



INSTRUCTION MANUAL



Digital Thermometer

Introduction

The DT200 is a portable, battery operated temperature measuring device. With its triple display screen, it allows you to measure two inputs simultaneously, and record critical time stamped information. Since the DT200 accepts type J, K, or T probes, you can use the probes you have without changing your existing process technology. The backlit display makes reading the LCD easy even in low light areas.

Features include

- -328 to 2498°F (-200 to 1370°C)
- Triple display
- Backlit display
- Dual input
- Differential temperature (ΔT)
- Relative function displays temperature change
- Accepts K, J and T thermocouples
- Data hold

Safety Notes

Before using this meter, read all safety information carefully. In this manual the word "**WARNING**" is used to indicate conditions or actions that may pose physical hazards to the user. The word "**CAUTION**" is used to indicate conditions or actions that may damage this instrument.

Safety precautions

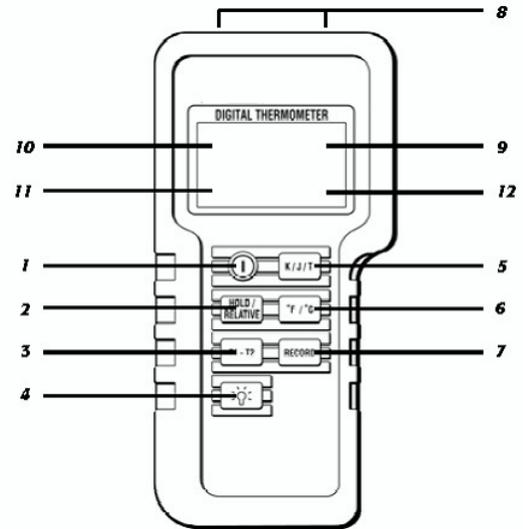
These are a few common safety practices for those working around temperature critical environments:

- Follow the manufacturer's maintenance procedures when servicing equipment
- Place **ONLY** thermocouples (type K, J, or T) in the DT200 thermocouple ports
- Make sure your DT200 is set for the proper thermocouple type you are using
- Be sure the thermocouple you use can withstand the temperature extreme it may be exposed to in your service task
- Properly maintain your DT200 and calibrate it regularly

International Symbols

 Dangerous Voltage	 Ground
 AC Alternating Current	 Warning or Caution
 DC Direct Current	 Double Insulation (Protection Class II)
 Either AC or DC	 Fuse
 Not Applicable to Identified Model	 Battery

Controls and Indicators



1. **Power Switch:** Powers instrument on and off.
2. **Hold/Relative Switch:** Freezes primary screen data or establishes a relative zero for the primary screen information.
3. **T1-T2 Switch:** Toggles screen information from T1 (Primary) and T2 (Secondary) to T2 Primary and T1 Secondary then to T1-T2 (differential) on Primary and alternating T1 and T2 temperatures on Secondary.
4. **Back Light Switch:** Turns back light on. Automatically turns off in 30 seconds.
5. **K/J/T Thermocouples Select Switch:** Selects proper input reference for thermocouple in use (T1 and T2 must be the same type).
6. **°F/°C Mode Select Switch:** Toggles display data from degrees Celsius to degrees Fahrenheit.
7. **Record Mode Select Switch:** Starts record mode (relative clock), displays maximum and minimum temperatures recorded on the Primary screen along with the relative time they were recorded.
8. **Thermocouple Ports:** Positive and negative polarized plugs for the thermocouple probes used (Blade type); T1 on the left, T2 on the right.
9. **LCD Displays:** Displays three screens of function and data information.
10. **Primary Data Screen:** Displays T1, T2, or T1 minus T2 (temperature differential - TD) or a relative zero of T1, T2 or TD.
11. **Secondary Data Screen:** Displays time in hours and minutes when Record is pressed and the relative time that NIM or MAX data was recorded.
12. **Relative Clock Screen:** Displays time in hours and minutes when record is pressed and the relative time that MIN or MAX data was recorded.

Functional Description

The DT200 will display all LCD segments when it is first turned on, for approximately 3 seconds. It will provide information with either one or both thermocouples plugged in.

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 keep you constantly updated with the temperature measurements and relative time information. You have a number of options regarding how and what information is presented on the LCD.

- Temperature readings area easily toggled between Fahrenheit and Celsius
- The back light illuminates the LCD for viewing in low light areas
- The HOLD button will freeze the upper display data while allowing the lower displays to continue updating
- Information about selected functions along with a low battery indicator is also displayed as appropriate
- The DT200 will default to the last mode selected when used in that setting for 10 seconds or more

NOTE: *If no thermocouples are plugged in, four dashes will appear in the temperature data screens. This instrument operates and updates silently.*

Auto Power Off

This instrument will shut off automatically in approximately 90 minutes. For recording or operating over longer periods of time you can defeat the auto power off function by holding down the on/off button and the hold button at the same time when turning the unit on. An "N" will appear in the middle of the screen at which time you can release the hold button. when the screen flashes over to its normal measurement mode, release the on/off button.

Mode Options

Delete and replace with Programmable user selectable start-up mode. The display will default to the mode last used if it was displayed for 10 seconds or more. For your convenience the DT200 defaults to the settings used during the last operation. The following table lists the modes of operation that can be invoked by pressing the buttons indicated. The table assumes your instrument 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	Response/Display
On/Off	Turns instrument on (Default setting) and off
HOLD/ RELATIVE	Press momentarily and the Primary display (T1, T2 or T1-T2) freezes; Press for two or more seconds - REL appears on top of LCD and the Primary display indicates the relative zero (Relative zero causes the value of the primary display to show as "000.0" - only the amount of temperature change will be indicated); Relative temperatures can be recorded. Press momentarily again and the unit returns to default
T1-T2	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
Back Light	Press momentarily and the back-light illuminates for approximately 30 seconds then turns off
K/J/T	Press momentarily and the unit cycles through K (the default), J and T thermocouple types; The current mode is displayed on the left of side of the LCD
°K/°C	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
Record	Press momentarily and the Relative Clock start in the lower right screen, REC is displayed in upper left of LCD - All other button functions are locked out except Power and Back-light. 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 RECORD for three seconds to turn off the record function

Operating Instructions

ACS1 Clamp Strap Adapter

For use with temperature testers measuring the temperature of pipes and tubes, e.g. super-heat measurements. The adjustable Velcro® strip clamps the probe tightly to pipes with diameters from 1/4" to 4" (Fig 1).



(Fig 1)

(Fig 1)

Maintenance

Cleaning

Use a damp cloth and mild soap to clean the case of your DT200. **DO NOT** use harsh detergents or abrasives as these may mar the finish or damage your unit's case with an adverse chemical reaction.

DO NOT allow moisture to directly contact the thermocouple ports, or enter the instrument's housing. Remove the instrument from its boot to ensure moisture is not trapped during cleaning.

Replacing the Battery

Replace your 9 volt alkaline battery when:

- The BAT icon appears on the right side of the LCD
- The instrument will not power on
- Use of the back-light causes the BAT icon to appear

Even if the battery was recently replaced, check its voltage level if you get no response from your instrument. Remove batteries from instruments that you do not plan to use for a month or more.

DO NOT leave batteries in instruments that may be exposed to temperature extremes.

Dispose of batteries in accordance with local land use regulations

To replace the batteries:

1. Remove the thermocouples from the top of the instrument
2. Remove the rubber boot, by sliding the instrument out toward the top faceplate cut-out
3. Lay the instrument face down on a clean, flat surface
4. Remove the battery cover
 - Apply inward pressure on the side of the battery cover at the recessed point, toward the slit, while lifting it out
5. Remove and replace the battery, observing indicated polarity

Calibration

When properly maintained, your DT200 will maintain an accuracy specification of up to 0.1% of the reading. To ensure your instrument is performing at its peak, send it to the QMI service centre for **Annual Calibration**

Troubleshooting Fault Table

If I see this malfunction	I should check for	Then take this corrective action
Instrument does not turn on	Battery voltage	Replace low battery
	battery installation	Ensure clip grips battery posts tightly
Dashes appear in T1 and T2 data screens	Thermocouples	Insert missing thermocouples
Dashes appear in T1 and/or T2 data screens with thermocouples inserted	Thermocouple continuity	Measure resistance of thermocouples to ensure they are not broken internally - Replace if required
	Thermocouple connection	Clean corrosion or debris off of thermocouple - Reinsert
Temperature drifts from known value in a controlled environment	Thermocouple type	Ensure thermocouple type matches the displayed icon
	Moisture, corrosion or debris on thermocouple	Clean and dry thermocouple blades - Allow thermocouple plug to air dry
	Defective thermocouple	Confirm defect with known good thermocouple - Replace if required
Relative clock will not start when RECORD button is pressed	Thermocouples properly inserted	Record will not start without thermocouples inserted
Dashes appear during review of maximum recorded value	Open thermocouple	Check for intermittent or momentarily removed thermocouple
Data continues to update when HOLD or RECORD are invoked	Proper operation	Hold and Record affect the Primary screen of info only
	Hold/Record is not being fully pressed	Observe HOLD or REC icons on LCD - Press button firmly
Instrument turns off during recording	Auto power off defeat	Follow procedures outlined in operating instructions

Troubleshooting

This instrument contains no user serviceable parts beyond those listed in the troubleshooting table. In the event your instrument is physically damaged or does not function properly after taking the listed action, please return the instrument to QMI

Specifications

Operating Conditions

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

T1-T2 Measurement, accuracy

±(0.2% T1-T2 reading + 1.7°C) or
±(0.2% T1-T2 reading + 3.4°F)

Ambient Coefficient

0 - 18°C and 28 - 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)

Power

9 Volt battery x1

Table of Specifications

Measurement Range	Accuracy	
K	-200 to 1370°C	$\pm(0.1\% \text{ rdg} + (0.7^\circ\text{C}))$
	-328 to 2498°F	$\pm(0.1\% \text{ rdg} + (1.4^\circ\text{C}))$
J	-200 to 760°C	$\pm(0.1\% \text{ rdg} + (0.7^\circ\text{C}))$
	-328 to 1400°C	$\pm(0.1\% \text{ rdg} + (1.4^\circ\text{C}))$
T	-200 to 390°C	$\pm(0.1\% \text{ rdg} + (0.7^\circ\text{C}))$
	-328 to 730°C	$\pm(0.1\% \text{ rdg} + (1.4^\circ\text{C}))$
Resolution		
K	-200 to 650°C	0.1°C
	-640 to 1370°C	1°C
	-328 to 999°F	0.1°F
	1000 to 1400°F	1°F
J	-200 to 499°C	0.1°C
	500 to 760°C	1°C
	-328 to 939°F	0.1°F
	940 to 1400°F	1°F
T	All range	0.1°C
	All range	0.1°F



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