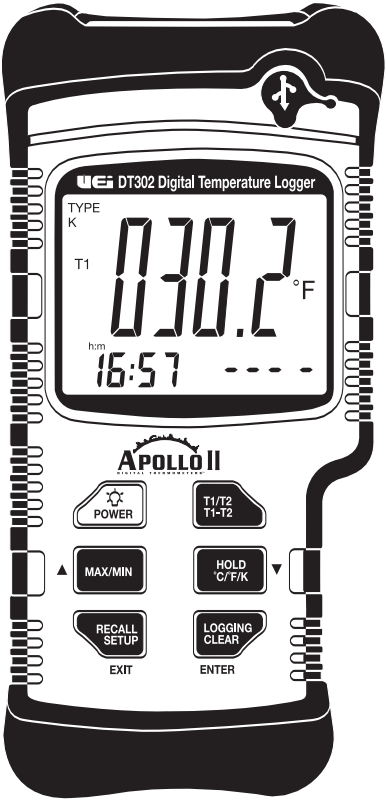
INSTRUCTION MANUAL

DT301/DT302

Digital Temperature Logger



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Introduction

The DT301 & DT302

Features include

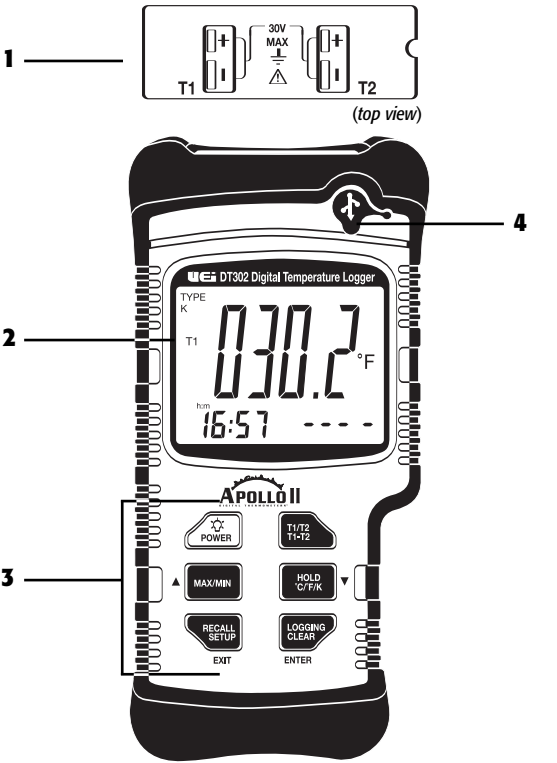
- IP67 Water/Dustproof rating
- Large Backlit Multi paramater display
- Convenient Probe Storage
- Accepts J,K,T and E type Thermocouples
- Min/Max and Data Hold
- 9,999 Memory position Logging with USB software download
- Relative (DT301)
- Temperature Differential T1-T2 (DT302)

Safety Notes

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

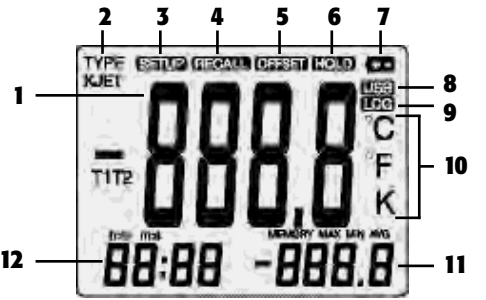
- Follow the manufacturer's maintenance procedures when servicing equipment
- Place ONLY thermocouples (type K,J,T or E) in the DT301 and DT302 thermocouple ports
- Make sure your meter is set for the proper thermocouple type you are using
- Be sure the thermocouple you use can withstand the temperature extreme it may be exposed to in your service task
- Properly maintain your thermometer and calibrate it regularly

Controls and Indicators



1. **Thermocouple inputs T1(DT301)T1 and T2 (DT302)**
2. **Display**
3. **Buttons**
4. **USB jack**

LCD Display Functional Description



1. **Primary Display:** (DT301: T1 reading)(DT302: T1-T2 reading)
2. **TYPE KJET:** Type of thermocouple.
3. **SETUP:** Setup is in progress.
4. **RECALL:** The logged readings are displayed.
5. **OFFSET:** The thermocouple measurement includes an offset.
6. **HOLD:** The display readings do not change.
7. **LOW BATTERY:** Replace batteries.
8. **USB:** The thermometer is connected to a PC via USB interface port.
9. **LOG:** Readings are being logged.
10. **°C, °F, K:** Temperature units.
11. **Secondary Display:** Internal temperature of the thermometer, MEMORY, MIN, MAX, AVG, and T1 or T2 (DT302) reading. Shows the memory location initially when a logged reading is recalled.
12. **Time Display:** 24-hour clock, shows the INTERVAL length in SETUP. Shows elapsed time when AVG is on or before clock has been set. Shows the memory time later on when a logged reading is recalled.

Buttons

NOTE: *Press all the dual function buttons momentarily to activate the Upper Row Function ,and press these buttons for more than 1 second to activate the Lower Row Functions.*

Press this button momentarily to turn the backlight on and off. The backlight turns off after 30 seconds without any button pressed. If the battery is low, the backlight is disabled.

Press this button for more than 1 second to turn the thermometer on and off.

(DT302) While displaying T1 in the primary display momentarily pressing this button will scroll through T2 or the internal temperature of the meter. Press and hold to change primary display to temperature differential (T1-T2). While displaying (T1-T2) in the primary display momentarily pressing this button will scroll through T1, T2, or the internal temperature of the meter in the lower display

(DT301) Press this button momentarily to enter or exit the "**RELATIVE**" mode.

Press this button momentarily to step through the maximum, minimum, and average readings in the secondary display. When viewing logged readings, shows the maximum, minimum, and average of the logged readings. Press this button for more than 1 second to turn off this display.

The " ▲ " function is activated in the "**RECALL**" and "**SETUP**" mode only.

Press this button momentarily to freeze or release the displayed readings. Press this button for more than 1 second to switch between Celsius (°C), Fahrenheit (°F), and Kelvin (K).

The " ▼ " function is activated in the "**RECALL**" and "**SETUP**" mode only.

Press this button momentarily to recall or stop viewing logged readings and MIN/MAX readings. Press this button for more than 1 second to start or exit "**SETUP**".

The "**EXIT**" function is activated in the "**RECALL**" and "**SETUP**" mode only.

Press this button momentarily to start or stop logging. Press this button for more than 1 second to clear logged readings.

To clear logged data press and hold until "SUrE" appears in the lower display. To execute the clear press and hold until "CLr" appears.

The "**ENTER**" function is activated in the "**SETUP**" mode only.

Operating Instructions

Before Operating

1. Plug the thermocouple(s) into the input terminal(s).
2. Press "POWER" to turn the instrument on. After 1 second, the thermometer displays the first reading and its internal temperature. If no thermocouple is plugged into the selected input or the thermocouple is "**OPEN**", the display shows "**----**".

1. How to Change Setup Options

Use "**SETUP**" to reset the thermometer or change the time units, time settings, thermocouple type, Auto-Power-Off mode, logging interval, and offset.

Entering and Exiting Setup

When the thermometer is in "**SETUP**" mode, the display always shows "**SETUP**".

- Press "RECALL SETUP" for more than 1 second to start or exit "**SETUP**".
  NOTE: *The meter must be in normal operation mode. (Not logging or displaying Min/Max/Avg values)*
- Press "EXIT" momentarily or "POWER" for more than 1 second to exit "**SETUP**".
  NOTE: *Press "▲" or "▼" to scroll to the setup option you want to change and then press "ENTER" to accept the selected setup option.*

Setting the Date

1. Entering Setup will show the first option of "dAtE"
2. Press **"ENTER"** and the display will show "YEAr"
3. Press " ▲ " or " ▼ " to select the correct year. Press "**ENTER**"
4. Next the meter will indicate month and day with "mmdd". Press " ▲ " or " ▼ " to select the correct day. Press "**ENTER**"
5. Press " ▲ " or " ▼ " to select the correct month. Press "**ENTER**"

Setting the Time Units

1. While in "**SETUP**" mode, scroll until the display shows "t1 nE" in the primary display and "Unit" in the secondary display.
2. Press " ENTER " to indicate you want to set the time units. The display shows "**h:m**" (blinks).
3. Press " ▲ " or " ▼ " to select the time units you want to display, and press " ENTER " to store the time units in memory.

Setting the Time

1. Press " ▲ " or " ▼ " until the display shows "t1 nE".
2. Press " ENTER " to indicate you want to set the time. The display shows "12:00" (blinks).
3. Press " ▲ " or " ▼ " until the display shows the correct hour (24-hour format), and the press " ENTER " to store the time in memory.

NOTE: *Holding down " ▲ " or " ▼ " causes the number to change more quickly.*

Changing the Thermocouple Type

1. Press " ▲ " or " ▼ " until the display shows "TYPE".
2. Press " ENTER " to display the thermocouple type choices (KJET). The currently selected thermocouple type blinks.
3. Press " ▲ " or " ▼ " until the thermocouple type you want appears on the display, and then press " ENTER " to store the thermocouple type in memory.

Changing the Auto-Power-Off Time (in minutes)

The thermometer enters Auto-Power-Off mode if no button is pressed for 30 minutes. Press " POWER " to turn the thermometer on. You can enable or disable Auto-Power-Off mode and also you can select the Auto-Power-Off mode and also you can select the Auto-Power-Off time (in minutes) among the 9 choices below:

① 00:10 h:m	② 00:20 h:m	③ 00:30 h:m	(default)
④ 00:40 h:m	⑤ 00:50 h:m	⑥ 00:60 h:m	
⑦ 00:70 h:m	⑧ 00:80 h:m	⑨ 00:90 h:m	

1. Press " ▲ " or " ▼ " until the display shows "APO".
2. Press " ENTER " to display "ON" or "OFF" in the time display. If "OFF" is displayed, press " ▲ " or " ▼ " to select "ON".
3. Press " ENTER " to display the choice number 3 in the secondary display and 00:30 h:m in the time display.
4. Press " ▲ " or " ▼ " until the display shows the Auto-Power-Off Time choice number you want, and then press " ENTER " to store the Auto-Power-Off setting in memory.

   Auto-Power-Off mode is automatically disabled in MIN/MAX and logging modes.

Changing the Logging Interval

The logging interval determines how often the thermometer stores logged readings in memory. You choose the length of the logging interval.

The thermometer stores logged readings at the end of each logging interval.

You can select a logging interval of 1 second (1), 10 seconds (2), 1 minute (2), 10 minutes (4), or user-defined (USEr).

1. Press " ▲ " or " ▼ " until the display shows "Int.L" and "LOG ".
2. Press " ENTER " to display the logging interval choices.
3. Press " ▲ " or " ▼ " until the display shows the logging interval you want, and then press " ENTER " to select.

4. If you selected a user-defined logging interval (1 second to 23 hours and 59 minutes).

   - Press " ▲ " or " ▼ " until the display shows "**h:m**" or "**m:s**", and then press " ENTER " to select. The last number in the time display blinks.

   - Press " ▲ " or " ▼ " until the logging interval you want appears on the display, and then press " ENTER " to select.

   Holding down " ▲ " or " ▼ " causes the number to change more quickly.

Changing the Offset

You can adjust the thermometer's readings to compensate for the errors of a specific thermocouple. The allowable compensation range is ±5.0˚C or K, and ±9.0˚F. (DT302 you can store individual offsets for T1 and T2)..

1. Press " ▲ " or " ▼ " until the display shows " OFFSET ".
2. Press " ENTER " to display T1 reading (blinks), T1 offset.
3. (DT302) Press " ENTER " to display T1 reading (blinks), T1 offset. Press" ▲ " or " ▼ " to display T1 or T2 in the primary display to select 1 input.

   (DT301) Press " ENTER " to display reading and offset. The temperature measurement plus the offset appears in the primary display. The offset appears in the secondary display.

3. Press " ▲ " or " ▼ " until the primary display shows the correct reading, and then press " ENTER " to store the offset setting in memory.

   Remember to reset the offset to 0.0 when it is no longer needed.

   NOTE: *If T1 or T2 has no offset at all, the display does not show " OFFSET ".*

Resetting the Thermometer

If you want to retore the thermometer settings as delivered from the factory, press " ▲ " or " ▼ " until the display shows "rESt" then press " ENTER " to display "SUrE" in the primary display. Press " UNIT " to exit setup.

2. How to Measure Temperature

Connecting a Thermocouple

Thermocouples are color coded by based on the ANSI color code:

Type	Color	Type	Color
J	Black	T	Blue
K	Yellow	E	Purple

1. Plug a thermocouple into the input terminal(s).
2. Set the thermometer for the correct thermocouple type. To change the thermocouple type, see "How to Change Setup Options".

Displaying Temperature

1. Press " HOLD SETUP " for more than 1 second to select the correct temperature unit.
2. Hold or attach the thermocouple(s) to the measurement location. The temperature reading appears in the selected display.
3. (DT302) Press " MODE T1-T2 " momentarily to show T1 reading in the primary display, and toggle showing T2 reading, or the internal temperature of the thermometer in the secondary display.

   Press " MODE T1-T2 " for more than 1 second to show T1-T2 reading in the primary display.

   Press " MODE T1-T2 " momentarily to toggle showing T1, T2, or the internal temperature of the thermometer in the secondary display while the primary display shows the T1-T2 reading.

NOTE: *The display shows "----" when a thermocouple is not connected. The display shows "* OFL *" (OVERLOAD) when the temperature being measured is outside the thermocouple's valid range.*

Holding the Displayed Temperature

1. Press "HOLD" momentarily to freeze the readings on the display. The display shows "**HOLD**".
2. Press "HOLD" momentarily again to turn off the "**HOLD**" function.

NOTE: *Press "HOLD" when turning on the thermometer to test the display. All display segments appear.*

Using the Relative Measurements (DT301)

1. Press "REL" momentarily to enter or exit the "**RELATIVE**" mode. When the thermometer is in Relative mode, the display shows "**REL**".
2. The difference value between the stored reference value and the measured reading value appears in the secondary display.

Viewing the MIN/MAX/AVG Readings

NOTE: *MIN/MAX and AVG values are captured only while this mode is active. Exiting the MIN/MAX/AVG mode will clear all values.*

1. Press "MAX/MIN" momentarily to step through the **MIN** (minimum), **MAX** (maximum), or the **AVG** (average) readings in the secondary display.

   The elapsed time since entering **MIN/MAX** mode appears with the average reading, or the time at which the **MINIMUM** or **MAXIMUM** occurred appears with the **MINIMUM** or **MAXIMUM** reading on the display.

3. (DT302) Press "T1/T2" momentarily to toggle showing the maximum (MAX) of T1, or T2 readings and its displayed time.

   Press "T1/T2" for more than 1 second to show the maximum (MAX) of T1-T2 reading and its displayed time.

   The minimum (MIN) or average (AVG) reading can be displayed in the similar way.

3. Press "MAX/MIN" for more than 1 second or "POWER" button for more than 1 second to exit **MIN/MAX** mode.

Using the Offset to Compensate for Probe Errors

Use the offset option in "**SETUP**" to adjust temperature readings to compensate for the errors of a specified thermocouple.

1. Plug the thermocouple into the input terminal.
2. Place the thermocouple in a known stable temperature environment (such as an ice bath or a dry well calibrator).
3. Allow the readings to stabilize.
4. In "**SETUP**", change the offset until the primary display reading matches the calibration temperature. See "How to Change Setup Options"

3. How to Use Memory

During logging session, the thermometer stores logged readings in its memory. At the end of the logging session you can view the logged readings on the display. You can also transfer the logged readings to a PC running the provided WS600 software (optional), see "How to Communicate with a PC".

WS600 displays the readings on an online form, which you can print or store for later use.

Initial Conditions and Data Entries

Logged readings include initial conditions and data entries. The initial conditions are the thermocouple type and the offsets for each thermocouple input. You can only view initial conditions using WS600.

The data entries are a time stamp and the T1, T2 or T1-T2 reading for the DT302 and current reading for the DT301. You can view these values by pressing "SETUP" momentarily or using WS600. The thermometer has 9,999 memory locations. The thermometer stores 9,999 sets of temperature readings and one set of initial conditions when logging continuously. It stores 9,999 sets of temperature readings and initial conditions when logging individual points manually.

Starting and Stopping Logging

Memory clear, and PC communications are in accessible during logging. Recall function is enabled during logging.

1. Set the time and the logging interval, see "How to Change Setup Options".
2. Press " " momentarily to start logging. The display shows "LOG".
3. Press " " momentarily again to stop logging.

Clearing Memory

When memory is full, "FULL" appears in the secondary display and logging stops. You can clear memory in normal or **MIN/MAX** mode.

1. Press " " for more than 1 second to display "SURE" in the "**RECALL**" mode.
2. Press " " for more than 1 second again to delete all logged readings from memory.
3. Press " " momentarily or turn off the thermometer to stop clearing memory.

Viewing Logged Readings

1. Press " " momentarily to display the last logged reading. If there is no logged readings, "noDATA" appears in the secondary display, and the thermometer returns to the previous mode.
2. Press " " to scroll through the logged readings. The display shows each logged reading and its time stamp, which is displayed 2 seconds after its memory location appeared in the secondary display.
3. Press " " momentarily to step through the minimum, maximum, average, and currently logged reading.
4. (DT302) Press " " momentarily to display the logged readings you want to view. Press " " for more than 1 second to display differential values between the logged readings you want to view.

5. Press " " momentarily or turn off the thermometer to stop viewing logged readings.

NOTE: *The thermometer calculates the minimum and maximum of all logging sessions in memory.*

The thermometer is equipped with an USB interface port. A Windows® software (WS600) CD and USB interface cable kit is available for data acquisition applications. This kit is required to connect the thermometer to a PC. The thermometer comes with this optional accessory kit.

You can transfer the currently measuring data and the contents of the thermometer's memory to a PC using this kit. Refer to the "**HELP**" menu in the WS600 for further details.

When the meter starts to send logged readings to a PC while the logging function is activating, the logging function is disabled.

NOTE: *Logging is disabled while communicating with a PC.*

Maintenance

Periodic service

WARNING!

Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the meter. This could alter the protection from electrical shock and personal injury this meter provides to the operator. Perform only those maintenance tasks that you are qualified to do.

These guidelines will help you attain long and reliable service from your meter:

1. Calibrate your meter annually to ensure it meets original performance specifications.
2. Keep your meter dry. If it gets wet, wipe it dry immediately. Liquids damage electronic circuits.
3. Whenever practical, keep the meter away from dust and dirt, which can cause premature wear.
4. Although your meter is built to withstand the rigors of daily use, it can be damaged by severe impacts. Use reasonable caution when using and storing the meter.

Cleaning and Decontamination

Periodically clean your meter's case using a damp cloth. **DO NOT** use abrasives, cleaning solvents or strong detergents, as they may damage the finish or affect the reliability of the structural components.

Storing the Thermocouples

The thermocouples with wire spools can be stored in the back of the thermometer.

1. Wind the wire around the wire spool.
2. Thread the end of wire through a hole of the wire spool.
3. Thread the end of wire through the other hole of the wire spool.
4. Insert the end of wire under the loop and pull the end of wire.

Battery Replacement

Always use a fresh replacement battery of the specified size and type. Immediately remove the old or weak battery from the meter and dispose of it in accordance with your local disposal regulations. Old or defective batteries can leak chemicals that corrode electronic circuits.

WARNING!

To avoid electric shock, be sure to turn off the meter's power and disconnect thermocouples from any equipment before you remove or install batteries.

To install a new battery, follow these procedures:

1. Remove the screws from the battery compartment cover on the back of the meter and lift the cover (Fig 1).
2. Remove and discard the old batteries. Always dispose of old batteries promptly in a manner consistent with local disposal regulations.

WARNING!

*Under **NO** circumstance should you expose batteries to extreme heat or fire as they may explode and cause injury.*

3. Place a fresh batteries in the compartment.

***NOTE:** If you do not plan to use the meter for a month or more, remove the battery and store it in an area that won't be damaged by a leaking battery.*

4. Reattach the battery compartment cover to the meter and reinstall the screws.

Specifications

Environmental

Operating Temperature	14˚ to 122˚F (-10˚ to 50˚C)
Storage Temperature	-40˚ to 140˚F (-40˚ to 60˚C)
Humidity	Non condensing <50˚F (10˚C) 85% RH: 50˚ to 86˚F (10˚ to 30˚C) 70% RH: 86˚ to 104˚F (30˚ to 40˚C) 45% RH: 104˚ to 122˚F (40˚ to 50˚C)
Altitude	Operating - up to 200 m Storage - 10000 m

General

Dimension	18.3 (H) x 9.4 (W) x 4.3 (D) cm
	(7.20" x 3.70" x 1.70)
Weight	Approx. 460 g (16.2 oz)
Battery	2 x LR03 (AAA) type 1.5V
Certification	CE
Safety	IEC 1010-1 (2001), UL 3111-1 (6, 1994), EN 61010-1 (2001), CSA C22.2 No. 1010.1 (1992)
CAT I	OVERVOLTAGE (Installation) CATEGORY I, Pollution Degree 2 per IEC 1010-1
Immersion (30 min) & Dust proof	IP67 according to IEC 60529

Thermocouple

Instrument	Part #	Type	Specifications
DT301	ATT19	J-Type	(-40˚- 950˚F/-40˚-510˚C) 48" w/oven clip
DT302	ATT39	K-Type	(-40˚- 950˚F/-40˚-510˚C) 48" Teflon coated Wire wrap handle

Electrical

Measurement range	J-Type: -346˚ to +2192˚F (-210˚ to +1200˚C) K-Type: -328˚ to +2498˚F (-200˚ to +1370˚C) T-Type: -418˚ to +752˚F (-250˚ to +400˚C) E-Type: -238˚ to +1832˚F (-150˚ to +1000˚C)
Display Resolution	0.1˚F/˚C < 1000˚ 1.0˚F/˚C ≥ 1000˚
Measurement Accuracy	J, K, T, and E-Type; ±[0.1% +1.0˚F (0.5˚C)] [Below -148˚F (-100˚C): add 0.2% of reading for J, K, and E-Type; and 0.1% of reading for T-Type]
Temperature Coefficient	0.01% of reading 0.1˚F per ˚F(+0.05˚C per ˚C) for <+64˚F (+18˚C) or +82˚F (+28˚C) [Below -148˚F (-100˚C): add 0.05% of reading for J, K, and E-type; and 0.1% of reading for T-type]
Real Time Clock Tolerance	About 1 second per day
Maximum Differential Common Mode Voltage	1V (maximum voltage difference between any pair of inputs)
Temperature Scale	ITS-90 (International Temperature Scale of 1990)
Applicable Standards	N.I.S.T. Monograph 175 revised to ITS-90
Accuracy is specified for ambient temperatures between 64˚F (18˚C) and 82˚F (28˚C) for a period of 1 year. The above specifications do not include thermocouple error.	

DT301/DT302

Digital Temperature Logger

Limited Warranty

The DT301 and DT302 are warranted to be free from defects in materials and workmanship for a period of five years from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

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This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

PLEASE
RECYCLE

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