

PALMER
INSTRUMENTS, INC.

INDUSTRIAL THERMOMETERS

New! Sky Blue Fill

Economy Line

Classic Line

Prover Tank

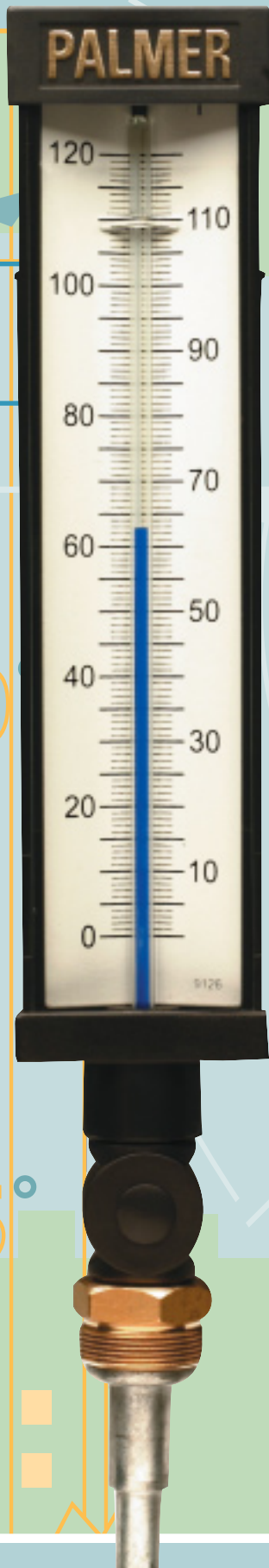
Air Duct

Water Lines

Narrow Case

All Angle

Multi-Sensing

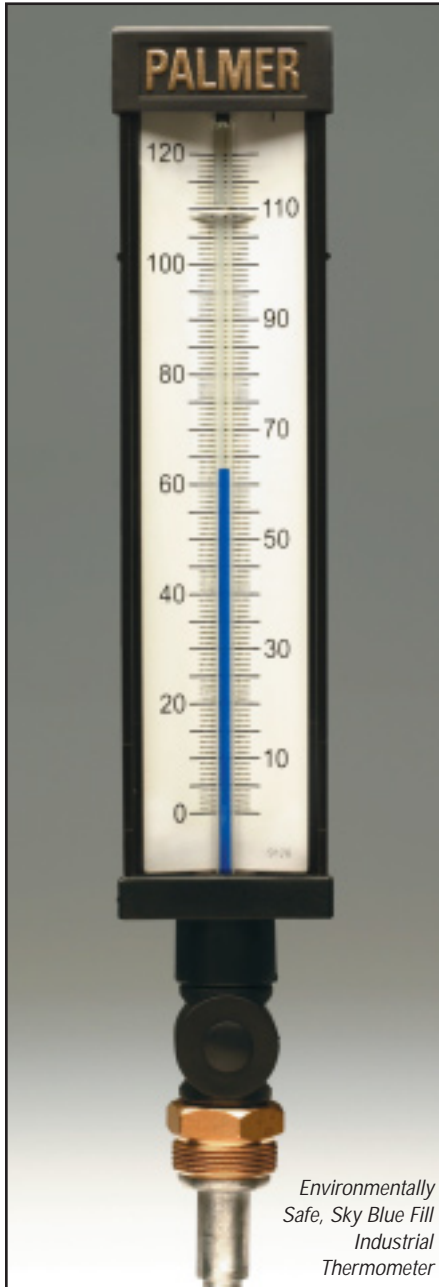


70

45°

PALMER Wahl
INSTRUMENTATION GROUP

Model 9AL • 9FL • 9ALSB • 9FLSB Economy Industrial Thermometers



• **NEW "SKY BLUE" Fill (SB) Environmentally Safe Models** are filled with a non-toxic, mercury-free Blue Liquid. **SB Models** are available in 9" Cases, with either 3-1/2" or 6" Stem Lengths, Ranges up to 300°F. Optional Red Spirit Fill also available.

• **Flex Angle Adjustment:** Just two screws permit cases to be rotated 180° and stems to be positioned in 10° increments. Users can "infinitely" adjust Economy Line Industrial Thermometers to virtually any viewing angle required.

• **Easy Readability:** Standard Lens front glass tube is "Red Reading" Mercury-Filled or Sky Blue Fill. Compact, yet visible 9" (229mm) Plastic or Aluminum, or 12" (305mm) Aluminum (only) cases, fitted with a "V" shaped white aluminum scale graduated with bold black lines and numerals.

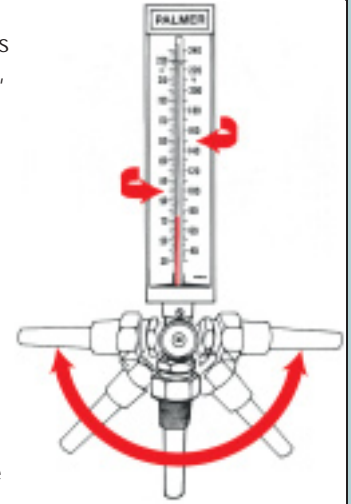
• **Accuracy:** Economy Line Industrial Thermometers are calibrated against standards traceable to the National Institute of Standards and Technology (NIST) and are guaranteed accurate to ±1 scale division.

• **Construction:** User selection of either tough, black-finished molded high temperature Plastic Case (**9FL Models**) or extruded, black-finished Aluminum Case (**9AL or 12AL Models**). Glass crystal, machined Brass Swivel Nut, and cast aluminum stem and seat are standard on all 3-1/2" stems.

• **Connection Assembly:** Tapered Bulb Chamber allows maximum metal-to-metal contact with matching tapered thermowell for fast response and increased accuracy. Brass Swivel Nut is industry standard 1-1/4" -18 UNEF thread.

• **Range and Stem Length Selection:** Full selection of Fahrenheit or Dual F & C Range scales available from -40 to 550°F (-40 to 290°C). Stock stem lengths are 3.5" (89 mm), 6" (152 mm), 8" (203 mm), 9" (229 mm), and 12" (305 mm).

• **Air Duct Construction:** Air Duct Models feature a super-sensitive bare bulb protected by a 3/4" diameter perforated brass bulb guard. This design allows exposure to circulating air while still protecting the glass tube from any impact.



TEMPERATURE RANGE CODES			
°F Range Codes	Div	Dual, °F & °C Range Codes	Div
-40/110F	2°F	-40/110F / -40/43C	2°F/2°C
0/120F	1°F	0/120F / -17/49C	1°F/0.5°C
0/160F	2°F	0/160F / -17/71C	1°F/0.5°C
20/180F	2°F	20/180F / -6/82C	2°F/1°C
30/240F	2°F	30/240F / 0/115C	2°F/1°C
30/300F	2°F	30/300F / -11/49C	2°F/1°C
<i>AL only</i> 50/400F*	5°F	50/400F / 10/204C*	5°F/2°C
<i>AL only</i> 100/550F*	5°F	100/550F / 40/290C*	5°F/2°C

* Not available in environmentally safe "Sky Blue" Fill

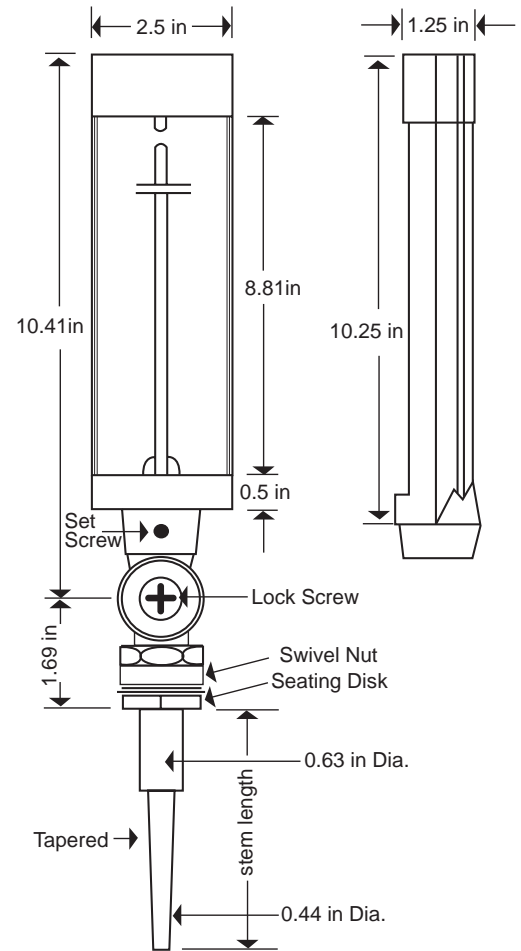
BASE MODEL NUMBERS									
	Aluminum Case				Plastic Case				
	Mercury Fill		Sky Blue Fill		Mercury Fill		Sky Blue Fill		
Case Size	9" Scale*	9" Scale*	9" Scale*	9" Scale*	9" Scale	9" Scale	9" Scale	9" Scale	9" Scale
Bulb Type	Tapered	Air Duct	Tapered	Air Duct	Tapered	Air Duct	Tapered	Air Duct	Air Duct
Stem Length:									
3.5" (89mm)	9AL3.5	N/A	9ALSB3.5	N/A	9FL3.5	N/A	9FLSB3.5	N/A	
6" (152mm)	9AL6	9ALAD6	9ALSB6	9ALADSB6	9FL6	9FLAD6	9FLSB6	9FLADSB6	
8" (203mm)	9AL8	N/A	9AL8**	N/A	9FL8	N/A	9FL8**	N/A	
9" (229mm)	9AL9	N/A	9AL9**	N/A	9FL9	N/A	9FL9**	N/A	
12" (305mm)	9AL12	9ALAD12	9AL12**	9ALAD12**	9FL12	9FLAD12	9FL12**	9FLAD12**	

* Optional 12" Aluminum Case available. ** Available in Red Spirit Fill only, add Code "RS" to Model Number

Model 9AL • 9FL • 9ALSB • 9FLSB

SPECIFICATIONS	
Form	All Angle Adjustable
Case	Painted Aluminum (AL) or molded Plastic (FL)
Case Size	9" (220mm) Plastic or Aluminum Case, optional 7" and 12" available
Stem Material	Standard cast Aluminum Stem and Seat
Stem Length	Listed in "Base Model" table, pg 2
Ranges	Listed in "Range" table, pg 2
Bulb	Choice of tapered Bulb Chamber or perforated Air Duct design
Fitting	1-1/4" - 18 UNEF machined Brass Swivel Nut
Scale Face	High visibility V-shaped painted white aluminum scale, black markings
Glass Tube	"Red Reading" Mercury Fill, Sky Blue Fill, Red Spirit Fill optional
Crystal	Glass Crystal Standard
Accuracy	Accurate to ± 1 scale division
Calibration	Calibrated to NIST traceable standards
Warranty	One year limited warranty

OPTION CODES	
Options Description	How to Order
7" (178 mm) Case (Sky Blue not available)	Substitute "7" in place of "9" inch Scale in Base Model No. Table
12" (305 mm) Case (Sky Blue not available)	Substitute "12" in place of "9" inch Scale in Base Model No. Table
Brass Stem and Seat	Option code "B"
Plastic Crystal	Option code "PC"
Red Spirit Fill (300°F/150°C limit)	Option code "RS"
Stainless Steel Stem/Seat material	Option code "S"
Adjustable, Tilting Air Duct Flange	Order Part No. "58" as a separate item
Flanged Union Connection	Order Part No. 1140-9 or 1141-9, see p.6

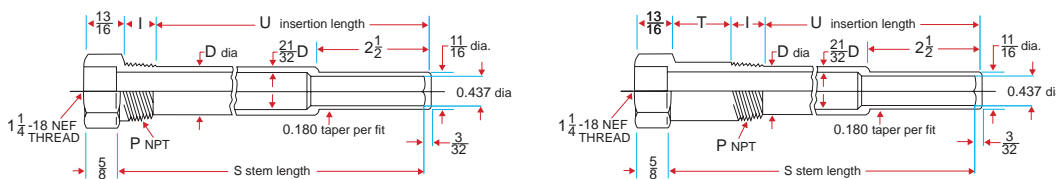


Dimensions for 9" Case Models

	Base Model No.	Temp. Range	Option Code
Sample Model Number	9FLAD6	30/240F & C	B
Sample Description	9" Case Plastic Case Air Duct 6" Stem	30/240°F & 0/114°C Dual Scale Range	Brass Stem and Seat

ECONOMY THERMOWELLS							
Well Material	REGULAR SERIES THERMOWELLS			LAGGING EXTENSION THERMOWELLS			
	Stem lgth. "S"	Insertion lgth. "U"	Model No.	Stem lgth. "S"	Insertion lgth. "U"	Lagging Ext. "T"	Model No.
Cast Brass	3.5"	2.5"	1140-203-01A	3.5"	1.75"	1"	1141-203-01A
Cast Brass	6"	5"	1140-206-01A	6"	2.5"	2.5"	1141-206-01A
Mach. Brass	8"	7"	1140-208-01	8"	4"	3"	1141-208-01
Mach. Brass	9"	8"	1140-209-01	9"	5"	3"	1141-209-01
Mach. Brass	12"	11"	1140-212-01	12"	8"	3"	1141-212-01

For a full listing of Industrial Thermometer Thermowells and Union Connections, Please Request catalog No. 1100



Air Duct Stem Model with Bare Bulb

Calibration Services Available

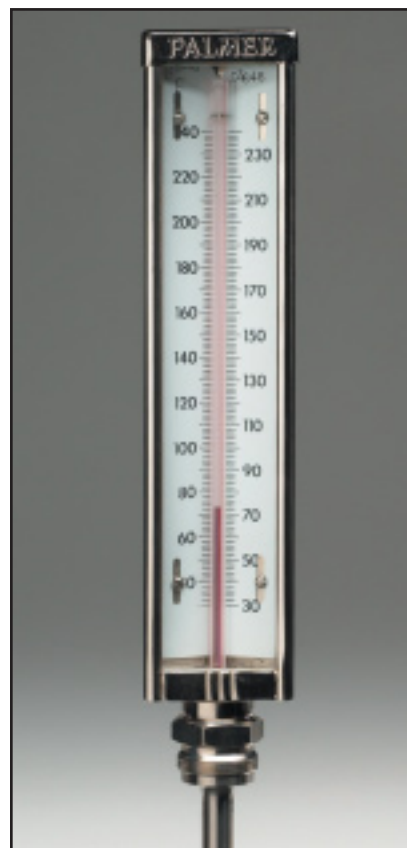
Industrial Thermometers

Classic Industrials

200 Series • 300 Series

Classic Industrials

Mercury Thermometers are the most reliable thermometers in the world. Palmer Industrial Thermometers set industry standards for accuracy, quality, and rugged operation. With looks to match their performance, these classic thermometers are designed and constructed for long-term industrial process service. For some applications requiring maximum response time using a union instead of a thermowell, specify one piece stem and bulb.



Model 209 Straight Industrial Thermometer

SPECIFICATIONS	
Case	Extruded "V" shaped brass with chrome finish in 9" or 12" size
Case Styles	Straight, 90° Back Angle, Left Side, Right Side, Incline, or Recline Angle
Glass Tube	Red Reading lens glass thoroughly annealed & aged for permanent accuracy. Individually calibrated.
Scales	Numerals and graduations are either printed on a painted metal scale, or individually engraved for each glass tube. See table below. Optional Dual Scales available
Connection	1-1/4" UNEF-18 Brass Swivel Nut connection is standard. Stainless Steel optional
Bulb:	Tapered design for maximum contact and heat transfer from Thermowell Stem and Bulb are Stainless Steel
Crystal Glass	Instrument Quality Glass, Plastic optional
Fill	"Red Reading" Mercury Fill Standard, Red Spirit Fill optional
Styles	Standard Case styles, Ranges and Stem Lengths are listed below Contact the factory for custom models and special needs
Accuracy	±1/2 scale division, ±1 scale division if Red Spirit Filled. Special calibration from customer-supplied set points available
Wells & Fittings	Palmer Industrial Thermowells are listed in Palmer Catalog PW1100

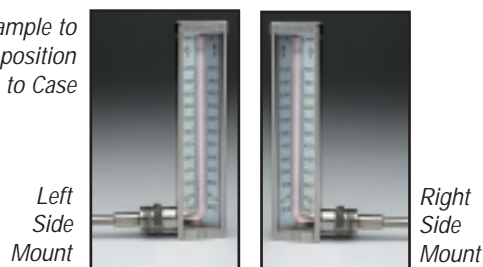
STANDARD RANGE CODES					
CODE	9" CASE	12" CASE	CODE	9" CASE	12" CASE
°F	DIV	DIV *	°C	DIV	DIV
0/100F	1°	0.5° *	-18/40C	1°	0.5°
0/100F&R	1°	0.5° *	0/80C	1°	0.5°
30/180F	2°	1° *	0/115C	1°	1°
30/240F	2°	2° *	0/150C	2°	1°
170/270F&P	1°	1° *	10/205C	2°	2°
30/300F	2°	2° *			
50/400F	5°	2° *			
200/400F	2°	2° *			

* Engraved Scale Standard

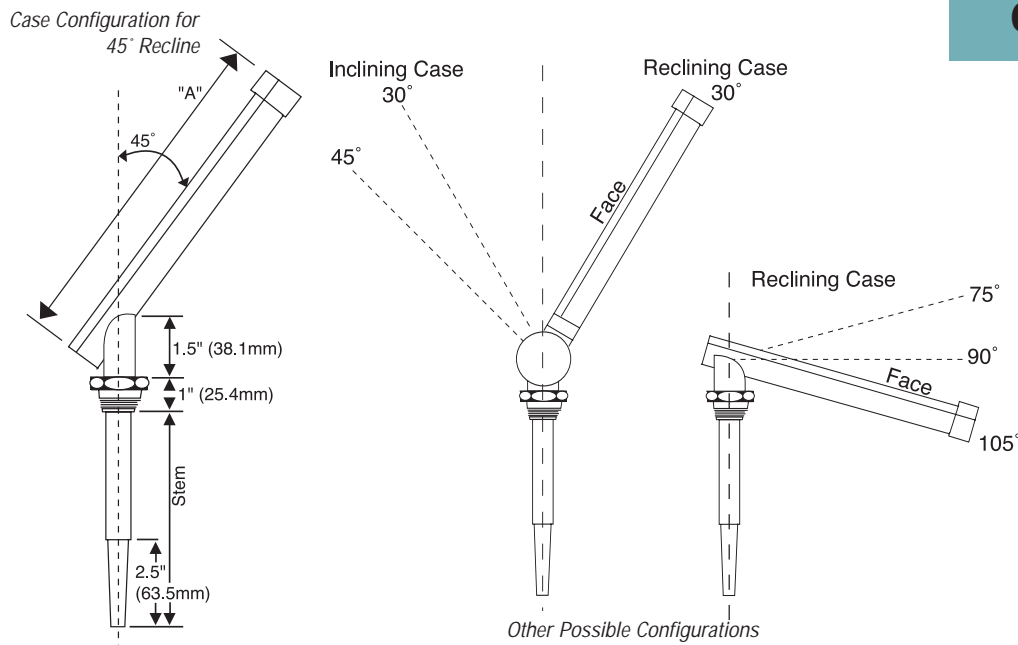
OPTIONAL RANGE CODES (ENGRAVED SCALES)					
CODE	9" CASE	12" CASE	CODE	9" CASE	12" CASE
°F	DIV	DIV	°C	DIV	DIV
-40/110F	2°	1°	-40/45C	1°	0.5°
-30/130F	2°	1°	40/265C	2°	2°
0/160F	2°	1°	95/405C	2°	2°
170/270F	1°	1°			
180/360F	2°	2°			
180/360F&P	2°	1°			
200/300F	1°	1°			
250/400F	2°	2°			
100/550F	5°	5°			
150/600F	5°	5°			
200/750F	5°	5°			

BASE MODEL NUMBERS		
CASE STYLE	200 SERIES 12" SCALE	300 SERIES 9" SCALE
Straight	209	309
Left Side Angle*	268L	368L
Right Side Angle*	268R	368R
Back Angle 90°	229	329
Incline 30° Angle	249-30I	349-30I
Incline 45° Angle	249-45I	349-45I
Recline 30° Angle	249-30R	349-30R
Recline 45° Angle	249-45R	349-45R
Recline 75° Angle	249-75R	349-75R
Recline 105° Angle	249-105R	349-105R

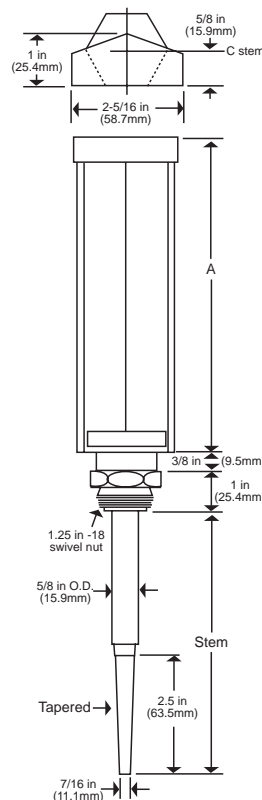
* Example to show position of Stem to Case



200 Series • 300 Series



Straight Case Configuration



ORDERING INFORMATION

To select a thermometer, please specify the following:

- 1) Base Model Code for case size and case style from the table on page 4.
- 2) Stem Length Code from the table to the right.
- 3) Range Code from tables on page 4.
- 4) Specify any required options from the Option Codes table below.

OPTION CODES			
Option	Code	Option	Code
Case Drain Holes	DH	Dual Scale	DS
One-Piece Stem/Bulb	OPS	Red Spirit Fill (up to 300°F)	RS
Special Engraved Scale	ES	304 SS Swivel Nut	SN
Plastic Crystal	PC		

STEM LENGTH CODES		
CODE	LENGTH	
	IN.	MM
3.5	3.5	89
6	6	152.4
8	8	203
12	12	305
18	18	457
24	24	610
30	30	762
36	36	914
42	42	1067
48	48	1219

Sample Model Number	329	3.5	30/240F	(RS)
Sample Description	90° Back Angle, 9° Case	3.5" Stem Length	30 to 240°F Range	Red Spirit Fill Option

PROVER TANK INDUSTRIAL THERMOMETERS

Prover Tank Thermometers

- Range: 10/ to 120°F, (1/2° divisions)
- Over-range reservoir to 150°F
- Nickel Scale to resist gasoline vapors.
- 12" Case only

PROVER TANK 12" Base Model Numbers

Stem Length	Straight	90° Back Angle	Left Side Mount	Right Side Mount	30° Incline Mount	30° Recline Mount
3.5"	210P3.5	210PBA3.5	210PLS3.5	210PRS3.5	210PI3.5	210PR3.5
6"	210P6	210PBA6	210PLS6	210PRS6	210PI6	210PR6
8"	210P8	210PBA8	210PLS8	210PRS8	210PI8	210PR8
12"	210P12	210PBA12	210PLS12	210PRS12	210PI12	210PR12

NOTE: Longer Stem Lengths available on request.

Add Range Code (10/120F) to Base Model Number above to complete a Prover Tank Model number.

Calibration Services Available

Industrial Thermometers

All Angle

Model 3AA • 2AA

All Angle Thermometers

Palmer All Angles are a versatile solution to many problems encountered in ordering, stocking, and replacing Industrial Thermometers. One thermometer can be "infinitely" adjusted to virtually any installation and viewing angle, greatly simplifying engineering and purchasing operations. Their versatility also aids in keeping both the inventory of "back-up" replacement thermometers and process down time at a minimum.

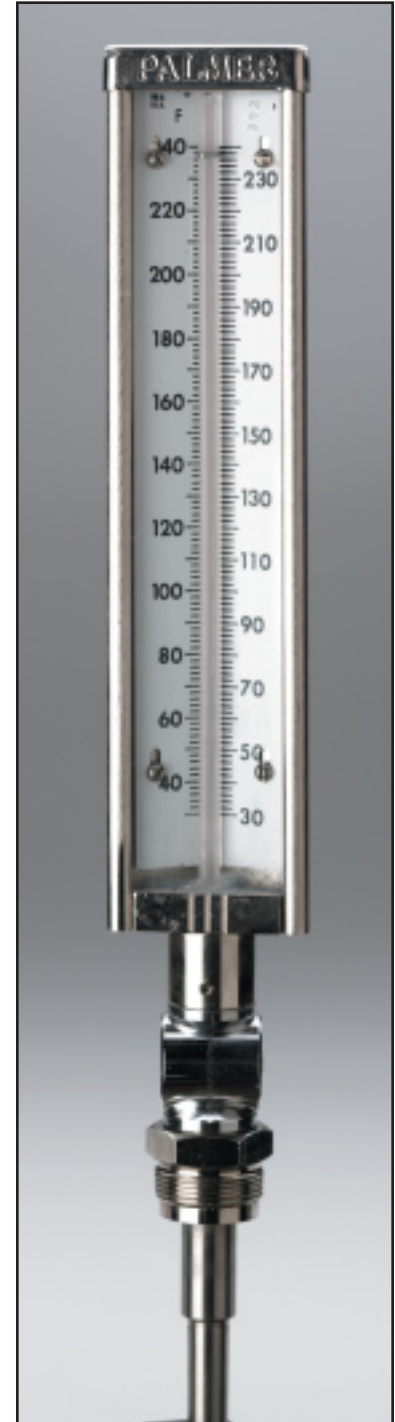
- **Model 3AA** 9" Long (229mm) Wide Case or **Model 2AA** 12" Long (178mm) Wide Case
- Red Reading, Mercury-Filled tubes for high visibility & accuracy, Red Spirit Fill optional
- 1-1/4"-18 UNEF Brass Swivel Nut for fast, easy installation
- Durable, rugged design for maximum versatility
- Accuracy within 1/2 scale division
- Full choice of stem lengths, temperature ranges, and options

SPECIFICATIONS		
	3AA	2AA
Case Length	9" (229mm)	12" (305mm)
Case Width	2.25" (57mm)	2.25" (57mm)
Case Material	Aluminum	Aluminum
Crystal	Instrument Glass	
Scales	Metal scales with black numerals & graduations on baked enamel finish	
Glass Tube	Red Reading lens glass thoroughly annealed & aged for permanent accuracy. Individually calibrated. Red Spirit Fill optional (up to 300°F)	
Swivel Nut	1-1/4" -18 UNEF Brass*	1-1/4" -18 UNEF Brass*
Bulb Chamber	Stainless steel, tapered 0.437" (11mm)	Stainless steel, tapered 0.437" (11mm)
Accuracy	Within 1/2 scale division	

* Stainless Steel optional

STEM LENGTH CODES		
CODE	LENGTH	
	IN	MM
3.5	3.5"	89
6	6"	152
8	8"	203
12	12"	305

STANDARD RANGE CODES			
°F CODE	DIV	°C CODE	DIV
-30/130F	2°	-35/55C	1°
0/100F	2°	-18/40C	2°
30/180F	2°	0/80C	2°
30/240F	2°	0/115C	1°
30/300F	2°	0/150C	2°
50/400F	5°	10/205C	2°



Model 3AA All Angle

THERMOWELLS AND FITTINGS

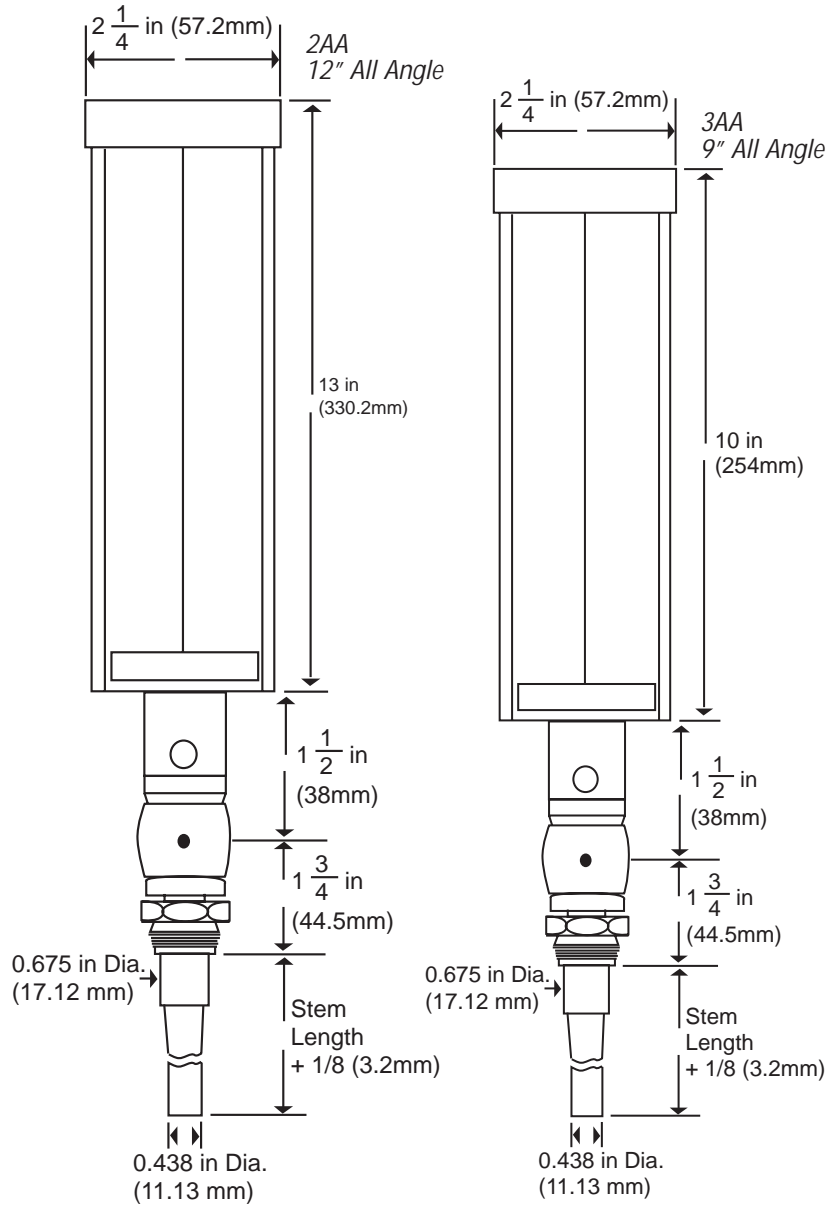
- For Tapered Bulbs (3AA) use 1140 Series Thermowells and Fittings

For a complete listing of Palmer Thermowells and Fittings, request Catalog PW1100.

Model 3AA • 2AA



All Angle Profile



ORDERING INFORMATION

To select a thermometer, please specify the following:

- 1.) Base Model Number:
 3AA 9" Case All Angle
 2AA 12" Case All Angle
- 2.) Add Stem Length Code from table on page 8.
- 3.) Add Temperature Range Code from table on page 8
- 4.) Specify any required options from the Option Code table at right.

OPTION CODES

Option	Code	9" (3AA)	12" (6AA)
Drain Holes	DH	✓	✓
Dual Scale	DS	✓	✓
Engraved Scale	ES	✓	Standard
One Piece Stem	OPS	✓	✓
Plastic Crystal	PC	✓	✓
Red Spirit Fill	RS	✓	✓
SS Swivel Nut	SN	✓	✓

✓ Available for this Model.

Sample Model Number	3AA	6	30/180F	ES
Sample Description	9" Case All Angle	6" Stem Length	30° to 180° F Range	Engraved Scale Option

Calibration Services Available

Industrial Thermometers

Multi-Sensing

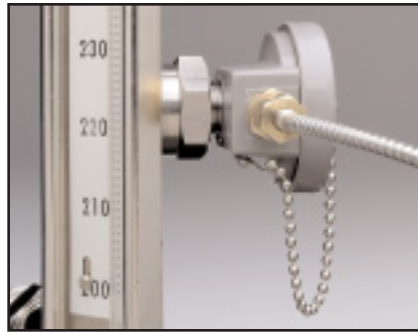
Multi-Sensing Industrial Thermometers

Palmer Multi-Sensing Industrial Thermometers easily integrate into computerized monitoring and control systems while retaining analog instrumentation reliability as an important backup reference. Multi-Sensing Industrial Thermometers also have the advantage of retrofitting electronic sensors into existing wells without additional electrical or mechanical connections. Now available with Wahl Thermocouple or RTD Sensors, matching Meters, Calibrators, and Accessories for a total Multi-Sensing Thermometer package.

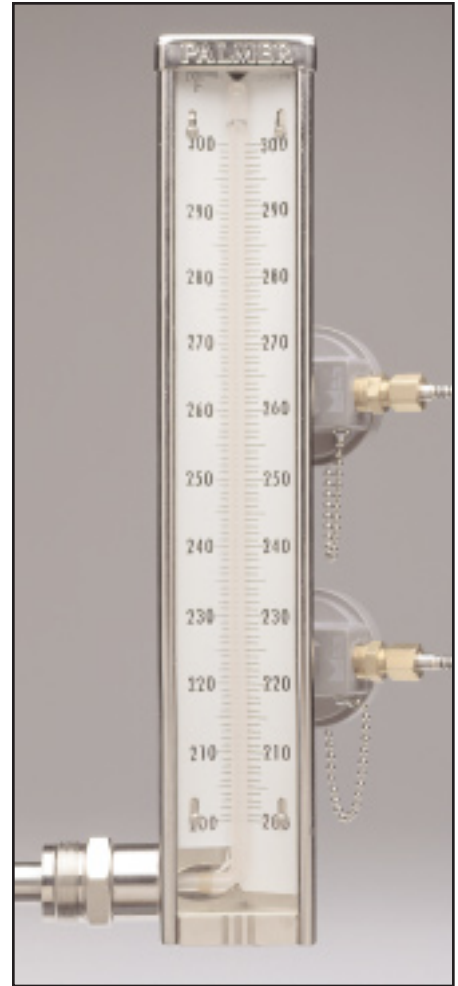
- **Durable and Accurate:** Liquid-in-glass Industrial Thermometer with One or Two Electronic Temperature Sensors and Output connections.
- **9" or 12" Case Sizes:** Full selection of Case Angle styles.
- **Swivel Nut Connection:** 1/4" -18 UNEF Brass Swivel Nut Connection (Stainless Steel option).
- **Individually Calibrated:** Metal scales are individually calibrated to annealed and aged glass tubes for long term accuracy and reliability.
- **Maximum Metal to Metal Heat Transfer:** Tapered Bulb design for maximum metal to metal heat transfer with resulting accuracy and speed of response.
- **Sensors:** Available with One or Two RTD or Thermocouple Electronic Sensors
- **Select:** 2, 3, 4-Wire, 385 DIN Pt100 RTD, or Type J or K Thermocouple.
Other Sensor types available on request.



RTD Meter Connection (option M) on back of Industrial to Wahl 392M



Close-up of Terminal Block with 1/2" Conduit Connector (option T).



Terminal block with 1/2" diameter Conduit Connector. One or Two Electronic Sensor/Output Connections can be specified.

WAHL METER SPECIFICATIONS

	RTD Meter		Type K Thermocouple Meters			
Model Numbers	392EF (°F) 392EC (°C) 392ED (°F & °C)	392MF (°F) 392MC (°C) 392MD (°F & °C)	2500M (°F) 1370M (°C) N/A	2500MVX (°F) 1370MVX (°C) N/A	TM-410 (°F & °C)	TM-500 (°F & °C)
Range	-290 to 1450°F -180 to 788°C	-60 to 752°F -51 to 400°C	-100 to 2500°F -70 to 1370°C	-100 to 2500°F -70 to 1370°C	-40 to 1999°F -40 to 1092°C	-328/2498°F -200/1370°C
Display Type	LED	LED	LED	LCD	LCD	LCD
Power Source	6.25V Rechg. battery pack	6.25V Rechg. battery pack	6.25V Rechg. battery pack	one 9V. battery	three AAA batteries	one 9V. battery
Resolution	0.1° from -290 to 375°F (190°C) Auto Ranges 1° above 375°F	0.1° to 375°F (190°C) Auto Ranges 1° above 375°F	1.0 °F or °C	1.0 °F or °C	0.1° at -40 to 199.9°F or °C 1.0° 200°F and above	0.1°, °F or °C
Input Connector	3 Conductor	3 Conductor	Standard Thermocouple Mini Connector			
Meter Accuracy at 77°F	±0.1°F/C ± one digit @ 32°F/°C	±0.1°F/C ± one digit @ 32°F/°C	±0.2% of reading ± one digit @ 77°F	±0.2% of reading ± one digit @ 77°F	±°F at 32 to 200°C ±0.5°C at 0 to 93°C	±0.5% of reading +1.4°F(0.7°C)@ 77°F
Features	Auto Range	Auto Range	Auto Zero	Auto Zero	Low Battery	Dual Input

Multi-Sensing Industrial Thermometers

OPTIONS AND ORDERING INFORMATION

BASE MODEL NUMBER

CASE STYLE	9" CODE	12" CODE
All Angle	3AA	2AA
Straight	309	209
90° Back	329	229
Left Side Angle	368L	268L
Right Side Angle	368R	268R
Incline Angle	349I	249I
Recline Angle	349R	249R

To select a Multi-Sensing Thermometer, specify the following from the tables below:

- 1) Base Model Number from table at left
- 2) Stem Length Code from table at left
- 3) Add Temperature Range Code from table below left
- 4) Select Sensor Code 1 and 2 (if applicable) from table below
- 5) Select Connection Code 1 and 2 (if applicable) from table below
- 6) Select Option Code from table below.

STEM LENGTH CODES

CODE	IN.	MM
2.25	2.25	57.2
3.5	3.5	89
3.75	3.75	95.3
4.75	4.75	120.7
6	6	152.4
8	8	203
9	9	229
12	12	305
18	18	457
24	24	610
30	30	762
36	36	914
42	42	1067
48	48	1219

Sample Model Number

Case	Stem	Range	Sensor 1	Connection 1	Sensor 2	Connection 2	Options
309	3.5	0/240F	K	MC	R3	T	(DH)

*Use XX in part number if 2nd Sensor and Connection are not applicable.

SELECT SENSOR 1 AND SENSOR 2

SELECT SENSOR 1 AND SENSOR 2	CODE
Type J Thermocouple	J
Type K Thermocouple	K
Pt100-2 wire Thin Film RTD (385 DIN)	RT2
Pt100-3 wire Thin Film RTD (385 DIN)	RT3
Pt100-4 wire Thin Film RTD (385 DIN)	RT4
Other Sensors available upon request	

STANDARD RANGE CODES

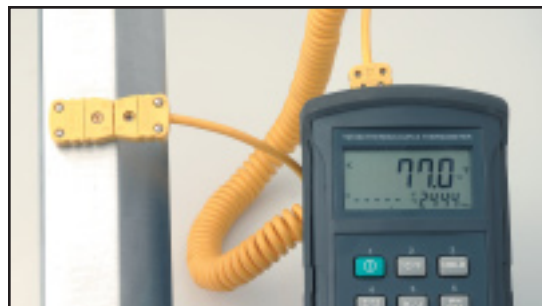
CODE	9" CASE	12" CASE	CODE	9" CASE	12" CASE
°F	DIV	DIV	°C	DIV	DIV
0/100F	1°	0.5°	-18/40C	1°	0.5°
0/100F&R	1°	0.5°	0/80C	1°	0.5°
-30/130F	2°	1°	0/115C	1°	1°
30/180F	2°	1°	0/150C	2°	1°
30/240F	2°	2°	10/205C	2°	2°
170/270F	1°	1°			
170/270F&P	1°	1°			
30/300F	2°	2°			
200/300F	1°	1°			
200/300F&P	1°	1°			
50/400F	5°	2°			
200/400F	2°	2°			

SELECT CONNECTION 1 AND CONNECTION 2

SELECT CONNECTION 1 AND CONNECTION 2	CODE
RTD Meter Connection to Wahl 392 M only	M
Terminal Block & 1/2" Conduit Connector for RTD or Thermocouple	T
Thermocouple Mini Connector	MC
Other Connections available upon request	

OPTION CODES

CODE	DESCRIPTION
DH	Drain Holes
ES	Engraved Scales
PC	Clear Plastic Crystal
RS	Red Spirit Fill*
SN	SS Swivel Nut



Thermocouple Mini Connection (option MC) on back of Industrial Case to Wahl TM500

* Required for ranges beginning below -40°F/°C; maximum up to 300°F/150°C

Calibration Services Available

(800) 421-2853 • FAX (828) 658-0728 • www.palmerwahl.com