

TMD90



Dual Input Digital Thermometer

User Manual



TMD90 Dual Input Thermometer

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
Safety Information

- Place **ONLY** thermocouples in the thermocouple input.
- Make sure your meter is configured for the thermocouple type to be used.
- Be sure the thermocouple you use can withstand the temperature extreme it will be exposed to.
- Properly maintain the meter and calibrate it regularly
- Use the thermometer only as specified in this manual, or the protection provided by the thermometer might be impaired.
- Replace the battery as soon as BAT appears to avoid false readings that can lead to electric shock and injury.

⚠ ⚠ Warning

Supplied thermocouple is not intended for contact with liquids or live electrical circuits.

Symbols Used in this Manual


	Dangerous Voltage		Refer to the manual
	Double insulated		Earth Ground
	Complies with EU directives		

Introduction

The Model TMD90 dual input thermometer accepts Type K, J, T, R, S, and E thermocouples. With a triple display screen to view measurement results and relative time clock. Optional RS-232 software and cable allows collection of real time data to a PC for further analysis or reports.

TMD90 displays all LCD (liquid crystal display) segments for approximately 3 seconds when it is first turned on and then provides information on any connected thermocouples. Numerous viewing combinations are available. The LCD is divided into three distinct sections; one large (Primary) top screen and two smaller bottom screens (Secondary and Relative Clock).

The three display areas are continually updated with the temperature measurements and relative time information. There are several options regarding how and what information is presented on the LCD.

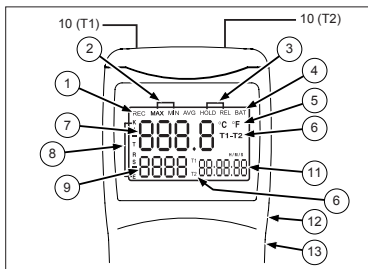
- Temperature readings are easily toggled between Fahrenheit and Celsius.
- A backlight illuminates the LCD for viewing in low light areas.
- The  button will freeze the upper display data while allowing the lower displays to continue updating information.
- A low battery indicator is also displayed as appropriate.
- The meter defaults to the last mode selected when turned off.

Note: If no thermocouples are connected, four dashes(----) appear in the temperature display.

Box Contents

TMD90 Thermometer	1
Type K thermocouple probe	1
Users Manual	1
Hard plastic carry case	1
9 V battery (installed)	1

Display and Controls



- ① **REC** Relative clock is active for recording min and max temperature occurrences or for time stamp purposes.
- ② **MAX/MIN** Maximum or minimum temperature measurements are being monitored.
- ③ **HOLD/REL** Freezes primary display or establishes a relative zero for the primary display information.
- ④ **BAT** Low battery indicator.
- ⑤ **°C °F** Displays temperature in either degrees Celsius or degrees Fahrenheit.
- ⑥ **T1-T2** Toggles screen information from T1 (Primary)/ T2 (Secondary) to T2 (Primary) / T1 (Secondary), then to T1-T2 (Differential) on Primary and alternating T1/T2 temperatures on Secondary display.
- ⑦ Primary data display. Displays T1, T2, or T1-T2 (temperature differential -TD) or a relative zero of T1, T2, or TD.
- ⑧ **KJTRSE** Selects proper input reference for thermocouple in use. T1 and T2 must be the same thermocouple type.
- ⑨ Secondary data display. Displays T2, T1 or T1 and T2 temperatures.
- ⑩ Thermocouple input. Positive and negative polarized plugs for the thermocouple probes used (Blade type); T1 on the left, T2 on the right.
- ⑪ Relative clock display. Displays time in hours, minutes, and seconds (HHMMSS) when REC is pressed and the relative time that MIN or MAX data was recorded.
- ⑫ RS-232 output port. Optional software and cable – PN TM-SW.
- ⑬ AC to DC converter input.

⚠ Caution

Read all Safety Information before using this thermometer.

Functions

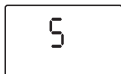
Auto Power Off (Sleep Mode)

The TMD90 shuts off automatically approximately 20 minutes after being turned on. For recording or operating over longer periods of time you can disable the sleep mode by pressing **①** and **HOLD REL** simultaneously while power on. When "n" then appear in the center of the screen you can release the On. Auto power off is disabled when you turn off the meter.



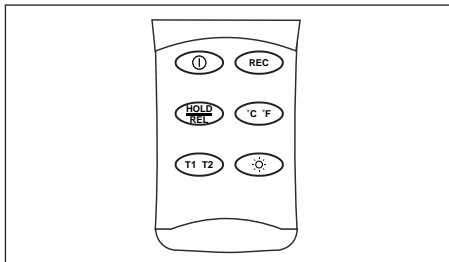
Change Thermocouple Type

Press **REC** and **①** simultaneously for 2 or more seconds until **K** appears. Press the **C°F** button the type of probe cycles through **K** (the default), **J**, **T**, **R**, **S**, and **E** types. The current mode is displayed on the left side of the LCD. press **REC**, an "S" will appear in the center of the screen.









Using the Pushbuttons

The display defaults to the mode last used. For your convenience the meter defaults to the settings used during the last operation.



Use the pushbuttons to control operation of the TMD90. The table assumes the TMD90 has been powered on with two thermocouples installed and is set to display (default) T1 on the primary display, type K thermocouple, and Record off.

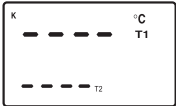

Button	Description
	Turns the meter on and off.
	Press and release HOLD/REL and the Primary display (T1, T2, or T1-T2) freezes with HOLD displayed on top; Press for two or more seconds REL appears on top of LCD and the REL Primary display indicates the relative zero. Relative zero causes the value of the primary display to show as "000.0", then only the amount of temperature change will be indicated. Relative temperatures can be recorded. Press HOLD/REL again and the unit returns to default.
	Press momentarily and the Primary display changes to T2 (Secondary screen displays T1); press momentarily again and it displays T1-T2; Secondary display alternates between T1 and T2; Press momentarily again and the instrument returns to default.
	Press momentarily and the backlight illuminates for approximately 30 seconds then turns off.
	Press momentarily and the unit toggles between Fahrenheit (the default) and Celsius temperatures; The current mode is indicated on the right side of the LCD.
	Press momentarily and the Relative Clock starts in the lower right screen. All other button functions are locked out except Power and Backlight. T1, T2, or T1-T2 is displayed on the Primary screen; The Secondary screen continues to update. Press momentarily again and the unit cycles through MAX and MIN (Maximum and Minimum recorded temperatures) and back to current temperature; The record mode is displayed on the LCD. Press and hold for three seconds to turn off the record function.

RS-232 Output

With optional software and cable, P/N TM-SW, the TMD90 can output measurement results to a computer with operating systems of Window 95/98/NT/2000/XP/ME. Features of the software:

- Record up to 16,000 sample readings with real-time clock memory.
- Programmable sample interval from 1 sec to 3,600 sec.
- User defined maximum and minimum alarm settings.
- Allow further analysis by downloading data to computer program.
- All data is saved in .txt format for easy transformation into another software program.

Troubleshooting

Problem	Solution
<p>Thermometer does not turn on.</p>	<ul style="list-style-type: none">• Check battery voltage and replace discharged battery.• Verify that battery clips grip the battery post tightly.
<p>Dashes appear in the T1 and T2 data screens.</p>  <p>The screenshot shows a digital display with 'K' at the top left and '°C' at the top right. Below 'K' is a row of four dashes, with 'T1' to its right. Below that is another row of four dashes, with 'T2' to its right.</p>	<ul style="list-style-type: none">• Insert missing thermocouple.
<p>Dashes appear in T1 and/or T2 data screens with thermocouples inserted.</p>  <p>The left screenshot shows 'K' and '°C' at the top. Below 'K' is a row of four dashes, with 'T1' to its right. Below that is the number '20.4' followed by 'T2'. The right screenshot shows 'K' and '°C' at the top. Below 'K' is the number '23.5' followed by 'T1'. Below that is a row of four dashes, with 'T2' to its right.</p>	<ul style="list-style-type: none">• Measure resistance of thermocouples to ensure they are not broken internally.• Clean the thermocouple and restart.
<p>Temperature drifts from a known value in a controlled environment</p>	<ul style="list-style-type: none">• Verify that thermocouple type matches the displayed icon.• Clean and dry the thermocouple blades and allow to air dry.• Confirm temperature with a known good thermocouple. Replace the defective thermocouple if required.

Problem	Solution
Relative clock does not start when you push the REC button.	<ul style="list-style-type: none"> Verify that the thermocouple is inserted correctly.
Dashes appear during a review of the maximum recorded value.	<ul style="list-style-type: none"> Thermocouple is not acknowledged. Check for intermittent or momentary thermocouple removal.
Data continues to update after you press the HOLD REL button.	<ul style="list-style-type: none"> Check for HOLD icon on the display. Press HOLD REL button firmly.
Instrument turns off while recording.	<ul style="list-style-type: none"> Press ⓘ and HOLD REL simultaneously before power on to disable the Auto power off feature.

Replacing the Battery

Replace the 9 V battery when:

- BAT** appears on the right side of the display.
- The meter will not turn on.
- BAT** appears when you turn on the backlight.

Even if the battery was recently replaced, check the voltage level if there is no response from the meter.

To replace the battery

- Remove all thermocouples from the top of the meter.
- Lay the instrument face down on a clean, flat surface.
- Loosen the screw and remove the battery door.
- Replace the battery.
- Replace the battery door and tighten the screw.

Remove the battery if you do not plan to use the meter for a month or more. Do not leave the battery in a meter that may be exposed to temperature extremes.

9 V ac Adapter

For long term measurement recording, a 9 V AC adapter can be used in place of the battery. This can be purchased at any electronics store using these specs: Miniature power plug with inner conductor positive and outer conductor negative, 500 mA current rating. The 9 V battery can be left in the TMD90 when using the AC adapter.

WARRANTY

The TMD90 Dual Input Thermometer is warranted against any defects of material or workmanship within a period of one (1) year following the date of purchase of the thermometer by the original purchaser or original user. Any thermometer claimed to be defective during the warranty period should be returned with proof of purchase to an authorized Meterman Test Tools Service Center or to the local Meterman Test Tools dealer or distributor where your thermometer was purchased. See Repair section for details. Any implied warranties arising out of the sale of a Meterman Test Tools thermometer, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited in duration to the above stated one (1) year period. Meterman Test Tools shall not be liable for loss of use of the thermometer or other incidental or consequential damages, expenses, or economical loss or for any claim or claims for such damage, expenses or economical loss. Some states do not allow limitations on how long implied warranties last or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Thermocouple Definitions

Type	Alloy	Alloy
J	Iron Fe	Copper-Nickel (Constantan) Cu-Ni
K	Nickel-Chromium (Chromel) Ni-Cr	Nickel-Aluminum Ni-AL
R	Platinum-13% Rhodium Pt-13% Rh	Platinum Pt
S	Platinum-10% Rhodium Pt-10% Rh	Platinum Pt
T	Copper Cu	Copper-Nickel (Constantan) Cu-Ni
E	Nickel-Chromium (Chromel) Ni-Cr	Copper-Nickel (Constantan) Cu-Ni

Specifications

T/C Type	Range	Resolution	Accuracy
K	-200 to 650 °C	0.1 °C	(0.1% rdg + 0.7 °C)
	651 to 1370 °C	1.0 °C	
	-328 to 1000 °F	0.1 °F	(0.1% rdg + 1.4 °F)
	1001 to 2498 °F	1.0 °F	
J	-200 to 500 °C	0.1 °C	(0.1% rdg + 0.7 °C)
	501 to 760 °C	1.0 °C	
	-328 to 940 °F	0.1 °C	(0.1% rdg + 1.4 °F)
	941 to 1400 °F	1.0 °F	
T	-200 to 390 °C	0.1 °C	(0.1% rdg + 0.7 °C)
	-328 to 730 °F	0.1 °F	
R/S	0 to 1000 °C	0.1 °C	(0.3% rdg + 0.7 °C)
	1001 to 1760 °C	1.0 °C	
	32 to 1000 °F	0.1 °F	(0.1% rdg + 1.4 °F)
	1001 to 3200 °F	1.0 °F	
E	-200 to 380 °C	0.1 °C	(0.3% rdg + 0.7 °C)
	381 to 736 °C	1.0 °C	
	-328 to 720 °F	0.1 °F	(0.1% rdg + 1.4 °F)
	721 to 1832 °F	1.0 °F	

Additional Specifications

OPERATING CONDITIONS

0 to 50 °C (32 to 122 °F) at 0 to 85 % relative humidity (non-condensing)

Ambient Coefficient

0 to 18 °C and 28 to 50 °C (Ambient temperatures) For each °C ambient below 18 °C or above 28 °C, add the following tolerance into the accuracy spec: 0.01% of reading +0.03 °C (0.01% of reading +0.06 °F).