slots are provided for using nylon zip ties to hold the tubing in place, if needed.

## FEATURES/BENEFITS

- Works with Series TE-A sensors
- Gray or natural color options
- 3/8", 1/4", or 1/8" sensor diameters

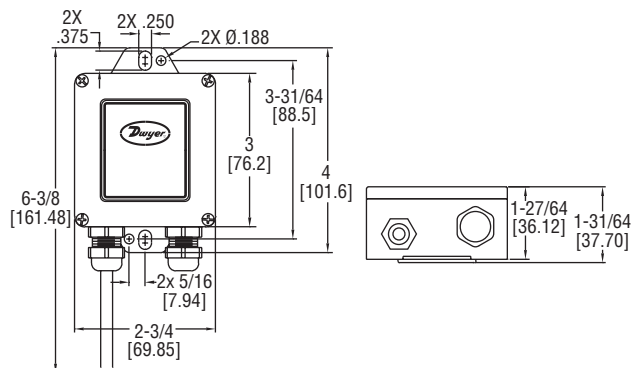
## APPLICATIONS

- Building automation
- Averaging temperature sensor mounting

MODEL CHART	
Model	Color
CC1-N	Natural
CC1-GY	Grey
<b>Note:</b> Sold individually	

**Dwyer****SERIES O-4****OUTSIDE AIR TEMPERATURE SENSORS**

NEMA 4X, Removable Terminal Block



The **SERIES O-4** Outside Air Temperature Sensors are great for monitoring ambient air temperatures in outdoor applications. The temperature sensors are mounted in a NEMA 4X enclosure with integral mounting tabs.

**FEATURES/BENEFITS**

- NEMA 4X weatherproof housing
- Surface or suspension mount

**APPLICATIONS**

- Agricultural house ventilation
- HVAC and building automation

**SPECIFICATIONS**

**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ); RTD temperature sensor: DIN class B:  $\pm 0.3^{\circ}\text{C}$  @  $0^{\circ}\text{C}$  ( $\pm 0.54^{\circ}\text{F}$  @  $32^{\circ}\text{F}$ ).

**Operating Temperature:** -40 to  $250^{\circ}\text{F}$ .

**Probe Diameter:** 0.235" (5.97 mm).

**Probe Length:** 3.5".

**Probe Material:** 304 SS.

**Mounting:** Suspension or surface.

**Enclosure Rating:** NEMA 4X (IP66).

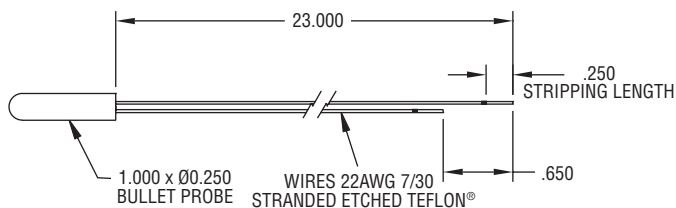
**Weight:** 3 oz (85 g).

**MODEL CHART**

Model	Sensor Type	Model	Sensor Type
O-4A	10k $\Omega$ type III thermistor	O-4D	Pt100 $\Omega$ RTD
O-4B	10k $\Omega$ type II thermistor	O-4E	Pt1000 $\Omega$ RTD
O-4C	3k $\Omega$ thermistor	O-4F	20k $\Omega$ thermistor

**SERIES S2-1****SURFACE MOUNT TEMPERATURE SENSORS**

RTD and Thermistor, 304 SS Probe, Waterproof

**S2-1X No Housing**

The **SERIES S2-1** Surface Mount Temperature Sensors provide a cost effective and reliable solution for surface contact temperature measurement of conditioned water pipes, low pressure steam or refrigerant lines.

**FEATURES/BENEFITS**

- Low profile sensor can be taped or strapped to the outside of a pipe
- Ideal for applications where immersion wells are not feasible

**APPLICATIONS**

- Heating or cooling loop line temperature monitoring
- HVAC systems

**MODEL CHART**

Model	Sensor Type	Model	Sensor Type
S2-11	Pt100 $\Omega$ RTD	S2-17	5k $\Omega$ NTC thermistor
S2-12	Pt1000 $\Omega$ RTD	S2-18	100k $\Omega$ NTC thermistor
S2-13	Ni1000 $\Omega$ RTD	S2-19	20k $\Omega$ NTC thermistor
S2-14	1000 $\Omega$ Balco® RTD	S2-1A	2252 $\Omega$ NTC thermistor
S2-15	10k $\Omega$ type II thermistor	S2-1B	10k $\Omega$ type III NTC thermistor
S2-16	3k $\Omega$ NTC thermistor		

**SPECIFICATIONS**

**Accuracy:** Platinum RTD:  $\pm 0.1\%$  @  $32^{\circ}\text{F}$  ( $0^{\circ}\text{C}$ ), alpha 385 per DIN 43760; Nickel RTD:  $\pm 0.5^{\circ}\text{F}$  @  $70^{\circ}\text{F}$  ( $21.1^{\circ}\text{C}$ ); Balco®:  $\pm 0.5^{\circ}\text{F}$  @  $70^{\circ}\text{F}$  ( $21.1^{\circ}\text{C}$ ); Thermistor:  $\pm 0.2^{\circ}\text{C}$  interchangeable @  $77^{\circ}\text{F}$  ( $25^{\circ}\text{C}$ ).

**Operating Temperature:** -40 to  $250^{\circ}\text{F}$  (-40 to  $125^{\circ}\text{C}$ ).

**Probe Diameter:** 1/4" (6.3 mm).

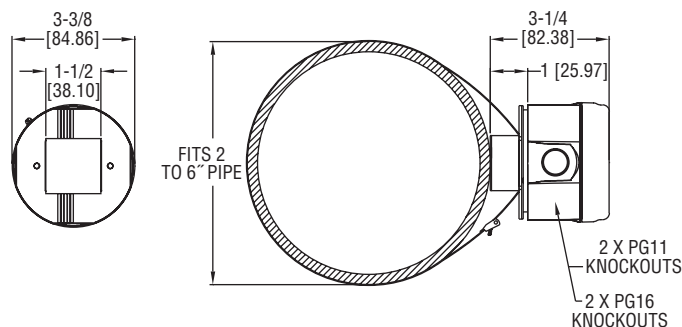
**Probe Length:** 1" (25 mm).

**Probe Material:** 304 SS.

Balco® is a registered trademark of CRS Holdings, Inc.  
Teflon® is a registered trademark of E.I. DuPont de Nemours and Company

## WEATHER RESISTANT SURFACE TEMPERATURE SENSORS

Strap On Design, Twist Off Cover, 2 to 6" Pipe Sizes



The **SERIES TE-SNW** Surface Temperature Sensors non-intrusively measures the process temperature in hot and cold water loops in buildings. In order to work with most common building controllers, the output of the sensor can be chosen from 6 different RTD and Thermistor curves.

## FEATURES/BENEFITS

- Easy to mount external tab housing
- 1/4 turn housing cover with chain
- Multiple conduit knockouts for easy installation positioning
- Non-intrusive temperature measurement of 2 to 6" pipes

## APPLICATIONS

- Heating or cooling loop line temperature monitoring
- HVAC systems

## SPECIFICATIONS

**Accuracy:** Thermistor temperature sensor:  $\pm 0.22^{\circ}\text{C}$  @  $25^{\circ}\text{C}$  ( $\pm 0.4^{\circ}\text{F}$  @  $77^{\circ}\text{F}$ ); RTD temperature sensor: DIN Class A  $\pm 0.15^{\circ}\text{C}$  @  $0^{\circ}\text{C}$  ( $\pm 0.28^{\circ}\text{F}$  @  $32^{\circ}\text{F}$ ).  
**Temperature Limits:** Operating:  $-32$  to  $240^{\circ}\text{F}$  ( $-35.5$  to  $115.5^{\circ}\text{C}$ ).  
**Sensor Curves:** See page reference 1 below.  
**Housing Material:** Meets UL 94 V-0 polycarbonate plastic, NEMA 3R.  
**Weight:** 7 oz (198 g).

## MODEL CHART

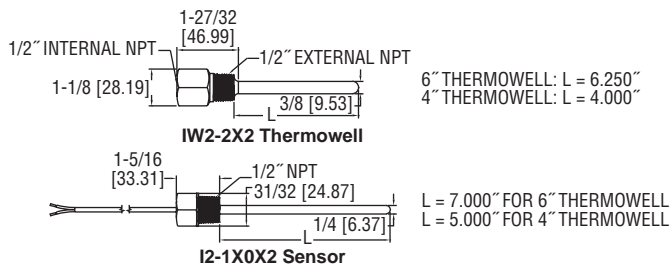
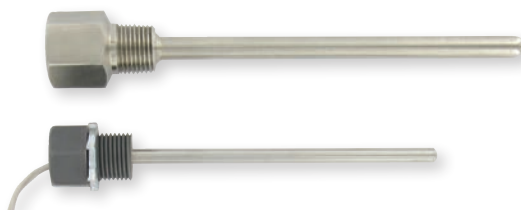
Model	Sensor Type
TE-SNW-A	10k $\Omega$ type III thermistor
TE-SNW-B	10k $\Omega$ type II thermistor
TE-SNW-C	3k $\Omega$ thermistor
TE-SNW-D	Pt100 $\Omega$ RTD
TE-SNW-E	Pt1000 $\Omega$ RTD
TE-SNW-F	20k $\Omega$ thermistor

1 Resistance vs. Temperature Table: See page 156 (Series TE-OND/RND/OSA)

## SERIES I2-1

## IMMERSION TEMPERATURE PROBES

RTD &amp; Thermistor Outputs, 304 SS Probes



The **SERIES I2-1** Immersion Temperature Probes are designed to monitor the hot and chilled water lines throughout a building's water distribution loop.

**Note:** A Series IW2 Thermowell must be used on pressurized air and water lines to prevent leakage around the probe.

## FEATURES/BENEFITS

- Direct wall mounting
- 6' cable
- 1/2" internal NPT accepts conduit for more industrial installation

## APPLICATIONS

- Hot or chilled water line monitoring
- HVAC and building automation systems

## SPECIFICATIONS

**Accuracy:** Platinum RTD:  $\pm 0.6\%$  @  $32^{\circ}\text{F}$  ( $0^{\circ}\text{C}$ ); Nickel RTD:  $\pm 0.5^{\circ}\text{F}$  @  $32^{\circ}\text{F}$  ( $0^{\circ}\text{C}$ ); Balco RTD:  $\pm 0.1\%$  @  $32^{\circ}\text{F}$  ( $0^{\circ}\text{C}$ ); Thermistors:  $\pm 0.36^{\circ}\text{F}$  from  $32$  to  $158^{\circ}\text{F}$  ( $0$  to  $70^{\circ}\text{C}$ ).  
**Operating Temperature:**  $-32$  to  $240^{\circ}\text{F}$  ( $-35.5$  to  $115.5^{\circ}\text{C}$ ).  
**Probe Diameter:** 1/4" (6.3 mm).  
**Cable Length:** 6' (1.8 m).  
**Probe Material:** 304 SS.  
**Mounting:** 1/2" threaded connection to fit Series IW2 thermowell.

## MODEL CHART - 6" INSERTION LENGTH

Model	Sensor Type
I2-11062	Pt100 $\Omega$ RTD
I2-12062	Pt1000 $\Omega$ RTD
I2-13062	Ni1000 $\Omega$ RTD
I2-14062	Balco 1000 $\Omega$ RTD
I2-15062	10k $\Omega$ type 2 thermistor
I2-16062	3k $\Omega$ thermistor
I2-17062	5k $\Omega$ thermistor
I2-18062	100k $\Omega$ thermistor
I2-19062	20k $\Omega$ thermistor
I2-1A062	2252 $\Omega$ thermistor
I2-1B062	10k $\Omega$ type 3 thermistor

## MODEL CHART - 4" INSERTION LENGTH

Model	Sensor Type
I2-11042	Pt100 $\Omega$ RTD
I2-12042	Pt1000 $\Omega$ RTD
I2-13042	Ni1000 $\Omega$ RTD
I2-14042	Balco 1000 $\Omega$ RTD
I2-15042	10k $\Omega$ type 2 thermistor
I2-16042	3k $\Omega$ thermistor
I2-17042	5k $\Omega$ thermistor
I2-18042	100k $\Omega$ thermistor
I2-19042	20k $\Omega$ thermistor
I2-1A042	2252 $\Omega$ thermistor
I2-1B042	10k $\Omega$ type 3 thermistor

## MODEL CHART - THERMOWELLS

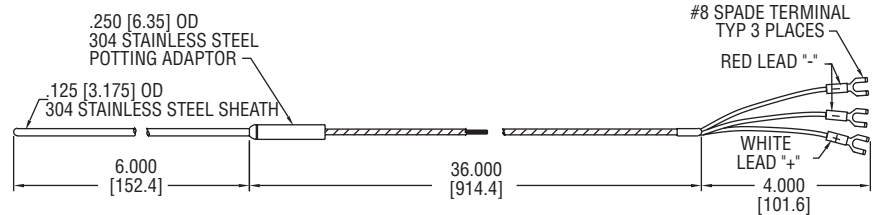
Model	Material	Insertion Length
IW2-262	304 SS	6"
IW2-242	304 SS	4"

**Dwyer**

SERIES RTD

**RESISTANCE TEMPERATURE DETECTOR**

High Temperature, Mineral Insulated, 316 SS Sheath



Precision **SERIES RTD** (Resistance Temperature Detector) offers excellent accuracy and stability over a wide temperature range. Industry standard 3-wire 100  $\Omega$  (DIN) probes are available in 6" (15 cm), 12" (30.5 cm), or 18" (46 cm) sheath lengths with 30" (76 cm) extension cable and spade lug terminals.

**APPLICATIONS**

Air ducts, bearing temperature, oil temperature indicator, soldering equipment, ovens, environmental test chambers, pharmaceutical mfg., food processing, plastic molding, petroleum & chemical processing, electric generating plants, etc.

**SPECIFICATIONS**

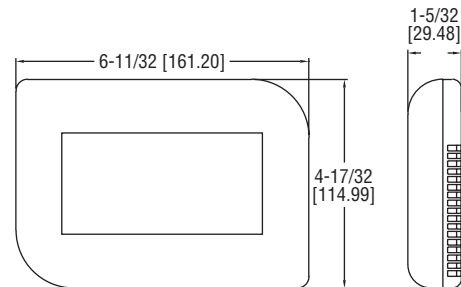
**Sensor Type:** Wire wound, 100  $\Omega$ .  
**Temperature Range:** -328 to 1202°F (-200 to 650°C).  
**Pressure Limits:** 250 psig (17.2 bar).  
**Probe Material:** 316 SS.  
**Extension Length:** 30" (76 cm).  
**Standard:** DIN .00385 (class B, 0.12%).

**MODEL CHART**

Model	Length	Diameter
RTD-686	6" (15 cm)	1/8"
RTD-646	6" (15 cm)	1/4"

**MODEL TLVT1****DIGITAL TOUCH SCREEN PROGRAMMABLE THERMOSTAT WITH HEAT PUMP CONTROL**

5 Control Modes, Large LCD Display



The **MODEL TLVT1** Digital Touch Screen Programmable Thermostat with Heat Pump simplifies controlling indoor temperatures in commercial and residential buildings. A large easy to read LCD display shows the current temperature, set point, as well as time and day of the week.

**FEATURES/BENEFITS**

- Weekday and weekend programs; 4 events per day
- Large touch LCD display
- Two-stage heating and cooling control
- Security code setting protection
- Filter and energy use timers

**APPLICATIONS**

- Commercial or residential indoor temperature control

**MODEL CHART**

Model	Description
TLVT1	LCD touch screen programmable thermostat

**SPECIFICATIONS**

**Range:** Measurement: 32 to 99°F (0 to 40°C); Adjustment: 41 to 95°F (5 to 35°C).  
**Accuracy:**  $\pm 1^\circ\text{F}$  (0.5°C).  
**Sensor Type:** NTC thermistor.  
**Resolution:**  $1^\circ\text{F}$  (0.5°C).  
**Power Requirements:** (2) AA alkaline batteries, not included.  
**Output:** 1 A @ 24 VAC 50/60 Hz.  
**Temperature Limits:** Operating: 32 to 122°F (0 to 50°C); Storage: 23 to 122°F (-5 to 50°C).  
**Weight:** 10 oz (283.5 g).  
**Agency Approvals:** RoHS.

**ACCESSORIES**

Model	Description
TG-1	Large thermostat cover
TG-2	Small thermostat cover



### SELECTION GUIDE

pages 162-165

### TYPICAL APPLICATIONS

pages 166-167



**HVAC Mobile Application**  
page 166

### HVAC MEASUREMENT GUIDE

pages 168-173



**Air Flow Hood**  
page 174



**Air Flow Hood, Software**  
page 175



**HVAC Balancing Instruments**  
pages 176-180



**Manometers, Portable**  
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**Manometers, Air Velocity**  
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**Pitot Tubes**  
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**Air Flow Grids**  
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**Vane Anemometer**  
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**Wind Meters**  
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**Vane Thermo-Anemometers**  
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**Thermo-Anemometers**  
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**Thermo-Hygrometers**  
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**Gas Analyzers/Kits**  
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**Signal Generators/Multimeters**  
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**Calibration Pumps**  
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**Chart Recorders**  
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**Data Loggers, Temperature**  
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**Data Loggers, Single Pressure**  
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**Data Loggers, Indicating**  
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**Data Loggers, USB**  
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**Data Loggers, Wireless**  
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## FEATURED PRODUCTS

### SMART AIR HOOD™ BALANCING INSTRUMENT SERIES SAH | page 174



- Patent pending Quad Flow Design Technology enables accurate readings
- Predictive Balancing that guides setting the optimal flow set point for each sequential terminal
- The ergonomic design is much lighter and easier to use than traditional air flow hoods

### 100 MM VANE THERMO-ANEMOMETER TEST INSTRUMENT SERIES 473B | page 199



- Included 100 mm vane probe is able to measure air velocity, volumetric air flow, temperature, and humidity
- Compatible with Dwyer AP1 thermo-anemometer and RP1 thermo-hygrometer wired probes (sold separately)

DIGITAL  
Manometers**AQTIA-WDPM**





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**477AV** - page 181**476A** - page 183**478A** - page 183**477B** - page 184

SERIES	AQTIA-WDPM - page 177	477AV - page 181	476A - page 183	478A - page 183	477B - page 184
Range	2 to 350 in w.c. (0.5 to 87 kPa)	1 in w.c. to 150 psi (.25 kPa to 10.34 bar)	±20 in w.c. (±5 kPa)	±4 in w.c.; ±60 in w.c. (±1 kPa; ±15 kPa)	20 in w.c. to 100 psi (4.982 to 689.5 kPa)
Service	Non-corrosive dry gases	Air and compatible gases	Air and compatible gases	Air and compatible gases	Air and compatible gases
Wetted Materials	Consult factory	Consult factory	Consult factory	Consult factory	Consult factory
Accuracy	±0.5% FS	±0.5% FS	±1.5% FS	±1.5% FS	±0.1% FS
Pressure Limits	10 psi (2 to 10 in w.c.); 20 psi (20 to 30 in w.c.); 15 psi (100 in w.c.); 45 psi (200 to 350 in w.c.)	5 psig (1 to 10 in w.c.); 10 psig (20 to 40 in w.c.); 30 psig (200 in w.c. to 10 psi); 60 psig (20 to 30 psi); 150 psig (100 psi); 200 psig (150 psi)	5 psig (.34 bar)	5 psig (.34 bar)	3 psig (20 to 40 in w.c.); 15 psig (200 in w.c.); 30 psig (10 psi); 60 psig (30 psi); 100 psig (50 psi); 200 psig (100 psi)
Temperature Limits	14 to 140°F (-10 to 60°C)	0 to 140°F (-17.8 to 60°C)	0 to 140°F (-17.8 to 60°C)	0 to 140°F (-17.8 to 60°C)	0 to 140°F (-17.8 to 60°C)
Comp. Temp. Limits	32 to 140°F (0 to 60°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	N/A
Housing Protection	Handheld: IP68	Rugged aluminum housing	Rugged aluminum housing	Rugged aluminum housing	Rugged aluminum housing
Display	4.3" QHD Gorilla glass, 960 x 540	4-digit backlit LCD	4-digit LCD	4-digit LCD	4-digit backlit LCD
Memory	RAM 1 GB & ROM 4 GB	40 readings	N/A	N/A	40 readings
Process Connection	(2) Barbed connections for use with 1/8" or 3/16" ID tubing	(2) Barbed connections for use with 1/8" or 3/16" ID tubing (Compression fittings for -7, -8 ranges)	Barbed connection for use with 3/16" or 1/4" ID tubing	(2) Barbed connection for use with 3/16" or 1/4" ID tubing	(2) Barbed connections for use with 1/8" or 3/16" ID tubing (Compression fittings for -6, -7 ranges)
Approvals	CE, FCC	CE	CE	CE	CE

These Selection Guides are for quick comparison of similar products. Please refer to the catalog page number referenced for complete product information and specifications.

# DIGITAL Manometers

				
<b>SERIES</b>	<b>475</b> - page 185	<b>490A</b> - page 186	<b>HM35</b> - page 187	<b>HM28</b> - page 187
<b>Range</b>	1 in w.c. to 150 psi (.25 kPa to 10.34 bar)	15 to 200 psi (1 to 13.8 bar)	10 in w.c. to 1305 psi (2.5 to 9000 kPa)	10 in w.c. to 245 psi (2.5 to 1700 kPa)
<b>Service</b>	Air and compatible combustible gases	Compatible gases and liquids	Air and compatible gases	Air and compatible gases
<b>Wetted Materials</b>	Consult factory	316L SS; With 3-way valve: Buna-N, silicone grease, PTFE, brass 360, copper, reinforced acetal copolymer	18/8 SS	18/8 SS
<b>Accuracy</b>	±0.1% FS	±0.1% FS	(±0.2% FS, ±0.1% FS, or ±0.05% FS) ±1 digit	(±0.2% FS, ±0.1% FS, or ±0.05% FS) ±1 digit
<b>Pressure Limits</b>	5 psig (1 to 10 in w.c.); 10 psig (20 to 40 in w.c.); 30 psig (200 in w.c. to 10 psi); 60 psig (20 to 30 psi); 150 psig (100 psi); 200 psig (150 psi)	30 psig (15 psi); 60 psig (30 psi); 100 psig (50 psi); 200 psig (100 psi); 400 psig (200 psi); 1000 psig (500 psi)	N/A	N/A
<b>Temperature Limits</b>	0 to 140°F (-17.8 to 60°C)	32 to 140°F (0 to 60°C)	32 to 122°F (0 to 50°C)	23 to 122°F (-5 to 50°C)
<b>Comp. Temp. Limits</b>	32 to 104°F (0 to 40°C)	N/A	N/A	N/A
<b>Housing Protection</b>	Rugged aluminum housing	Rugged aluminum housing	IP54 (NEMA 3)	IP54 (NEMA 3)
<b>Display</b>	4-digit LCD	4-digit backlit LCD	Graphical backlit LCD, 128 x 64 points	2 line, 16 character, dot matrix LCD, with switchable display sizes
<b>Memory</b>	N/A	Up to 40 readings	10,742 readings	10,742 readings
<b>Process Connection</b>	(2) Barbed connections for use with 1/8" or 3/16" ID tubing (Compression fittings for -7, -8 ranges)	(2) 1/8" female NPT	Hose 4/6 mm or 1/8" NPT	Hose 4/6 mm or 1/8" NPT
<b>Approvals</b>	CE, FM	CE	CE	CE

# THERMO

## Anemometers



SERIES	AQTIA-AP2 - page 177	AQTIA-VP2 - page 177	VT-300 - page 198
Air Velocity Range	0 to 6000 FPM (0 to 30 m/s)	50 to 5000 FPM (0.25 to 25 m/s)	98.4 to 3937 FPM (0.5 to 20 m/s)
Air Velocity Accuracy	±3% FS	±1.5% of reading ±20 FPM	±3% of reading ± 0.2 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)
Temperature Accuracy	±0.5°F (±0.28°C)	±0.54°F (±0.3°C)	±1°F (±0.6°C)
Humidity Range	N/A	0 to 100% RH	0.1 to 99.9% RH
Humidity Accuracy	N/A	±2% RH	±3% RH
Air Volume Range	999,999 in selected flow units	999,999 in selected flow units	99,999 (CFM or m3/s)
Wet Bulb Range	N/A	N/A	-7.6 to 158°F (-22 to 70°C)
Meter Temperature Range	Operating: -4 to 140°F (-20 to 60°C) Storage: -40 to 176°F (-40 to 80°C)	Operating: -4 to 140°F (-20 to 60°C) Storage: -40 to 176°F (-40 to 80°C)	32 to 122°F (0 to 50°C)
Meter Humidity Limits	5 to 95% RH	5 to 95% RH	<80% RH
Display	4.3" QHD Gorilla glass, 960 x 540	4.3" QHD Gorilla glass, 960 x 540	1 x 1.8" (26 x 45 mm) graphical LCD
Approvals	CE, FCC	CE, FCC	CE

# CALIBRATION

## Pumps



SERIES	HP - page 205	CHP - page 205	A-396A - page 205	PCHP - page 206
Output Range	-27" Hg to 45 psig (-0.91 to 3 bar)	-28.8" Hg to 100 psi (-0.975 to 3.4 bar)	<1 in w.c. to 72 psig (5 bar)	-28" Hg to 600 psi (-0.945 to 40 bar)
Process Connection	1/4" female NPT	1/8" female NPT	Barbed fitting or 1/8" female NPT	1/4" female NPT/BSPT
Gage Connection	1/4" female NPT	1/8" female NPT	N/A	1/8" female NPT/BSPT
Materials	N/A	Acetel plastic and anodized aluminum	N/A	SS fittings, anodized aluminum housing, plastic/rubber handles, and nitrile O-rings

# THERMO

## Anemometers



SERIES	473B - page 199	471B - page 200
Air Velocity Range	40 to 5000 FPM (0.2 to 25 m/s)	0 to 6000 FPM (0 to 30 m/s)
Air Velocity Accuracy	±1.5% of reading ±20 FPM	±3% FS
Temperature Range	-20 to 212°F (-29 to 100°C)	-40 to 212°F (-40 to 100°C)
Temperature Accuracy	±0.54°F (±0.3°C)	±0.5°F (±0.28°C)
Humidity Range	0 to 100% RH	N/A
Humidity Accuracy	±2% RH	N/A
Air Volume Range	19,999 in selected flow units	19,999 in selected flow units
Wet Bulb Range	N/A	N/A
Meter Temperature Range	Process: -20 to 212°F (-29 to 100°C) Ambient: 5 to 125°F (-15 to 51°C)	Process Air Velocity: -20 to 212°F (-29 to 100°C); Process Temperature: -40 to 212°F (-40 to 100°C); Ambient: 5 to 125°F (-15 to 51°C)
Meter Humidity Limits	N/A	N/A
Display	4.5-digit backlit LCD	4.5-digit backlit LCD
Approvals	CE	CE

# CALIBRATION

## Pumps



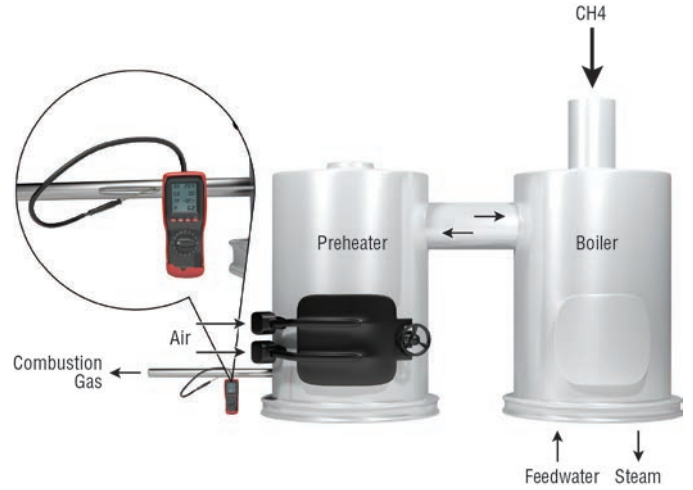
SERIES	HCHP - page 206	LPCP - page 207	BCHP - page 207
Output Range	0 to 10,000 psi (0 to 700 bar)	-5.8 psi to 5.8 psi (-0.4 to 0.4 bar)	-28" Hg to 870 psi (-0.95 to 60 bar)
Process Connection	1/4" female NPT/BSPT	M20x1.5 or 1/4" female NPT	1/4" female BSPT
Gage Connection	1/4" female NPT/BSPT	M20x1.5 or 1/4" female NPT	1/2" female BSPT
Materials	SS, polyurethane, anodized hard-coat aluminum, PTFE, and nitrile	Ram/adapters: 316 SS, Body: Steel/aluminum; Seals: Buna-N	Anodized aluminum, brass, and ABS





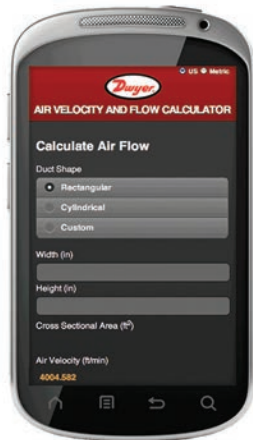
#### Current/voltage signal generator used to calibrate panel meters.

The Model CSG Digital Signal Generator is perfect for generating or simulating input signals to panel meters and process controllers. The signal generator is capable of sourcing up to 10 VDC or 20 mA in 1 VDC or 1 mA steps. The backlit digital display allows users to quickly compare the reading on the Model CSG to that of the panel meter or process controller. The signal from the Model CSG can be used to set up the upper and lower limits of the process range. It can also be used to ensure that set point and alarm functions are working properly on the panel meter or process controller.



#### Combustion analyzer maximize boiler efficiency while monitoring harmful products of combustion.

There are several critical factors in attaining efficient combustion for boilers and other combustors. Monitoring the temperature of combustion and minimizing the amount of excess air in the system are undoubtedly essential steps. A Dwyer® 1207-NOx Flue Gas Analyzer can break down the products of combustion, giving an accurate volumetric composition of harmful NOx compounds, O<sub>2</sub>, CO<sub>2</sub>, and CO. Additionally, the 1207-NOx will monitor differential temperature, excess air and poison index. Results can be easily viewed on screen or uploaded to a PC via the user-friendly software.



#### FREE DOWNLOAD!

Download the phone App or use the Web version of our Air Velocity and Flow Calculator on our website at: [www.dwyer-inst.com/flowcalc](http://www.dwyer-inst.com/flowcalc).



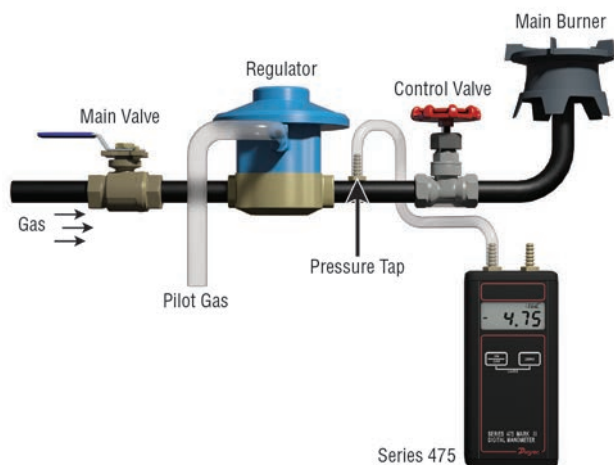
#### HVAC mobile application

For those customers in the HVAC or Building Automation Systems Industry, Dwyer offers the Air Velocity and Flow Calculator App available on the iOS® and Google Play® Markets. One can easily convert velocity pressure to air velocity or air velocity to air volume. Converting velocity pressure to air volume is advantageous for effortlessly changing the pressure on your Magnehelic® Differential Pressure Gage or manometer to velocity. Moreover, this Calculator also includes air density factors from humidity levels. By utilizing the air velocity to air volume functionality, one can simplistically convert the air velocity to air flow rates from duct dimensions, with just the tap of a button.



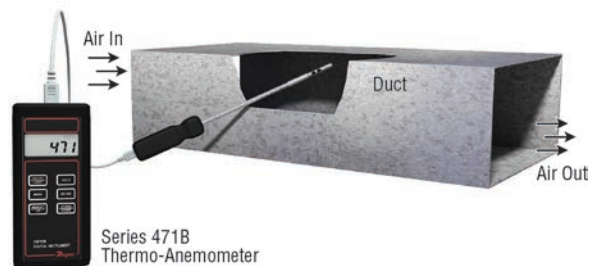
#### Field calibrate and certify pressure gauges.

Using the series PHP-1 with a DPG-100, a technician can calibrate or certify process pressure gauges up to 1% accurate. The PHP-1 hand pump can easily supply pressures up to 600 PSI by squeezing the handle and adjusting the volume control valve. The pump has two connections to be connected with a test gage, such as the Dwyer® Model DPG-100, and a process gage, such as the Dwyer® SGL series.



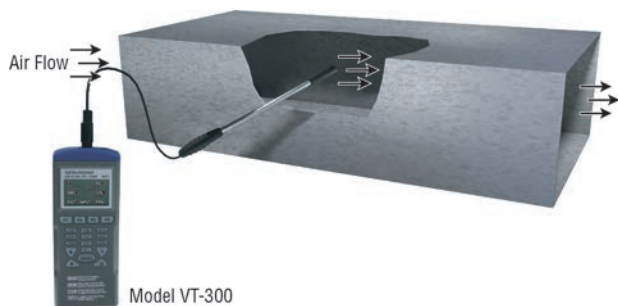
#### Digital Manometers used to check gas pressure to a heating burner.

Checking the gas pressure to a heating unit on the burner side of the regulator is a standard installation and service routine. The Dwyer® Series 475 Handheld Digital Manometer is a low-cost, durable device that is easily transportable in a pocket or briefcase. Units are highly accurate with 0.5% full scale accuracy. Some servicemen prefer our portable Dwyer® Magnehelic® differential pressure gage with dial type scale for field use.



#### Determine air velocity and temperature levels in ducts or air supply grills.

The Dwyer® Series 471B Digital Thermo-Anemometer is the ideal portable product for determining air velocity and temperature levels in ducts or air supply grills. With a push of a button, FPM and Fahrenheit readings are converted to MPS and Celsius. Readings may be stored and retrieved which allows the user greater efficiency with HVAC balancing at various locations in a building.



#### Handheld anemometer enables measuring duct flow measurements.

Handheld anemometers are an excellent, portable tool for performing tests on HVAC system performance; however, large rotating vanes can prevent easy access to ducts. Dwyer introduces the VT-300 Mini-Vane Thermo-Anemometer to eliminate this problem. Additionally, simple keypad programming enables the user to view volumetric flow rates in CFM or CMM.



#### Quickly measure humidity and temperature levels in ambient air.

The Dwyer® 485B-1 Thermo-Hygrometer is a simple, portable device for quickly measuring humidity and temperature levels in ambient air. The dew point and wet-bulb temperature readings are derived from relative humidity and temperature measurements. The 485B-1 is often used in agricultural applications where proper humidity and temperature levels are critical in plant or animal well being.

# AIR VELOCITY MEASUREMENT

## INTRODUCTION

In air conditioning, heating and ventilating work, it is helpful to understand the techniques used to determine air velocity. In this field, air velocity (distance traveled per unit of time) is usually expressed in feet per minute (FPM). By multiplying air velocity by the cross section area of a duct, you can determine the air volume flowing past a point in the duct per unit of time. Volume flow is usually measured in cubic feet per minute (CFM).

Velocity or volume measurements can often be used with engineering handbook or design information to reveal proper or improper performance of an airflow system. The same principles used to determine velocity are also valuable in working with pneumatic conveying, flue gas flow and process gas systems. However, in these fields the common units of velocity and volume are sometimes different from those used in air conditioning work.

To move air, fans or blowers are usually used. They work by imparting motion and pressure to the air with either a screw propeller or paddle wheel action. When force or pressure from the fan blades causes the air to move, the moving air acquires a force or pressure component in its direction of motion due to its weight and inertia. Because of this, a flag or streamer will stand out in the air stream. This force is called velocity pressure. It is measured in inches of water column (w.c.) or water gage (w.g.). In operating duct systems, a second pressure is always present. It is independent of air velocity or movement. Known as static pressure, it acts equally in all directions. In air conditioning work, this pressure is also measured in inches w.c.

In pressure or supply systems, static pressure will be positive on the discharge side of the fan. In exhaust systems, a negative static pressure will exist on the inlet side of the fan. When a fan is installed midway between the inlet and discharge of a duct system, it is normal to have a negative static pressure at the fan inlet and positive static pressure at its discharge.

Total pressure is the combination of static and velocity pressures, and is expressed in the same units. It is an important and useful concept to use because it is easy to determine and, although velocity pressure is not easy to measure directly, it can be determined easily by subtracting static pressure from total pressure. This subtraction need not be done mathematically. It can be done automatically with the instrument hook-up.

## SENSING STATIC PRESSURE

For most industrial and scientific applications, the only air measurements needed are those of static pressure, total pressure and temperature. With these, air velocity and volume can be quickly calculated.

To sense static pressure, six types of devices are commonly used. These are connected with tubing to a pressure indicating instrument. Fig. 1-A shows a simple thru-wall static pressure tap. This is a sharp, burr-free opening through a duct wall provided with a tubing connection of some sort on the outside. The axis of the tap or opening must be perpendicular to the direction of flow. This type of tap or sensor is used where air flow is relatively slow, smooth and without turbulence. If turbulence exists, impingement, aspiration or unequal distribution of moving air at the opening can reduce the accuracy of readings significantly.

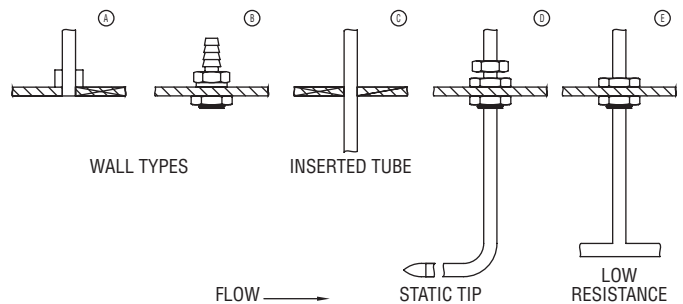


Figure 1 - Types of Static Pressure Devices

Fig. 1-B shows the Dwyer® No. A-308 Static Pressure Fitting. Designed for simplified installation, it is easy to install, inexpensive, and provides accurate static pressure sensing in smooth air at velocities up to 1500 FPM.

Fig. 1-C shows a simple tube through the wall. Limitations of this type are similar to wall type Fig. 1-A.

Fig. 1-D shows a static pressure tip which is ideal for applications such as sensing the static pressure drop across industrial air filters and refrigerant coils. Here the probability of air turbulence requires that the pressure sensing openings be located away from the duct walls to minimize impingement and aspiration and thus ensure accurate readings. For a permanent installation of this type, the Dwyer® No. A-301 or A-302 Static Pressure Tip is used. It senses static pressure through radially-drilled holes near the tip and can be used in air flow velocities up to 12,000 FPM.

Fig. 1-E shows a Dwyer® No. A-305 low resistance Static Pressure Tip. It is designed for use in dust-laden air and for rapid response applications. It is recommended where a very low actuation pressure is required for a pressure switch or indicating gage — or where response time is critical.

## MEASURING TOTAL PRESSURE AND VELOCITY PRESSURE

In sensing static pressure we make every effort to eliminate the effect of air movement. To determine velocity pressure, it is necessary to determine these effects fully and accurately. This is usually done with an impact tube which faces directly into the air stream. This type of sensor is frequently called a “total pressure pick-up” since it receives the effects of both static pressure and velocity pressure.

# AIR VELOCITY MEASUREMENT

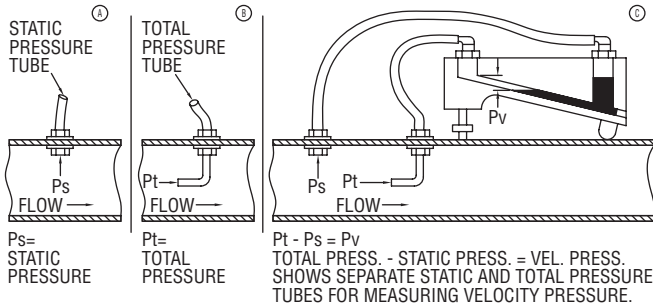


Figure 2 - Types of Pressure Measurements

In Figure 2, note that separate static connections (A) and total pressure connections (B) can be connected simultaneously across a manometer (C). Since the static pressure is applied to both sides of the manometer, its effect is cancelled out and the manometer indicates only the velocity pressure.

To translate velocity pressure into actual velocity requires either mathematical calculation, reference to charts or curves, or prior calibration of the manometer to directly show velocity. In practice this type of measurement is usually made with a Pitot tube which incorporates both static and total pressure sensors in a single unit.

Essentially, a Pitot tube consists of an impact tube (which receives total pressure input) fastened concentrically inside a second tube of slightly larger diameter which receives static pressure input from radial sensing holes around the tip. The air space between the inner and outer tubes permits transfer of pressure from the sensing holes to the static pressure connection at the opposite end of the Pitot tube and then, through connecting tubing, to the low or negative pressure side of a manometer. When the total pressure tube is connected to the high pressure side of the manometer, velocity pressure is indicated directly. See Figure 3.

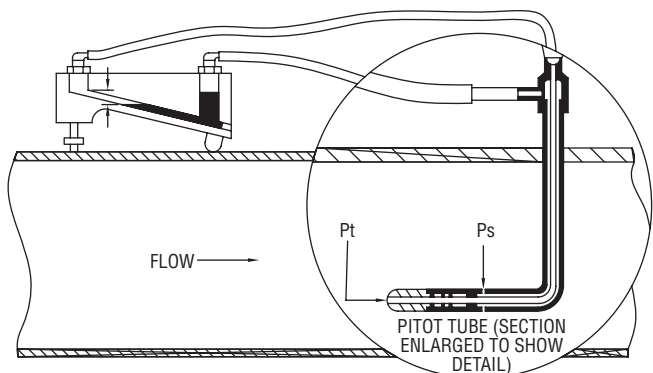


Figure 3 - Pitot Tube Senses Total and Static Pressures. Manometer Measures Velocity Pressure – (Difference Between Total and Static Pressures).

Since the Pitot tube is a primary standard device used to calibrate all other air velocity measuring devices, it is important that great care be taken in its design and fabrication. In modern Pitot tubes, proper nose or tip design — along with sufficient distance between nose, static pressure taps and stem — will minimize turbulence and interference. This allows use without correction or calibration factors. All Dwyer® Pitot tubes are built to AMCA and ASHRAE standards and have unity calibration factors to assure accuracy.

To ensure accurate velocity pressure readings, the Pitot tube tip must be pointed directly into (parallel with) the air stream. As the Pitot tube tip is parallel with the static pressure outlet tube, the latter can be used as a pointer to align the tip properly. When the Pitot tube is correctly aligned, the pressure indication will be maximum.

Because accurate readings cannot be taken in a turbulent air stream, the Pitot tube should be inserted at least 8-1/2 duct diameters downstream from elbows, bends or other obstructions which cause turbulence. To ensure the most precise measurements, straightening vanes should be located 5 duct diameters upstream from the Pitot tube.

## HOW TO TAKE TRAVERSE READINGS

In practical situations, the velocity of the air stream is not uniform across the cross section of a duct. Friction slows the air moving close to the walls, so the velocity is greater in the center of the duct.

To obtain the average total velocity in ducts of 4" diameter or larger, a series of velocity pressure readings must be taken at points of equal area. A formal pattern of sensing points across the duct cross section is recommended. These are known as traverse readings. Figure 4 shows recommended Pitot tube locations for traversing round and rectangular ducts.

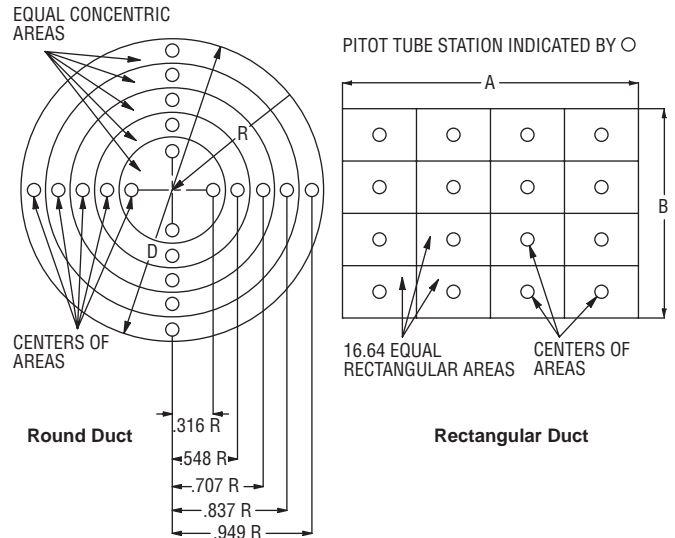


Figure 4 - Traverse on Round and Rectangular Duct Areas

In round ducts, velocity pressure readings should be taken at centers of equal concentric areas. At least 20 readings should be taken along two diameters. In rectangular ducts, a minimum of 16 and a maximum of 64 readings are taken at centers of equal rectangular areas. Actual velocities for each area are calculated from individual velocity pressure readings. This allows the readings and velocities to be inspected for errors or inconsistencies. The velocities are then averaged.

By taking Pitot tube readings with extreme care, air velocity can be determined within an accuracy of  $\pm 2\%$ . For maximum accuracy, the following precautions should be observed:

1. Duct diameter should be at least 30 times dia. of Pitot tube.
2. Locate the Pitot tube in a duct section providing 8-1/2 or more duct diameters upstream and 1-1/2 or more diameters downstream of Pitot tube free of elbows, size changes or obstructions.
3. Provide an egg-crate type of flow straightener 5 duct diameters upstream of Pitot tube.
4. Make a complete, accurate traverse.

In small ducts or where traverse operations are otherwise impossible, an accuracy of  $\pm 5\%$  can frequently be achieved by placing Pitot tube in center of duct. Determine velocity from the reading, then multiply by 0.9 for an approximate average.



# AIR VELOCITY MEASUREMENT



## CALCULATING AIR VELOCITY FROM VELOCITY PRESSURE

Manometers for use with a Pitot tube are offered in a choice of two scale types. Some are made specifically for air velocity measurement and are calibrated directly in feet per minute. They are correct for standard air conditions: i.e. air density of .075 lb per ft<sup>3</sup> corresponds to dry air at 70°F, barometric pressure of 29.92 inches Hg. To correct the velocity reading for other than standard air conditions, the actual air density must be known. It may be calculated if relative humidity, temperature and barometric pressure are known.

Most manometer scales are calibrated in inches of water. Using readings from such an instrument, the air velocity may be calculated using the basic formula:

$$V = 1096.7 \sqrt{\frac{h_v}{d}} \left\{ = 4004.4 \sqrt{h_v} \text{ for } .075 \text{ lb/ft}^3 \text{ dry air @ } 70^\circ\text{F, } 29.92 \text{ in. Hg Baro.} \right\}$$

Where:  $V$  = Velocity in feet per minute.  
 $h_v$  = Velocity pressure in inches of water.  
 $d$  = Density of air in pounds per cubic foot.

To determine dry air density, use the formula:

$$d = 1.325 \frac{P_B}{T}$$

Where:  $d$  = Air density in pounds per cubic foot.

$$P_B = \left\{ \text{Barometric (or absolute) static pressure in inches of mercury.} \right\}$$

$T$  = Absolute temperature (indicated temperature in °F plus 460°).

With dry air at 29.9 inches mercury, air velocity can be read directly from curves on the following page. For partially or fully saturated air a further correction is required. To save time when converting velocity pressure into air velocity, the Dwyer® Air Velocity Calculator may be used. A simple slide rule, it provides for all the factors needed to calculate air velocity quickly and accurately. It is included as an accessory with each Dwyer® Pitot tube.

To use the Dwyer® Calculator:

1. Set relative humidity on scale provided. On scale opposite known dry bulb temperature, read correction factor.
2. Set temperature under barometric pressure scale. Read density of air over correction factor established in 1 (above).
3. On the other side of calculator, set air density reading just obtained on the scale provided.
4. Under Pitot tube reading (velocity pressure, inches of water) read air velocity, feet per minute.

## DETERMINING VOLUME FLOW

Once the average air velocity is known, the air flow rate in cubic feet per minute is easily computed using the formula:

$$Q = AV$$

Where:  $Q$  = Quantity of flow in cubic feet per minute.  
 $A$  = Cross sectional area of duct in square feet.  
 $V$  = Average velocity in feet per minute.

## DETERMINING AIR VOLUME BY CALIBRATED RESISTANCE

Manufacturers of air filters, cooling and condenser coils and similar equipment often publish data from which approximate air flow can be determined. It is characteristic of such equipment to cause a pressure drop which varies proportionately to the square of the flow rate. Figure 5 shows a typical filter and a curve for air flow versus resistance. Since it is plotted on logarithmic paper, it appears as a straight line. On this curve, a clean filter which causes a pressure drop of .50 in w.c. would indicate a flow of 2,000 c.f.m.

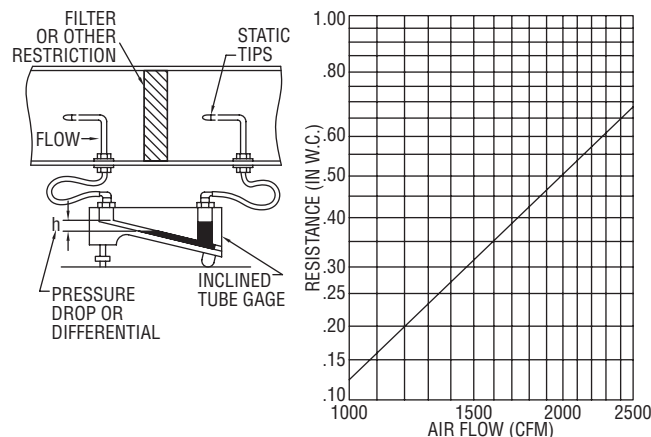


Figure 5 - Differential Measurement Across Duct Restriction

For example, assuming a manufacturer's specification for a filter, coil, etc:

Given Flow  $Q$  (ft<sup>3</sup>/min.) = at differential "h" (inches w.c.)

To determine flow at other differentials the formula is:

$$Q_n (\text{other flows}) = Q \sqrt{\frac{h_n}{h}}$$

Where:  $Q$  = Quantity of flow in cubic feet per minute  
 $h$  = Differential in inches water column  
 $h_n$  = Differential (other flow conditions)

## OTHER DEVICES FOR MEASURING AIR VELOCITY

A wide variety of devices are commercially available for measuring air velocities. These include hot wire anemometers for low air velocities, rotating and swinging vane anemometers and variable area flowmeters.

The Dwyer® No. 460 Air Meter is one of the most popular and economical variable area flowmeter type anemometers. Quick and easy to use, it is a portable instrument calibrated to provide a direct reading of air velocity.

A second scale is provided on the other side of the meter to read static pressure in inches w.c. The 460 Air Meter is widely used to determine air velocity and flow in ducts, and from supply and return grilles and diffusers. Two scale ranges are provided (high and low) with calibrations in both f.p.m. and in w.c.

## TO CHECK ACCURACY

Use only devices of certified accuracy. All anemometers and to a lesser extent portable manometers should be checked regularly against a primary standard such as a hook gage or high quality micromanometer. If in doubt return your Dwyer® instrument to the factory for a complete calibration check at no charge.

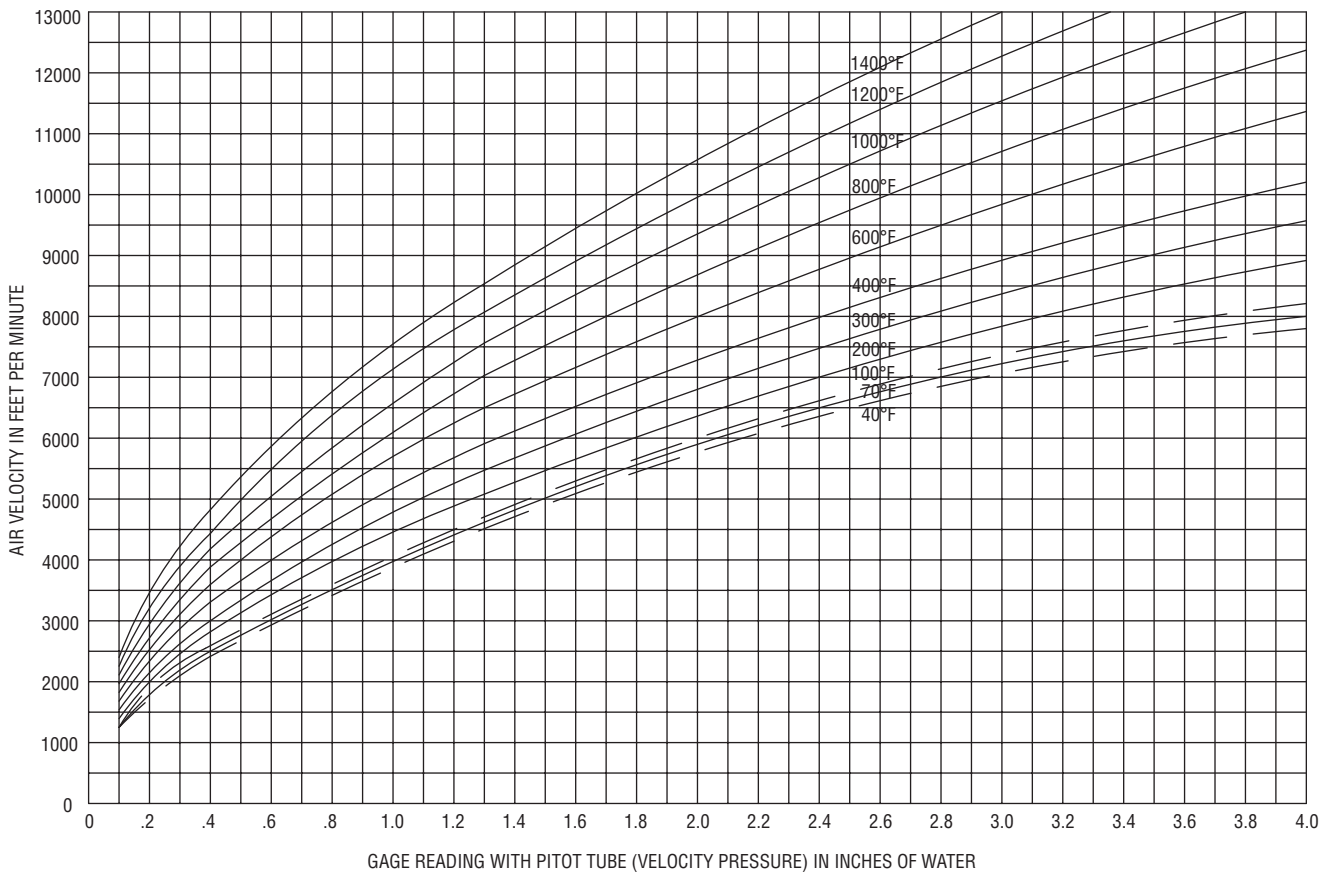
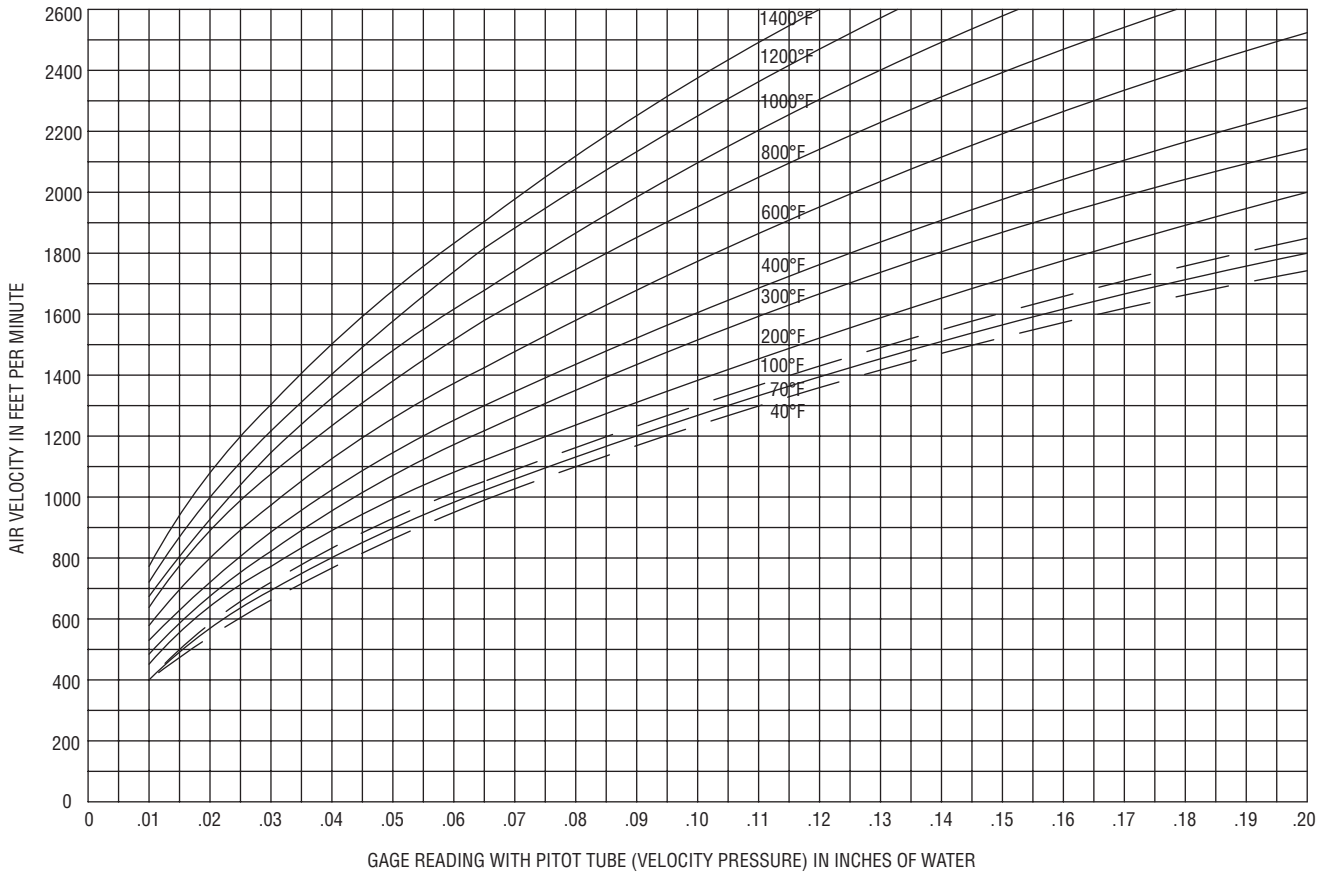
## HVAC MOBILE APPLICATION

Easily converts velocity pressure to air velocity or air velocity to air volume for most Android® or iOS devices.





# AIR VELOCITY FLOW CHARTS



# AIR BALANCING HVAC SYSTEMS

## METHODS OF AIR BALANCING

Air balancing a distribution system is needed to properly direct the air flow in order to optimize the system's design. Flow rates are tested, adjusted, and balanced as cubic feet per minute (CFM) or cubic meters per hour (m<sup>3</sup>/h). There are two traditional methods for balancing airflow at the terminals. The first is sequential balancing, which involves setting the zone and branch dampers in sequence. However, the most common method of air balancing is called proportional balancing.

For traditional proportional balancing, an air flow hood, or capture hood, is the most popular test instrument used to take air flow readings. Traverse readings in the duct with a Pitot tube or a hot-wire thermo-anemometer is another accepted method of capturing the actual air flow.

Dwyer has designed a variation of proportional balancing, which is called Predictive Balancing used in Dwyer's Series SAH SMART Air Hood™ Balancing Instrument. Predictive Balancing is designed to be a faster process and give more accurate results than traditional proportional balancing.

## PREDICTIVE VS PROPORTIONAL BALANCING

In traditional proportional balancing, the flow hood will directly measure volumetric air flow at the outlets or terminals of a system: the registers, grilles, and diffusers. Most air flow hoods are cone shaped and aligned to the ceiling registers as shown in Figure 1 in the left picture. When a flow hood is placed over a terminal, it will generate pressure within the duct system, which reduces the air flow to the terminal. This condition is called back pressure. The effect of back pressure can result in errors when taking readings. Before using a flow hood, many technicians recommend performing a duct traverse to verify the K factor. Some digital flow hoods include back pressure compensation that attempts to calculate the effect of backpressure for the technician.

Dwyer's Predictive Balancing technique is based on mass balance and energy conservation methods. Predictive Balancing, is a process that involves predicting the ideal flow set points for each TUA (Terminal Under Adjustment) so that every terminal is at the target flow until the process is complete. Dwyer's Series SAH SMART Air Hood™ Balancing Instrument was designed with Predictive Balancing in mind. Dwyer's air hood is being used in Figure 1 in the right picture.



Figure 1 – Traditional Air Flow Hood (left picture) versus Dwyer Smart Air Hood (right picture)

Predictive Balancing is deterministic and minimizes the number or process steps involved in testing, adjusting, and balancing HVAC systems. Figure 2 illustrates a comparison between Predictive Balancing and traditional proportional balancing processes, showing how much faster Predictive Balancing is.

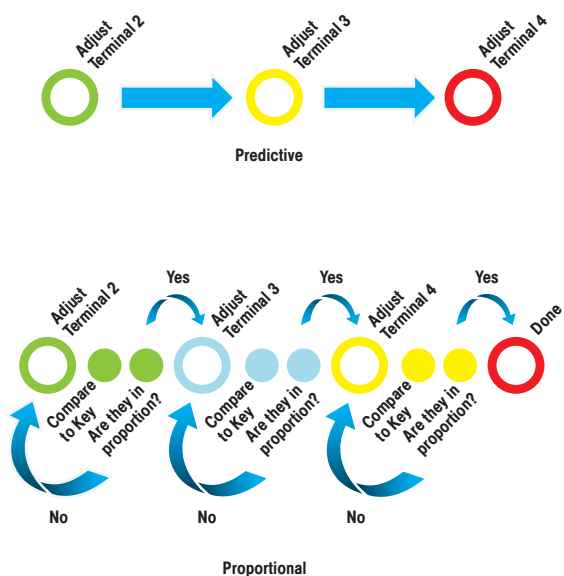


Figure 2 – Predictive vs Proportional Balancing



# AIR BALANCING HVAC SYSTEMS

## PROPORTIONAL BALANCING

With proportional balancing (reference Figure 3), the technician balances a terminal proportional to the key terminal. To start a proportional balance of a system, one requirement is that the system has an 80% to 120% rate to the total design flow. Systems that are higher or lower than this range will not balance properly. If the system is outside of this range, the fan speed should be adjusted to get within range. Once set, the air flow from each terminal will remain the same ratio to other terminals.

If key Terminal 1 has a design flow percent of 60%, then Terminal 2 is 57%, Terminal 3 is 65%, and the ratio to the key Terminal 1 is  $57\% / 60\% = 0.95$ . Meaning Terminal 2 will deliver 95% of the air volume of Terminal 1. With Terminal 1 as the key, delivering 100% of design flow, then Terminal 2 will be delivering 95% of the design flow. This will meet the design requirements. For example, if the damper for Terminal 3 is adjusted down to 525 CFM, the flow from Terminal 1 may increase to 550 CFM. In this case, Terminal 2 is within the design range;  $550 * 0.95 = 523$  CFM.

Once the terminals are in balance, with the proper ratio of tolerance with each other, they remain in balance with each other even though the air volume may change. All terminals in the system are then proportionally balanced. The fan RPM can be set to deliver the intended total air volume and all terminals will deliver the design flow within the established tolerances.

This process requires the balancing technician to adjust the flow from the terminal under-adjustment (TUA) to the key to gain the correct flow proportion. The key terminal's flow changes when the TUA damper is changed. It may take several iterations to achieve the proper flow proportion.

Since the technician is estimating where to set the flow rate of the TUA relative to the key, the tolerance can vary considerably, which limits the accuracy of the balancing. The illustration in Figure 3 shows the potential number of lengthy steps involved with proportional balancing.

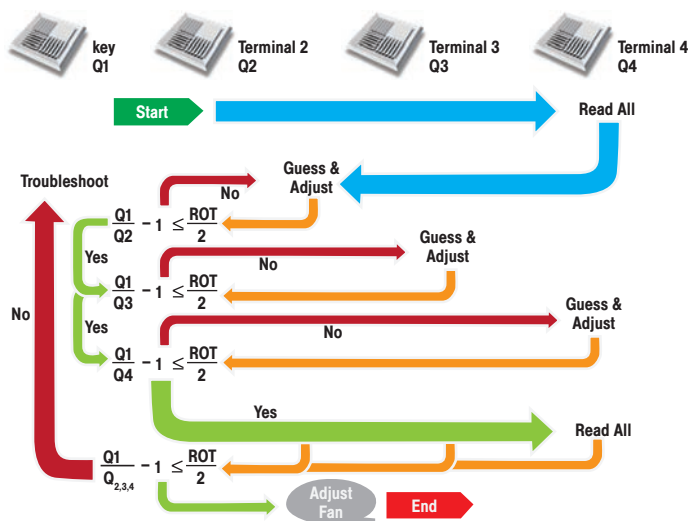


Figure 3 – Proportional Balancing

## PREDICTIVE BALANCING

The Predictive Balancing (reference Figure 4) process begins by opening the dampers 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 loads and the pressure drop in the system.

Terminal 2 is the first damper adjusted in the system, and Terminal 1 is the key. Predictive Balancing calculates the ideal flow set point for Terminal 2 for TUA and predicts flows for Terminals 1, 3, and 4.

After adjusting the Terminal 2 flow to the ideal flow set point, Predictive Balancing calculates the ideal set point for Terminal 3 and predicts the new flows for terminals 1, 2, and 4.

To finish, Predictive Balancing calculates the ideal set point for the last Terminal, number 4, and flows for Terminals 1, 2, and 3 are correctly proportioned to the target.

Finally, Predictive Balancing calculates the ideal flow for Terminal 4 so the blower flow can be adjusted to bring all the terminal flows to the target flows.

Predictive Balancing also monitors and compensates for load on the blower/fan from the damper closures during the balancing process. The illustration in Figure 4 compared to Figure 3 shows just how much easier and faster Predictive Balancing is over Proportional Balancing in the amount of steps involved in the process.

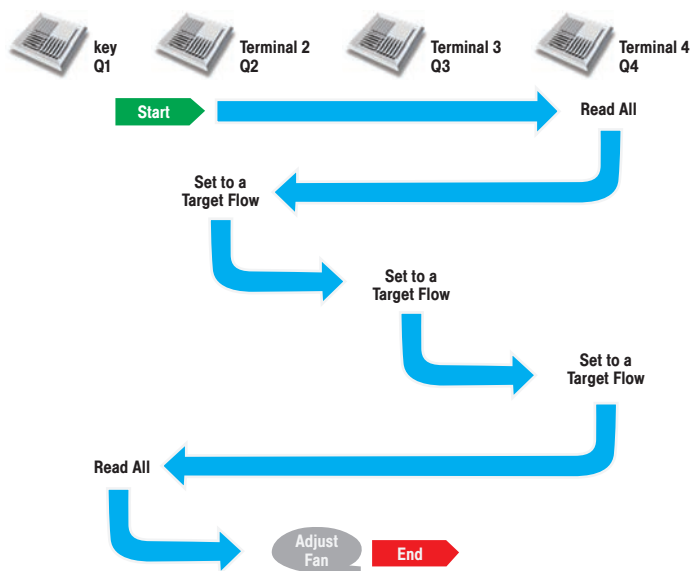
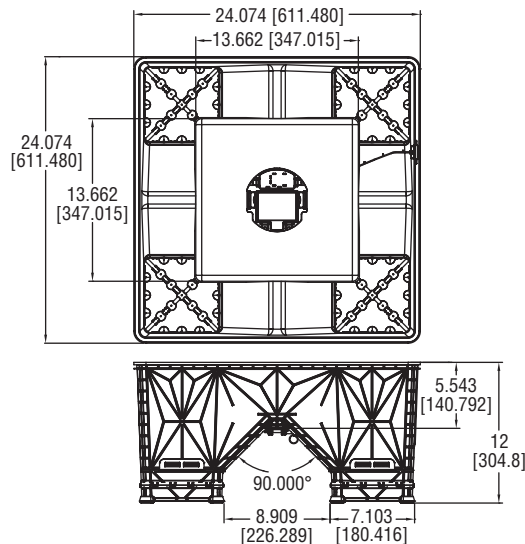


Figure 4 – Predictive Balancing

# SMART AIR HOOD™ BALANCING INSTRUMENT

## Quad Flow Design Technology, Predictive Balancing



The **SERIES SAH SMART Air Hood™** Balancing Instrument is the most accurate and easy to operate air flow hood on the market. By using the included hood stand and wireless communications to the handheld, a single operator can balance a branch in less time than traditional balancing teams. Besides being lighter than most traditional capture hoods, the ergonomic design makes the Series SAH easy to maneuver, with less physical stress. The rugged polypropylene base hood features patented Quad Flow Design Technology for controlling air flow and minimizing back pressure, which yields superior measurement accuracy. The Wi-Fi direct communication gives reliable communication with a distance of up to 200 yards (183 m) between the hood and the handheld test instrument. The SMART Air Hood™ Balancing Instrument includes the PredictAir™ Application Software which reduces the number of steps in the air flow balancing process using Predictive Balancing's Express Balance mode. Predictive Balancing is a method of predicting the optimal flow set point for each register and the order in which they should be adjusted.

### FEATURES/BENEFITS

- Patent pending Quad Flow Design Technology directs the circulating air patterns to provide a more even air flow that minimizes backpressure enabling accurate readings
- Predictive Balancing is a process that guides the balancing technician on setting the optimal flow set point for each sequential terminal. With the PredictAir™ Application Software, the balancing process takes much less time than traditional air balancing methods
- The ergonomic design is much lighter and easier to work with than the existing bulky air hoods, providing greater maneuverability and less physical strain. One technician can complete the air balancing
- Wi-Fi direct wireless communication provides a range up to 200 yards (183 m)

### APPLICATIONS

- Commissioning, testing, adjusting and balancing volumetric air flow from diffusers, grilles, and registers in HVAC systems

### MODEL CHART

Model	Description
<b>SAH-22</b>	SMART Air Hood™ with 2' x 2' (0.6 m x 0.6 m) opening
<b>SAH-22-LB</b>	SMART Air Hood™ with 2' x 2' (0.6 m x 0.6 m) opening, less the lithium battery (for International shipments only).
Included with the SAH: Translucent gray SAH base unit with 2' x 2' (0.6 m x 0.6 m) opening, handheld test instrument with attached quick release, extendable pole 4.5' to 12' (1.4 m x 3.7 m) with handheld test instrument connection, extendable pole with 2' to 4' (0.6 m x 1.2 m) with handheld test instrument connection, installation and operating manual, pole safety clamp, stationary pole adapter, SAH travel case, cable adapter to connect SAH and handheld test instrument, charger and cables for SAH and handheld test instrument.	

### SPECIFICATIONS

#### VOLUME FLOW

**Service:** Air.

**Units:** CFM, m³/h, l/s.

**Volume Flow Ranges:** Supply: 40 to 2000 CFM (68 to 3398 m³/h) (19 to 944 l/s); Exhaust: 80 to 2000 CFM (136 to 3398 m³/h) (38 to 944 l/s).

**Accuracy at Calibration > 40 CFM:** ±3% of reading ±7 CFM (12 m³/h) (3.3 l/s)\*.

**Accuracy for Any Diffuser > 40 CFM:** ±3% of reading ±10 CFM (17 m³/h) (4.7 l/s)\*\*.

**Resolution:** 1 CFM (1.7 m³/h) (.5 l/s).

#### TEMPERATURE

**Units:** °F, °C, K.

**Operating Range:** 40 to 140°F (4.4 to 60°C).

**Storage Range:** -4 to 122°F (-20°C to 50°C).

**Accuracy:** ±0.3% of reading (no calibration required).

#### RELATIVE HUMIDITY

**Range:** 5 to 95%.

**Accuracy:** ±5% of reading (no calibration required).

**Resolution:** 0.1% RH.

#### ABSOLUTE PRESSURE

**Units:** mbar, Pa.

**Range:** 10 to 2000 mbar (1000 to 200,000 Pa).

**Accuracy @ 25°C and within 300 to 1100 mbar:** ±2% of reading (no calibration required).

**Resolution:** 0.1 mbar.

**Power Requirements:** 3.6 V NCR18650B MH12210 lithium ion battery, included, user replaceable or (4) 1.5 V AA alkaline batteries, not included, user replaceable.

**Housing Material:** Polypropylene.

**Weight:** 5.75 lb (2.6 kg).

**Agency Approvals:** CE, FCC, IC.

\*Based on calibration with Sensing Precision Calibration fixture and Dwyer standard diffuser.

\*\*Based on any diffuser in the Dwyer downloadable library.

### ACCESSORIES

Model	Description
<b>A-SAH-14S</b>	Canvas hood 1' x 4' (0.3 m x 1.2 m)
<b>A-SAH-15S</b>	Canvas hood, 1' x 5' (0.3 m x 1.5 m)
<b>A-SAH-24S</b>	Canvas hood, 2' x 4' (0.6 m x 1.2 m)
<b>A-SAH-33S</b>	Canvas hood, 3' x 3' (0.9 m x 0.9 m)
<b>A-SAH-BK</b>	SAH adapter base kit for canvas hood
<b>A-SAH-CK</b>	Spare calibration kit with four Quad Flow Sensing Grids and Sensor Module

# PREDICTAIR™ APPLICATION SOFTWARE

Includes Diffuser Flow Coefficient Library, Predictive Balancing, Logging



The **PREDICTAIR™** Application Software displays flow measurements from Dwyer's 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 register in order to balance the HVAC system accurately and efficiently. PredictAir™ Application Software is factory installed into the handheld unit that comes with the SMART Air Hood™ Balancing Instrument.

## FEATURES/BENEFITS

- Extensive diffuser library has flow coefficients that calibrates the Series SAH to within  $\pm 3\%$  of reading accuracy for any diffuser type in the library
- Predictive Balancing process determines the order and set points for adjusting registers in the balancing process
- Generates and shares air balancing reports directly from the handheld device

## APPLICATIONS

- Commissioning, testing, adjusting and balancing volumetric air flow from diffusers, grilles, and registers in HVAC systems

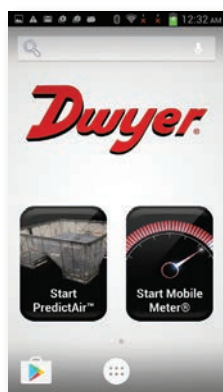
## SPECIFICATIONS

**Operating System:** PredictAir™ Application Software only available with factory supplied test instrument.

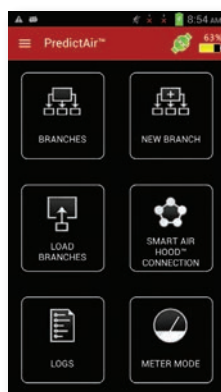
**Wireless Protocol:** Wi-Fi direct low energy wireless technology.

**Response Time:** 1 s.

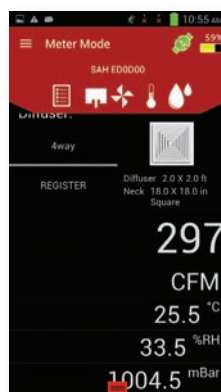
Updates to diffuser library can be downloaded using Google Play™ store.



Handheld Home Screen



Application Main Menu



Meter Mode



Predictive Balancing Mode



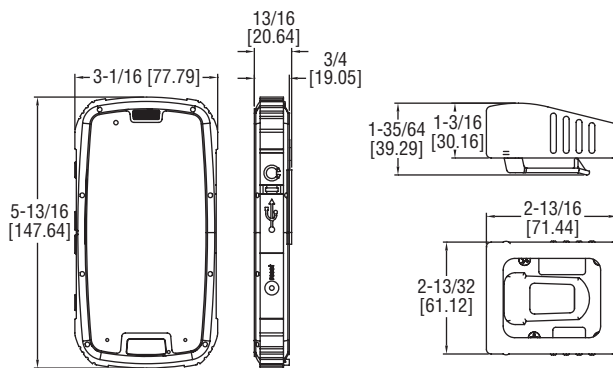
**Dwyer**

MODEL UHH2

# UNIVERSAL HANDHELD TEST INSTRUMENT

Rugged Weatherproof Case, Works with Wireless Sensors

CE



UHH2 Base Unit

UHH-BTG  
Wireless Mobile Gateway

The **MODEL UHH2** Universal Handheld Test Instrument provides the functionality and versatility of the Mobile Meter® Software App on a rugged IP68 Android® based handheld. Wireless anemometer, hygrometer, and pressure probes communicate to the handheld using Bluetooth SIG, Inc. wireless technology and can all be displayed simultaneously. Each UHH2 includes a UHH2 handheld base unit, UHH-BTG wireless mobile gateway, two USB charging cables, charging block, mini-screwdriver, user manual, and headphones.

**FEATURES/BENEFITS**

- Rugged weatherproof housing withstands 1.5 meter drop test
- Wireless measurement of pressure, air velocity, air flow, temperature, and humidity
- Share logged data directly from handheld over Wi-Fi, GSM or CDMA networks

**APPLICATIONS**

- Building commissioning
- Building balancing
- Testing HVAC equipment performance

**MODEL CHART**

Model	Description
UHH2	Universal handheld base unit
AP2	Wireless thermo-anemometer, air velocity, & temperature probe
RP2	Wireless thermo-hygrometer, humidity, and temperature probe
VP2	Wireless 100 mm vane thermo-anemometer, air velocity, temperature, and humidity probe
WDPM-002	Wireless differential pressure module, ±2 in w.c. (498.18 Pa)
WDPM-005	Wireless differential pressure module, ±5 in w.c. (1245.4 Pa)
WDPM-010	Wireless differential pressure module, ±10 in w.c. (2490.9 Pa)
WDPM-020	Wireless differential pressure module, ±20 in w.c. (4981.8 Pa)
WDPM-030	Wireless differential pressure module, ±30 in w.c. (7472.7 Pa)
WDPM-100	Wireless differential pressure module, ±100 in w.c. (24909 Pa)
WDPM-200	Wireless differential pressure module, ±200 in w.c. (49818 Pa)
WDPM-350	Wireless differential pressure module, ±350 in w.c. (87181 Pa)

**ACCESSORIES**

Model	Description
KF-CC-304	Dual USB charger with North American adapter (1.5 A)
UHH-C1	Soft carrying case
UHH-C2	Heavy duty hard case with pre-cut foam inserts for additional sensors
UHH-CBL	USB to mini-USB cable
UHH-CBL2	USB to micro-USB cable
UHH-ICHRG	UHH dual USB charger with international adapters (1.0 A) (Not CE approved)



UHH-BTG



WDPM



AP2



RP2



VP2

**SPECIFICATIONS**

**Display:** 4.3" QHD Gorilla glass touch screen, 960x540.  
**Wireless Distance:** 50' (15 m) or greater.  
**Response Time:** 1 s.  
**Temperature Limits:** Operating: -4 to 140°F (-20 to 60°C); Storage: -40 to 176°F (-40 to 80°C).  
**Humidity Limits:** 5 to 95% RH.  
**Power Requirements:** 2000 mAh lithium ion battery, installed functional, non-replaceable.  
**Memory:** RAM 1G & ROM 4G.  
**Operating System:** Android 4.2.2.  
**CPU:** MTK6589W Quad Core 1.2 GHz.  
**Enclosure Rating:** IP68.  
**Weight:** 15.9 oz (450 g).  
**Agency Approvals:** CE.



# AIR QUALITY TEST INSTRUMENT KITS

AQTIA Combines the UHH2 Universal Handheld with Compatible Probes



The **SERIES AQTIA** Air Quality Test Instruments combine the versatile Model UHH2 handheld base with various compatible probes and modules. The versatile combination provides a line of instruments capable of streamlining a technician's everyday testing by combining all into one product and using Bluetooth SIG, Inc. wireless technology for ease of use.

## FEATURES/BENEFITS

- Rugged IP68 housing withstands 1.5 meter drop test
- Wireless measurement of pressure, air velocity, air flow, temperature, and humidity

## APPLICATIONS

- Building commissioning
- Building balancing
- Testing HVAC equipment performance

## SPECIFICATIONS

**Display:** 4.3" QHD Gorilla glass, 960x540.  
**Temperature Limits:** Operating: -4 to 140°F (-20 to 60°C); Storage: -40 to 176°F (-40 to 80°C).  
**Humidity Limits:** 5 to 95% RH.  
**Power Requirements:** 2000 mAh lithium ion battery, installed functional, non-replaceable.  
**Memory:** RAM 1G & ROM 4G.  
**Operating System:** Android 4.2.2.  
**CPU:** MTK6589W Quad Core 1.2 GHz.  
**Enclosure Rating:** IP68.  
**Weight:** 15.9 oz (450 g).  
**Agency Approvals:** CE.

MODEL CHART			
Model	Parameters	Range	Engineering Units Available
AQTIA-AP2	Velocity/temperature	0 to 6000 FPM; -20 to 212°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K
AQTIA-RP2	Humidity/temperature	0 to 100% RH; -20 to 140°F	Humidity: %RH; Temperature: °F, °C, °K
AQTIA-VP2	Velocity/RH/temperature	40 to 5000 FPM; 0 to 100% RH; -4 to 140°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K
AQTIA-WDPM-002	Pressure	±2 in w.c. (498.18 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-005	Pressure	±5 in w.c. (1245.4 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-010	Pressure	±10 in w.c. (2490.9 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-020	Pressure	±20 in w.c. (4981.8 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-030	Pressure	±30 in w.c. (7472.7 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-100	Pressure	±100 in w.c. (24909 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-200	Pressure	±200 in w.c. (49818 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
AQTIA-WDPM-350	Pressure	±350 in w.c. (87181 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa

**Note:** AQTIA series models supplied with: UHH2, UHH-BTG, wireless sensing probe, soft carrying case (UHH-C1), charging cable (UHH-CBL2), and headphones.  
**Note:** Pro series models supplied with: UHH2, UHH-BTG, wireless sensing probe, soft carrying case (UHH-C1), charging cable (UHH-CBL2), headphones, heavy duty hard case with pre-cut foam inserts for additional sensors (UHH-C2), and NIST calibration certificate. For pro series models, replace AQTIA with AQTIA-P.

MODEL CHART				
Model	Probes Provided	Parameters	Range	Engineering Units Available
AQTIA-PDPM-002-PKIT	WDPM-002	Pressure	±2 in w.c. (498.18 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
	AP2	Velocity/temperature	0 to 6000 FPM; -20 to 212°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K
	RP2	Humidity/temperature	0 to 100% RH; -20 to 140°F	Humidity: %RH; Temperature: °F, °C, °K
	VP2	Velocity/RH/temperature	40 to 5000 FPM; 0 to 100% RH; -4 to 140°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K
AQTIA-PDPM-005-PKIT	WDPM-005	Pressure	±5 in w.c. (1245.4 Pa)	in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> ; mm w.c., cm w.c., mbar, Pa, hPa, kPa
	AP2	Velocity/temperature	0 to 6000 FPM; -20 to 212°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K
	RP2	Humidity/temperature	0 to 100% RH; -20 to 140°F	Humidity: %RH; Temperature: °F, °C, °K
	VP2	Velocity/RH/temperature	40 to 5000 FPM; 0 to 100% RH; -4 to 140°F	Velocity: fps, fpm, mph, knots, m/s, m/h, k/h; Temperature: °F, °C, °K

**Note:** Full professional kits supplied with UHH2, UHH-BTG, AP2 thermo-anemometer probe, RP2 thermo-hygrometer probe, VP2 thermo-anemometer probe, WDPM wireless differential pressure module, 160-18 stainless steel pitot tube, 160F straight stainless steel pitot tube, 160G averaging air flow grid, (2) A-303 portable static pressure tip, soft carrying case (UHH-C1), charging cable (UHH-CBL2), headphones, heavy duty hard case with pre-cut foam inserts for additional sensors (UHH-C2), and NIST calibration certificates.

# MOBILE METER® SOFTWARE TEST INSTRUMENT APP

Works With Most Android® and iOS® Phones/Tablets; Wireless Probes



Touch to access parameters

Connection status



Touch to toggle between meter and gauge view

The **MOBILE METER®** Software Test Instrument App converts Android® and iOS® based phones and tablets into a multi-function test instrument. Wireless probes connect to the phone or tablet using our mobile gateway, Model UHH-BTG, which utilizes wireless technology from Bluetooth SIG Inc. Parameters from multiple probes can be displayed simultaneously, or a single probe's parameters can be displayed as a meter or analog gauge.

## FEATURES/BENEFITS

- Available on Android® and iOS® devices
- Data logging feature records measurements from a single probe and can email reports directly from device
- Display multiple parameters in gauge or meter display

## APPLICATIONS

- Building balancing
- Building commissioning
- Testing HVAC equipment performance

## SPECIFICATIONS

**Operating Systems:** Android® firmware version 3.X or later, iOS® firmware version 5.X or later.  
**Wireless Protocol:** Conforms to Bluetooth SIG, Inc. low energy wireless technology.  
**Wireless Distance:** 50' (15 m) or greater.  
**Response Time:** 1 s.

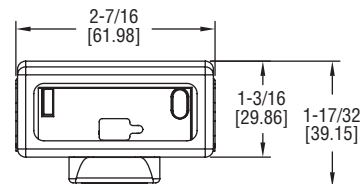
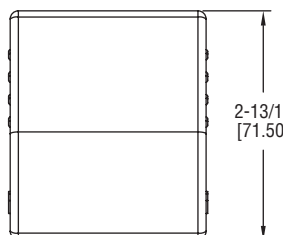


Scan here to download for FREE for iOS® & Android® devices  
<http://www.dwyer-inst.com/MobileMeterApp/>

## MODEL UHH-BTG

# WIRELESS MOBILE GATEWAY

Converts UHH Probe Wireless Signals to Bluetooth SIG, Inc. Wireless Technology



The **MODEL UHH-BTG** Wireless Mobile Gateway transforms the wireless signal from any Dwyer Instruments, Inc. universal handheld probe or module into a Bluetooth SIG, Inc. Wireless Technology. Using this gateway, any iOS® Firmware version 5.X or later or Android® Firmware Version 3.X or later smartphone or tablet can become the base instrument for measuring or logging. Once the gateway is paired with a device, our Mobile Meter® Software Mobile App or any other Dwyer Instruments, Inc. approved apps can detect available probes or modules.

## FEATURES/BENEFITS

- Detects probes/modules from 50 ft (15 m) away
- Compact size with belt clip for carrying around
- Can be recharged using the same mini-USB cable and charger as probes/modules

## APPLICATIONS

- Building balancing
- Building commissioning
- Testing HVAC equipment performance

## MODEL CHART - CONVERTS THESE WIRELESS PROBES FOR USE WITH OUR MOBILE METER® SOFTWARE MOBILE APP

Model	Description
AP2	Wireless thermo-anemometer probe
RP2	Wireless thermo-hygrometer probe
VP2	Wireless 100 mm vane thermo-anemometer probe
WDPM-002	Wireless differential pressure probe ±2 in w.c.
WDPM-005	Wireless differential pressure probe ±5 in w.c.
WDPM-010	Wireless differential pressure probe ±10 in w.c.
WDPM-020	Wireless differential pressure probe ±20 in w.c.
WDPM-030	Wireless differential pressure probe ±30 in w.c.
WDPM-100	Wireless differential pressure probe ±100 in w.c.
WDPM-200	Wireless differential pressure probe ±200 in w.c.
WDPM-350	Wireless differential pressure probe ±350 in w.c.

**Note:** See wireless probe catalog page on the web for full specifications.

## SPECIFICATIONS

**Wireless Protocol:** Conforms to Bluetooth SIG, Inc. low energy wireless technology.  
**Wireless Distances:** 50' (15 m) or greater.  
**Response Time:** 1 s.  
**Temperature Limits:** Ambient: 5 to 125°F (-15 to 51°C); Battery charging: 32 to 113°F (0 to 45°C).  
**Power Requirements:** 3.7 V YT562447 lithium ion battery, installed functional, user replaceable.  
**Weight:** 2.5 oz (70.87 g).  
**Agency Approvals:** CE with CE approved charger, FCC.

## MODEL CHART

Model	Description
UHH-BTG	Wireless mobile gateway

## ACCESSORY

Model	Description
UHH-ICHRG	Dual USB charger



RP2

AP2

VP2

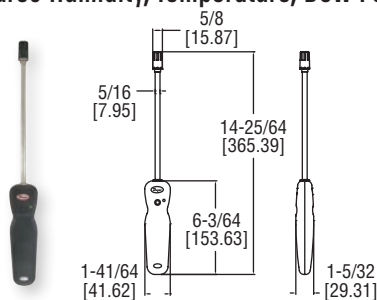
WDPM

Google Inc.® is a registered trademark of Google, Inc.  
 Google® is a registered trademark of Google, Inc.  
 iOS® is a registered trademark of Apple Systems, Inc.  
 Google Play™ is a trademark of Google, Inc.

Wireless Probes: See page 179 (Models RP2, AP2 & VP2)

## THERMO-HYGROMETER PROBE

Wireless, Measures Humidity, Temperature, Dew Point, &amp; Wet Bulb Temperatures



## SPECIFICATIONS

**Service:** Clean air.  
**Temperature Limits:** Process: -4 to 140°F (-20 to 60°C); Ambient: 5 to 125°F (-15 to 51°C);  
**Battery Charging:** 32 to 113°F (0 to 45°C).  
**Range:** RH: 0 to 100% (non-condensing); Temperature: -22 to 140°F (-30 to 60°C).  
**Accuracy:** RH: ±2% @ 25°C (10 to 90% RH); ±4% (0 to 10, 90 to 100% RH); Temperature: ±0.54°F @ 77°F (±0.3°C @ 25°C).  
**Response Time:** 1.5 s.

**Probe Length:** 8" (203 mm) insertion.  
**Power Requirements:** 3.7 V YT562447 Lithium ion battery, installed functional, user replaceable. (**Note:** Intended to be operated with power cables less than 3 m in length). (Wireless Only).  
**Maximum Wireless Distance:** 50' (15 m).  
**Handle Enclosure:** Thermoplastic elastomer over polycarbonate.  
**Supplied With:** Wrist strap.  
**Weight:** 11.2 oz (331.22 g).  
**Agency Approvals:** CE (not while charging), FCC compliant.

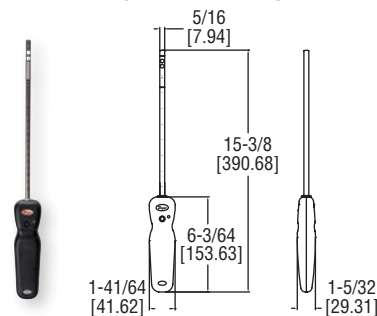
## MODEL CHART

Model	Description
RP2	Wireless thermo-hygrometer probe for use with the Model UHH handheld meter and the Mobile Meter® Software Test Instrument Mobile App

## MODEL AP2

## THERMO-ANEMOMETER PROBE

Wireless, Measures Velocity, Flow, &amp; Temperature



## SPECIFICATIONS

**Service:** Dry, clean air.  
**Temperature Limits:** Process: -20 to 212°F (-29 to 100°C); Ambient: 5 to 125°F (-15 to 51°C).  
**Range:** Air Velocity: 0 to 6000 FPM (0 to 30 m/s); Volumetric Air: 999,999 in selected flow units; Temperature: -20 to 212°F (-29 to 100°C).  
**Accuracy:** Air Velocity: ±3% FS within temperature range of 40 to 90°F (4 to 32°C); Temperature: ±0.5°F (±0.28°C).  
**Response Time:** 1 s.  
**Probe Length:** 8" (203 mm) insertion.  
**Battery Charging Limits:** 32 to 113°F (0 to 45°C). (Wireless Only).

**Power Requirements:** 3.7 V YT562447 Lithium ion battery, installed functional, user replaceable. (**Note:** Intended to be operated with power cables less than 3 m in length). (Wireless Only).  
**Maximum Wireless Distance:** 50' (15 m). (Wireless Only).  
**Handle Enclosure:** Thermoplastic elastomer over polycarbonate.  
**Supplied With:** Wrist strap.  
**Weight:** 11.2 oz (317 g).  
**Agency Approvals:** CE (not while charging), FCC compliant.

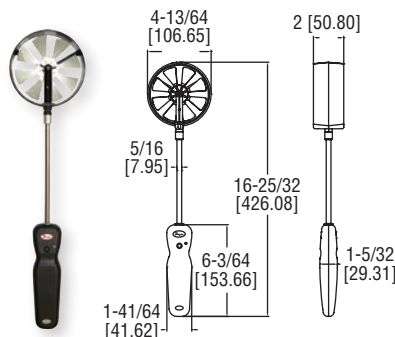
## MODEL CHART

Model	Probe Length
AP2	8" (203.2 mm)
AP2-18	18" (457.2 mm)
AP2-24	24" (609.6 mm)
AP2-36	36" (914.4 mm)

## MODEL VP2

## 100 MM VANE THERMO-ANEMOMETER PROBE

Wireless, Measures Velocity, Flow, Humidity, &amp; Temperature



## SPECIFICATIONS

**Service:** Dry, clean air.  
**Temperature Limits:** Process: -20 to 212°F (-29 to 100°C); Ambient: 5 to 125°F (-15 to 51°C).  
**Range:** Air Velocity: 40 to 5000 FPM (0.2 to 25 m/s); Volumetric Air: 999,999 in selected flow units; Temperature: -20 to 212°F (-29 to 100°C); Relative Humidity: 0 to 100% RH.  
**Accuracy:** Air Velocity: 0.25 to 10 m/s: ±1.5% of reading ±20 FPM (±0.1 m/s); 10 to 20 m/s: 1.5% of reading ±40 FPM (±0.2 m/s); 20 to 25 m/s: ±1.5% of reading ±60 FPM (±0.3 m/s); Temperature: ±0.54°F @ 77°F (±0.3°C @ 25°C); Relative Humidity: ±2% @ 77°F (25°C) (10 to 90% RH); ±4% (0 to 10% RH and 90 to 100%).

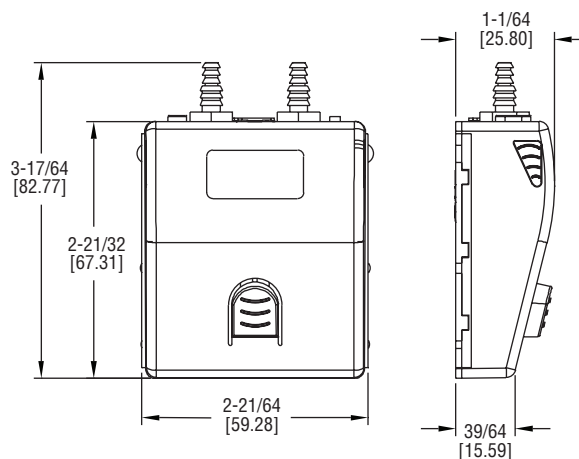
**Response Time:** Air Velocity and Air Volume: 1 s; Temperature and Relative Humidity: 1.5 s.  
**Probe Length:** 8" (203 mm) insertion.  
**Battery Charging Limits:** 32 to 113°F (0 to 45°C). (Wireless Only).  
**Power Requirements:** 3.7 V YT562447 Lithium ion battery, installed functional, user replaceable. (**Note:** Intended to be operated with power cables less than 3 m in length). (Wireless Only).  
**Maximum Wireless Distance:** 50' (15 m). (Wireless Only).  
**Handle Enclosure:** Thermoplastic elastomer over polycarbonate.  
**Supplied With:** Wrist strap.  
**Weight:** 13.6 oz (385 g).  
**Agency Approvals:** CE (not while charging), FCC compliant.

## MODEL CHART

Model	Description
VP2	Wireless 100 mm vane thermo-anemometer probe for use with the Model UHH handheld meter and the Mobile Meter® Software Test Instrument Mobile App

## DIFFERENTIAL PRESSURE MODULES

Wireless, Measures Differential Pressure, Air Velocity, &amp; Flow



**SERIES WDPM** Wireless Differential Pressure Modules for use with the Model UHH handheld meter and the Mobile Meter® Software Test Instrument Mobile App.

MODEL CHART		
Model	Range	Maximum Pressure
WDPM-002	±2 in w.c. (±500 Pa)	10 psi (68.9 kPa)
WDPM-005	±5 in w.c. (±1250 Pa)	10 psi (68.9 kPa)
WDPM-010	±10 in w.c. (±2.5 kPa)	10 psi (68.9 kPa)
WDPM-020	±20 in w.c. (±5 kPa)	20 psi (137.9 kPa)
WDPM-030	±30 in w.c. (±7.5 kPa)	20 psi (137.9 kPa)
WDPM-100	±100 in w.c. (±25 kPa)	15 psi (103.4 kPa)
WDPM-200	±200 in w.c. (±50 kPa)	45 psi (310.3 kPa)
WDPM-350	±350 in w.c. (±87 kPa)	45 psi (310.3 kPa)

ACCESSORIES	
Model	Description
A-WDPM-BRK	Differential pressure mounting bracket

## SPECIFICATIONS

**Service:** Non-corrosive dry gases.

**Wetted Materials:** Consult factory.

**Accuracy:** ±0.5% FS span @ 25°C (includes non linearity, hysteresis, and non repeatability).

**Pressure Limits:** See Table 1.

**Engineering Units:** Pressure: in w.c., ft w.c., in Hg, psi, OzSI, mm w.c., cm w.c., mBar, Pa, hPa, and kPa; Velocity: fpm, mph, kn, m/s, m/h, k/h, and fps; Flow: cfm, gpm, gph, gpd, m³/s, m³/h, lps, lpm, and lph.

**Temperature Limits:** Compensated: 32 to 140°F (0 to 60°C); Process/ambient: 14 to 140°F (-10 to 60°C).

**Thermal Effects:** ±0.01% FS/°F (±0.02% FS/°C).

**Battery Charging Limits:** 32 to 113°F (0 to 45°C).

**Power Requirements:** 3.7 V YT562447 lithium ion battery, installed functionally, user replaceable.

**Wireless Distance:** At least 50' (15 m).

**Connections:** Two barbed connections for use with 1/8" (3.18 mm) or 3/16" (4.76 mm) ID tubing.

**Weight:** 2.5 oz (70.87 g).

**Agency Approvals:** CE with CE approved charger, FCC.

## SERIES UHH-ACC

## HANDHELD ACCESSORIES



UHH-C1  
Soft Carrying Case  
(19" x 6" x 3")



KF-CC-304  
Dual USB Charger



A-VPX-CKIT



UHH-C2  
Hard Carrying Case  
(24" x 18" x 9")



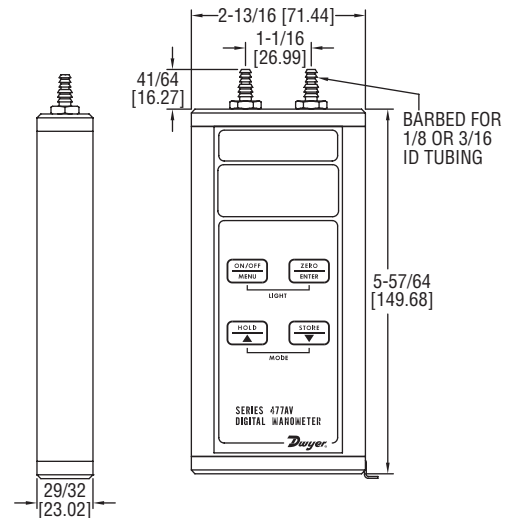
A-WDPM-BRK  
Differential Pressure  
Mounting Bracket

ACCESSORIES	
Model	Description
UHH-ICHRG	UHH dual USB charger with international adapters (1.0 A) (Not CE approved)
UHH-CBL	USB cable
UHH-CBL2	USB to micro-USB cable
UHH-C1	Soft carrying case
UHH-SD	2 GB SD card
KF-CC-304	Dual USB CHARGER with North American adapter (1.5 A)
UHH-C2	Heavy duty hard case with pre-cut foam inserts for additional sensors
A-VPX-CKIT	Vane hood kit
A-WDPM-BRK	Differential pressure mounting bracket



# HANDHELD DIGITAL MANOMETER

Measures Pressure, Flow and Velocity;  $\pm 0.5\%$  Accuracy



The **SERIES 477AV** Handheld Digital Manometer is now available with pressure, flow, and velocity measurements along with a number of other convenient features. The built-in air velocity and flow calculations provide accuracy and conserve time and error associated with manual calculations. Also featured on this unit are adjustable zero and span values for calibrating in the field, as well as a damping feature to compensate for the fluctuating of readings.

## FEATURES/BENEFITS

- Calculates and displays air velocity and volumetric air flow
- Rugged aluminum case protects instrument from damage during transport/use
- 9 selectable English and metric engineering units
- Large, easy to read display with backlight for use in dark areas
- Stores up to 40 readings with minimum, maximum and average statistics

## APPLICATIONS

- Air flow monitoring, when used with a Dwyer® Pitot tube (●)
- Duct static pressure

## SPECIFICATIONS

<b>Service:</b> Air and compatible gases.	<b>Units of Pressure:</b> in w.c., ft w.c., in Hg, psi, oz/in <sup>2</sup> , mm w.c., cm w.c., mm Hg, mbar, Pa, kPa, hPa.
<b>Wetted Materials:</b> Consult factory.	<b>Units of Velocity:</b> fpm, fps, mph, m/h, m/s, k/h, knot.
<b>Accuracy:</b> $\pm 0.5\%$ FS, 60 to 78°F (15.6 to 25.6°C); $\pm 1.5\%$ FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40.0°C).	<b>Units of Flow:</b> cfm, m <sup>3</sup> /h, m <sup>3</sup> /s.
<b>Pressure Hysteresis:</b> $\pm 0.1\%$ FS.	<b>Power Requirements:</b> 9 V alkaline battery, installed non-functional, user replaceable.
<b>Pressure Limits:</b> See chart.	<b>Weight:</b> 10.2 oz (289 g).
<b>Temperature Limits:</b> 0 to 140°F (-17.8 to 60°C).	<b>Process Connections:</b> Two barbed connections for use with 1/8" (3.18 mm) or 3/16" (4.76 mm) ID tubing. Two compression fittings for use with 1/8" (3.18 mm) ID x 1/4" (6.35 mm) OD tubing for 477AV-7 and 477AV-8 only.
<b>Compensated Temperature Limits:</b> 32 to 104°F (0 to 40°C).	<b>Agency Approvals:</b> CE.
<b>Storage Temperature Limits:</b> -4 to 176°F (-20 to 80°C).	
<b>Display:</b> 0.42" (10.6 mm) 4 digit LCD.	
<b>Resolution:</b> See chart.	

## MODEL CHART

Model	Pressure Range	Velocity Range		Available Pressure Units										Maximum Pressure
		fpm	m/s	psi	in Hg	kPa	in w.c.	mm Hg	mbar	mm w.c.	Pa	ft w.c.	oz/in <sup>2</sup>	
477AV-000	0 to 1.000 in w.c.	4004	20.34	-	0.0736	0.2491	1.000	1.868	2.491	25.40	249.1	0.0833	0.5780	5 psig
477AV-00	0 to 4.000 in w.c.	8009	40.69	0.1445	0.2942	0.996	4.000	7.473	9.96	101.6	996	0.3333	2.312	5 psig
477AV-0	0 to 10.00 in w.c.	1.266k	64.33	0.3613	0.7355	2.491	10.00	18.68	24.91	254.0	2491	0.8333	5.780	5 psig
477AV-1	0 to 20.00 in w.c.	1.791k	90.97	0.7225	1.471	4.982	20.00	37.36	49.82	508.0	4982	1.667	11.56	10 psig
477AV-2	0 to 40.00 in w.c.	1.791k	128.7	1.445	2.942	9.96	40.00	74.73	99.6	1016	9964	3.333	23.12	10 psig
477AV-3	0 to 200.0 in w.c.	56.63k	287.7	7.225	14.71	49.82	200.0	373.6	498.2	5080	-	16.67	115.6	30 psig
477AV-4	0 to 10.00 psi	66.62k	338.4	10.00	20.36	68.95	276.8	517.1	689.5	7031	-	13.07	160.0	30 psig
477AV-5	0 to 20.00 psi	94.22k	478.6	20.00	40.72	137.9	553.6	1034	1379	-	-	46.13	320.0	60 psig
477AV-6	0 to 30.00 psi	115.4k	586.2	30.00	61.08	206.9	830.4	1551	2069	-	-	69.20	480.0	60 psig
477AV-7	0 to 100.0 psi	210.7k	1070	100.0	203.6	689.5	2768	5171	6895	-	-	230.7	1600	150 psig
477AV-8	0 to 150.0 psi	258.0k	1311	150.0	305.4	1034	4152	7757	-	-	-	346.0	2400	200 psig

OPTION	
To order add suffix:	Description
-NIST	NIST traceable calibration certificate
Example: 477AV-1-NIST	

ACCESSORIES	
Model	Description
A-402A	Carrying case; tough gray nylon pouch protects any Series 477AV Manometer; double zippered for quick and easy access, with a belt loop that snaps closed; 7-1/2"H x 3"W x 2-1/4"D (191 x 76 x 57 mm)
UHH-C1	Soft carrying case
A-47X-BOOT	Protective magnetic rubber boot



A-402A



UHH-C1



A-47X-BOOT  
(Manometer not included)

● Pitot tube: See pages 213-242 (Air Quality section)





## SERIES 475-AV & 477-AV KITS

# AIR VELOCITY KITS

Digital Manometer and Pitot Tube for Balancing System Air Flows



475-XX-FM-AV



475-XXT-FM-AV



477-XXXT-AV

Convenient all-in-one **SERIES 475-AV & 477-AV KITS** that are small, light and easy to use. No set-up or leveling needed. An indispensable test kit for the plant engineer, and HVAC technician that must balance system air flows at start-up.

### THE SERIES 475-XX-FM-AV KIT INCLUDES:

- Series 475 digital manometer  
( $\pm 0.5\%$  FS accuracy and minor divisions to 0.01, large 1/2" LCD readout is easy to see in poorly lighted areas and has "low battery" warning)
- Model 166-6-CF, 6" SS pitot tube with integral compression fitting to hold it securely when taking readings
- Two no. A-303 static pressure tips with magnetic mounting
- Two 9' lengths 3/16" ID rubber tubing
- No. A-397 step drill for 3/16"-1/2" holes in 1/16" increments
- No. A-532 AV slide chart
- 9 V battery
- Fitted polyethylene case

### MODEL CHART - 475-XX-FM-AV

Model	Range
475-00-FM-AV	0-4.000 in w.c.
475-0-FM-AV	0-10.00 in w.c.
475-1-FM-AV	0-20.00 in w.c.
475-2-FM-AV	0-40.00 in w.c.

### THE SERIES 475-XXT-FM-AV KIT INCLUDES:

- Series 475 digital manometer  
( $\pm 0.5\%$  FS accuracy and minor divisions to 0.01, large 1/2" LCD readout is easy to see in poorly lighted areas and has "low battery" warning)
- Model 166T, 36" telescoping SS pitot tube, fully adjustable from 11.5" to 36" (29.2 to 91.4 cm)
- Two no. A-303 static pressure tips with magnetic mounting
- Two 4-1/2' L 3/16" ID rubber tubing
- No. A-397 step drill for 3/16"-1/2" holes in 1/16" increments
- No. A-532 AV slide chart
- 9 V alkaline battery
- Fitted polyethylene case

### MODEL CHART - 475-XXT-FM-AV

Model	Range
475-00T-FM-AV	0-4.000 in w.c.
475-0T-FM-AV	0-10.00 in w.c.
475-1T-FM-AV	0-20.00 in w.c.

### THE SERIES 477-XXXT-AV KIT INCLUDES:

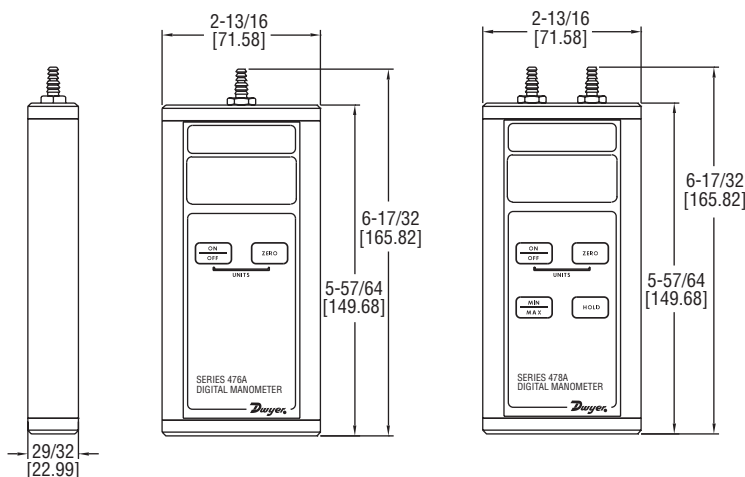
- Series 477AV digital manometer  
( $\pm 0.5\%$  FS accuracy, calculates air velocity or volumetric air flow, stores up to 40 readings in memory, instantly selecting up to nine English/Metric pressure units, large, backlit 0.4" LCD readout, both audible and visual overpressure alarms and a "low battery" warning are standard features)
- Model 166T, 36" telescoping SS pitot tube, fully adjustable from 11.5" to 36" (29.2 to 91.4 cm)
- Two no. A-303 static pressure tips with magnetic mounting
- Two 4-1/2' L 3/16" ID rubber tubing
- No. A-397 step drill for 3/16"-1/2" holes in 1/16" increments
- No. A-532 AV slide chart
- 9 V alkaline battery
- Fitted polyethylene case

### MODEL CHART - 477AV-XXXT-AV

Model	Range
477-000T-AV	0-1.000 in w.c.
477-00T-AV	0-4.000 in w.c.
477-0T-AV	0-10.00 in w.c.
477-1T-AV	0-20.00 in w.c.

# SINGLE PRESSURE DIFFERENTIAL PRESSURE DIGITAL MANOMETERS

Electronic Zeroing,  $\pm 1.5\%$  Accuracy



The **SERIES 476A** Single Pressure Digital Manometer can be used to measure low pressures from -20 to 20 in w.c. with  $\pm 1.5\%$  FS accuracy. The **SERIES 478A** Differential Pressure Digital Manometer can be used to measure positive, negative, or differential pressures. Both units are constructed of an extruded aluminum case for exceptional durability.

## FEATURES/BENEFITS

- $\pm 1.5\%$  FS accuracy
- Rugged extruded aluminum housing
- One button auto-zero function
- Auto power off function to conserve battery life
- Instant selection of up to nine English/metric units

## APPLICATIONS

- Verify field instrumentation performance
- Adjust fuel mixture on combustion systems

## SPECIFICATIONS

**Service:** Air and compatible gases.  
**Wetted Materials:** Consult factory.  
**Accuracy:**  $\pm 1.5\%$  FS at 72°F (22.2°C). Includes linearity and repeatability.  
**Pressure Hysteresis:**  $\pm 0.1\%$  FS.  
**Pressure Limits:** 5 psig (.74 bar).  
**Temperature Limits:** 0 to 140°F (-17.8 to 60°C).  
**Compensated Temperature Limits:** 32 to 104°F (0 to 40°C).  
**Thermal Effect:** 0.05% FS/°F.  
**Display:** 4 digit LCD (.425"H x .234"W digits).  
**Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.  
**Process Connections:** For use with 3/16" or 1/4" ID tubing.  
**Weight:** 10.8 oz (306 g).  
**Agency Approvals:** CE.

## MODEL CHART

Model	Range in w.c.	Available Pressure Units								Resolution in w.c.	Maximum Pressure	
		bar	psi	in Hg	kPa	in w.c.	mm Hg	mbar	mm w.c.			Pa
476A-0	-20.0 to 20.0	.0498	0.723	1.471	4.98	20.00	37.4	49.8	508	-	0.02	5 psig
478A-0	-4.00 to 4.00	-	.1445	.294	0.996	4.00	7.47	9.96	101.6	996	0.01	5 psig
478A-1	-60.0 to 60.0	.1495	2.168	4.41	14.95	60.0	112.1	149.5	1524	-	0.1	5 psig

## OPTION

To order add suffix:	Description
-NIST	NIST traceable calibration certificate
Example: 478A-1-NIST	

## ACCESSORIES

Model	Description
A-402A	Carrying case, tough gray nylon pouch protects any Series 476A/478A manometer, double zippered for quick and easy access, belt loop that snaps closed, 7-1/2"H x 3"W x 2-1/4"D (191 x 76 x 57 mm)
UHH-C1	Soft carrying case
A-47X-BOOT	Protective magnetic rubber boot



A-402A



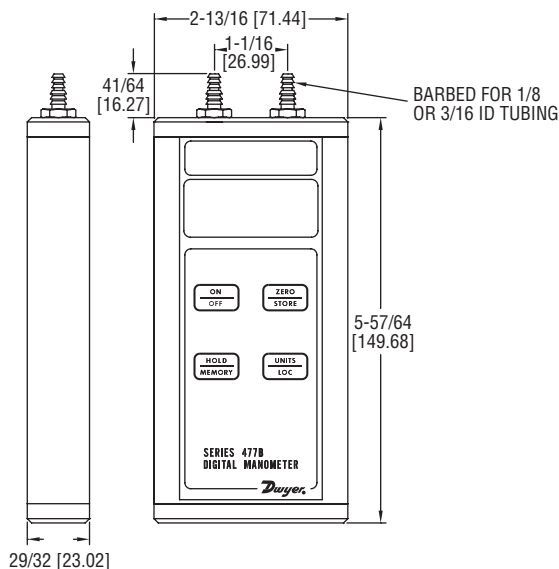
UHH-C1



A-47X-BOOT  
(Manometer not included)

# HANDHELD DIGITAL MANOMETER

### Precise Air Pressure Measurement, $\pm 0.1\%$ Accuracy



The **SERIES 477B** Handheld Digital Manometers are versatile, hand-held, battery operated manometers available in several basic ranges from 0-20 in w.c. up to 100 psi. All models measure either positive, negative or differential pressures with  $\pm 0.10\%$  of full scale accuracy. You can select from up to seven common English and metric pressure units so conversions are not necessary. A memory function allows storage of up to 40 readings for later recall and a backlight provides auxiliary lighting for hard-to-see locations. Also standard are a hold feature plus both visual and audible overpressure alarms.

## FEATURES/BENEFITS

- Precise 0.1% FS accuracy provides four times better accuracy than most standard manometer/gages
- Aluminum housing protects instrument against damage
- 40 readings in internal memory reduces time to record data

## APPLICATIONS

- Lab calibration of other pressure instruments
- Air velocity/air flow measurements in commercial buildings

## SPECIFICATIONS

**Service:** Air and compatible gases.

**Wetted Parts:** Consult factory.

**Accuracy:**  $\pm 0.10\%$  FS from 60 to 78°F (15.6 to 25.6°C);  $\pm 1\%$  FS from 32 to 60 and 78 to 104°F (0 to 15.6 and 25.6 to 40°C).

**Pressure Hysteresis:**  $\pm 0.1\%$  FS.

**Pressure Limits:** See chart.

**Temperature Limits:** 0 to 140°F (-17.8 to 60°C).

**Storage Temperature Limits:** -4 to 176°F (-20 to 80°C).

**Display:** 4-digit LCD (.425" H x .234" W digits).

**Resolution:** See chart.

**Power Requirements:** 9 volt alkaline battery. Battery included but not connected.

**Connections:** Two barbed connections for use with 1/8" (3.18 mm) or 3/16" (4.76 mm) I.D. tubing for 477B-1, 477B-2, 477B-3, 477B-4 and 477B-5 only. Two compression fittings for use with 1/8" (3.18 mm) I.D. x 1/4" (6.35 mm) O.D. tubing for 477B-6 and 477B-7 only.

**Weight:** 10.2 oz. (289 g).

**Agency Approvals:** CE.

## MODEL CHART

		Available Pressure Units									Maximum Pressure	
Model	Range	bar	psi	in Hg	kPa	in w.c.	mm Hg	mbar	ft w.c.	mm w.c.	Pa	
477B-1	0 to 20.00 in w.c.	.0498	7.225	1.471	4.982	20.00	37.36	49.82	1.667	508.0	4982	3 psig
477B-2	0 to 40.00 in w.c.	.0996	1.445	2.942	9.96	40.00	74.73	99.6	3.333	1016	9964	3 psig
477B-3	0 to 200.0 in w.c.	.4982	7.225	14.71	49.82	200.0	373.6	498.2	16.67	5080	-	15 psig
477B-4	0 to 10.00 psi	.6895	10.00	20.36	68.95	276.8	517.1	689.5	23.07	7031	-	30 psig
477B-5	0 to 30.00 psi	2.069	30.00	61.08	206.9	830.4	1551	2069	69.20	-	-	60 psig
477B-6	0 to 50.00 psi	3.447	50.00	101.8	344.7	1384	2585	3447	115.3	-	-	100 psig
477B-7	0 to 100.00 psi	6.895	100.0	203.6	689.5	2768	5171	6895	230.7	-	-	200 psig

## OPTION

<b>To order add suffix:</b>	<b>Description</b>
<b>-NIST</b>	NIST traceable calibration certificate
<b>Example:</b> 477B-1-NIST	

## ACCESSORIES

Model	Description
A-402A	Carrying case; tough gray nylon pouch protects any Series 477B Manometer; double zippered for quick and easy access, with a belt loop that snaps closed; 7-1/2"H x 3"W x 2-1/4"D (191 x 76 x 57 mm)
UHH-C1	Soft carrying case
A-47X-BOOT	Protective magnetic rubber boot



A-402A



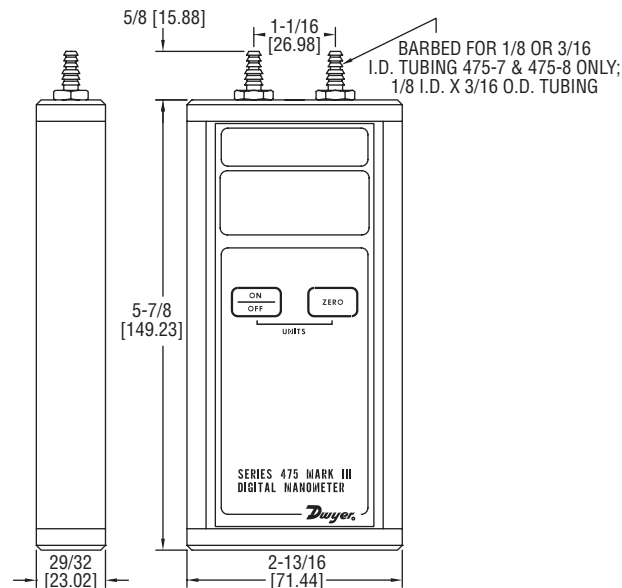
UHH-C1



**A-47X-BOOT**  
(Manometer not included)

# INTRINSICALLY SAFE HANDHELD DIGITAL MANOMETER

Ranges from 1 in w.c. to 150 psid,  $\pm 0.5\%$  Accuracy



The **SERIES 475** Handheld Digital Manometer measures positive, negative, or differential pressures of air and natural gases in ranges from 1 in w.c. (0.249 kPa) to 150 psid (10.34 bar). The dual push pads on the front panel control the on/off, auto zero, and pressure unit selection, allowing for simple operation with no set up needed. When used with a Dwyer® Pitot tube (●), the Series 475 can also be used as an air velocity gage.

## FEATURES/BENEFITS

- Rugged aluminum case protects instrument from damage during transport/use
- Large, easy to read LCD and simple operation
- FM approved to be intrinsically safe in hazardous locations, Class 1, Div 2, Groups A, B, C, D, T4 Ta = 70°C

## APPLICATIONS

- Monitoring natural gas pressures on boilers and other combustion equipment
- Air velocity monitoring, when used with a Dwyer® Pitot tube (●) and AV calculator
- Field calibration of other instruments
- Monitoring or troubleshooting HVAC systems

## SPECIFICATIONS

**Service:** Air and compatible combustible gases.  
**Wetted Materials:** Consult factory.  
**Accuracy:**  $\pm 0.5\%$  FS, 60 to 78°F (15.6 to 25.6°C);  $\pm 1.5\%$  FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40°C).  
**Pressure Hysteresis:**  $\pm 0.1\%$  FS.  
**Pressure Limits:** See chart.  
**Temperature Limits:** 0 to 140°F (-17.8 to 60°C).  
**Compensated Temperature Limits:** 32 to 104°F (0 to 40°C).  
**Storage Temperature Limits:** -4 to 176°F (-20 to 80°C).  
**Display:** 0.42" (10.6 mm) 4 digit LCD.  
**Resolution:** See chart.  
**Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.  
**Weight:** 10.8 oz (306 g).  
**Process Connections:** Two barbed connections for use with 1/8" (3.18 mm) or 3/16" (4.76 mm) ID tubing. Two compression fittings for use with 1/8" (3.18 mm) ID x 1/4" (6.35 mm) OD tubing for 475-7 & 475-8 only.  
**Agency Approvals:** CE, FM approved to Class I, Div 2, Groups A, B, C, D, T4 Ta = 70°C.

MODEL CHART			
Model	English Range	Metric Range	Maximum Pressure
475-000-FM	0 to 1.000 in w.c.	.2491 kPa	5 psig
475-00-FM	0 to 4.000 in w.c.	0.996 kPa	5 psig
475-0-FM	0 to 10.00 in w.c.	2.491 kPa	5 psig
475-1-FM	0 to 20.00 in w.c.	4.982 kPa	10 psig
475-2-FM	0 to 40.00 in w.c.	9.96 kPa	10 psig
475-3-FM	0 to 200.0 in w.c.	49.82 kPa	30 psig
475-4-FM	0 to 10.00 psi	.6895 bar	30 psig
475-5-FM	0 to 20.00 psi	1.379 bar	60 psig
475-6-FM	0 to 30.00 psi	2.069 bar	60 psig
475-7-FM	0 to 100.0 psi	6.895 bar	150 psig
475-8-FM	0 to 150.0 psi	10.34 bar	200 psig

ACCESSORIES	
Model	Description
A-402A	Carrying case, tough gray nylon pouch protects any Series 475 manometer, double zippered for quick and easy access, belt loop that snaps closed, 7-1/2"H x 3"W x 2-1/4"D (191 x 76 x 57 mm)
UHH-C1	Soft carrying case
A-47X-BOOT	Protective magnetic rubber boot

OPTIONS	
To order add suffix:	Description
-AV	Air velocity kit, includes the Series 475 manometer, two A-303 static pressure tips two 9' lengths 3/16" ID rubber tubing, no. 166-6-CF pitot tube, A-397 step drill, A-532 air velocity slide chart and instruction bulletin H-11, all packed in a tough, molded plastic carrying case with die cut foam liner.
<b>Examples:</b> 475-1-AV; 475-000-AV	
-NIST	NIST traceable calibration certificate
<b>Example:</b> 475-1-NIST	



A-402A



UHH-C1



-AV Option  
475-AV Air Velocity Kit

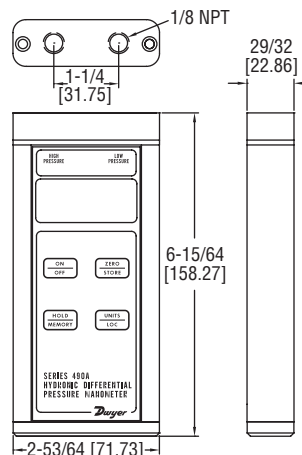


A-47X-BOOT  
(Manometer not included)

● Pitot tube: See pages 213-242 (Air Quality section)  
 Process Tubing Options: See page 489 (Gage Tubing Accessories)

# HYDRONIC DIFFERENTIAL PRESSURE MANOMETER

Liquid & Gas Pressure Measurement,  $\pm 0.5\%$  FS Accuracy



The **SERIES 490A** Hydronic Differential Pressure Manometers are versatile, hand-held, battery operated manometers available in several basic ranges for positive or positive differential pressure measurement and can tolerate most liquid media compatible with 316LSS.

A new feature added to the Series 490A is a field adjustable damping, which allows the user to choose the level of display averaging rate corresponding to the fluctuation level common in many applications.

## FEATURES/BENEFITS

- Up to 0.5% accuracy
- Seven user-selectable English and metric units
- Stores up to 40 readings for later recall
- Backlight for use in dim areas

## APPLICATIONS

- Chiller to coils for freeze protection
- HEPA filters to determine when a filter needs to be changed
- Measure pressure drop across pumps
- Valves to determine valve position

## MODEL CHART

Model	Range psi	Available Pressure Units								Maximum Pressure
		bar	psi	in Hg	kPa	in w.c.	mm Hg	mbar	ft w.c.	
490A-1	0 to 15.00	1.034	15.00	30.54	103.4	415.2	775.7	1034	34.60	30 psig
490A-2	0 to 30.00	2.069	30.00	61.08	206.9	830.4	1551	2069	69.20	60 psig
490A-3	0 to 50.00	3.447	50.00	101.8	344.7	1384	2585	3447	115.3	100 psig
490A-4	0 to 100.0	6.895	100.0	203.6	689.5	2768	5171	6895	230.7	200 psig
490A-5	0 to 500.0	34.47	500.0	1018	3447	-	-	-	1153	1000 psig
490A-6	0 to 200.0	13.79	200.0	407.2	1379	5536	-	-	461.3	400 psig

## SPECIFICATIONS

**Service:** Compatible gases & liquids.  
**Wetted Materials:** Without valve: 316L SS; Additional wetted parts with 3-way valve option: Buna-N, silicone grease, PTFE, brass 360, copper, reinforced acetal copolymer.  
**Accuracy:**  $\pm 0.5\%$  FS, 60 to 78°F (15.6 to 25.6°C);  $\pm 1.5\%$  FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40°C).  
**Pressure Hysteresis:**  $\pm 0.1\%$  FS.  
**Pressure Limits:** See chart.

**Temperature Limits:** 32 to 140°F (0 to 60°C).  
**Storage Temperature Limits:** -4 to 176°F (-20 to 80°C).  
**Display:** 0.42" (10.6 mm) 4 digit LCD.  
**Resolution:** See chart.  
**Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.  
**Weight:** 14.1 oz (400 g).  
**Process Connections:** Two 1/8" (3.18 mm) female NPT.  
**Agency Approvals:** CE.

OPTION	
To order add suffix:	Description
-NIST	NIST traceable calibration certificate
Example: 490A-1-NIST	
-3V	3-way vent valve with bleed screw rated up to 100 psi
Example: 490A-1-3V	



-3V Option  
3-Way Vent Valve

ACCESSORY	
Model	Description
A-402A	Carrying case, tough gray nylon pouch protects any Series 490A manometer, double zippered for quick and easy access, belt loop that snaps closed, 7-1/2"H x 3"W x 2-1/4"D (191 x 76 x 57 mm)
A-47X-BOOT	Protective magnetic rubber boot



A-402A

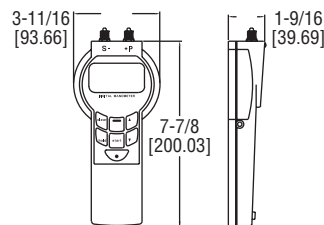


A-47X-BOOT  
(Manometer not included)



# PRECISION DIGITAL PRESSURE MANOMETER

Up to 0.05% Accuracy, Graphical Display, Data Logging Capability



The **SERIES HM35** Precision Digital Pressure Manometer is designed to reliably measure and log absolute pressure, differential pressure, or gage pressure with up to 0.05% accuracy. The data logging function can store up to 10,742 readings and transmit the readings to a PC through an IR serial port. The large display can graphically display trends in the data as well as peaks and valleys.

## FEATURES/BENEFITS

- Able to record up to 10,742 readings, which can be downloaded to a PC
- Up to 0.05% accuracy for use in critical applications
- Measure absolute, differential, or gage pressure

## APPLICATIONS

- Calibration facilities
- Laboratories

## MODEL CHART - ERROR LIMIT 0.2% FS FOR GAGE, VACUUM, AND DIFFERENTIAL PRESSURE

Model	Range	Over Pressure
HM3531DLB300	0 to 10 in w.c. (0-2.5 kPa)	50 in w.c.
HM3531DLC300	0 to 28 in w.c. (0-7 kPa)	140 in w.c.
HM3531DLE300	0 to 80 in w.c. (0-20 kPa)	600 in w.c.
HM3531DLF300	0 to 120 in w.c. (0-30 kPa)	600 in w.c.
HM3531DLG300	0 to 200 in w.c. (0-50 kPa)	58 psi
HM3531DLH300	0 to 14.5 psi (0-100 kPa)	58 psi

**Note:** For higher accuracy models, change the 10th digit from a 3 to a 1 (0.05% FS), 2 (0.1% FS), or 6 (0.1% of reading); higher accuracies are only available on 0 to 28 in of w.c. range or higher.

**Example:** HM3531DLC100 (0 to 28 in w.c. with 0.05% accuracy); consult factory.

## SPECIFICATIONS

**Service:** Air and compatible gases.  
**Wetted Materials:** 18/8 stainless steel.  
**Accuracy:** (Includes linearity, hysteresis, and repeatability): Depending on model;  $\pm 0.20\%$  FS  $\pm 1$  digit;  $\pm 0.10\%$  FS  $\pm 1$  digit;  $\pm 0.05\%$  FS  $\pm 1$  digit.  
**Temperature Limits:** 32 to 122°F (0 to 50°C).  
**Storage Temperature:** -4 to 140°F (-20 to 60°C).  
**Humidity:** Maximum 95% RH non-condensing.  
**Display:** Graphical back lit LCD. 128 x 64 points.  
**Power Requirements:** (3) 1.5 V AA alkaline batteries, installed functional, user replaceable. Can operate on 6 to 9 VDC external power.  
**Current Consumption:** 25 mA without back lit display, IR, or buzzer.  
**Memory:** 10,742 readings. Recording intervals adjustable from 1 s to 24 hrs or manual.  
**Case Protection:** IP54 (NEMA 3).  
**Weight:** 10.5 oz (300 g).  
**Process Connections:** Hose 4/6 mm or 1/8" NPT.  
**Agency Approvals:** CE.

## ACCESSORIES

Model	Description
HM28-0	1/8" NPT adapter (1 piece)
HM35-1	Communication software
HM35-2	Infrared RS-232 serial adapter, required to download stored data to a PC
HM35-3	External power converter with U.S. plug adapter, input 100 to 240 VAC, 50/60 Hz

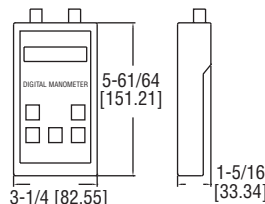
## OPTION

Use order code:	Description
NISTCAL-MD	NIST traceable calibration certificate

## SERIES HM28

# PRECISION HANDHELD DIGITAL MANOMETER

High Accuracy (0.2%, 0.1% or 0.05%), Differential, Gage or Absolute



The **SERIES HM28** Precision Handheld Digital Manometer is designed to measure a wide range of pressures with up to 0.05% accuracy. The data logging function can store up to 964 readings and transmit the readings to a PC through an IR serial report. The dual line LCD is able to display a resolution to 0.001 of the selected unit and indicate peaks and valleys.

## FEATURES/BENEFITS

- Measures differential, gage, or absolute pressure
- Able to record up to 964 readings, which can be downloaded to a PC
- Up to 0.05% accuracy

## APPLICATIONS

- Calibration facilities
- Laboratories

## MODEL CHART

Model	Features
<b>Error limit 0.2% FS for gage, underpressure and differential pressure</b>	
HM28D3B10000	0 to 10 in w.c. (2.5 kPa)
HM28D3C10000	0 to 28 in w.c. (7 kPa)
HM28D3F10000	0 to 120 in w.c. (30 kPa)
<b>Error limit 0.05% FS for gage, underpressure and differential pressure</b>	
HM28D3C30000	0 to 28 in w.c. (7 kPa)
HM28D3F30000	0 to 120 in w.c. (30 kPa)
HM28D3K30000	0 to 100 psi (700 kPa)
<b>For absolute pressure</b>	
HM28A310000	0 to 15.9 psia (0.2% FS (110 kPa abs))
<b>Note:</b> Consult factory for 0.10% models.	

## SPECIFICATIONS

**Service:** Air and compatible gases.  
**Accuracy:** (Includes linearity, hysteresis, and repeatability): per order code.  $\pm 0.20\%$  FS  $\pm 1$  digit;  $\pm 0.10\%$  FS  $\pm 1$  digit;  $\pm 0.05\%$  FS  $\pm 1$  digit.  
**Wetted Materials:** 18/8 stainless steel.  
**Temperature Limits:** 23 to 122°F (-5 to 50°C).  
**Storage Temperature:** -4 to 140°F (-20 to 60°C).  
**Humidity:** 30 to 95% rH, non-condensing.  
**Display:** 2 line, 16 character, dot matrix LCD, with switchable display sizes.  
**Power Requirements:** 9 V alkaline battery, installed functional, user replaceable. Can operate from external power supply of 7 to 14 VDC.  
**Current Consumption:** < 9 mA.  
**Memory:** 964 measured values. Recording intervals adjustable from manual, 1, 5, 10, 20, 30 seconds, 1, 2, 3, 5, 10, 30, 60 minutes.  
**Case Protection:** IP54 (NEMA 3).  
**Case Dimensions:** 6" x 3.27" x 1.34" (152 x 83 x 34 mm).  
**Weight:** 9.5 oz (270 g).  
**Process Connections:** Hose; 4/6 mm or 1/8" NPT.  
**Maximum Measurement Rates:** Stand alone: 2-1/2 readings/s (0.1% and 0.05% ratings), 5 readings/s (0.2% rating). Output to RS-232: 20 measurements/s (0.2% rating), 10 measurements/s (0.1% and 0.05% ratings).  
**RS-232 Baud Rate:** Adjustable, 1200, 2400, 4800, or 9600 baud.  
**Agency Approvals:** CE.

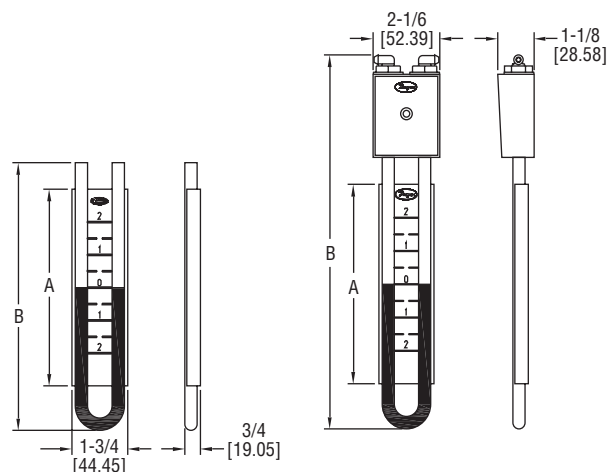
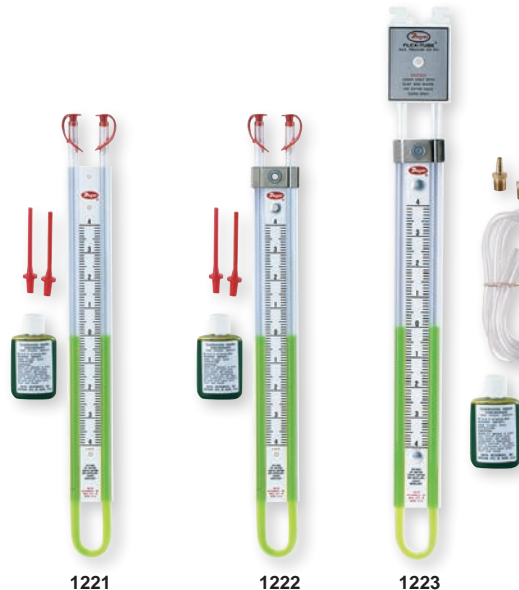
## ACCESSORIES

Model	Description
HM28-0	1/8" NPT adapter (1 piece)
HM28-1	Communication software and cable
HM28-2	Universal power adapter

## OPTION

Use order code:	Description
NISTCAL-MD	NIST traceable calibration certificate

## FLEX-TUBE® U-TUBE MANOMETERS



Range		Hg Required to Fill		1221, 2 & 3 Scale Length "A"		1221 & 2 O.A. Length "B"		1223 O.A. Length "B"	
Inches H <sub>2</sub> O	Millimeters H <sub>2</sub> O	Grams	Ounces	W/M	D	W/M	D	W/M	D
8 (4-0-4)	M200 (100-0-100)	178.5	6.3	12-1/4	14	15-1/4	17	18-1/2	19-7/8
12 (6-0-6)	M300 (150-0-150)	225.5	7.9	16-1/4	18-7/8	19-1/4	21-3/4	21-1/8	24-5/8
16 (8-0-8)	M400 (200-0-200)	269	9.5	20-3/8	23-5/8	23-1/4	26-1/2	26-1/8	30-3/8
20 (10-0-10)	-	314.5	11.1	24-1/4	28-1/2	27-1/4	31-1/2	30-1/8	34-3/8
-	M600 (300-0-300)	353.1	12.4	27-7/8	32-7/8	30-3/4	35-3/4	33-5/8	38-5/8
24 (12-0-12)	-	379.7	13.4	28-1/4	33-3/8	31-1/2	36-1/4	33-3/8	39-1/8
36 (18-0-18)	-	491.1	17.3	40-1/4	47-7/8	43-1/4	50-3/4	46-1/8	53-5/8
-	M1000 (500-0-500)	526.6	18.5	43-5/8	52	46-1/2	55	49-3/8	57-7/8

**Note:** Not recommended for vacuum service above 5 in. Hg (68 in w.c.).

The **SERIES 1221/1222/1223** Flex-Tube® U-Tube Manometer combines the inherent accuracy of the "U" Tube with the durability of tough, long-lasting plastic construction. The columns are made of 0.375" O.D. flexible and shatterproof clear butyrate tubing and are backed by a white scale channel to provide maximum color contrast. These manometers are ideal wherever a portable, direct reading manometer is needed.

#### FEATURES/BENEFITS

- Suitable for total pressures up to 100 psi
- High contrast scale for better precision when measuring

#### APPLICATIONS

- Duct static pressure
- Calibration labs
- Filter monitoring

**SERIES 1221 MANOMETER**, Our simplest, lowest cost basic U-gage. A dependable U-tube manometer that withstands hard use and provides accurate, high visibility readings. For use with water, mercury or red gage fluid. For mercury filled manometers, a scale clamp bar, Dwyer® Part No. A-363 (available as an extra for Series 1221 — and standard on Series 1222) is recommended. One pair of carrying plugs and a pair of non-kink vinyl tube connectors are included with each manometer.

**SERIES 1222 MANOMETER**, All the features of the 1221 plus magnetic clips for mounting to any vertical steel surface, and clamp bar to insure against U-tube slipping. (Especially recommended for manometers used with mercury.) Both magnets are easily removed and replaced at the user's convenience.

**SERIES 1223 MANOMETER**, Our finest U-gage — for either portable or stationary use. Safety traps prevent loss of indicating fluid in case of accidental over-pressure. Tubing is permanently bonded to a molded, high impact acrylic plastic top that contains safety traps. Large magnetic clips and clamp bar are provided. Standard type "a" connections include two rapid shut-off type molded nylon tubing connections, two 3-foot lengths of flexible Tygon® plastic tubing, and two 1/8" pipe thread to tube adapters.

MODEL CHART			
Model	Model	Model	Ranges
1221-8-W/M	1222-8-W/M	1223-8-W/M	8 (4-0-4) in w.c.
1221-12-W/M	1222-12-W/M	1223-12-W/M	12 (6-0-6) in w.c.
1221-16-W/M	1222-16-W/M	1223-16-W/M	16 (8-0-8) in w.c.
1221-20-W/M	1222-20-W/M	1223-20-W/M	20 (10-0-10) in w.c.
1221-24-W/M	1222-24-W/M	1223-24-W/M	24 (12-0-12) in w.c.
1221-36-W/M	1222-36-W/M	1223-36-W/M	36 (18-0-18) in w.c.
1221-M200-W/M	1222-M200-W/M	1223-M200-W/M	M200 (100-0-100) mm w.c.
1221-M300-W/M	1222-M300-W/M	1223-M300-W/M	M300 (150-0-150) mm w.c.
1221-M400-W/M	1222-M400-W/M	1223-M400-W/M	M400 (200-0-200) mm w.c.
1221-M600-W/M	1222-M600-W/M	1223-M600-W/M	M600 (300-0-300) mm w.c.
1221-M1000-W/M	1222-M1000-W/M	1223-M1000-W/M	M1000 (500-0-500) mm w.c.

**Note:** To order models with red gage fluid change -W/M to -D.

#### ACCESSORIES - STANDARD

Model	Description
1221	2 plastic carrying plugs; 2 flexible plastic tubing connectors for attachment of 3/16" rubber or plastic tubing without kinking. 1 ounce bottle .826 sp. gr. red gage fluid furnished for "D" style manometers. Fluorescein green dye concentrate furnished with "W/M" style manometers.
1222	2 magnetic mounting clips; tube clamp; 2 plastic carrying plugs and 2 flexible plastic tubing connectors for attachment of 3/16" rubber or plastic tubing without kinking. 1 ounce bottle .826 sp. gr. red gage fluid furnished for "D" style manometers. Fluorescein green dye concentrate furnished with "W/M" style manometers.
1223	Magnetic mounting clips; tube clamp and Type "a" connections consisting of two rapid shut off molded nylon tubing connectors; two 1/8" pipe thread to tube adapters; two 3-foot lengths of Tygon® plastic tubing, 1 ounce bottle .826 sp. gr. red gage fluid is furnished for "D" style manometers; fluorescein green dye concentrate with "W/M" style.

#### OPTION

To order add suffix:	Description
-NIST	NIST traceable calibration certificate
<b>Example:</b> 1230-8-W/M-NIST	

Tygon® is a registered trademark of Saint-Gobain Performance Corporation

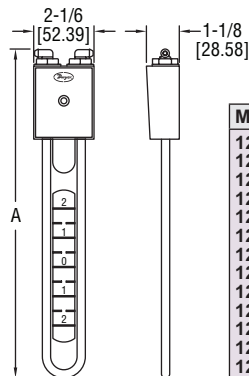
# SLACK TUBE® MANOMETERS



**Slack Tube® Manometer**  
rolled up for easy  
handling and storage



**1212**  
**Gas Pressure Kit**



Model	Dimension "A"
1211-8	16-3/4 [425.45]
1211-12	20-3/4 [527.05]
1211-16	24-3/4 [628.65]
1211-24	32-3/4 [831.85]
1211-30	38-3/4 [984.25]
1211-36	44-3/4 [1136.65]
1211-48	56-3/4 [1441.45]
1211-60	68-3/4 [1746.25]
1211-72	80-3/4 [2051.05]
1211-120	128-3/4 [3270.25]
1211-50	28-3/4 [730.25]
1211-100	48-3/4 [1238.25]
1211-200	87-3/4 [2228.85]

The **SERIES 1211** Slack Tube® Manometer is as accurate as the finest laboratory "U" gages, but is designed to roll up compactly for easy carrying. These manometers cover a wide range of pressure readings from 4-0-4 inches up to 60-0-60 inches.

The **MODEL 1212** Gas Pressure Kit in comes supplied with a 1211-16 Slack Tube® Manometer, carrying case, necessary tubing, and connection fittings for checking gas pressures in virtually all gas appliances.

## FEATURES/BENEFITS

- Rolls up for easy storage and transport
- Over pressure safety traps to prevent loss of fluid due to over range pressures or surges in pressure

## APPLICATIONS

- Filter monitoring
- Duct static pressure for setting damper position

MODEL CHART					
Model	Range, In.	Hg Req'd (oz.)	Metric Model	Range, CM	Hg Req'd (oz.)
1211-8	4 to 0 to 4	6	1211-50	25 to 0 to 25	11
1211-12	6 to 0 to 6	7	1211-100	50 to 0 to 50	18-1/2
1211-16	8 to 0 to 8	9	1211-200	100 to 0 to 100	35
1211-24	12 to 0 to 12	12-1/2			
1211-30	15 to 0 to 15	15			
1211-36	18 to 0 to 18	17-1/2			
1211-48	24 to 0 to 24	22-1/2			
1211-60	30 to 0 to 30	27			
1211-72	36 to 0 to 36	32			
1211-120	60 to 0 to 60	57			

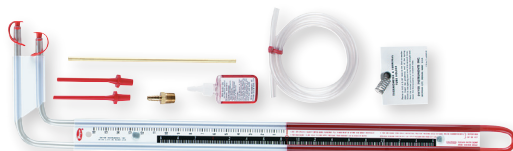
INCLUDED WITH THE 1212 KIT	
Description	
(1) #1211-16 Slack Tube® Manometer, reads pressure to 16" water*, (1) Carrying case, plastic, 8-1/2" x 7" x 3-1/8", (1) 1 oz. bottle Fluorescein green color concentrate with wetting agent, (2) 1/8" pipe thread rubber tubing adapters, (1) 1/8" to 1/4" pipe thread bushing, (1) 3' L 3/16" rubber tubing, (1) Rubber tubing adapter to fit standard 7/16" dia. spud.	
*Other ranges available.	

MODEL CHART	
Model	Description
1212	Gas pressure kit

ACCESSORIES - STANDARD	
Description	
Plastic case, magnetic mounting clips, two rapid shutoff type molded nylon rubber tubing connectors and one bottle of fluorescein green color concentrate with wetting agent.	

## SERIES 1227

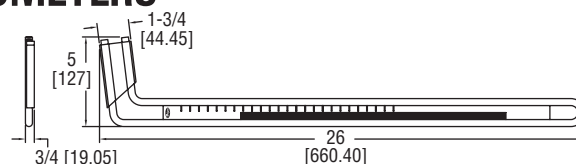
# DUAL RANGE FLEX-TUBE® U-INCLINED MANOMETERS



**1227 Dual Range**



**1227**  
**Mounted in Incline Position**



As Vertical U-Tube Manometer	As Inclined Manometer
0-16" water with 1" major divisions, .2" minor divisions	Scale is 17" long, reading .20-0-2.6" water with .02" minor divisions
Model 1227M (metric) is 0-400 mm water column	Model 1227M (metric) is -5 to 0 to 70 mm water column

The **SERIES 1227** Dual Range Flex-Tube® U-Inclined Manometer is a versatile, low cost manometer that can be used to read high-range pressure on the right leg or as an inclined manometer to read low-range pressure on the bottom leg. It is made of a sturdy, clear plastic and offers direct readings as a U-tube or an inclined gage. Magnetic clips are attached to the unit to hold it in position on any steel duct surface and instructions are conveniently printed directly on the scale.

## FEATURES/BENEFITS

- Reads 0 to 16 in w.c. as a U-tube and -0.20 to 0 to 2.6 in w.c. as an inclined gage
- Clear, shatterproof indicating tube provides overpressure protection
- Black markings on a stark white scale for positive definition

## APPLICATIONS

- Fan status
- Filter monitoring

MODEL CHART	
Model	Description
1227	English units
1227M	Metric units

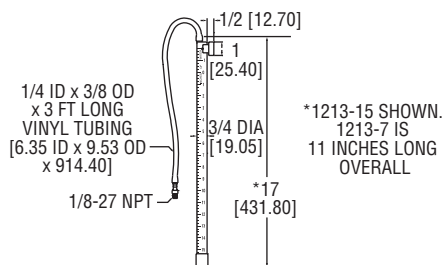
ACCESSORIES - STANDARD	
Description	
Two plastic carrying plugs with retainers for use when manometer is not in service. Two magnetic clips to hold instrument to metal surface. Flexible red vinyl plastic tubing connectors. Brass terminal tube 1/4" diameter x 8" long. One terminal tube holder. Brass adapter, 1/8" pipe thread to plastic tubing. One 4-1/2' length of Tygon® plastic tubing. One 1 ounce bottle .826 sp. gr. red gage fluid. Vinyl carrying case.	

**Dwyer**

SERIES 1213

# GAS PRESSURE MANOMETER

The "Tube in a Tube" Direct Reading Manometer



The **SERIES 1213** Gas Pressure Manometer provides visual indication of pressure of natural gas up to 15 in w.c. Tap water is used as the sensing media and a magnetic clip provides temporary or permanent mounting. The 1213 is made of a durable plastic for years of trouble-free service, and includes 3' of vinyl tubing and 1/8" nylon male NPT to barb fitting.

**FEATURES/BENEFITS**

- Used to monitor any compatible gas up to 15 in w.c.
- Durable plastic housing for long term use
- Economically priced

**APPLICATIONS**

- Combustion supply gas monitoring

**SPECIFICATIONS**

**Temperature Limit:** 140°F (60°C) maximum.

**Pressure Limits:** 15 in w.c. (381 mm).

**Piping Connections:** 1/8" male NPT connector provided.

**Wetted Materials:** Vinyl, PVC and nylon.

**Weight:** 5 oz (142 g).

**MODEL CHART**

Model	Length (mm)
1213-15	7" (177.8)

**SERIES MARK II**

## MOLDED PLASTIC AIR VELOCITY METERS

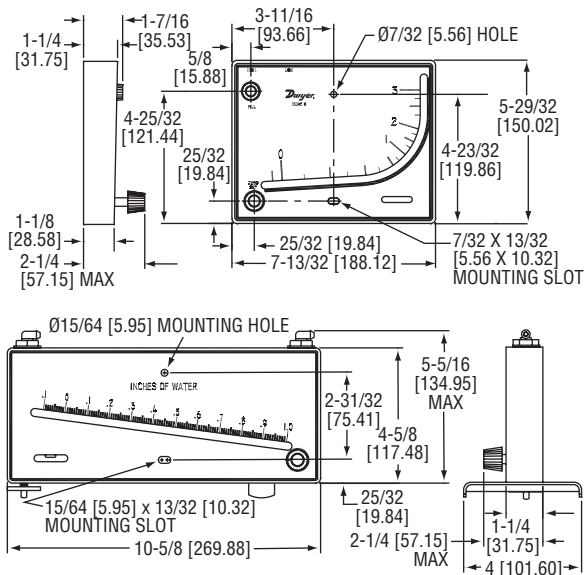
Low in Cost, Direct Reading Scales Offer 3% Accuracy, For Portable or Stationary Applications



27



**40-AV** – Shown with standard swing-out stand and leveling screw installed.



The **SERIES MARK II** Air Velocity Gage Kits offer the accuracy and durability of our Mark II manometers with direct air velocity readings. They are designed to be used with Dwyer's Series 160 line of Pitot tubes (not included).

**FEATURES/BENEFITS**

- Thick white styrene-acrylonitrile housing is virtually indestructible
- Moderate overpressures are accommodated by an overflow tank (Model 25) or float operated overflow traps (Model 40)
- Able to be mounted on any vertical surface

**APPLICATIONS**

- Measure air velocity in ducts

**MODEL CHART**

Model	Range
Mark II 27	0 to 7000 FPM
Mark II 28	0 to 10500 FPM
Mark II 40-250 Pa-AV	0 to 21 MPS

**Note:** Pitot tube not included with models above.

**ACCESSORY**

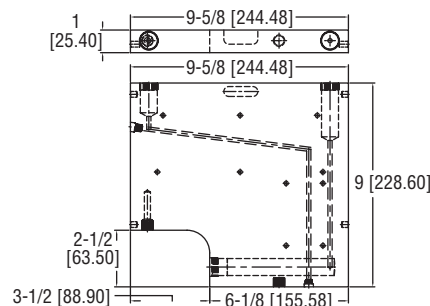
Model	Description
A-612	Portable stand (for models 27, 28)

**OEM SPECIALS**

All models of the Dwyer® Mark II molded plastic air velocity meters can be supplied with your logo or special scale in OEM quantities. Consult factory for details. See also our Digital Manometers and Pitot tubes.



# AIR VELOCITY METERS



The **SERIES 400** Air Velocity Meter offers the convenience of a dual purpose instrument with high accuracy and easy-to-read scales. It can be used to balance air conditioning systems, measure pressure drop across filters, and test fan and blower discharge and inlet pressures. Series 400 kits include a manometer, Pitot tube, necessary tubing and connectors, red gage fluid, and carrying case.

## FEATURES/BENEFITS

- Red figures display velocity in FPM and black figures display air pressure in inch w.c.
- No conversion tables needed for air at standard conditions
- Available with Pitot tubes and carrying case

## APPLICATIONS

- Air balancing
- Building commissioning

## MODEL CHART - WITH COMBINATION INCLINED/VERTICAL SCALES\*

Model	Range in w.c.	Velocity FPM	Minor Div.; Range in w.c. Inclined	Vertical	Pitot Tube
<b>400-10-Kit</b>	0 to 10	400 to 12600	.01, 0 to 1.0	.10, 1-10	18 in
<b>400-10-Gage</b>	0 to 10	400 to 12600	.01, 0 to 1.0	.10, 1-10	None

\*Rated for total pressures to 100 psig (6.89 bar); temperatures to 150°F (65°C)



## Complete Kit, Model 400-10

Size\*\*: 11-1/2"H x 20-1/4"W x 1-1/2"D

Weight: Only 13-1/4 lb with equipment

\*\*Contact factory for extra long steel cases for use with longer Pitot tubes

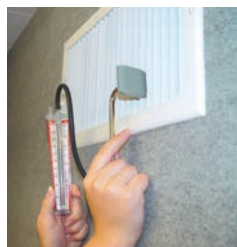
## MODEL 460

# AIR METER/DRAFT GAUGE

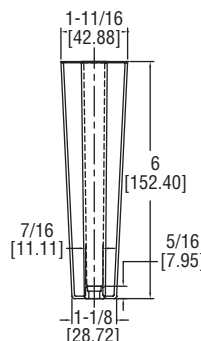
A Low-Cost, Direct Reading Instrument Used for Air Velocity & Static Pressure Tests



Furnace draft



Grille velocities



The **MODEL 460** Air Meter is popular for servicing HVAC equipment because of its consistent, accurate results. The direct reading velocity and static pressure scales show supply and return grille velocities, furnace draft, and pressure drop across filters. The 460 is made of a rugged plastic for daily use.

## FEATURES/BENEFITS

- High and low range velocity in one unit
- Simple and quick operation with highly accurate results
- Compact housing for easy portability

## APPLICATIONS

- Measuring grille velocities, furnace draft, and pressure drop across filters

## MODEL CHART

Model	Description
<b>460</b>	Air meter, complete kit



## A Complete Pocket-Size Kit

Includes air meter, return and supply grille probes, angle connector, cleaning materials, instruction card, air velocity calculator and carrying case.

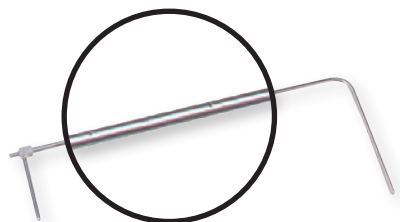
## ACCESSORIES

Model	Description
<b>A-378</b>	Tube of 3 replacement floats
<b>A-379</b>	Supply grille probe
<b>A-380</b>	Return grille probe
<b>A-381</b>	Cleaning kit including 1 anti-static chemically treated pipe stem cleaner and nylon high range orifice cleaner

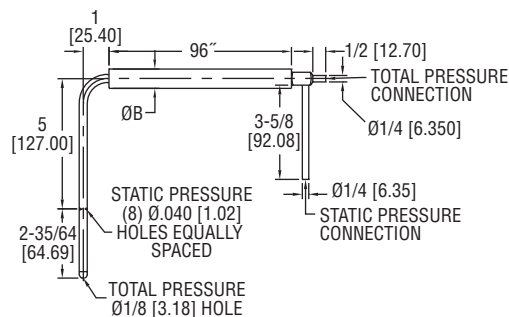


# STAINLESS STEEL PITOT TUBES

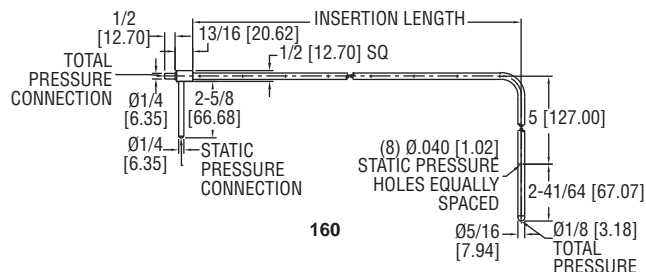
## ASME Design Meets AMCA and ASHRAE Codes



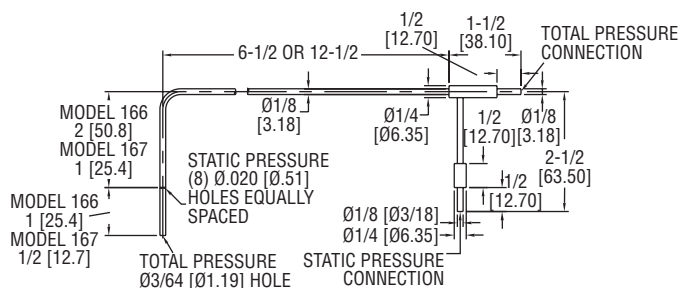
Standard Model 160 Pitot Tube



160  
96" and longer with stiffener



160



166/167

The **SERIES 160** Stainless Steel Pitot Tube is constructed from corrosion resistant stainless steel with permanently etched insertion depth graduations for a lifetime of service. The static pressure port is parallel to the sensing tube to allow quick, easy alignment of the tube with air flow. A universal model fits the user supplied 3/4" schedule 40 pipe in any length.

### FEATURES/BENEFITS

- Low sensitivity to misalignment up to 15 degrees
- No calibration needed due to ASHRAE tip design
- Silver soldered connections for leak-proof operation
- 5/16" models rated to 1500°F (815.5°C)

### APPLICATIONS

- Monitor or control air velocity or air flow when combined with differential pressure gage, switch, or transmitter



Download the Dwyer  
Air Velocity Calculator App for  
iOS® or Android® devices

### MODEL CHART

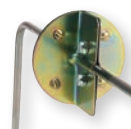
Standard 5/16" Diameter Model	Insertion Length	Longer Length with Stiffener Model	Insertion Length
160-8	8-5/8"	160-96	96"
160-12	12-5/8"		
160-18	18-5/8"	Pocket Size 1/8" Diameter Model	Insertion Length
160-24	24-5/8"		
160-36	36-5/8"	166-6	6"
160-48	48-5/8"	166-12	12"
160-60	60-5/8"	167-6	6"
		167-12	12"
Model	Description		
160-KIT	Kit containing 160-18, 160-24, 160-36, 160-48, and carrying case		

### OPTION

To order add suffix:	Description
-CF	1/8" male NPT compression fitting, mounting option for Series 166/167
Example: 166-6-CF	

### ACCESSORIES

Model	Description
A-156	Flange mounting plate 1/2" female NPT Split flange mounting. Can be added to any Dwyer® No. 160 standard pitot tube. Cadmium plated steel. Gasket is pattern for mounting holes. Secure flange loosely to tube, adjust tube depth and tighten screws. Gasket of 1/16" Neoprene fits tightly around tube and against duct for leak-proof seal. Nuts, washers included.
A-158	
A-159	
A-160-CASE	Mounting gland. Versatile adapter slips on any Series 160, 5/16" standard pitot tube made after Dec. 1990. Two-part stainless steel fitting slides over tube and provides permanent, secure mounting. Where duct interior is accessible, use the washers and jam nut supplied. For blind applications or in thicker materials, use model A-156 flange mounting plate. Once tube is adjusted to proper depth and angle, tighten smaller hex bushing to lock position. Graphite bushing inside assures leak-proof seal even at higher temperatures. TFE bushing also available. <b>Note:</b> For full insertion with this fitting, order next longer pitot tube. A-159 mounting gland is used for both duct mounting and flange mounting.
A-397	Carrying case for pitot tubes up to 48" Step drill. For fast, convenient installation of pitot tubes in sheet metal ducts. No center punch needed; automatic de-burring. Drills six sizes from 3/16"-1/2" in 1/16" increments.



A-158



A-159



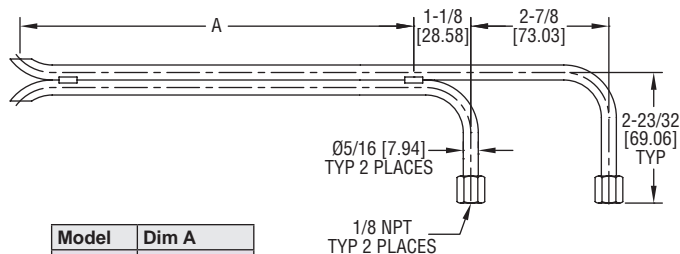
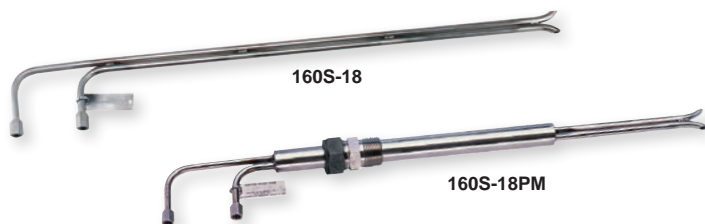
To flange mount, the A-159 must be used with the A-156 flange mounting plate.

A-160-CASE

A-397

# "S" TYPE STAINLESS STEEL PITOT TUBES

Large, Open Tip Design Resists Fouling; Optional Permanent Mount Models



Model	Dim A
160S-18	18 [457.20]
160S-24	24 [609.60]
160S-36	36 [914.40]
160S-48	48 [1219.20]
160S-60	60 [1524.00]

The **SERIES 160S** "S" Type Stainless Steel Pitot Tube is designed specifically for flow measurement of dirty, particulate laden air or gas streams typical in smoke stack and other environmental testing. Total and static pressure tubes are precisely aligned and welded together every 6 inches for maximum accuracy, strength, and long term durability. Permanent mount (PM) models include a 1" welded stainless steel sleeve and adjustable compression fitting with 1" MNPT mounting threads.

## FEATURES/BENEFITS

- Large 5/16" stainless steel tubing resists plugging under harsh conditions
- 1/8" FNPT connections are permanently welded to unit
- Able to be used in up to 1500°F (815.5°C) and 100 psig (6.89 bar)

## APPLICATIONS

- Monitor or control air velocity or air flow in particulate laden air streams

MODEL CHART			
Model	Insertion in Inches	Perm. Mtg. Model	Insertion in Inches
160S-18	18	160S-18PM	18
160S-24	24	160S-24PM	24
160S-36	36	160S-36PM	36
160S-48	48		
160S-60	60		
160S-72	72		

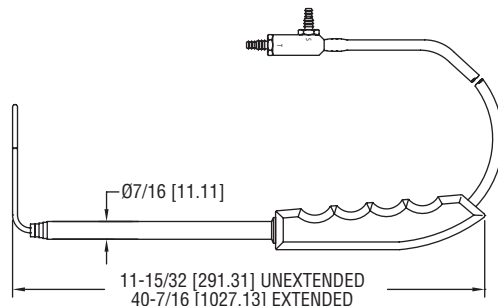
**Note:** Permanent Mounting (PM) models include 1 inch dia. welded stainless steel sleeve and adjustable compression fitting with 1 inch male NPT mounting threads. Adjust depth, lock in place.

ACCESSORY	
Model	Description
A-160-CASE	Carrying case for pitot tubes up to 48"

## MODEL 166T

# TELESCOPING STAINLESS STEEL PITOT TUBE

Adjustable Design Extends Insertion Length to 36 Inches



The **MODEL 166T** Telescoping Stainless Steel Pitot Tube is a unique air flow sensor which can quickly and easily be adjusted for any duct insertion length from 11.5 to 36 inches (29.2 to 91.4 cm), allowing it to replace up to 5 conventional fixed length Pitot tubes. The telescoping sections lock in place as they are extended, which enables the use of the handheld grip to gauge proper alignment of the tip with the airstream. For even greater convenience, it is securely protected by a custom fitted polyethylene carrying case.

## FEATURES/BENEFITS

- Adjustable length can replace up to 5 fixed length Pitot tubes
- Stainless steel construction resists corrosion
- 1.8" diameter hemispherical tip has 1.0 flow coefficient

## APPLICATIONS

- Monitor or control air velocity or air flow when combined with differential pressure gage, switch, or transmitter where varying lengths are needed

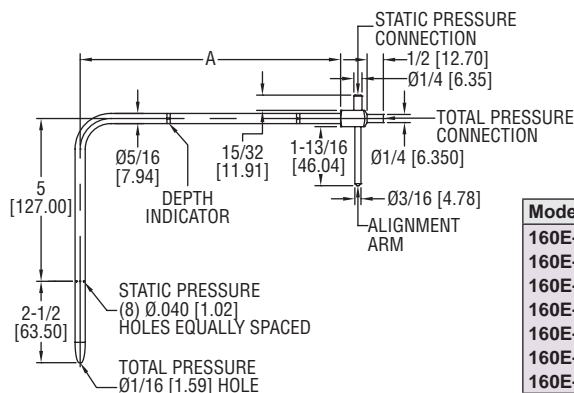
MODEL CHART	
Model	Description
166T	Telescoping pitot tube



Download the Dwyer  
Air Velocity Calculator App for  
iOS® or Android® devices

**Dwyer****MODEL 160E****ELLIPSOIDAL TIP PITOT TUBE**

Designed to Meet ISO Standard 3966



Model	Dim A
160E-00	7-7/8 [200.03]
160E-01	11-7/8 [301.63]
160E-02	18-7/8 [479.43]
160E-03	31-1/2 [800.10]
160E-04	39-1/2 [1003.30]
160E-05	48 [1219.20]
160E-06	59-7/8 [1520.83]

The **SERIES 160E** Ellipsoidal Tip Pitot Tube uses a precision crafted tip configuration, which allows air to pass smoothly with minimum turbulence for consistent, reliable readings. Sliding depth indicators grip firmly to ensure uniform insertion when measuring traverses across ducts. Total and static pressure taps are 1/4" (6 mm) and are permanently silver soldered to the connection block, making them leak-proof and durable.

**FEATURES/BENEFITS**

- Designed to meet ISO standard 3966 commonly required in UK and Europe
- Ellipsoidal tip design for improved accuracy
- 304 stainless steel construction adds strength and resists corrosion
- Adjustable depth indicators for fast, consistent traverses
- Alignment indicator helps keep tip parallel to flow

**APPLICATIONS**

- Monitor or control air velocity or air flow when combined with differential pressure gage, switch, or transmitter

MODEL CHART	
Model	Insertion in Meters
160E-00	0.2
160E-01	0.3
160E-02	0.48
160E-03	0.8
160E-04	1.0
160E-05	1.22
160E-06	1.52

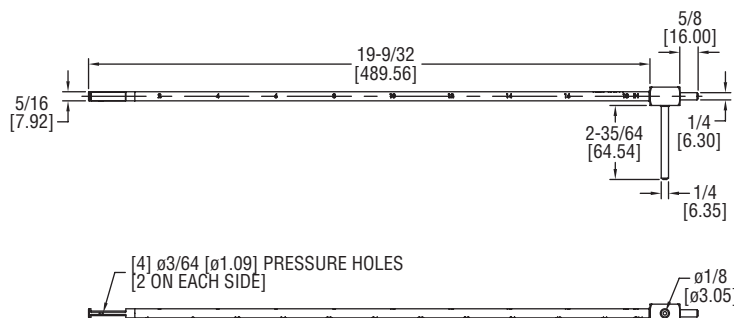
ACCESSORY	
Model	Description
A-160-CASE	Carrying case for pitot tubes up to 1.22 m



Handy A-532 Slide Chart speeds air velocity calculations. All plastic, stays clean for years. Included with each Pitot tube.

**MODEL 160F****STRAIGHT STAINLESS STEEL PITOT TUBES**

Sensing Profile



The **SERIES 160F** Straight Stainless Steel Pitot Tube is constructed from corrosion resistant stainless steel with permanently etched insertion depth graduations for a lifetime of service. The static pressure port is parallel to the sensing tube to allow quick, easy alignment of the tube with air flow. The straight design allows for easy insertion into ducts through grills and pressure taps, as well as aids in positioning in hard to reach locations where a hook style Pitot tube may not allow access.

**FEATURES/BENEFITS**

- Straight design allows for easy insertion into ducts
- Permanent stamped insertion depth graduations facilitate accurate positioning
- Alignment indicator helps keep tip parallel to flow

**APPLICATIONS**

- Monitor or control air velocity or air flow when combined with differential pressure gage, switch, or transmitter where hook style Pitot tubes don't allow access

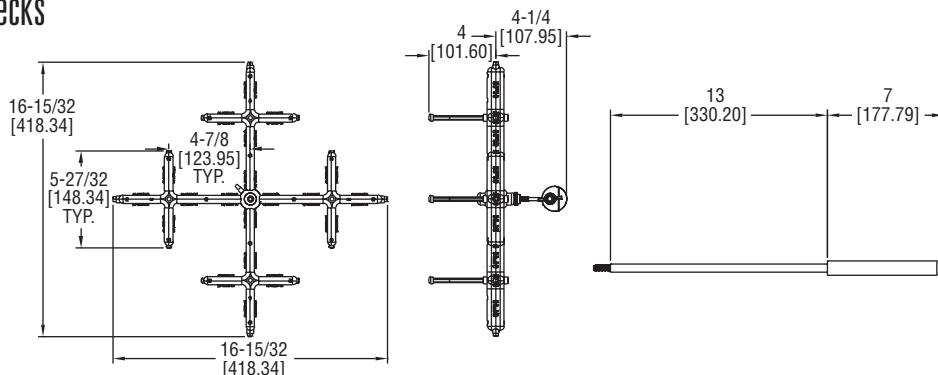
MODEL CHART			
Model	Probe Length	Model	Description
160F	18" (457.2 mm)	160F-KIT	Kit containing 160-18, 160-24, 160-36, 160-48, and carrying case
160F-24	24" (609.6 mm)		
160F-36	36" (914.4 mm)		
160F-48	48" (1219.2 mm)		
160F-60	60" (1524 mm)		

SPECIFICATIONS	
<b>Wetted Material:</b> 304 SS.	
<b>Accuracy:</b> ±2% FS, 0 to 9000 FPM (45 M/s).	
<b>K-Factor:</b> 0.81.	
<b>Temperature Limit:</b> 1500°F (815°C).	
<b>Insertion Length:</b> 18" (44 cm).	
<b>Process Connections:</b> 1/4" OD.	
<b>Weight:</b> 4.3 oz (122 g).	
<b>Agency Approvals:</b> Meets the technical requirements of EU Directive 2011/65/EU (RoHS II).	

ACCESSORIES	
Model	Description
A-156	Flange mounting plate 1/2" female NPT
A-158	Split flange
A-159	Mounting gland
A-160-CASE	Carrying case for pitot tubes up to 48"
A-397	Step drill

# AVERAGING AIR FLOW GRID

Extends Over 50" to Aid in Air Flow Output Checks



The **MODEL 160G** Averaging Air Flow Grid utilizes 16 sensing points to provide precision sensing across its 16.5" (41.9 cm) length and width. The uniquely designed swivel and tightening nut allows the user to position the sensing grid at any angle for ease of use in hard to reach locations. The included color coded tubing connects to the integral barbed fittings, providing a differential pressure signal to a gage or manometer where the readings can be converted into a velocity or flow reading.

## FEATURES/BENEFITS

- Maximum reach of approximately 52" (132 cm)
- 16 sensing points provide an accurate average flow

## APPLICATIONS

- Measure face air velocity on grills, diffusers, registers, exhaust hoods

## SPECIFICATIONS

**Service:** Air or compatible gases.

**Wetted Materials:** Grid: Black polycarbonate; Swivel: Carbon steel; Handle: SS; Bolts: SS; Wing Nut: SS; Standoffs: Aluminum with rubber bumpers, two sets: 1.25" (31.7 mm) and 2" (50.8 mm), 1/8" ID / 1/4" OD; Tubing: Two 10' (3 m) lengths of silicone rubber.

**Accuracy:** ±2% FS.

**Temperature Limits:** -40 to 257°F (-40 to 125°C).

**K Factor:** 0.84.

**Range:** 1000 to 5000 FPM (5 to 25 m/s).

**Process Connection:** 1/8 to 1/4" ID tubing.

**Weight:** 3.5 lb (1.587 kg).

**Agency Approvals:** Meets the technical requirements of EU Directive 2011/65/EU (RoHS II).

## MODEL CHART

Model	Description
160G	Averaging air flow grid

## ACCESSORY

Model	Description
UHH-C2	Protective hard case



UHH-C2

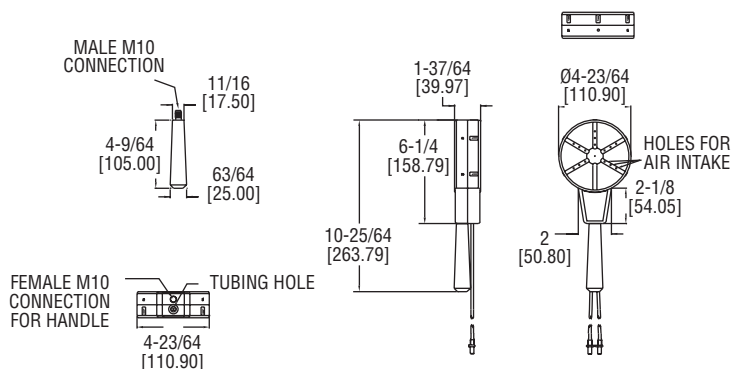
## MODEL ANE-1

# DIFFERENTIAL PRESSURE ANEMOMETER

Bi-Directional Anemometer, No Sensing Electronics



Tubing Adapter



The **MODEL ANE-1** Differential Pressure Anemometer is a robust and durable bi-directional anemometer with no moving parts or sensing electronics. Using the installed tubing, the ANE-1 connects easily to any manometer or applicable pressure sensing device and is capable of measuring a wide velocity range. The air velocity range and accuracy is dependent on the installed manometer, and the ANE-1 retains the accuracy as long as it is dust free.

## FEATURES/BENEFITS

- Wide velocity range dependent on connected manometer
- Includes 5' of blue and 5' of red silicone tubing with a removable adapter sized 2 mm OD to 3/16" OD

## APPLICATIONS

- Measure face air velocity on grills, diffusers, registers, exhaust hoods

## SPECIFICATIONS

**Service:** Clean air only.

**Wetted Materials:** Anemometer: ABS; Tubing: Silicone; Handle: Phenolic.

**Dimensions:** Tubing: 2 mm ID x 4.5 mm OD; Adapter: 2 mm OD to 3/16" OD connections.

**Temperature Limits:** 23 to 122°F (-5 to 50°C).

**K-Factor:** 0.843.

**Process Connections:** 2 removable 5" (12.7 cm) tubing 3/16" ID.

**Weight:** 7.7 oz (220 g).

## MODEL CHART

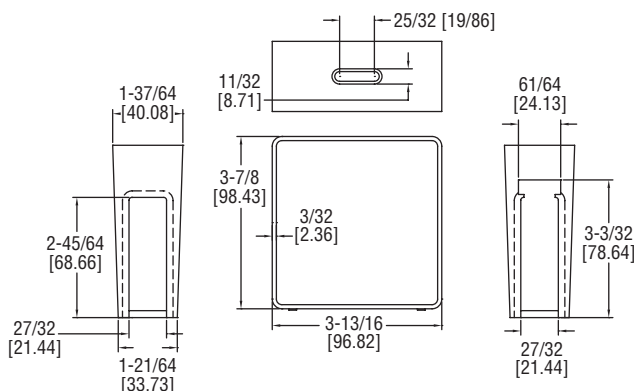
Model	Description
ANE-1	Differential pressure anemometer

**Dwyer****MODEL 480****VANEOMETER™ SWING VANE ANEMOMETER**

Use This Sensitive Dwyer Unit to Measure Low Air Velocities — at Low Cost



Use a Vaneometer™ Swing Vane Anemometer to measure velocity of air flow into laboratory fume hoods and at paint spray booths to determine when to change filters. Or wherever needed to meet OSHA standards of ventilation for smoke, dust or fume removal.



The **MODEL 480** Vaneometer™ Swing Vane Anemometer is a durable, economically priced instrument specifically designed to simplify the measurement of low air velocities. It is accurate to  $\pm 5\%$  of full scale to 100 FPM and  $\pm 10\%$  from 100 FPM to the top of scale. It has a spirit level to ensure accurate readings and the large scales are easy to read and visible from both sides.

**FEATURES/BENEFITS**

- Small size and weight for easy portability
- Easy to clean ABS plastic housing

**APPLICATIONS**

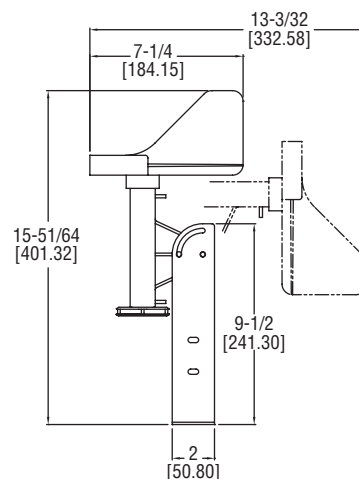
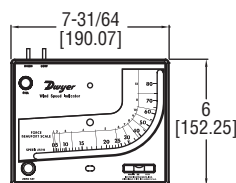
- Measure air flow into laboratory fume hoods

MODEL CHART	
Model	Description
480	25 to 400 FPM
M480	0 to 2.0 m/s

ACCESSORIES	
Model	Description
A-390	Extra vanes, pkg. of 2
A-406	Molded carrying case
A-407	Plastic carrying pouch

**SERIES MARK II****WIND SPEED INDICATOR**

Includes ABS plastic vane, 50' tubing, mounting hardware and gage fluid.



The **SERIES MARK II** Wind Speed Indicator indicates wind speed directly on the liquid filled scale reading in both miles per hour (0-80) and Beaufort scale (1-12). A metric model is also available, which reads the same as above, but reading 0-130 kilometers per hour. The Mark II Wind Speed Indicator is an accurate, economically priced option for measuring wind speed.

**FEATURES/BENEFITS**

- Durable molded white instrument with gold scale
- English and metric units available

**APPLICATIONS**

- Weather monitoring stations

MODEL CHART	
Model	Scale
Mark II WSI	mph
Mark II WSI Metric	kph





SERIES WIND METER

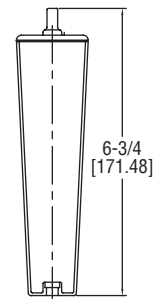
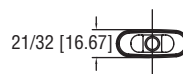
# PORTABLE WIND METER



Hold this way  
for low scale reading



For high scale reading,  
finger covers hole



Dimensions: 5/8" W X 6-3/4" H X 17/32" D

The Portable **SERIES WIND METER** is used to indicate wind speed and is ideal for yachtsmen, outdoors-men, and farmers. By holding the meter at eye level with the back of the unit to the wind, the white ball in the tube indicates wind speed. The meter has two scales for maximum accuracy.

## FEATURES/BENEFITS

- Direct reading requires no calculations
- Dual scales to fit any requirement

## APPLICATIONS

- Fishing, hunting, golf

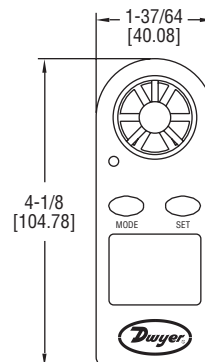
MODEL CHART	
Model	Scale
Wind Meter-MPH	mph
Wind Meter-KNOT	knots
Wind Meter-KPH	kph
Wind Meter-MPS	mps

ACCESSORY	
Model	Description
A-376	Replacement floats for windmeter, tube of 3

## MODEL MW-1

# POCKET WIND METER

Measures Wind Speed and Temperature, Wide Range



The **MODEL MW-1** Pocket Wind Meter measures wind speed and temperature via the integral vane and thermo-anemometer sensor. Users can view readings on the four-digit LCD with wind speed bar graph and select units for air velocity and temperature. The MW-1 also features automatic shut-off, detailed instruction manual, and protective plastic water resistant housing that floats.

## FEATURES/BENEFITS

- User selectable units to fit any requirement
- Auto shut-off to conserve battery life
- Water resistant plastic housing floats

## APPLICATIONS

- Balancing applications
- Energy audits
- HVAC inspection

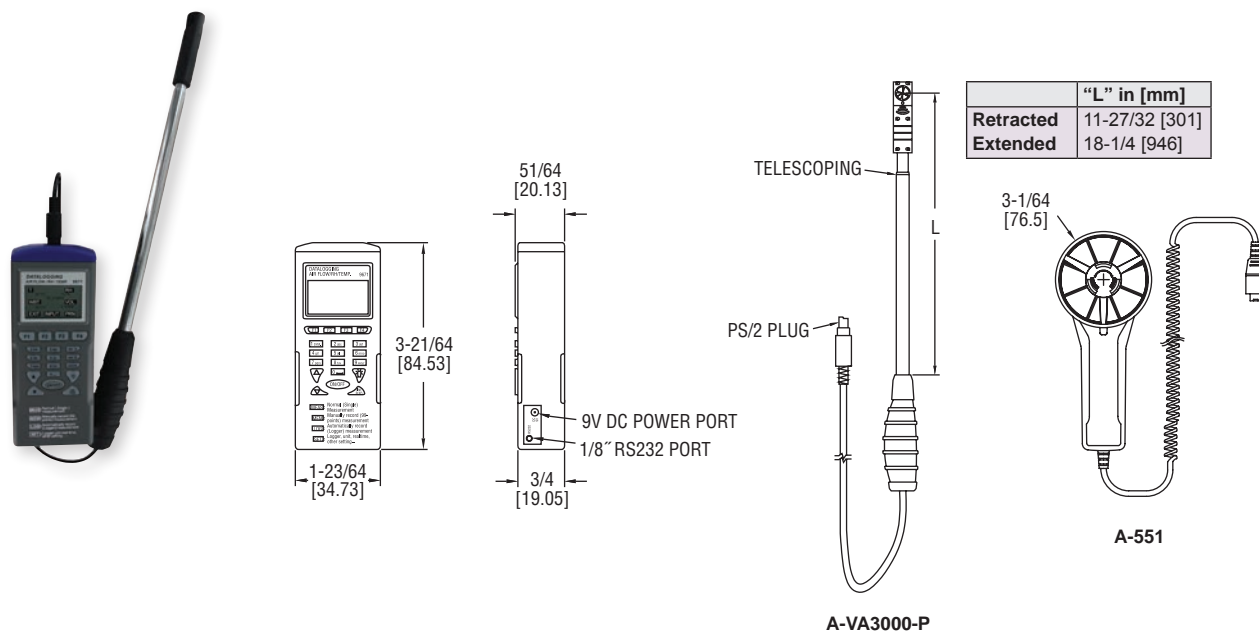
SPECIFICATIONS	
<b>Air Velocity Range:</b> 0 to 30 m/s, 0 to 5860 ft/min, 0 to 90 km/h, 0 to 65 mph, 0 to 55 knots.	
<b>Temperature/Wind-Chill Ranges:</b> 14 to 113°F (-10 to 45°C).	
<b>Temperature Resolution:</b> 0.36°F (0.2°C).	
<b>Accuracy:</b> Wind speed: ±5% of reading. Temperature: ±3.6°F (±2°C).	
<b>Resolution:</b> 0.1 m/s, 19 ft/min, 0.3 km/h, 0.2 mph, 0.2 knots.	
<b>Sample Time:</b> 1 reading per second.	
<b>Water-Resistant:</b> Up to 3' (1 meter).	
<b>Power Requirements:</b> 3 V CR2032 or BR1225 lithium metal battery, installed functional, user replaceable.	
<b>Auto-Off:</b> 14 minutes after last key is pressed.	
<b>Impeller:</b> Plastic, replaceable.	
<b>Case:</b> Plastic.	
<b>Display:</b> 2.32 x 2" (59 x 51 mm).	
<b>Weight:</b> 1.84 oz (52.1 g).	
<b>Agency Approvals:</b> CE.	

MODEL CHART	
Model	Description
MW-1	Hand-held, mini-vane thermo-anemometer

ACCESSORY	
Model	Description
A-166	Replacement vane for MW-1

# MINIATURE VANE THERMO-ANEMOMETER

Telescoping Probe Measures Air Velocity, Air Volume, Temperature, and Humidity



The **MODEL VT-300** Miniature Vane Thermo-Anemometer measures air velocity, air volume, temperature, and humidity inside air ducts. This meter includes a telescoping vane probe that is only 0.7" (18 mm) in diameter that allows duct traverse measurements up to 20" ducts. User-selectable units include ft/min, m/s, knots, mph, and km/hr. The vane probe has a built-in sensor to record temperature in °F or °C, as well as humidity in %RH. There are three modes which include viewing data in real time, manual recording, and automatic recording. Model VT-300 can store measurements that can later be transferred to a PC via RS-232 communication. The vane probe is detachable for easy replacement, if necessary. Each unit is supplied with a hard carrying case, batteries, logging software CD, USB to RS-232 cable and instruction manual.

MODEL CHART	
Model	Description
VT-300	Miniature vane thermo-anemometer

ACCESSORIES	
Model	Description
A-VT300-P	Replacement probe with miniature vane
A-551	Replacement probe with large vane

## SPECIFICATIONS

### AIR VELOCITY

**Range:** 98.4 to 3937 ft/min (0.5 to 20 m/s).

**Accuracy:** ±3% of reading + 0.2 m/s.

**Resolution:** 0.1 m/s.

**Response Time:** 1 s.

### TEMPERATURE

**Range:** -4 to 140°F (-20 to 60°C).

**Accuracy:** ±1°F (±0.6°C) from -4 to 122°F (-20 to 50°C); ±2.2°F (±1.2°C) from 122 to 140°F (50 to 60°C).

**Resolution:** 0.1°F (0.1°C).

**Response Time:** 60 s (typ).

### RELATIVE HUMIDITY

**Range:** 0.1 to 99.9% RH.

**Accuracy:** ±3% RH at 25°C (10 to 90% RH); ±5% RH (0.1 to 10% RH, 90 to 99.9% RH).

**Resolution:** 0.1% RH.

**Response Time:** 60 s (typ).

### AIR VOLUME

**Range:** 0 to 99,999 (CFM or m³/s).

**Resolution:** 0.1 (0 to 9999.9) or 1 (10,000 to 99,999).

### WET BULB

**Range:** -7.6 to 158°F (-22 to 70°C).

**Resolution:** 0.1°F (0.1°C).

### METER

**Temperature Limits:** Operating: 32 to 122°F (0 to 50°C); Storage: -4 to 122°F (-20 to 50°C).

**Humidity Limits:** Operating: <80% RH; Storage: <90% RH.

**Display:** 1 x 1.8" (26 x 45 mm).

**Serial Communications:** 9600 bps, 8 data bits, no parity.

**Power Requirements:** (4) AAA 1.5 V alkaline batteries, included, user replaceable.

**Battery Life:** 100 hours.

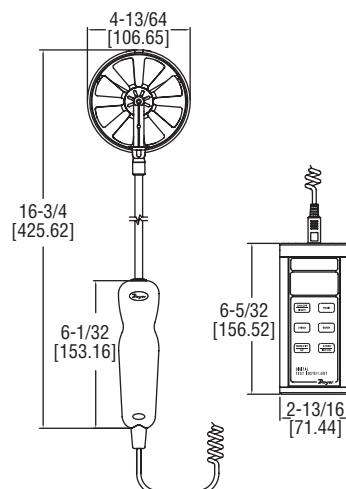
**Vane Diameter:** 0.7" (18 mm).

**Weight:** 7.41 oz (210 g).

**Agency Approvals:** CE.

# 100 MM VANE THERMO-ANEMOMETER TEST INSTRUMENT

Measures Air Velocity or Air Volume, Temperature, and Humidity Simultaneously



The **MODEL 473B** 100 mm Vane Thermo-Anemometer Test Instrument is a versatile unit that quickly and easily measures air velocity or volumetric air flow, as well as air temperature and humidity in imperial or metric units. A stainless steel 100 mm vane probe is included, which has a comfortable hand grip. The extruded aluminum housing fully protects electronics, yet is lightweight and comfortable to hold.

## FEATURES/BENEFITS

- Compatible with Dwyer AP1 thermo-anemometer and RP1 thermo-hygrometer wired probes (sold separately)
- Included 100 mm vane probe is able to measure air velocity, volumetric air flow, temperature, and humidity
- High contrast and backlit LCD for visibility in any condition
- Able to store up to 99 readings for later evaluation

## APPLICATIONS

- Residential balancing
- HVAC inspections

MODEL CHART	
Model	Description
473B-1	Vane thermo-anemometer test instrument

OPTIONS	
To order add suffix:	Description
-COC	Certificate of calibration
-FC	Factory calibration certificate
-NIST	NIST traceable calibration certificate
Example: 473B-1-NIST	

## SPECIFICATIONS

**Service:** Dry, clean air.

**Temperature Limits:** Process: -20 to 212°F (-29 to 100°C); Ambient: 5 to 125°F (-15 to 51°C)

**Display:** 4.5 digit backlit display.

**Range:** Air velocity: 40 to 5000 fpm (0.2 to 25 m/s); Volumetric air flow: 19,999 in selected flow units; Temperature: -20 to 212°F (-29 to 100°C); Relative humidity: 0 to 100% RH.

**Accuracy:** Air velocity:  $\pm 1.5\%$  of reading  $\pm 20$  fpm ( $\pm 0.1$  m/s) [0.25 to 10 m/s];  $\pm 1.5\%$  of reading  $\pm 40$  fpm ( $\pm 0.2$  m/s) [10 to 20 m/s];  $\pm 1.5\%$  of reading  $\pm 60$  fpm ( $\pm 0.3$  m/s) [20 to 25 m/s]; Temperature:  $\pm 0.54^\circ\text{F}$  @  $77^\circ\text{F}$  ( $\pm 0.3^\circ\text{C}$  @  $25^\circ\text{C}$ ); Relative Humidity:  $\pm 2\%$  @  $77^\circ\text{F}$  ( $25^\circ\text{C}$ ) [10 to 90% RH];  $\pm 4\%$  [0 to 10, 90 to 100% RH].

**Response Time:** Air velocity: 1 s; Volumetric air flow: 1 s; Temperature: 1.5 s; Relative humidity: 1.5 s.

**Probe Length:** 8" (203 mm) insertion.

**Cable Length:** 28" (71 cm) retracted; 6' (18.3 m) extended.

**Vane Material:** Anodized aluminum.

**Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.

**Weight:** 18.4 oz (521 g).

**Agency Approvals:** CE.

ACCESSORIES	
Model	Description
A-47X-BOOT	Protective magnetic rubber boot
A-VPX-CKIT	Vane hood kit
AP1*	Hot wire thermo-anemometer probe with coiled cable
RP1*	Thermo-hygrometer probe with coiled cable
UHH-C1	Soft carrying case
VP1*	100 mm vane thermo-anemometer probe with coiled cable (replacement)
*Consult website for more details.	



**A-47X-BOOT**  
(manometer not included)



**A-VPX-CKIT**



**AP1**



**RP1**



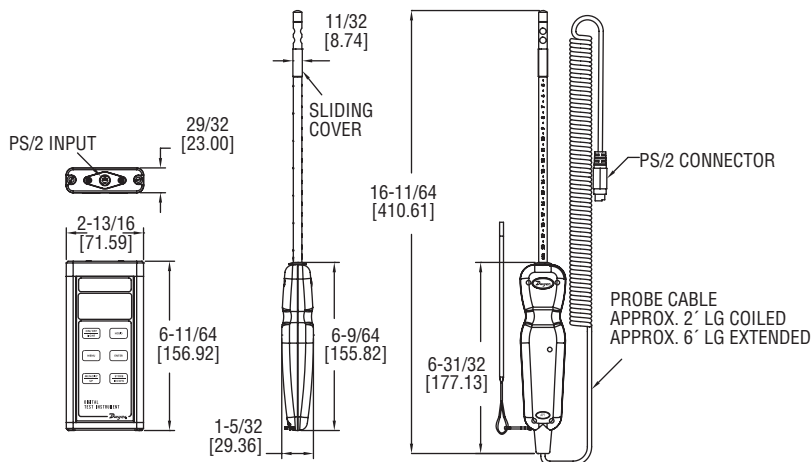
**UHH-C1**



**VP1**

# THERMO-ANEMOMETER TEST INSTRUMENT

Measures Air Velocity or Air Volume and Temperature Simultaneously



The **MODEL 471B** Thermo-Anemometer Test Instrument is a versatile dual function unit that quickly and easily measures air velocity or volumetric flow as well as air temperature in imperial or metric units. A stainless steel probe is included, which has a comfortable hand grip and etched insertion depth marks. The extruded aluminum housing fully protects electronics, yet is lightweight and comfortable to hold.

## FEATURES/BENEFITS

- Compatible with Dwyer RP1 thermo-hygrometer and VP1 100 mm vane thermo-anemometer probes (sold separately)
- High contrast and backlit LCD for visibility in any condition
- Able to store up to 99 readings
- Integral sliding cover protects probe sensors when not in use
- Built-in volumetric air flow calculations

## APPLICATIONS

- Duct traverses
- HVAC inspections
- Testing and balancing

## MODEL CHART

Model	Description
471B-1	Digital thermo anemometer includes 9V battery, sensing probe, wrist strap, soft carrying case and instructions

## ACCESSORIES - CASES

Model	Description
UHH-C1	Spare soft carrying case
A-160-CASE	Hard carrying case for longer probes (18" to 36")
A-47X-BOOT	Protective magnetic rubber boot

## ACCESSORIES - PROBES

Model	Probe Length	Description
AP1	8"	Thermo anemometer air velocity & temperature probe with coiled cable
AP1-18	18"	Thermo anemometer air velocity & temperature probe with coiled cable
AP1-24	24"	Thermo anemometer air velocity & temperature probe with coiled cable
AP1-36	36"	Thermo anemometer air velocity & temperature probe with coiled cable

## SPECIFICATIONS

**Service:** Air velocity and temperature of clean, dry air.

**Temperature Limits:** Process air velocity: -20 to 212°F (-29 to 100°C); Process temperature: -40 to 212°F (-40 to 100°C); Ambient: 5 to 125°F (-15 to 51°C).

**Display:** 4.5 digit LCD.

**Resolution:** 0.1%, 0.1 °F/°C.

**Range Air Velocity:** 0 to 6000 FPM (0 to 30 m/s).

**Accuracy Air Velocity:** ±3% FS within temperature range of 40 to 90°F (4 to 32°C).

**Range Volumetric Air Flow:** 19,999 in selected flow units.

**Range Temperature:** -40 to 212°F (-40 to 100°C).

**Accuracy Temperature:** ±0.5°F (±0.28°C) from 32 to 122°F (0 to 50°C); ±1.5°F (±0.83°C) from -40 to 32°F (-40 to 0°C) & 122 to 212°F (50 to 100°C).

**Probe Length:** 8" (203 mm) insertion.

**Cable Length:** 28" (71 cm) retracted, 6 ft (183 cm) extended.

**Power Requirements:** 9 V alkaline battery, installed non-functional, user replaceable.

**Weight:** 16 oz (454 g).

**Agency Approvals:** CE.



Replaceable Probe with  
Secure 6 Pin Adapter



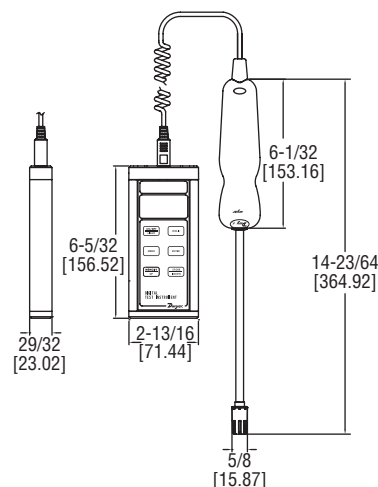
Soft Carrying Case  
Included with Every Unit



A-47X-BOOT  
(Manometer not included)

# THERMO-HYGROMETER

Measures % RH, Temperature, Dew Point and Wet Bulb



The **MODEL 485B** Thermo-Hygrometer is a versatile, compact, handheld instrument for measuring percentage of relative humidity and temperature in °F or °C. Dew point and wet bulb temperatures are derived from the relative humidity and temperature measurements and are displayed on the LCD.

## FEATURES/BENEFITS

- Compatible with Dwyer AP1 thermo-anemometer and VP1 100 mm vane thermo-anemometer probes (sold separately)
- Hold feature to freeze current readings on the display
- Stores up to 99 readings for future evaluation

## APPLICATIONS

- Building commissioning
- Pulp & paper

MODEL CHART	
Model	Description
485B-1	Digital thermo-hygrometer includes 9V battery, sensing probe, wrist strap, soft carrying case and instructions

## SPECIFICATIONS

<b>Service:</b> Humidity, temperature, wet bulb and dew point temperature detection in clean air. <b>Temperature Limits:</b> Process: -40 to 176°F (-40 to 80°C) Ambient: 5 to 125°F (-15 to 51°C). <b>Range Relative Humidity:</b> 0 to 100% (non-condensing). <b>Accuracy Relative Humidity:</b> ±2% FS over 10 to 90% @ 77°F (25°C).	<b>Range Temperature:</b> -20 to 140°F (-28 to 60°C). <b>Accuracy Temperature:</b> ±0.54°F @ 72°F (±0.3°C @ 25°C). <b>Display:</b> 4.5 digit LCD. <b>Resolution:</b> 0.1%, 0.1 °F/°C. <b>Probe Length:</b> 8" (203 mm) insertion. <b>Power Requirements:</b> 9 V alkaline battery, included, user replaceable. <b>Weight:</b> 16 oz (454 g). <b>Agency Approvals:</b> CE.
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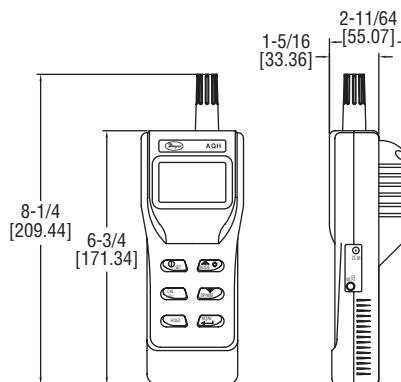
## ACCESSORIES

Model	Description
RP1	Thermo-hygrometer % RH and temperature probe with coiled cable
UHH-C1	Soft carrying case
A-47X-BOOT	Protective magnetic rubber boot

## MODEL AQH-20

# INDOOR AIR QUALITY METER

Measures CO<sub>2</sub>, Temperature and Humidity



The **MODEL AQH-20** Handheld Indoor Air Quality Meter reduces the number of instruments a contractor has to carry by measuring carbon dioxide concentration, air temperature, and humidity percentage in one device. A large backlit LCD shows all three parameters simultaneously. This product offers user selectable engineering units, maximum/minimum/average readings, a hold function, and an audible alarm.

## FEATURES/BENEFITS

- All-in-one unit for carbon dioxide, temperature, and humidity
- Large backlit LCD for visibility in dark areas
- User configurable alarms for audible indication of hazardous conditions

## APPLICATIONS

- Building commissioning
- Green house monitoring

MODEL CHART			
Model	CO <sub>2</sub> Range	Humidity Range	Temperature Range
AQH-20	0 to 2000 ppm	0.0 to 99.9%	14 to 140°F (-10 to 60°C)

## SPECIFICATIONS

<b>Ranges:</b> CO <sub>2</sub> : 0 to 2000 ppm; Temperature: 14 to 140°F (-10 to 60°C); Relative Humidity: 0.0 to 99.9% RH. <b>Accuracy:</b> CO <sub>2</sub> : ±30 ppm ±5% of reading; Temperature: ±0.9°F (±0.6°C); Humidity: ±3% RH (10 to 90%), ±5% (0.0 to 9.9% or 90 to 99.9%). <b>Resolution:</b> CO <sub>2</sub> : 1 ppm; Temperature: 0.1°F (0.1°C); Humidity: 0.1% RH. <b>Response Time:</b> CO <sub>2</sub> : < 30 seconds; Temperature: < 2 minutes; Humidity: <10 minutes.	<b>Display:</b> 4 digits for temperature/CO <sub>2</sub> and 3 digits for humidity. <b>CO<sub>2</sub> Sensor:</b> Non-dispersive infrared. <b>Temperature Limits:</b> 32 to 122°F (0 to 50°C). <b>Humidity Limits (Non-Condensing):</b> 0 to 95% RH. <b>Power Requirements:</b> (4) 1.5 V AA alkaline batteries, included, user replaceable. <b>Warm Up Time:</b> 30 seconds. <b>Weight:</b> 6.76 oz (200 g). <b>Agency Approvals:</b> CE.
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## ACCESSORY

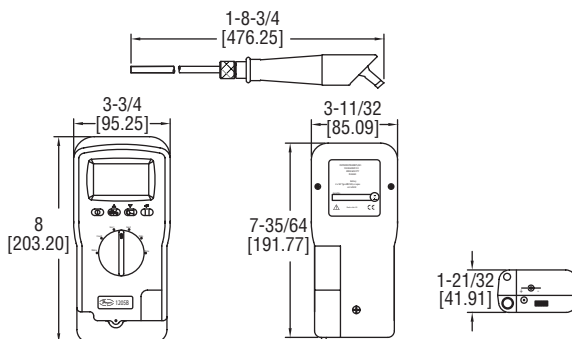
Model	Description
TH-CAL	33% and 75% salt bath calibration standards



**Dwyer****MODEL 1205B**

# HANDHELD CO/CO<sub>2</sub> GAS ANALYZER

Measures Indoor Air Quality, Includes Sampling Probe with Hose



The **MODEL 1205B** Handheld CO/CO<sub>2</sub> Gas Analyzer accurately measures the concentration of carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) in a duct or space and displays the measurement on a dual line backlit LCD. The unit's memory stores up to 255 sets of readings that are logged manually or auto-logged with 1 to 10 minute intervals. Results can then be printed via an optional infrared printer.

**FEATURES/BENEFITS**

- Displays carbon monoxide and carbon dioxide concentrations simultaneously
- Stores up to 255 sets of readings for future evaluation
- User configurable alarms

**APPLICATIONS**

- Service and adjustment of boilers, ovens, and other combustion equipment

**SPECIFICATIONS**

**Ranges:** CO: 0 to 1000 ppm, overflow 2000 ppm; CO<sub>2</sub>: 200 to 4000 ppm, overflow 9999 ppm.  
**Accuracy:** CO:  $\pm 5$  ppm < 100 ppm;  $\pm 5\%$  > 100 ppm;  $\pm 10\%$  > 1000 ppm; CO<sub>2</sub>:  $\pm 20$  ppm < 400 ppm;  $\pm 5\%$  < 4000 ppm;  $\pm 10\%$  > 4000 ppm.  
**Resolution:** CO: 1 ppm; CO<sub>2</sub>: 1 ppm.  
**Display:** Dual LCD display.  
**Temperature Limits:** 32 to 104°F (0 to 45°C).

**Humidity Limits (Non-Condensing):** 10 to 90% RH.

**Power Requirements:** 100 to 240 VAC, 50 to 60 Hz or (5) AA NiMH batteries, internal, factory replaceable.

**Battery Life:** 6 hours with full charge and pump on.

**Weight:** 2.21 lb (1 kg).

**Agency Approvals:** CE.

**ACCESSORIES**

Model	Description
1205B-US	120 VAC power adapter for 1205B
1205B-EU	240 VAC power adapter for 1205B
1205B-PR	Replacement probe for 1205B

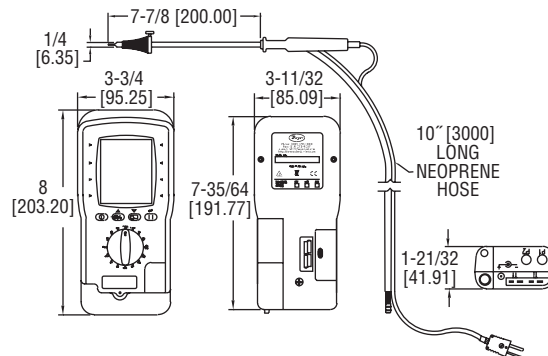
**MODEL CHART**

Model	Description
1205B-0	Gas analyzer and logger for CO and CO <sub>2</sub>

**MODEL 1207A**

# HANDHELD FLUE GAS COMBUSTION ANALYZER

Rotary Dial Selection, Display 4 Parameters Simultaneously



The **MODEL 1207A** Handheld Flue Gas Combustion Analyzer allows users to monitor four parameters simultaneously and change the parameters shown using the rotary dial selection switch. The unit's memory stores up to 255 time stamped test sets and can output the measurements to a serial printer. For extra protection, the analyzer comes standard with a protective boot and magnetic back.

**FEATURES/BENEFITS**

- Displays 4 configurable parameters simultaneously
- Stores up to 255 time stamped test sets for future evaluation

**APPLICATIONS**

- Service and adjustment of boilers, ovens, and other combustion equipment

**SPECIFICATIONS**

**Range:** O<sub>2</sub>: 0 to 21%; CO: 0 to 2000 ppm (4000 ppm max for 15 minutes); CO<sub>2</sub>: 0 to 30%; Temp. (flue and net): 32 to 1112°F (0 to 600°C); Efficiency: 0 to 99.9%; Excess air: 0 to 250%.  
**Accuracy:** O<sub>2</sub>:  $\pm 0.2\%$ ; CO:  $\pm 10$  PPM < 100 PPM else  $\pm 5\%$  of reading; CO<sub>2</sub>:  $\pm 0.3\%$  reading; Temp. (flue and net):  $\pm 2^\circ\text{C}$   $\pm 0.3\%$  reading; Efficiency:  $\pm 1\%$  reading; Excess air:  $\pm 0.2\%$ .  
**Resolution:** O<sub>2</sub>: 0.1%; CO: 1 PPM; CO<sub>2</sub>: 0.1%; Temp. (flue and net): 0.1°F/°C; Efficiency: 0.1%; Excess air: 0.1%.

**Ambient Operating Temperature:** 32 to 104°F (0 to 40°C).

**Power Requirements:** (8) AA alkaline batteries, installed functional, user replaceable, (4) AA NiMH batteries, included, user replaceable (charger included) or optional power adapter.

**Pre-Programmed Fuels:** Natural gas, light oil, propane, butane, LPG, and wood pellets.

**Probe:** 11.8" (300 mm) length x 0.25" (6 mm) diameter with 7.8" (200 mm) stainless steel shaft.

**Hose:** 10 ft (3 m).

**Weight:** 1.7 lb (0.77 kg).

**Agency Approvals:** CE.

**MODEL CHART**

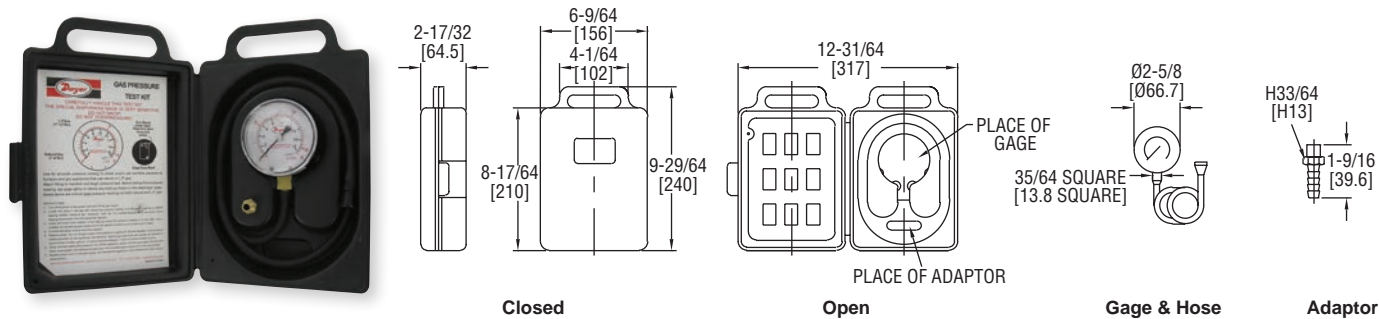
Model	Description
1207A	Handheld flue gas combustion analyzer

**ACCESSORIES**

Model	Description
1207A-US	120 VAC power adapter
1207A-EU	230 VAC power adapter
1207A-SP	Serial printer
1207A-PP	Printer paper for 1207A-SP
1207A-RF	Replacement filter

# GAS PRESSURE TEST KIT

Convenient Kit Perfect For Testing LP and Natural Gas Controls



The **SERIES LPTK** Gas Pressure Test Kit is ideal for testing LP and natural gas lines and controls. The kit's gage shows if proper pressure is present or if a leak exists. Series LPTK is easier to use than a manometer and includes a sturdy case for added durability and safe handling.

#### FEATURES/BENEFITS

- Calibration screw on the back of the gage
- Simple interface for ease of use

#### APPLICATIONS

- Combustion gas supply monitoring and testing

MODEL CHART	
Model	Range
LPTK-01	0 to 15 in w.c. & 0 to 8.6 oz/in <sup>2</sup>
LPTK-02	0 to 32 in w.c. & 0 to 18.5 oz/in <sup>2</sup>
LPTK-03	0 to 4 kPa & 0 to 40 mbar
LPTK-04	0 to 8 kPa & 0 to 80 mbar

**Note:** Consult factory for other range options.

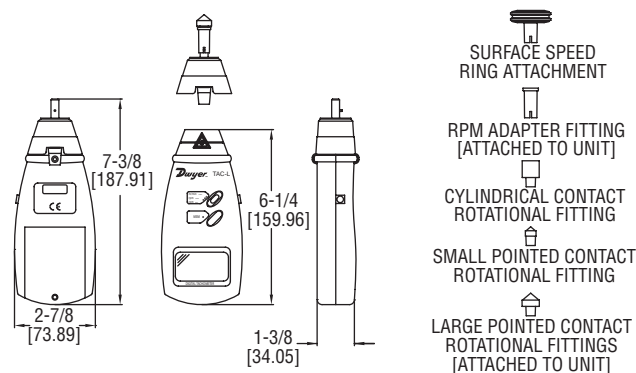
#### SPECIFICATIONS

**Service:** Compatible gases.  
**Wetted Materials:** Gage: brass, hose: rubber.  
**Housing Materials:** Steel with black finish.  
**Lens:** Polycarbonate.  
**Accuracy:** ±3% FS.  
**Pressure Limit:** 110% of range.  
**Temperature Limits:** -40 to 150°F (-40 to 65°C).  
**Size:** 2-1/2" (63 mm).  
**Process Connections:** 1/8" NPT, brass hose barb.  
**Case:** ABS plastic.  
**Hose:** Rubber, 36" (91.4 cm).  
**Tube Nipple:** Rubber.  
**Weight:** 1.75 lb (0.8 kg).

#### MODEL TAC-L

# PORTABLE DIGITAL TACHOMETER

Contact or Photo Non-Contact Operation, Backlit LCD



The **MODEL TAC-L** Portable Digital Tachometer measures rotational speed either by contacting a rotatable head to the shaft of the object or by using a photo sensor to detect the reflections from the laser. The housing is made of a strong, lightweight ABS plastic housing, which is designed to comfortably fit in the hand of the user. Supplied with this model are 3 contact rotational heads, a contact surface wheel, and a protective carrying case.

#### FEATURES/BENEFITS

- Non-contact operation can record from a distance of up to 20 inches
- Memory function recalls records since last power off
- Large backlit LCD for visibility in dark areas

#### APPLICATIONS

- HVAC fan motors
- Powder and bulk conveyor belts

MODEL CHART	
Model	Description
TAC-L	Contact/non-contact digital tachometer

#### SPECIFICATIONS

**Range:** Non-contact (RPM): 2.5 to 99,999 RPM; Contact (RPM): 0.5 to 19,999 RPM; Surface speed (m/min): 0.05 to 1999.9 m/min.  
**Accuracy:** ±(0.05% + 1 digit).  
**Display:** Backlit LCD; 5 digits, 7 segments, 0.7" (1.8 cm) H.  
**Resolution:** Non-contact (RPM): 0.1 RPM (2.5 to 999.9 RPM), 1 RPM (1000 to 99,999 RPM); Contact (RPM): 0.1 RPM (0.5 to 999.9 RPM), 1 RPM (1000 to 19,999 RPM); Surface speed (m/min): 0.01 m/min (0.05 to 99.99 m/min), 0.1 m/min (100.0 to 1999.9 m/min).

**Non-contact Measuring Distance Range:** 2 to 20" (5 to 50 cm).  
**Sampling Time:** 0.8 s.  
**Temperature Limits:** 32 to 122°F (0 to 50°C).  
**Power Requirements:** (4) 1.5 V AA alkaline batteries, included, user replaceable.  
**Weight:** 1.37 lb (.620 kg).  
**Agency Approvals:** CE.

#### ACCESSORY

Model	Description
TAC-5	Reflective tape, 5' (1.5 m) roll, 1/2" (13 mm) wide

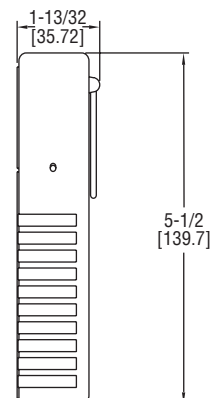
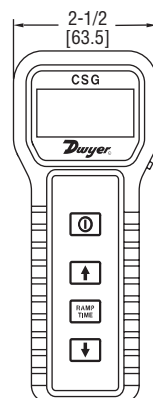


**Dwyer**

MODEL CSG

# CURRENT/VOLTAGE SIGNAL GENERATOR

Ramp Function, Large Numeric LCD Display



The **MODEL CSG** Current/Voltage Signal Generator generates a 0 to 10 VDC signal in increments of 1 V or a 0 to 20 mA signal in increments of 1 mA. The large LCD features a blue backlight for use in dimly lit areas. Model CSG continuously ramps the output using the user selected minimum, maximum, and ramp interval timing parameters.

**FEATURES/BENEFITS**

- Large backlit LCD for visibility in dark areas
- Timed ramp function
- Auto shut-off to conserve battery life

**APPLICATIONS**

- Troubleshooting transmitters and transducers
- Configuring panel meters

**SPECIFICATIONS**

**Impedance:** Voltage: 1000  $\Omega$  min; Current: 300  $\Omega$  max.  
**Output:** 0 to 20 mA (1 mA increments); 0 to 10 VDC (1 VDC increments).  
**Resolution:** 1 mA (current); 1 VDC (voltage).  
**Ramping Time Intervals:** 1 to 20 s (1 s increments).  
**Ambient Operating Temperature:** 32 to 122°F (0 to 50°C).  
**Power Requirements:** 9 V alkaline battery, included, user replaceable or 120 VAC (provided).  
**Auto Power Off:** 1 to 20 min.  
**Electrical Connections:** 6' (1.8 m) with alligator clips.  
**Weight:** 6 oz (170 g).

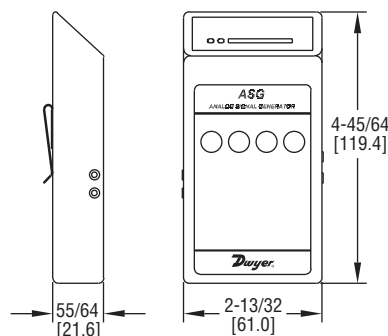
**MODEL CHART**

Model	Description
CSG	Current/voltage signal generator

**MODEL ASG**

# ANALOG SIGNAL GENERATOR

Ramp Function, Bar Graph LED, Selectable Auto Shut Off



The **MODEL ASG** Analog Signal Generator generates a 0 to 10 VDC signal in increments of 1 V or a 4 to 20 mA signal in increments of 2 mA. An LED bar graph visually indicates the analog signal level. Model ASG will also continuously ramp to user defined maximum and minimum values with user defined ramp interval timing.

**FEATURES/BENEFITS**

- LED bar graph for visibility in dark areas
- Variable ramp function timing
- Auto shut-off to conserve battery life

**APPLICATIONS**

- Troubleshooting transmitters and transducer
- Calibrating transducers, displays, and other analog signal devices

**SPECIFICATIONS**

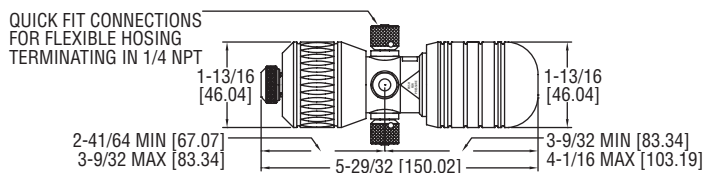
**Impedance:** Voltage: 1000  $\Omega$  min; Current: 300  $\Omega$  max.  
**Output:** 0 to 20 mA (2 mA increments); 0 to 10 VDC (1 VDC increments).  
**Resolution:** 2 mA (current); 1 VDC (voltage).  
**Ramping Time Intervals:** 2 to 20 sec (2 sec increments).  
**Ambient Operating Temperature:** 32 to 122°F (0 to 50°C).  
**Power Requirements:** 9 V alkaline battery, installed functional, user replaceable or 120 VAC (provided).  
**Auto Shutoff Times:** 2 to 20 min. (2 min. increments) (6 minute default).  
**Electrical Connections:** 6' (1.8 m) with alligator clips.  
**Weight:** 3.2 oz (without battery).

**MODEL CHART**

Model	Description
ASG	Analog signal generator

# HAND PUMP

Generates Pressures up to 45 psig (3 bar), Single Hand Operation



The **MODEL HP** Hand Pump provides a dual source of pneumatic pressure and vacuum for verifying the calibration of pressure instrumentation. Pump can generate pressures up to 45 psig (3 bar) and vacuum to -27 in Hg (-910 mbar). The compact pump is designed for portability and single hand operation. Model HP features a pressure relief valve and fine adjustment for control better than 0.0015 psi (0.1 mbar). Pump includes two 39" (1 m) hoses terminating in 1/4" female NPT connections and instruction manual.

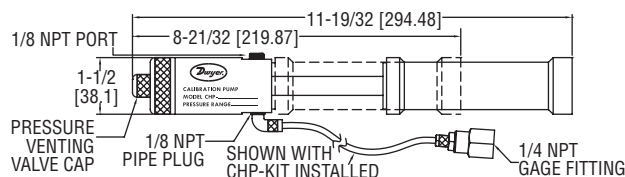
MODEL CHART	
Model	Description
HP	Hand pump

ACCESSORIES	
Model	Description
HP-1K	Service kit
HP-1C	Hard case

## SERIES CHP

# PNEUMATIC HAND PUMP

Vacuum or Pressure, Ranges up to 100 psig



The **SERIES CHP** Pneumatic Hand Pump is the most dependable and rugged pump for applications up to 100 psi or 28.8 in Hg vacuum. The durable Acetal plastic and anodized aluminum construction prevents body heat transfer, resulting in drift-free, accurate readings. The Series CHP is equipped with oversized check valves in order to provide smooth and controlled operation. Dual O-Rings on all pistons ensure the pump to be leak-free. The unit includes a 2' L hose, 1/8" female NPT gauge fitting, and 1/8" NPT pipe plug. An optional hose kit is available so that a tee is not required when connecting a sensor and a calibrator. The Series CHP is ideal for checking calibration of pressure or vacuum gauges, switches, or transmitters.

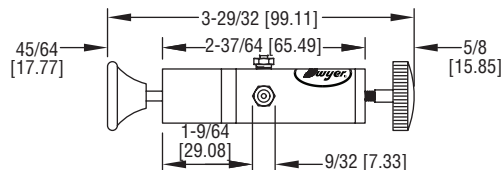
MODEL CHART	
Model	Description
CHP-P	Pressure calibration pump
CHP-V	Vacuum calibration pump

ACCESSORY	
Model	Description
CHP-KIT	2' hose and NPT fitting

## MODEL A-396A

# CALIBRATION PUMP

Generates up to 72 psig, Integral Bleed Fitting



The **MODEL A-396A** Calibration Pump serves as pressure source to calibrate gages and transmitters or to set pressure switches. Use with manometer or other pressure standard. Includes volume adjuster enabling fine pressure control and bleed valve. Generates pressures from a fraction of an in w.c. to 72 psig (5 bar). Includes barbed fitting, tee connector and three 36" lengths of vinyl tubing.

MODEL CHART	
Model	Description
A-396A	Calibration pump

## MODEL A-350

# ASPIRATOR BULB

Single Hand Operation, Vacuum or Pressure

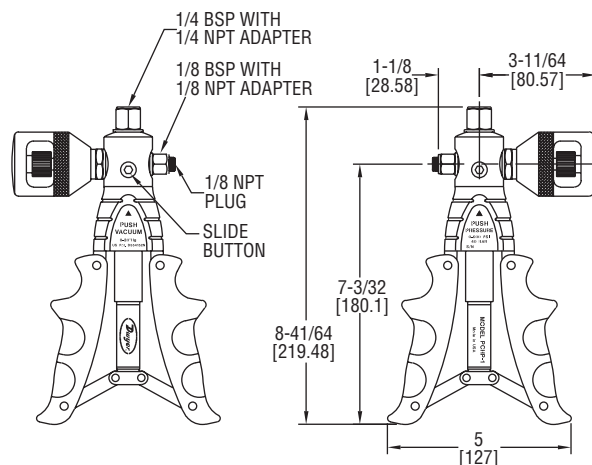


The **MODEL A-350** Aspirator Bulb can be used to source pressure for calibration and leak checking tests. Simply squeeze the bulb after the tubing is connected to generate pressure. For applications such as our CO<sub>2</sub> indicator, the aspirator bulb can be squeezed before inserting the tubing to draw a vacuum to pull the smoke or air from a duct or stack into the gage.

MODEL CHART	
Model	Description
A-350	Aspirator bulb

**Dwyer****SERIES PCHP****PNEUMATIC CALIBRATION HAND PUMP**

Generates up to 600 psi (40 bar), Comfort Grip Handles



The **SERIES PCHP** Pneumatic Calibration Hand Pump sources pressure and vacuum to check calibration of gages, switches, transmitters, and recorders. The contoured cushion handles provide extra comfort while preventing the pump from sliding.

**FEATURES/BENEFITS**

- Oversized check valve maintain smooth operation
- Dual O-rings on pistons ensure no leaks

**APPLICATIONS**

- Instrument calibration
- Laboratories
- Production areas

**ACCESSORY**

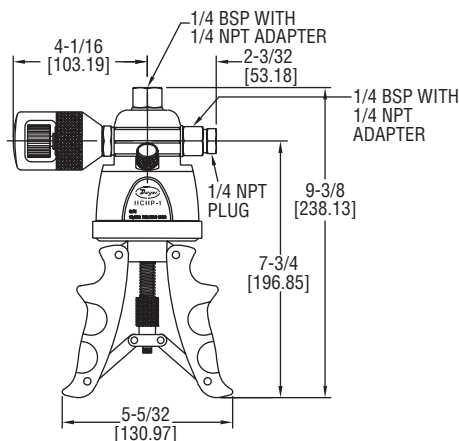
Model	Description
PCHP-HK	High pressure hose

**SPECIFICATIONS****Output Ranges:** -28 in Hg to 600 psi (-0.945 to 40 bar).**Process Connection:** 1/4" NPT/BSP.**Gage Connection:** 1/8" NPT/BSP.**Materials:** SS fittings, anodized aluminum housing, plastic/rubber handles, and nitrile O-rings.**Weight:** 2 lb (0.91 kg).**MODEL CHART**

Model	Description
PCHP-1	Pneumatic calibration hand pump
PCHP-1K	Pneumatic calibration hand pump with hose kit

**SERIES HCHP****HYDRAULIC CALIBRATION HAND PUMP**

Triple Filtration, Generates Pressure up to 10,000 psi (700 bar)



The **SERIES HCHP** Hydraulic Calibration Hand Pump utilizes a fully adjustable stroke control that allows for quick priming, easy pumping, and fast pressure generation up to 10,000 psi (700 bar). The ergonomically engineered handles provide extra comfort, while the triple filtration system ensures pump operation in spite of dirty conditions.

**FEATURES/BENEFITS**

- Oversized check valve maintain smooth operation
- Shatterproof reservoir and stainless steel construction guarantee no leaks

**APPLICATIONS**

- Instrument calibration
- Laboratories
- Production areas

**ACCESSORY**

Model	Description
HCHP-1F	Spare washer and filter kit

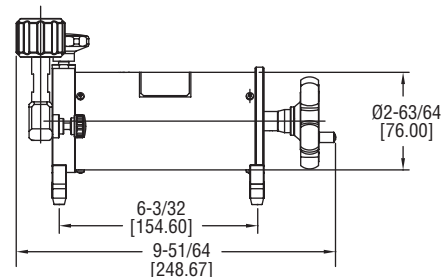
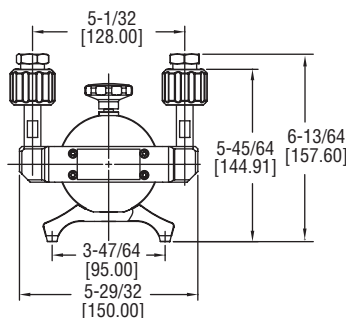
**SPECIFICATIONS****Output Ranges:** 0 to 10,000 psi (0 to 700 bar).**Process Connection:** 1/4" NPT/BSP.**Gage Connection:** 1/4" NPT/BSP.**Materials:** SS, polyurethane, anodized hard-coat aluminum, PTFE, and nitrile.**Weight:** 3 lb (1.36 kg).**MODEL CHART**

Model	Description
HCHP-1	Calibration hand pump
HCHP-1K	Calibration hand pump with hose kit



# LOW PRESSURE CALIBRATION PUMP

High Resolution for Calibrating Low Pressure Gages and Transmitters



The **MODEL LPCP** Low Pressure Calibration Pump is a low air pressure source with the ability to easily adjust and stabilize. It is made up of quick connectors for fast instrument connect and disconnect.

## FEATURES/BENEFITS

- Heat insulator between the cover and pressure chamber lessens the heat effect during micro-pressure calibration
- Highly stable adjustment

## APPLICATIONS

- Instrument calibration
- Laboratories
- Production areas

MODEL CHART	
Model	Description
LPCP-2	Low pressure calibration pump

## SPECIFICATIONS

**Media:** Air.  
**Output Ranges:** 5.8 psi (0.4 bar) vacuum to 5.8 psi (0.4 bar) positive pressure.  
**Pressure Resolution:** 0.01 Pa; 0.0001 mbar.  
**Process Connection:** M20\*1.5 or 1/4" NPT.  
**Gage Connection:** M20\*1.5 or 1/4" NPT.  
**Material:** Ram/adapters: 316 SS; Body: Steel/aluminum; Seals: Buna-N.  
**Weight:** 2.21 lb (1.0 kg).

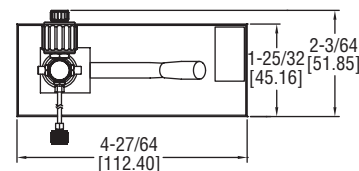
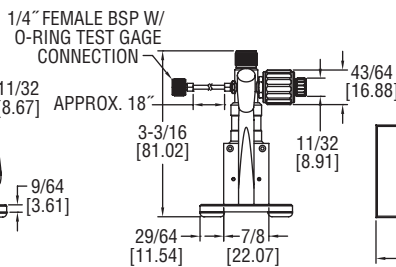
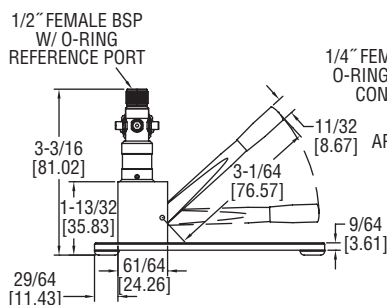
## ACCESSORY

Model	Description
A-113A	Fitting kit. Includes (1) 1/4" NPT to 1/8" quick connect fitting, (1) 1/4" NPT to hose barb fitting, (1) hose barb fitting to 1/8" quick connect fitting, (2) 19.7" (0.5 m) length of blue 1/8" O.D. tubing, (2) 12" (0.3 m) length of clear 1/4" O.D. tubing

## SERIES BCHP

# LOW PRESSURE CALIBRATION PUMP

Vacuum or Pressure, Generates up to 870 psi (60 bar)



The **SERIES BCHP** Low Pressure Calibration Pump is able to generate pressure and vacuum for adjusting or calibrating pressure gauges, transmitters, or switches. The pump is hand operated and has a pneumatic pressure range of -28 to 870 psi (-0.95 to 60 bar).

## FEATURES/BENEFITS

- Dual pressure ports for ease of use
- Fine adjustment valve ensures precise measurements

## APPLICATIONS

- Instrument calibration
- Laboratories
- Production areas

MODEL CHART	
Model	Description
BCHP-1	Calibration test pump
BCHP-KIT	Test pump with 1/4" NPT connections, fine volume adjustment tool and case

## SPECIFICATIONS

**Media:** Air.  
**Output Ranges:** -28 in Hg to 870 psi (-0.95 to 60 bar).  
**Process Connections:** 1/4" female BSP  
**Gauge Connection:** 1/2" female BSP.  
**Materials:** Anodized aluminum, brass, and ABS.  
**Weight:** 8.4 lb (3.8 kg).

## ACCESSORIES

Model	Description
A-BCHP-CASE	Case for BCHP-1
A-BCHP-NPT	1/4" BSP to 1/8" NPT, 1/4" NPT, 3/8" NPT and 1/2" NPT converter set for test connection
A-BCHP-VAT	Fine volume adjustment tool