



TEGAM is a manufacturer of electronic test and measurement equipment for metrology, calibration, and production test. We also provide repair, calibration, and other support services for a wide variety of test and measurement equipment including RF power sensor calibration systems, RF attenuation measurement systems, resistance standards, ratio transformers, arbitrary waveform generators, micro-ohmmeters, LCR meters, handheld temperature calibrators, thermometers, humidity and temperature control devices, and more.

TEGAM also repairs and calibrates test and measurement equipment formerly manufactured by Elcto-Scientific Industries (ESI), Gertsch, Keithley Instruments, Lucas Weinschel, and Pragmatic Instruments. A complete list can be viewed on our Product Service Directory at [www.tegam.com](http://www.tegam.com)

For more information about TEGAM and our products, please visit our website at [www.tegam.com](http://www.tegam.com): or contact one of our customer service representatives at [sales@tegam.com](mailto:sales@tegam.com) or 800-666-1010.

## **Budget Series Digital Thermometer**

Instruction manual  
Models 874F/C, 875F/C, 878 and 879

This owner's manual was as current as possible when this product was manufactured. However, products are constantly being updated and improved. Because of this, some differences may occur between the description in this manual and the product you received.



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**Custom Probes** to suit your special temperature measurement applications are also available from Tegam, Inc. Please call or send your custom probe design to Tegam for price and delivery information.

**Additional Instruction Manuals** are available. Order the manual package, Tegam Part Number 878-901-01, for a manual and any applicable addenda.

**Calibration Instructions**, are available upon request. Please call or write.

### WARRANTY

Tegam, Inc. warrants this product to be free from defects in material and workmanship for a period of one year from date of shipment. During the warranty period, we will at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, write or call Tegam, Inc. in Geneva, Ohio. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

### LIMITATION OF WARRANTY

This warranty does not apply to defects resulting from unauthorized modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Tegam, Inc. shall not be liable for any indirect, special or consequential damages.

### STATEMENT OF CALIBRATION

This instrument has been inspected and tested in accordance with specifications published by Tegam, Inc.

The accuracy and calibration of this instrument are traceable to the National Bureau of Standards through equipment which is calibrated at planned intervals by comparison to certified standards maintained in the Laboratories of Tegam, Inc.

**Model 8717 Hypodermic Probe** for the measurement of soft and semi-soft materials. Miniature junction responds with one second time constant. All stainless steel construction is suitable for food industry, biological and chemical applications. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1sec (liquids). Max tip temperature is  $500^{\circ}\text{C}$  or  $932^{\circ}\text{F}$ .

**Model 8731** Package of 5 miniature thermocouple connectors. Type K (male).

**Model 8732** Standard to miniature thermocouple adapter. The female end of the adapter is on the standard side. The male end of the adapter is on the miniature side.

#### TYPE J PROBES (For Model 879)

**Model 8722 Thermocouple Sensor** is a three foot, 24 gauge thermocouple wire that has a beaded thermocouple junction. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is  $< 1\text{sec}$ . Max tip temperature is  $480^{\circ}\text{C}$  or  $900^{\circ}\text{F}$ .

**Model 8723 Regular General Purpose/Immersion Probe** for liquids and general applications. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or  $0.75^{\circ}$ , whichever is greater. Time constant is 1sec (stirred liquids). Max tip temperature is  $760^{\circ}\text{C}$  or  $1400^{\circ}\text{F}$ .

**Model 8725 Regular Surface Probe** for measurements of flat surfaces of solids. Keeping the sensor tip flush to most surfaces provides fast responding measurements. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 3sec (High thermal capacity/conductive solids). Max tip temperature is  $400^{\circ}\text{C}$  or  $750^{\circ}\text{F}$ .

**Model 8726 Regular Air/Gas Probe** for measurement of air/gasses. Exposed junction within protection shroud responds to ambient temperature while shielded from incident radiation. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 3sec. (5m/s air flow). Max tip temperature is  $300^{\circ}\text{C}$  or  $570^{\circ}\text{F}$ .

#### TYPE T PROBES (For Models 875F & 875C)

**Model 8752 Thermocouple Sensor** is a three foot, 24 gauge thermocouple wire sensor that has a beaded thermocouple junction. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is  $< 1\text{sec}$ . Max tip temperature is  $400^{\circ}\text{C}$  or  $752^{\circ}\text{F}$ .

**Model 8753 Compact General Purpose/Immersion Probe** for liquids and general purpose applications. Has a one foot (5' extended) coil cord, with a molded plastic handle. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 2sec (stirred liquids). Max tip temperature is  $200^{\circ}\text{C}$  or  $392^{\circ}\text{F}$ .

**Model 8754 Compact Penetration Probe** for measurements within soft or semi-frozen materials. Has a one foot (5' extended) coil cord, with a molded plastic handle. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1sec (stir-red liquids). Max tip temperature is  $200^{\circ}\text{C}$  or  $392^{\circ}\text{F}$ .

**Model 8756 Compact Air/Gas Probe** for measurement of air/gasses. Exposed junction within protective shroud responds to ambient temperature while shielded from incident radiation. Has a one foot (5' extended) coil cord, with a molded plastic handle. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1.5sec (5 m/s air flow). Max tip temperature is  $300^{\circ}\text{C}$  or  $570^{\circ}\text{F}$ .

## SPECIFICATIONS

TEGAM MODEL	T.C. TYPE <sup>1</sup>	TEMPERATURE RANGE	TEMPERATURE SPAN	RESOLUTION	ACCURACY <sup>2</sup> (18° to 28°C; 1 year)
874F	K	200°F	-40.0° to 199.9°F	0.1°	$\pm(0.5\% \text{ rdg.} + 1.0^{\circ}\text{F})$
		2000°F	-120° to 1999°F	1°	$\pm(1\% \text{ rdg.} + 2^{\circ}\text{F})$
874C	K	200°C	-40.0° to 199.9°C	0.1°	$\pm(0.5\% \text{ rdg.} + 0.5^{\circ}\text{C})$
		1100°C	-85° to 1100°C	1°	$\pm(1\% \text{ rdg.} + 1^{\circ}\text{C})$
875F	T	200°F	-112.0° to 199.9°F	0.1°	$\pm(0.4\% \text{ rdg.} + 1.1^{\circ}\text{F})$
		752°F	200° to 752°F	1°	$\pm(1\% \text{ rdg.} + 2^{\circ}\text{F})$
875C	T	200°C	-80.0° to 199.9°C	0.1°	$\pm(0.4\% \text{ rdg.} + 0.6^{\circ}\text{C})$
		400°C	200° to 400°C	1°	$\pm(1\% \text{ rdg.} + 1^{\circ}\text{C})$
878	K	°F	-120° to 1999°F	1°	$\pm(1\% \text{ rdg.} + 2^{\circ}\text{F})$
		°C	-85° to 1100°C	1°	$\pm(1\% \text{ rdg.} + 1^{\circ}\text{C})$
879	J	°F	-112° to 1400°F	1°	$\pm(1\% \text{ rdg.} + 2^{\circ}\text{F})$
		°C	-80° to 760°C	1°	$\pm(1\% \text{ rdg.} + 1^{\circ}\text{C})$

## GENERAL SPECIFICATIONS

**INPUT CURRENT:**  $\leq 1$  microamp, typical.

**REPEATABILITY:**  $0.3^{\circ}\text{F}$  ( $0.2^{\circ}\text{C}$ ) typical for 1 week at constant ambient temperature.

**TEMPERATURE COEFFICIENT:** 18° to 28°C; included in accuracy specification.

From  $-10^{\circ}$  to  $18^{\circ}$ , and  $28^{\circ}$  to  $50^{\circ}\text{C}$ ; less than  $\pm(0.025\% \text{ of rdg} + 0.1^{\circ}\text{C})/^{\circ}\text{C}$ .

**ENVIRONMENTAL LIMITS FOR OPERATING:**  $-10^{\circ}$  to  $50^{\circ}\text{C}$ , less than 80% relative humidity (R.H.) up to  $35^{\circ}\text{C}$ ; reduce R.H. limit by  $3\%/^{\circ}\text{C}$  from  $35^{\circ}$  to  $50^{\circ}\text{C}$ .

**ENVIRONMENTAL LIMITS FOR STORAGE:**  $-35^{\circ}$  to  $60^{\circ}\text{C}$ , less than 90% relative humidity up to  $35^{\circ}\text{C}$ , reduce R.H. limit by  $3\%/^{\circ}\text{C}$  from  $35^{\circ}$  to  $60^{\circ}\text{C}$ .

**DISPLAY:** 3 1/2 digit LCD, 13mm (0.5") height. Polarity indication. Decimal point when req'd.

**CONVERSION RATE:** 1.3 readings per second.

**OVERRRANGE AND OPEN SENSOR INDICATION:** 3 least significant digits blanked.

**MAXIMUM COMMON MODE VOLTAGE:** 42V peak to earth.

**THERMOCOUPLE INPUT:** Miniature TC Connector.

**POWER:** 9V alkaline or carbon-zinc (NEDA 1604) battery.

**BATTERY LIFE, CONTINUOUS:** 350 hours typical with alkaline; 200 hours typical with carbon-zinc.

**BATTERY INDICATOR:** Display indicates "LO BAT" when less than 10% of life remains.

**DIMENSIONS:** 160mm long x 69mm wide x 31mm thick (6.3" x 2.7" x 1.2").  
Net weight 210gm (7.5 oz.)

**CONSTRUCTION:** Heavy duty ABS plastic housing.

**ACCESSORIES SUPPLIED:** Battery and Instruction Manual.

Specifications subject to change without notice.

<sup>1</sup>Type K=NiCr-NiAl Thermocouple, Type T=Cu-CuNi Thermocouple, Type J=Fe-CuNi Thermocouple.

<sup>2</sup>Excludes thermocouple sensor errors.

## MANUAL ADDENDA

Improvements or changes to this manual will be explained on an addendum included with the instrument. All changes information should be incorporated immediately into the appropriate places in the manual.

## UNPACKING AND INSPECTION

Each instrument is inspected both mechanically and electrically before shipment. Upon receiving your instrument unpack all items from the shipping container and check for any obvious damage that may have occurred during transit. Report any damage to the shipping agent. Retain and use the original packing materials if reshipment is necessary.

## PREPARATION FOR USE

Each instrument is supplied with a 9 volt battery (See page 6 of this manual for battery installation instructions). Connect the appropriate probe to the miniature TC connector located on the top of the instrument (just above the display).

## OPERATION

The digital thermometer is easy to use. There is only one control (located on the side of the instrument) that turns the instrument on/off and selects the range. Use the following procedure to operate the instrument:

1. Select the appropriate temperature probe and insert it into the miniature TC-input connector, located on the top of the instrument.
2. Turn on the power to the instrument by selecting the desired range. Note: For the best accuracy always use the low range when measuring temperatures below 200°.
3. Make the measurement:
  - A. Touch the probe tip to the material to be measured.
  - B. Read the display.

## OPTIONAL ACCESSORIES

The following accessories can be used with your thermometer to enhance the performance of the instrument. These accessories are available through your local Tegam distributor or the factory.

**Model 8660 Tilt Stand/Belt Clip/Probe Holder** can be used as a tilt stand or clipped to your belt. It will hold the instrument and one compact probe.

**Model 8668 Soft Carrying Case** for all models.

### TYPE K PROBES (For Models 874F, 874C & 878)

**Model 8711A Thermocouple Kit** includes the Model 8712 Thermocouple Sensor, 6m (20') of AWG #24 Type-K duplex TC wire, a miniature TC plug and jack, and a standard TC plug and jack.

**Model 8712 Thermocouple Sensor** is a three foot, 24 gauge TC wire sensor that has a beaded thermocouple junction. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is  $<1\text{sec}$ . Max tip temperature is  $480^{\circ}\text{C}$  or  $900^{\circ}\text{F}$ .

**Model 8713 Regular General/Immersion Probe** for liquids and general purpose applications. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1sec (stirred liquids). Max tip temperature is  $900^{\circ}\text{C}$  or  $1650^{\circ}\text{F}$ .

**Model 8733 Compact General Purpose/Immersion Probe** has a one foot (5' extended) coil cord with a molded plastic handle. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1sec (stirred liquids). Max tip temperature is  $200^{\circ}\text{C}$  or  $392^{\circ}\text{F}$ .

**Model 8714A Regular Penetration Probe** for measurements within soft or semi-frozen materials. Accuracy  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 2sec (stirred liquids). Max tip temperature is  $900^{\circ}\text{C}$  or  $1650^{\circ}\text{F}$ .

**Model 8734 Compact Penetration Probe** has a one foot (5' extended) coil cord, with a molded plastic handle. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 1sec (stirred liquids). Max tip temperature is  $200^{\circ}\text{C}$  or  $392^{\circ}\text{F}$ .

**Model 8715 Regular Surface Probe** for measurements of flat surfaces of solids. Keeping the sensor tip flush to most surfaces provides fast responding measurements. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 3sec (high thermal capacity/conductive solids). Max tip temperature is  $400^{\circ}\text{C}$  or  $750^{\circ}\text{F}$ .

**Model 8716 Regular Air/Gas Probe** for measurement of air gasses. Exposed junction within protective shroud responds to ambient temperature while shielded from incident radiation. Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Time constant is 3sec (5m/s air flow). Max tip temperature is  $300^{\circ}\text{C}$  or  $570^{\circ}\text{F}$ .

**Model 8736 Compact Air/Gas Probe** has a one foot (5' extended) coil cord, with a molded plastic handle. Time constant is 1.5sec (5m/ air flow). Accuracy is  $\pm 2.2^{\circ}\text{C}$  or 0.75%, whichever is greater. Max tip temperature is  $200^{\circ}\text{C}$  or  $392^{\circ}\text{F}$ .

4. Turn on the instrument and use the following table to verify that the readings on each range are within specifications.

**Table 1. Performance Verification**

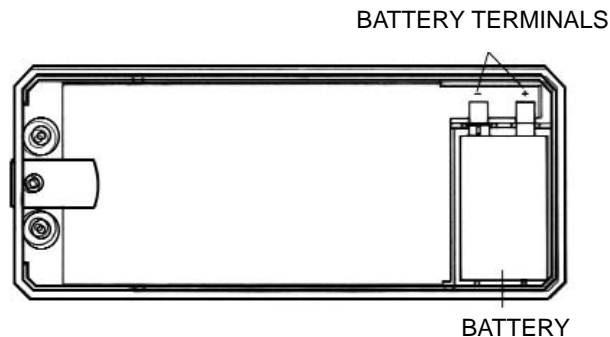
Model No.	Range	Reading	Model No.	Range	Reading
874F	200	32.0 ± 1.2°F	879	760	0 ± 1°C
	2000	32 ± 2°F		1400	32 ± 2°F
874C	200	0.0 ± 0.5°C	875F	200	32 ± 1.2°F
	1100	0 ± 1°C		752	32 ± 2°F
878	1100	0 ± 1°C	875C	200	0.0 ± 0.6°C
	2000	32 ± 2°F		400	0 ± 1°C

**BATTERY INSTALLATION/REPLACEMENT**

**WARNING**

Turn the instrument off and disconnect the input probe before removing the bottom cover. Reinstall the cover before resuming use of the instrument.

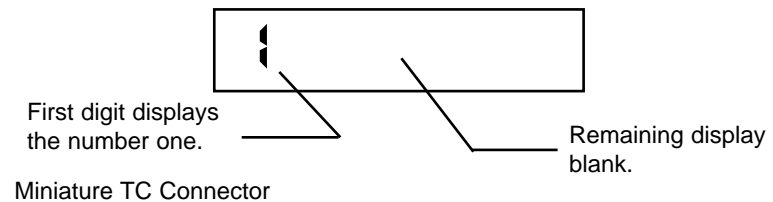
1. Place the unit face down on a bench or other similar surface and remove the screws from the bottom cover.
2. Separate the bottom cover from the rest of the instrument by grasping the top of the case (just above the display) and carefully lifting it away from the display.
3. Remove the old battery.
4. Place the new battery in the battery compartment. Be sure to observe the proper polarity. Refer to Figure 2.
5. Reinstall the bottom cover before resuming use of the instrument.



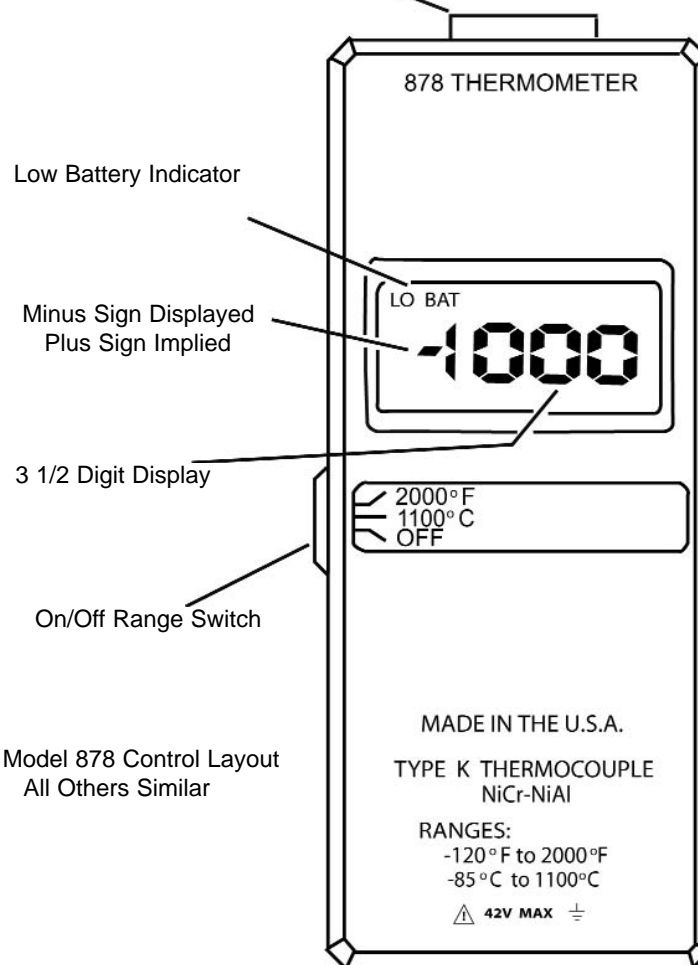
**Figure 2 Battery Installation**

**NOTE**

An open sensor or overrange condition is indicated by the following display.



Miniature TC Connector




Model 878 Control Layout  
All Others Similar

**Figure 1.**

## ENVIRONMENTAL CONDITIONS

Operation of the instruments should take place at an ambient temperature of -10°C to 50°C (14°F to 122°F), less than 80% relative humidity up to 35°C, reduce R.H. limit by 3% per °C from 35°C to 50°C.

## SAFETY SYMBOLS AND TERMS

The symbol  on the instrument denotes that the user should refer to the operating instructions.

The **WARNING** used in this manual explains dangers that could result in personal injury or death.

The **CAUTION** used in this manual explains hazards that could damage the instrument.

## SAFETY PRECAUTIONS

1. Do not touch the probe tip when measuring excessively high or low temperature.
2. Do not exceed 42V peak from the probe tip or input jack to earth ground.

### WARNING

**A shock hazard exists on the thermometer input jacks when probes or sensors are exposed to voltage levels greater than 42V peak to earth ground**

### CAUTION

**Do not attempt to measure temperatures beyond the range of the probe being used. Probe damage may occur. Maximum probe temperatures are given in the optional accessories section.**

## MAINTANCE INFORMATION

This section contains information needed to maintain your instrument. The following information is included: functional check, performance verification, and battery installation/replacement.

### WARNING

**The information presented in this section is intended for use by qualified personnel only. Turn off the power and remove all probes from the instrument before replacing the battery.**

### FUNCTIONALITY CHECK

At room temperature hold the tip of a probe sensor between your thumb and index finger. A reading between 25°C and 40°C (77°F and 104°F) should be observed to confirm functionality of the instrument.

### PERFORMANCE VERIFICATION

#### Accuracy Check

The instrument should be at an ambient temperature of 23°C ± 1°C and a relative humidity of less than 80% during accuracy check.

1. Prepare a pure water ice bath as follows:
  - A. Drill a hole in the cap of a Dewar flask or thermos to accommodate the thermocouple.
  - B. Firmly pack the flask with pea-size ice cubes made from distilled water and then fill the flask with distilled water.
  - C. Replace the melted ice with more ice while removing the excess water.
  - D. Place the cap on the flask.
2. Connect a TC probe to the input jack of the instrument.
3. Immerse the TC probe into the pure water ice bath and allow 10 minutes for thermal stabilization.