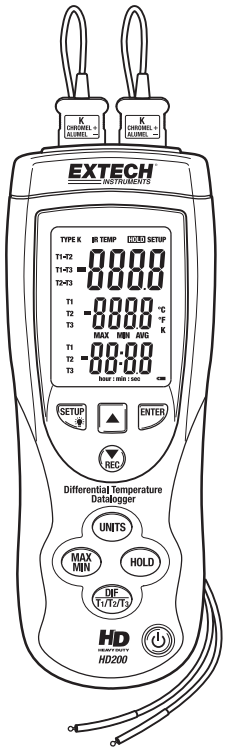
User's Guide

EXTECH INSTRUMENTS

A FLIR COMPANY

Differential Thermometer Datalogger

Model HD200



Introduction

Congratulations on your purchase of the Extech HD200 Differential Thermometer Datalogger. The HD200 supports differential temperature measurements using dual Type K thermocouple probe inputs and provides selectable units of °C, °F or °K. The large backlit LCD displays a versatile combination of readings: T1, T2, T3, T1-T2, T1-T3, T2-T3, plus MAX-MIN-AVG readings.

The electronic offset feature permits compensation adjustment for thermocouple errors and to maximize overall accuracy.

The HD200 can also make non-contact temperature measurements with the supplied IR thermometer probe.

The HD200 datalogger can store 18,000 measurement readings (for each channel) in the meter's internal memory. Stored readings can later be transferred to a PC using the supplied PC USB interface kit. Real-time meter-to-PC logging is also supported.

This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Safety

Please read the safety and operational instructions before using this device.

WARNING
To avoid electrical shock or instrument damage, do not apply voltage exceeding the maximums specified.

WARNING
To avoid damage or burns, do not make temperature measurement in microwave ovens.

WARNING
Do not use the meter in any explosive atmosphere.

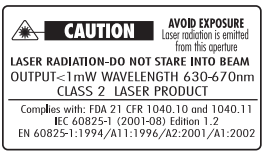
CAUTION
Repeated flexing can break the thermocouple leads. To prolong lead life, avoid sharp bends in the leads, especially near the connector.


This symbol on the instrument indicates that the operator must refer to an explanation in this manual.


Double insulation

IR Safety Notes

- Remove the battery if meter is to be stored for longer than 60 days.
- Use extreme caution when the laser pointer beam is on
- Do not point the beam toward anyone's eye or allow the beam to strike the eye from a reflective surface
- Do not use the laser near explosive gases or in other potentially explosive areas

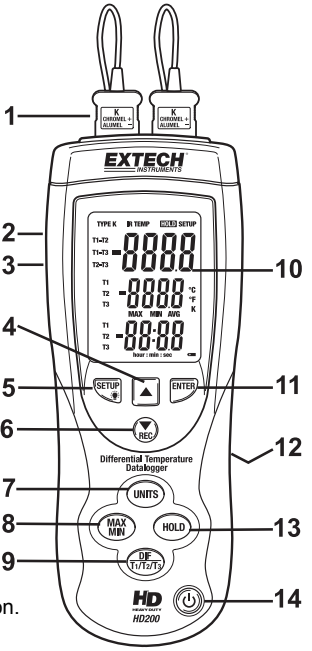


Description

Meter Description

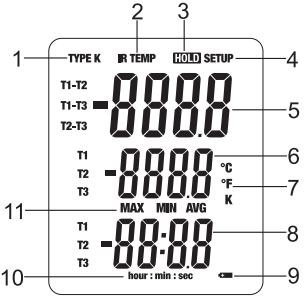
1. Thermocouple inputs
2. PC USB interface input
3. IR probe input jack
4. Up arrow button
5. SETUP & Display backlight button
6. Down arrow and Record button
7. Temperature units select button
8. MAX-MIN button
9. Display configuration button
10. LCD Display
11. ENTER button
12. Battery compartment & Tripod mount (rear)
13. Display HOLD button
14. Power button

Note: Description of IR sensor contained in later section.



Display Description

1. Thermocouple type (Icon flashes when the meter is recording)
2. IR temperature (display flashes when the meter recording)
3. Data Hold mode (readings are frozen on display)
4. Appears when meter is in the SETUP mode
5. Primary Display: T1, T2, T3 , T1-T2,T1-T3,or T2-T3 reading.
6. Secondary Display: MAX, MIN, AVG, offset,T1, T2 , or T3 reading.
7. Temperature unit of measure
8. Third display. Elapsed timer or T1, T2, T3 reading
9. Low battery icon
10. Timer
11. MAX, MIN, AVG display mode icons



Operation

The Basics

1. Press ⏻ to turn the thermometer on. Press and hold the ⏻ button for 3 seconds to turn the meter off.
2. Press **MAX/MIN** to record and step through the maximum, minimum, and average readings for the T1 and T2 inputs (does not apply for the T3 IR input). When active, the display shows the maximum, minimum, or average of the logged readings and the elapsed time. To exit the **MIN/MAX/AVG** mode press and hold the **MAX/MIN** button for 3 seconds.
3. Press °**C**·°**F**·°**K** to switch between Celsius (°C), Fahrenheit (°F), and Kelvin (°K).
4. Press **HOLD** to freeze or unfreeze the displayed readings.
5. Press **DIF/T1·T2·T3** to scroll through display combinations: T1, T2, T3 and T1-T2, T1-T2, T2-T3 (differential temperature measurement) in the primary, secondary and third display.
6. Press the **Setup**/💡 button to turn on the backlight. Press it again to turn off the backlight.
7. Press and hold the **Setup**/💡 button for 5 seconds to enter or exit the Setup mode. Press ▲ to scroll to a Setup option. (see "Changing Setup Options.")
8. Press **REC/**▼ to start or stop recording. If in the Setup mode, use this button to scroll to the Setup option you want to change. Press **REC/**▼ to decrease the displayed setting.
9. Press **ENTER** to enter a Setup option. Press **ENTER** again to store the displayed setting in memory.

Using the thermocouple (s)

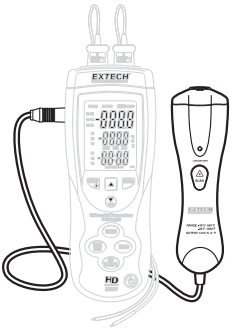
1. Plug the thermocouple(s) into the T1or T2 input connector(s).
2. Press ⏻ to turn on the thermometer. After 1 second the thermometer displays the reading. If no thermocouple is plugged into the selected input or the thermocouple is "open," the display shows **"- - - -**".

Using the supplied IR (Infrared) Thermometer Probe

Plug the output of the remote IR probe into the T3 (IR input) meter jack (see diagram), "**T3 - - - -**" will appear on screen. If the IR probe is not connected, "**T3 - - - -**" will not appear.

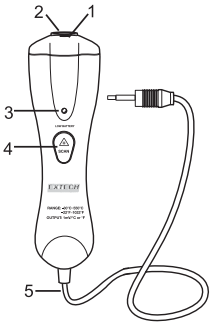
Press the external probe's **"SCAN"** button to take and display a reading. Use the laser pointer to improve target aim.

While the **SCAN** button is held down, the readings change as the user scans various surfaces. When the button is released the display is held for approx. 7 seconds and the meter then returns to normal operation.



IR Description

1. Laser Pointer
2. IR sensor
3. Lo Battery led
4. ON/Scan button
5. Cable



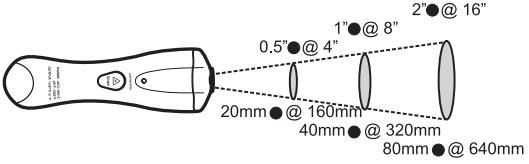
IR (Infrared) Thermometer Measurement Considerations

- The object under test should be larger than the spot (target) size calculated by the field of view diagram.
- If the surface of the object under test is covered with frost, oil, grime, etc., clean before taking measurements.
- If an object's surface is highly reflective, apply masking tape or flat black paint to the surface before measuring.
- The meter may not make accurate measurements through transparent surfaces such as glass.
- Steam, dust, smoke, etc. can obscure measurements.
- The meter compensates for deviations in ambient temperature. It can, however, take up to 30 minutes for the meter to adjust to extremely wide ambient temperature changes.
- To find a hot spot, aim the meter outside the area of interest then scan across (in an up and down motion) until the hot spot is located.
- IR measurements cannot be made through glass.

IR (Infrared) Thermometer Field of View

The meter's field of view is 8:1. For example, if the meter is 16 inches from the target (spot), the diameter of the target must be at least 2 inches.

Note that measurements should normally be made less than 2 feet from the target. The meter can measure from further distances but the measurement may be affected by external sources of light. In addition, the spot size may be so large that it encompasses surface areas not intended to be measured.



Setup Option Mode

Entering and Changing a Setup Options

1. Press and hold the **Setup** button for 3 seconds to enter the Setup mode. "**SETUP**" will appear in the upper right-hand corner of the LCD
2. Press ▲ or ▼to scroll to the desired setup option
3. Press **ENTER** to begin editing the selected option.
4. Press ▲or ▼ to change to the desired setting.
5. Press **ENTER** to store the new setting in memory and step to the next option
6. Press and hold the **Setup** button for 3 seconds to exit the Setup mode

Display	Option	Description
T1	T1 Offset	Adjust T! offset value
T2	T2 Offset	Adjust T2 offset value
T3	T3 Offset	Adjust T3 offset value
SLP	Sleep Mode	ON (mode on) or OFF (sleep mode off)
tiE	Time setting	Check the time or Set the time
rAt	Sample rate	Set the datalogging sample interval
CLR	Clear	Clear the datalogger memory

Note: Setup is disabled in **MIN MAX/AVG** or **REC** mode.

Offset (for T1, T2, or T3)

The primary display shows the actual temperature **plus** the offset; the secondary display shows only the offset value. Individual offsets for T1, T2 and T3 can be stored for later recall.

Auto Power Off mode (SLP)

1. The default mode is Sleep Mode ON (the meter will automatically shut off after 20 minutes of inactivity)**.**
2. Press ▲ or ▼ to scroll to the "**SLP**" page.
3. Press **ENTER** to show the current setting (ON or OFF).
4. Press ▲ or ▼ to change the setting. Press **ENTER** to store the new setting in memory. **On** (sleep mode on) or **0FF** (sleep mode off).

Time Setting (tiE)

1. Display the time**.** The primary display shows the year. The secondary display shows the month and the day, the third display shows the hours and minutes. Press **ENTER** to exit the time setting option without making changes.
2. Set the time. The order is year--- month ----day---- hours--- minutes. Use °**C**·°**F**·°**K** to select a digit group. Use the ▲ or ▼ buttons to change the setting. Press **ENTER** to store the new setting in memory.

Sample Rate (rAt)

The third display shows the datalogger sample rate. The default sample rate is 1 second. The third display show "**0 0 0 1**". The order is minutes/seconds. Press °**C**·°**F**·°**K** to toggle between minutes and seconds. The flashing digits indicate the digits ready to be edited. Press ▲ or ▼ to change the sample rate. Press **ENTER** to store the new setting in memory.

Erase the Datalogger Memory (CLR)

To clear the memory, enter the **CLR** setup mode, press ▲ or ▼ until the display shows the confirmation screen "**SURE YES**" and press **ENTER** to clear the memory.

Displaying Temperature units

1. Press °**C**·°**F**·°**K** to select the desired temperature units.
2. Touch the thermocouple(s) to the object under test. The temperature reading appears in the primary display.

Notes:

- The display shows **"- - - -"** when a thermocouple is not connected.
- The display shows **OL** (overload) when the temperature being measured is outside the thermocouple or meter range.

Holding the Displayed Readings

1. Press **HOLD** to freeze the readings on the display .The display shows "**HOLD"**.
2. Press **DIF/T1·T2·T3** to scroll through T1, T2, T3, T1-T2, T1-T3, or T2-T3 readings for the primary or secondary display.
3. Press **HOLD** again to turn off the HOLD function.

Viewing the MIN, MAX, and AVG Readings

1. Press **MAX/MIN** to step through the maximum (MAX), minimum (MIN), or the average (AVG) readings. The elapsed time since entering MIN MAX mode, or the time at which the minimum or maximum occurred appears on the display.
2. Press **MAX/MIN** button for 3 seconds to exit the MIN MAX mode.

Note: Max/Min/Ave applies to the T1 and T2 inputs only.

Datalogging

1. Set the desired sampling interval as described in the Setup Mode.
2. Press the **REC/▼** button to start recording. The "**TYPE K**" and "**IR TEMP**" indicators will flash on at the set sample rate when the meter is datalogging.
3. Press the **REC/▼** button to stop recording.

The supplied software allows the user to transfer stored data to a PC. Refer to the separate software instructions on the supplied software disk for details.

Using the Offset Function to Adjust for Probe Errors

Use the offset option in Setup Mode to adjust the thermometer's readings to compensate for errors in a specific thermocouple or IR temperature. The allowable adjustment range is ± 5.0 ^{0}C or ± 9.0 ^{0}F.

1. Plug the thermocouple into the input connector.
2. Place the thermocouple in a known, stable temperature environment such as an ice bath or dry well calibrator.
3. Allow the readings to stabilize.
4. In Setup change the offset until the primary reading matches the calibration temperature.

Battery Replacement

1. Turn off the thermometer.
2. Slide off the meter's rear panel.
3. Replace the battery.
4. Secure the rear panel.

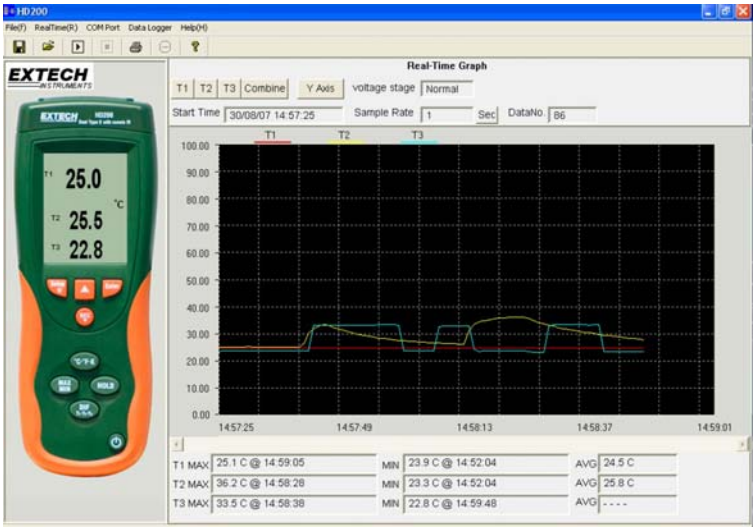
You, as the end user, are legally bound (Battery ordinance) to return all used batteries and accumulators; disposal in the household garbage is prohibited! You can hand over your used batteries / accumulators, gratuitously, at the collection points for our branches in your community or wherever batteries / accumulators are sold!

Disposal

Follow the valid legal stipulations in respect of the disposal of the device at the end of its lifecycle

USB PC Software and Interface

The HD200 is equipped with a communication jack on its upper left side. The supplied communications cable connects to this jack and to a USB port on a PC. The supplied software allows the user to view and save readings to the PC. Instructions for use and features are detailed in the supplied software HELP utility.



Specifications

General Specifications

Display	Three line display multi-function LCD
IR Field of View	8:1 distance to spot ratio
Datalogger memory	Over 18000 readings per input channel
Memory Sample Rate	Adjustable, 1per second to 1 per 59min 59sec
Over range indication	"-------" appears on the LCD
Open input indication	"-------" appears on the LCD
Low battery indication	Battery symbol appears on the LCD
Power supply	9V Battery
Operating Temperature	0 to 40°C (32 to 104°F)
Operating Humidity	10 to 80% RH
Storage Temperature	-10 to 60°C (14 to 140°F)
Storage Humidity	10 to 75% RH
Dimensions	7.9 x 2.9 x 1.9" (201 x 75 x 50mm)
Weight	Approx. 9.8oz. (280g) with battery

Function	Range	Resolution	Accuracy
T1, T2 (Type K)	-100°C to 1372°C -148°F to 2501°F	<1000°; 0.1°C/F >1000°; 1°C/F	± (0.15%rgd+1°C/1.8°F)
	-200°C to -100°C -328°F to -148°F		± (0. 5%rgd+2°C/3.6°F)
T3 (IR)	-30°C to 550°C -22°F to 1022°F	1°C/F	± (2%rgd+2°C/3.6°F)