D-M-E Temp-Sure™
DIGITAL PYROMETER

PYROMETER KIT (TS-2000)

The D-M-E TEMP-SURE™ Digital Pyrometer is an accurate, hand-held instrument designed for measuring air, gas, liquid or surface termperatures. The TEMP-SURE pyrometer has both °F and °C operational capabilities, with temperature ranges from −30° to 2000°F or −35° to 1095°C. The 100% solid-state TEMP-SURE pyrometer features PEAK HOLD and MEMORY circuitry. The PEAK HOLD circuit displays and holds the highest temperature sensed — even after the sensor is removed from the tested surface. The unique MEMORY circuit feature holds peak temperature readings after the instrument is turned off, eliminating the possibility of its accidental loss.

The TEMP-SURE Digital Pyrometer is powered by one nine-volt alkaline or carbon-zinc battery and readings are displayed in large 0.50" (12.70 mm) digital LCDs. The bold, black liquid crystal numbers are easily read in all lighting conditions. The display includes a low battery indicator.

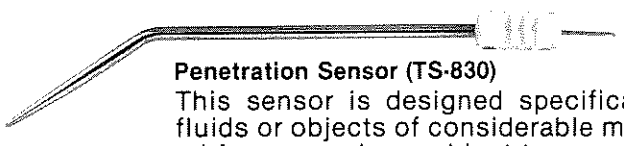
The D-M-E TEMP-SURE™ Digital Pyrometer is available in kit form, which includes the pyrometer, the straight surface sensor, the sensor handle and the holster-style carrying case. All of these items and the following sensors are available separately.

Straight Surface Sensor (TS-700)

45° Surface Sensor (TS-745)

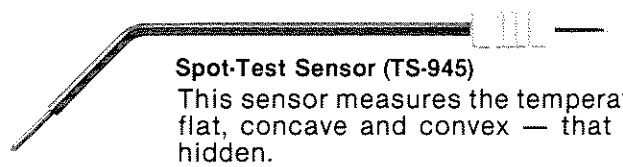
90° Surface Sensor (TS-790)

The TEMP-SURE Surface Sensors are designed to measure external surface temperatures of extruder barrels, nozzles, dies, hot plates, steam lines, boiler and tube walls, and other applications where internal measurements are not possible. The 45° and 90° Surface Sensors accurately measure surface temperatures of areas inaccessible to the standard straight sensor.



Penetration Sensor (TS-830)

This sensor is designed specifically for insertion into fluids or objects of considerable mass, and is not intended for measuring ambient temperatures.



Spot-Test Sensor (TS-945)

This sensor measures the temperatures of all surfaces — flat, concave and convex — that are hard to reach and hidden.

SPECIFICATIONS

Pyrometer Catalog Number: TS-200
Temperature Range: −30° to 2000°F (−35° to 1095°C)
Accuracy: 1° up to 600°F and 1/3 of 1% or better up to 2000°F (1093°C) ± 1 digit
Resolution: 1°F or 1°C
Sensor Connection: polarized plug
Damaged Sensor/Over Range: reads −400 or greater
Ambient Temperature Range: 40° to 120°F (4° to 50°C) ± 1 degree
Useable Ambient Temperature Range: 17° to 127°F (−8° to 53°C)
Repeatability: 1 degree
Update Reading: response time 1/3 second
Display: 0.50" (12.70 mm) high, black liquid crystal digits
Peak Hold Circuit: holds and displays highest sensed temperature
Memory Circuit: prevents peak temperature reading loss after the instrument is turned off
Peak Hold Depreciation Rate: 1°F maximum change per minute (typical change is 1°F per 1.75 minutes)
Battery Life: approximately 800 hours of service with one nine-volt alkaline battery
Low Battery Indicator: When "LO BAT" appears on the display, there is approximately 10 hours of continuous use time left.
Pyrometer Body Material: formed aluminum
Weight: 8.5 ounces (252 kg)
Dimensions: 6-3/16" x 3" x 1-3/16" (132 mm x 76.2 mm x 30.2 mm)
Body Color: anodized blue

CATALOG NUMBER	DESCRIPTION	PRICE
TS-2000	D-M-E Temp-Sure™ Digital Pyrometer Kit (Kit Includes: Pyrometer, Straight Surface Sensor, Sensor Handle and Holster-Style Carrying Case)	$396.00
TS-700*	Straight Surface Sensor	42.00
TS-745*	45° Surface Sensor	46.25
TS-790*	90° Surface Sensor	47.50
TS-830*	Penetration Sensor	60.00
TS-945*	Spot-Test Sensor	59.00
TS-350*	Sensor Handle (5¾" Long) (Cable: 36¼" Long)	62.00
TS-650	Holster-Style Carrying Case	22.00
TS-200	D-M-E Temp-Sure™ Digital Pyrometer (Only)	270.00

*Sensor Handle and Sensors are Compatible with Both Previously Available Pyrometer Models DP-90F and DP-90C.

SENSOR TYPE	RESPONSE TIME[1] (SECONDS)	MEDIUM[2]	CONTINUOUS TEMPERATURE LIMIT	MAXIMUM TEMPERATURE SHORT INTERVAL	DIMENSIONS (INCHES)	
					O.D.	LENGTH
Surface	2 Seconds*	600°F Stainless Steel	1500°F Maximum	2000°F †	.500	1.375 Approx.
Spot-Test	2 Seconds**	600°F Stainless Steel	1000°F Maximum	1050°F †	.080	4.125 @ 45°
Penetration	6 Seconds***	Molten Metal @ 1000°F	2000°F Maximum	2100°F †	Point	4.50 @ 30°

*Total Temperature @ 6 to 10 Seconds
**Total Temperature @ 8 to 10 Seconds
***Total Temperature @ 3 Seconds
† Not Recommended to Exceed

NOTES:
1. Response Time: Time to reach 63% of a temperature step change.
2. Medium: Medium for response time. Response times vary with different media.

D-M-E Company
29111 Stephenson Highway
Madison Heights, MI 48071

CALIBRATION PROCEDURE

DME TEMP-SURE
MODEL TS-200

The following is the procedure used to calibrate a K-type thermocouple Temp-Sure:

The two controls to look for will be on the right side of the instrument painted with red paint.

The Z control is for the low-end calibration. The low set point is 32 degrees F. This control will be on the lower right.

The G control is for the high-end calibration. The high set point is 600 degrees F. If your instrument goes to 2000 degrees F, use 1600 degrees F as your high set point.

Once these points have been set, your instrument should be in calibration.

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CALIBRATION PROCEDURE

The following information is provided in accordance with your request for calibration data. If the details contained herein indicates a calibration deviation, which cannot be corrected as per this information, then the instrument should not be recalibrated on your premises and will have to be returned to EDL for replacement of either specialized resistors or other basic circuit elements.

POCKET-PROBE Digital and DYNA-TEMP Digital pyrometers should maintain calibration after years of use. High quality, high accuracy resistors are used in all critical circuits. All amplifiers are burned-in and selected to minimize aging problems and long-term drifts. If this calibration data does not enable you to calibrate the instrument, please contact EDL for further assistance.

THE FOLLOWING CALIBRATION TRIMMERS ARE CONTAINED IN ALL EDL INSTRUMENTS:

Trimmer "A" or "Z" - Room Temperature bias Trimmer
Trimmer "B" or "T" - Cold End Compensation Trimmer
Trimmer "G" - Sets HIGH TEMPERATURE VALUE...All Version "B" Instruments
Trimmer "H" - Sets HIGH TEMPERATURE VALUE...All Version "A" Instruments

CAUTION...TRIMMER ADJUSTMENTS

The Trimmers on POCKET-PROBE Digital and DYNA-TEMP Digital pyrometers are sealed with both BLUE and RED Lacquers.

...Trimmers sealed with BLUE LACQUER are factory set and MUST NOT BE ADJUSTED.
...ADJUST only Trimmers sealed with RED LACQUER..A or (Z), B or T, (G) and H.

THERE ARE NO EXCEPTIONS TO THIS CAUTION!

TABLE 1

EDL INSTRUMENT ACCURACY ± 1 DIGIT

MODEL	TYPE	CALIBRATION TEMP. °F (1)	INSTRUMENT READING °F	°C	CALIBRATION TEMP. °F (1)	INSTRUMENT READING °F	°C	CALIBRATION TEMP. °F (1)	INSTRUMENT READING °F	°C
22-23	K	32°	= 32°	0°	212°	= 211°	99/100°	600°	= 600°	316°
223	K	32°	= 32°	0°	212°	= 211°	99/100°	600°	= 600°	316°
24-25	K	32°	= 31/32°	-0°	212°	= 213°	100/101°	1500°	= 1504°	818°
245	K	32°	= 31/32°	-0°	212°	= 213°	100/101°	1500°	= 1504°	818°
267	K	32°	= 32°	0°	212°	= 212°	100°	1700°	= 1700°	927°
289	K	32°	= 32°	0°	212°	= 212/213°	100/101°	1400°	= 1401°	761°
423	J	32°	= 32°	0°	212°	= 212°	100°	500°	= 501°	266°
445	J	32°	= 32°	0°	212°	= 211°	99/100°	1400°	= 1407°	764°
467	J	32°	= 32°	0°	212°	= 212°	100°	1000°	= 1001°	538°
48	J	32°	= 31/32°	-0°	212°	= 211°	99/100°	1000°	= 1001°	538°
489	J	32°	= 31/32°	-0°	212°	= 211°	99/100°	1000°	= 1001°	538°
623	E	32°	= 32°	0°	212°	= 211°	99/100°	250°	= 251°	122°
645	E	32°	= 31/32°	-0°	212°	= 211°	99/100°	1450°	= 1448°	787°

(1) Use a suitable standard; such as EDL's PRACTI-CAL Calibrator or equivalent.

NOTICE ... POCKET-PROBE Pyrometers have the Trimmer designations A or Z, ~~B or T~~, G and H located on the edge of the circuit boards in front of the Trimmers.

CAUTION ... DO NOT, UNDER ANY CONDITIONS, OR FOR ANY REASON, BREAK ANY SEALS OR ADJUST ANY TRIMMERS other than those distinctly lettered A or Z, B or T, G and H.

ONLY INSTRUMENTS PRODUCED AFTER JANUARY 1981 HAVE BLUE AND RED TRIMMER SEALING LACQUER.

CALIBRATION PROCEDURE:

1. Before beginning the calibration check and the calibration procedure, observe the battery to make sure that it is within operational voltage.

2. Each instrument has a calibration tolerance as per the instrument accuracy chart. This error can vary PLUS or MINUS from the true temperature value. Therefore, at many temperatures the readings will be precise. At other temperatures, the PLUS or MINUS error will be present. However, at the HIGH TEMPERATURE VALUE calibration point, THE STIPULATED ERROR SHOULD BE PRESENT AND EXACT, as per Table 1.

3. Make an ice bath reference by placing shaved or crushed ice into a wide mouth Aladdin Vacuum or Thermos bottle. Approximately 1/8" or 1/4" of water should be floating on top of the crushed or shaved ice. Insert the sensor plug into the instrument and place the sensor into the center of the ice bath. ALL instruments should have an ice point reading of 32°F or 31°F, and -0°C or 0°C, as per the listing in Table 1.

   Adjust Trimmer "A or Z" to obtain the 31°F or 32°F reading; this should correspond with the particular instrument MODEL CODE requirement, as listed in Table 1. We recommend that you use either an EDL PRACTI-CAL Thermometer/ Calibrator or a TRU-CAL Calibrator. If any other system is used, it should be a high-accuracy Potentiometer type calibration system, 0.1% accuracy or better. NOTE: On all version "A" instruments, a resistor of the proper value must be inserted from Table 2. The temperature values must be SET EXACTLY, therefore, your calibration device MUST POSSESS the required 0.1% or better accuracy. Be sure that you know the Model Code Number of the instrument being calibrated and adjust Trimmer "G" or ~~"H"~~ depending upon the instrument version, ~~"A"~~ or "G".

4. Stabilize instrument for one hour at 80°F. Apply proper millivolts to accurately check the high temperature calibration value for the particular instrument model code, as indicated in Table 1. Then check 0°F, 32°F and 212°F. Temperatures above 600°F can only be used as check points on those model code instruments, which have a range covering such temperatures. Be sure to make a written note of the true temperature value and the pyrometer readout temperatures for future comparison. If the high temperature calibration value is exact, and if 32°F is as per the model code listing in Table 1, then calibration is correct. The only other check that may be necessary is an ambient check to determine whether the instrument is within +/- 1 degree for the ambient operation range.

OPTIONAL--AMBIENT CHECK...THIS CHECK SHOULD ONLY BE PERFORMED IF A SEVERE CALIBRATION ADJUSTMENT IS REQUIRED.

5. Remove the sensor plug from the instrument. Cool the instrument to 40°F and stabilize it at this temperature for one hour. Insert the sensor plug into the instrument. Place the sensor into the ice bath and observe the instrument reading...make a note of this ice point reading. Remove the sensor plug from the instrument. Heat the instrument to 120°F and stabilize for one hour at this temperature. Insert the sensor plug into the instrument and place the sensor into the ice bath and observe the reading on the instrument...make a note of this ice point reading. The difference between these two ice point readings will be added or subtracted from 32°F or 31°F (depending upon the instrument model code).

6. Allow instrument to stabilize at 80°F for one hour, then proceed. If the instrument indicated a PLUS deviation at 120°F, then adjust Trimmer "B or T" in a PLUS direction equal to the difference between the two ice point readings. The opposite is true if the deviation at 120°F is negative. Example: (B22K)... At 40°F, the instrument reads 30°F and at 120°F the instrument reads 34°F, the difference is 4°F positive. Add the 4°F to 32°F and you get 36°F. Stabilize the instrument at 80°F for one hour. Insert the sensor plug into the instrument. Place the sensor into the ice bath, adjust Trimmer "B or T" to read 36°F. Then readjust Trimmer "A or Z" to read 32°F. Calibration is now complete. If you desire, run a simple check up and down the scale as performed initially, to verify calibration by applying the proper millivolts.

NOTE I

Stabilization at the various temperatures need not be done during the same day.

If you desire to obtain the best of accuracy for instrument temperature stabilization, it is recommended that an accurate, glass bulb, mercury thermometer be placed into the instrument to verify temperatures at 40°F, 80°F and 120°F.

40°F and 120°F are recommended as stabilizing temperatures. If you are unable to achieve these exact temperatures, then use between 38°F and 42°F and 118°F to 122°F.

F AND C INSTRUMENTS...

Instrument models which contain °F and °C should be checked for calibration on °F. After calibration has been completed, switch the instrument to °C and recheck the points, which have been noted as °F readings. You should have proper correlation between °F and °C. If there is a discrepancy, the instrument may have to be returned to EDL for a more accurate and comprehensive calibration procedure.

NOTE II

Instruments are calibrated by EDL in accordance with the National Bureau of Standards Thermocouple Reference Tables, based on the IPTS-68.

NOTE !!!

Seal all Trimmers which have been adjusted. Use Lacquer, Nail Polish, etc.

CAUTION...ADJUST ONLY TRIMMERS SEALED WITH RED LACQUER..."A" or ("Z"), "B" or "T", ("G") and "H" THERE ARE NO EXCEPTIONS TO THIS CAUTION.

INSTRUMENTS MADE BEFORE JANUARY, 1981, HAD ALL TRIMMERS SEALED WITH RED LACQUER. AS OF JANUARY, 1981, ALL INSTRUMENTS PRODUCED BY EDL HAVE BLUE AND RED SEALING LACQUER AS PER THESE CALIBRATION DATA NOTES. REFER TO TRIMMER LAYOUT DRAWING FOR LOCATION OF TRIMMERS A or Z, B or T, G and H.

TABLE 2 - RESISTANCE TABLE

Standard resistance for a version "A" digital pyrometer of type "K" calibration is 3.0 ohms. This value should include the lead and the source resistance.

Standard resistance for a version "A" digital pyrometer of type "E" calibration is 3.94 ohms. This value should include the lead and the source resistance.

Standard resistance for a version "A" digital pyrometer of type "J" calibration is 2.3 ohms. This value should include the lead and the source resistance.

CALIBRATION PROCEDURE

FOR PYROMETERS MADE BY ELECTRONIC DEVELOPMENT LABORATORIES, INC.

USING NATIONAL BUREAU OF STANDARDS CHARTS

ABSOLUTE MILLIVOLTS (INT. 1948)

REFERENCE JUNCTION 32°F

Practically all pyrometers have scales which do not start at 32°F, which is equivalent to 0.00 millvolts on the N. B. S. chart. Therefore, a correction with respect to the N. B. S. 32° Reference Junction chart must be made in order to obtain a 0.00 E.M.F. as a basis from which to obtain proper calibration.

Charts are available from the National Bureau of Standards or our company, in increments of 10°. Where increments of 5° or less are required interpolation can be used. Any interpolation error occurring within any 10° increment will be negligible.

The National Bureau of Standards charts use a reference junction of 32°F for Fahrenheit scales and 0°C for Centigrade scales. Since this reference junction temperature will not coincide with instrument scales, which start at a temperature other than 32°F, a scale correction must be made. EXAMPLE--When using the N. B. S. chart to calibrate an instrument having a scale 50°F to 600°F, the N. B. S. chart will show +.59 millivolt for 50°F. In order to reduce this +.59 millivolt to 0.00 millivolt, .59 millivolt must be subtracted from the chart value. Accordingly, at all points on the scale where a check is made, .59 millivolt must be subtracted from the millivolts indicated on the N. B. S. chart.

Where a scale begins with a minus millivolt value, an amount equal to the minus millivolts must be added to obtain a "0" millivolt value for calibration. Therefore, an instrument which has a scale starting at -20°F would have to be corrected as per the National Bureau of Standards chart by adding 1.64 millivolts, since -20°F is equal to minus 1.64 millivolts. Thus, the -20°F is converted to 0.00 millivolt on the meter scale.

The two tables below illustrate the method of adding and subtracting millivolts in order to correlate the National Bureau of Standards chart with the actual scale.

IN ALL INSTANCES ANY PYROMETER BEING CALIBRATED WHICH USES STANDARD SENSORS MUST HAVE AN EXTERNAL RESISTANCE OF 3.94 OHMS ADDED INTO THE CALIBRATION CIRCUIT. WHERE SPECIAL SENSORS ARE USED WITH A PYROMETER, ADD AN EXTERNAL RESISTANCE EQUAL TO THE VALUE MARKED UNDER EXT. RES. ON THE SCALEPLATE.

ELECTRONIC DEVELOPMENT LABS. INC.
ROUTE 5, BOX 1098, DANVILLE, VA. 24540
EDL TOLL FREE: 1-800 DIAL EDL 1-804 799 0807

ELECTRONIC DEVELOPMENT LABS. INC:
& EDL TOOL & DIE
1-800-DIAL-EDL 1-800-342-5335
FAX 1-804-799-0847
Route 5, Box 1398
Danville, VA. 24540
1-804-799-0807
NEW ADDRESS
244 Oakland Dr.
Danville, VA. 24540

CERTIFICATE OF CALIBRATION

CUSTOMER_____

CERTIFICATE#_____ PURCHASE ORDER#_____

PRIMARY STANDARD--HEWLETT PACKARD 3456A PRIMARY LAB STANDARD

SERIAL NO. 2015A03222-ACCURACY .002%

SECONDARY STANDARD--RUBICON TYPE B POTENTIOMETER +/-.01%

THIRD STANDARD--DATA PRECISION 3500-SERIAL NO. 6156

ACCURACY-.008%

This instrument/sensor was calibrated with precision temperature measurement equipment and thermocouples traceable to the National Bureau of Standards and meets our established accuracy when checked in our laboratory

MODEL#_____ SERIAL#_____

OUR STANDARD CALIBRATION PROCEDURE IS AS FOLLOWS:

1. Stabilize at 80 F +/-1 for one hour
2. Calibrate
3. Digital: Ambient check point calibration at 120 F and at 40 F Analog: Ambient check point calibration at 130 F
4. Stabilize at 80 F +/--1 for one hour
5. Check calibration and adjust as necessary
6. Digital only: seal trimmers
   Analog: put dot on zero corrector
7. Final performance check

Analog instruments: All calibration is performed in a horizontal plane

This instrument must be used in accordance with our published instructions in order to meet or exceed the published accuracy.

SIGNATURE_____

DATE_____