UNI-T®

UT309E
Professional Infrared Thermometer
User Manual

Overview

UT309E professional non-contact infrared thermometer (hereinafter referred to as thermometer) can determine surface temperature through measuring infrared energy radiated by the target surface. UT309E can measure temperatures from -35 °C to 850 °C. This 20:1 ratio meter can store up to 99 sets of data and perform scheduled measurement with a maximum interval of 96 hours between two measurements. This Thermometer is also IP65 rated and can withstand 3 meters drop.

Safety Instructions

⚠ **Warning:**
To avoid eyes or personal injury, please read the following safety instructions before using the thermometer:
- Please do not irradiate people or animals with laser directly or indirectly.
- Please do not look at the laser directly or through other optical tools (telescope, microscope, etc.).
- If battery symbol on LCD display is flashing, replace batteries immediately to avoid inaccurate measurements before using the thermometer.
- Inspect the case before using the thermometer. Do not use the thermometer if it appears damaged. Look for cracks or missing plastic.
- Please refer to the emissivity information for the actual temperature. Reflective objects can cause the actual temperature value to be higher than the measured temperature value. When measuring these objects, please be aware not to touch high temperature surfaces.
- Do not use the thermometer in an explosive gas, steam or humid environment.
- To ensure measurement accuracy, place the thermometer in the test environment for more than 30 minutes before using it.
- Avoid keeping the thermometer near high temperature objects for a long time.

Specifications

Functions	
Temperature range	−35˚C~850˚C (−31˚F~1562˚F)
Accuracy 21˚C~25˚C(70˚F~77˚F)	≥0˚C: ±1.8˚C or ±1.8% of reading, whichever is greater <0˚C: ±(10% of reading + 1.8˚C) ≥32˚F: ±3.6˚F or ±1.8% of reading, whichever is greater <32˚F: ±(10% of reading + 3.6˚F)
Temperature coefficient	0.1˚C/˚C (0.1˚F/˚F) or ±0.1% of reading per degree, whichever is greater
D:S ratio	20:1 (calculated when energy is 90%)
Emissivity	0.1~1.0 adjustable
Response time	250ms (95% of reading)
Spectral response	8um~14um
Resolution	0.1˚C (0.1˚F)
Repeatability	0.8˚C or 0.8% of reading, whichever is greater
Number of lasers	Dual Lasers
Laser type	CLASS 2
Laser wavelength	630nm~670nm
Laser power	<1mW
Battery type	9V Battery (1604A)
Battery life	≥16H
Product size	189mm*118mm*55mm
Weight	292g
Operating temperature	0˚C~50˚C (32˚F~104˚F)
Storage temperature	-20˚C~60˚C (-4˚F~140˚F)
Operating humidity	< 90% RH (non-condensing)
Operating altitude	2000m
Protection level	According to IEC60529, complies with IP65
Drop test	3m

Safety Standards
CE Certification: EN61326-1 EN61326-2-3
Laser Safety Standard: IEC/EN 60825-1, EN 50689.
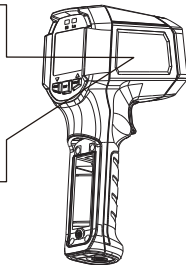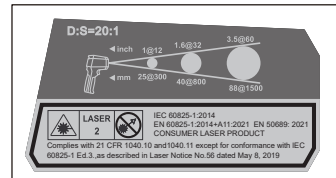**Reference Standard:** JJG 856-2015

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
Compliance with IEC/EN 60825-1, EN 50689.

D:S=20:1

Product Features

Strong and Durable: Passed 3m drop test.
Dustproof and Waterproof: Passed IP65 level dustproof and waterproof tests.
Ergonomic Design: Comfortable handheld, simple and convenient operation.
MAX/AVG/DIF/MIN: Can quickly display the maximum, minimum, average and difference value (between maximum and minimum) during measurement.
Large Backlight Screen: Large screen, bold fonts, and uniform white backlight combined make it an attractive display.
Alarm Function: High and low temperature alarm is displayed with flashing LED and symbol, to easily observe the exceeded measurement results when alarm is triggered.
Dual-wavelength rotatable Laser indication: Allows you to accurately and quickly determine the area to be measured.
Data Storage: Up to 99 groups of data for measurement analysis.
Scheduled Measurement: Set a time point at which the thermometer will automatically turn on and perform measurement once every preset interval, maximum interval is 96 hours.
Monitoring Measurement: Set a time interval, after which the thermometer will automatically turn on and perform measurement once.

Function Description

🔒	Temperature measurement lock trigger
⚠	Laser on
HILO	High and low limit alarm
🔋	Low battery
SCAN	Temperature measurement trigger
HOLD	Measurement data hold
˚F˚C	Unit
8888	Measurement value on main display
8888	Measurement value on secondary display
ε=0.88	Emissivity
LOG	Data storage mode
Auto	Scheduled measurement
Interval	Monitoring measurement
Protect	Auto shutdown protection
MAX MIN AVG DIF	Mode

Operations

Power On and Off
1. Gently pull the trigger to power on thermometer, LCD screen and backlight will be on.
2. The thermometer will power off automatically without operation for 8s.

Power off without operation for 8s
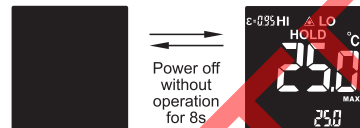
Manual Measurement
1. Pull and hold the trigger after aiming at the target. SCAN icon will be flashing indicating target object temperature is being measured.
2. Release trigger, SCAN icon disappears and HOLD icon appears, indicating measurement has stopped and the last measured value is kept.

Lock Measurement
1. During lock measurement, pull trigger to enable function. The 🔒 icon will appear on thermometer screen and SCAN icon will flash. Thermometer keeps continuously measuring the target temperature.
2. Pull trigger again, 🔒 and SCAN icons will disappear, HOLD icon will appear. Thermometer stops measurement and keeps the last measured value.

Note: During measurement, target must be larger than the light spot to ensure accuracy. Please refer to the D:S values.

MAX/MIN/AVG/DIF Value Reading
Short press MODE button to change MAX/MIN/AVG/DIF modes respectively, temperature value of corresponding modes are shown in the secondary display area (as shown below).
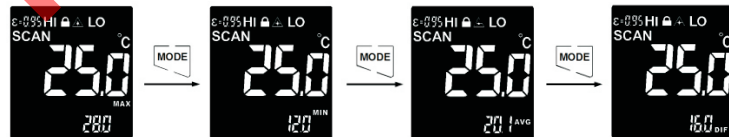
HIGH Alarm ON/OFF
Short press SET button to switch to HIGH alarm ON/OFF setup (as shown below), use LOG or MODE button to switch between ON/OFF. Thermometer will exit setup after 5 seconds without any operation.
When HIGH alarm is ON, HI symbol and red LED will flash when temperature exceeds high alarm limit.

HIGH Alarm Limit Setup
Short press SET button to switch to HIGH alarm limit setup (as shown below), use functional buttons to set values.
Short press LOG or MODE button to add or subtract 1 every time. Long press LOG or MODE button to add or subtract 10 every second. Thermometer will exit limit setup after 5 seconds without any operation.

LOW Alarm ON/OFF
Short press SET button to switch to LOW alarm ON/OFF setup (as shown below), use LOG or MODE button to switch between ON/OFF. Thermometer will exit setup after 5 seconds without any operation.
When LOW alarm is ON, LO symbol and blue LED will flash when temperature is lower than the low alarm limit.

LOW Alarm Limit Setup
Short press SET button to switch to LOW alarm limit setup (as shown below), use functional buttons to set values.
Short press LOG or MODE button to add or subtract 1 every time. Long press LOG or MODE button to add or subtract 10 every second. Thermometer will exit limit setup after 5 seconds without any operation.
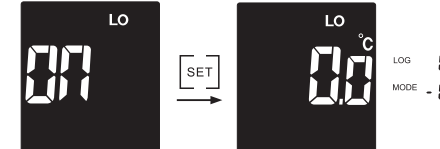
Emissivity Setup
UT309E emissivity can be adjusted from 0.1 to 1.0. Short press SET button to enter emissivity setup interface (as shown below). Use LOG or MODE button to set values. Short press LOG or MODE button to add or subtract 0.01 every time, long press LOG or MODE button to add or subtract 0.1 every second. Thermometer will exit setup after 5 seconds without any operation.

Unit Setup
Short press SET button to switch to unit setup interface (as shown in the following figure), use LOG or MODE button to change ˚C and ˚F units. Thermometer will exit setup if there is no operation for 5 seconds.

Laser ON/OFF
Short press SET button to enter laser on or off setup interface (as shown below), use LOG or MODE button to turn on or off lasers. Thermometer will exit setup if there is no operation for 5 seconds.


Lock Measurement ON/OFF
Short press SET button to switch to lock measurement ON/OFF setup interface (as shown below), use LOG or MODE button to turn on/off lock measurement. Thermometer will exit setup if there is no operation for 5 seconds.

Enter/Exit Data Storage Mode
In the HOLD state of normal measurement mode, short press LOG button to enter the data storage mode, then press LOG/MODE to select the data group to be viewed (up to 99 groups). '- - - -' indicates that no data has been saved in the group. Long press LOG for 3s to return to normal measurement mode.

Long press LOG for 3s
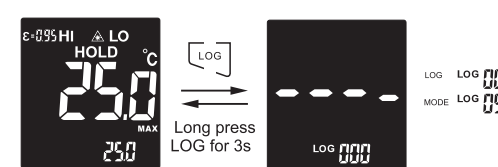
Data Storage

Under data storage mode (with new data in HOLD state), press SET, data flashes 3 times and is saved in current data group, then the screen will display the data of next group. If no data has been saved in the group, '- - - -' appears. You can short press MODE to return to view the previous stored data.

Delete Data

Under data storage mode, long press SET for 5s to delete all data (99 groups).

Scheduled Measurement

Enable this function to measure at a preset time (within 24 hours). The thermometer will wake up automatically to perform measurement and save record at preset time.
General measurement mode: Long press MODE for 3s to enter the scheduled measurement ON/OFF setup interface (as shown below), use LOG or MODE button to switch between ON/OFF. Thermometer will exit setup after 5 seconds of no operation.
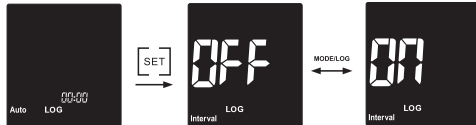

Scheduled Measurement Time Setup

Under scheduled measurement ON/OFF setup interface, short press SET to enter the scheduled measurement time setup interface (as shown below), use LOG/MODE to set the hour, then short press SET and use LOG/MODE to set the minute.

Monitoring Measurement

Enable this function to setup monitoring measurement at a preset interval (1min-24h). The Thermometer will automatically wake up to measure and record a measurement at every interval.
Under the scheduled measurement time setup interface, short press SET to enter the monitoring measurement setup interface (as shown below), use LOG or MODE button to switch between ON/OFF. Thermometer will exit setup after 5 seconds without any operation.

Monitoring Measurement Time Setup

Under monitoring measurement ON/OFF setup interface, short press SET to enter the monitoring measurement time setup interface (as shown below), use LOG/MODE to set the hour, then short press SET and use LOG/MODE to set the minute.

Protection Function

Without protection function, the thermometer will always be on during locked measurement mode, even when trigger is enabled by accident. When protection function is enabled, the thermometer will stop measurement and shut down when there is no button operation for 10 minutes.
Under the monitoring measurement time setup interface, short press SET to enter the protection mode ON/OFF setup interface (as shown below), use LOG or MODE button to switch between ON/OFF. Thermometer will exit setup after 5 seconds without any operation.

System Time Setup

Please set the system time before the scheduled measurement and monitoring measurement.
This thermometer supports 24-hour time format.
Under the protection mode ON/OFF setup interface, short press SET to enter the system time setup interface (as shown below), use LOG/MODE to increase/decrease the relevant value, and short press SET to set the year-month-date-hour-minute accordingly. Thermometer will exit setup after 5 seconds of no operation.
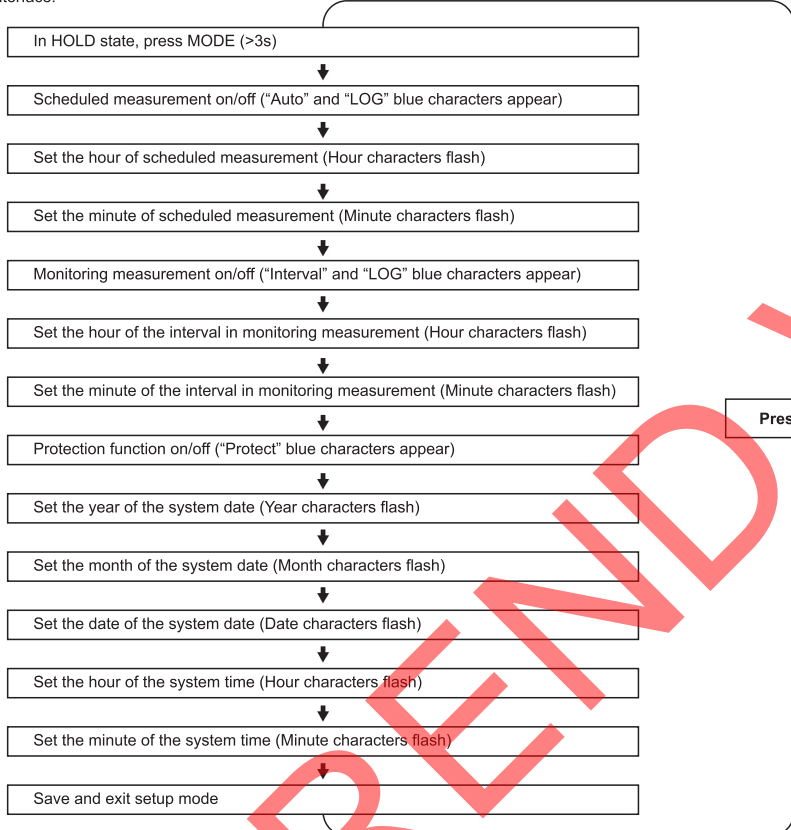

Notes:

1) The records will be saved from the 000 position when they are stored in memory. After all 99 positions are occupied, the recording will return to 000 again and overwrite the original data.
2) When this function is turned on and the thermometer is in the SCAN or HOLD states, "Auto" or "Interval" will be displayed.
3) When the thermometer restarts, the system time and the measurement settings will be restored to the default values (need to be reset), but the recording memory will still exist.
4) It is not recommended to enable the scheduled measurement and monitoring measurement at the same time, as their measurement records all start from 000, and will overwrite each other's measurement data.

Enter the scheduled measurement/monitoring measurement/protection function/system time setting modes

In the HOLD state, press **MODE** button for more than 3s to enter the scheduled measurement mode; then press **SET** to enter the following setting interface:

| In HOLD state, press MODE (>3s) |
| Scheduled measurement on/off ("Auto" and "LOG" blue characters appear) |
| Set the hour of scheduled measurement (Hour characters flash) |
| Set the minute of scheduled measurement (Minute characters flash) |
| Monitoring measurement on/off ("Interval" and "LOG" blue characters appear) |
| Set the hour of the interval in monitoring measurement (Hour characters flash) |
| Set the minute of the interval in monitoring measurement (Minute characters flash) |
| Protection function on/off ("Protect" blue characters appear) |
| Set the year of the system date (Year characters flash) |
| Set the month of the system date (Month characters flash) |
| Set the date of the system date (Date characters flash) |
| Set the hour of the system time (Hour characters flash) |
| Set the minute of the system time (Minute characters flash) |
| Save and exit setup mode |

Press SET

Find Hot Point and Cold Point

Aim at target area with thermometer, then move up and down slowly to sweep the whole area until the hot point and cold point are found.
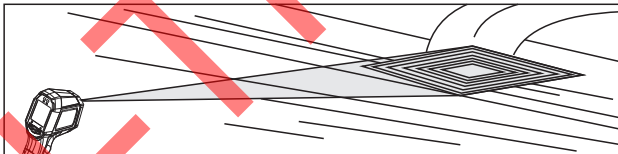

D:S Ratio (Distance to spot ratio)

S increases as D increases (S represents 90% of energy in the circle). The maximum D:S can be obtained when D=800mm (32'') and S=40mm (1.6'').

D:S=20:1
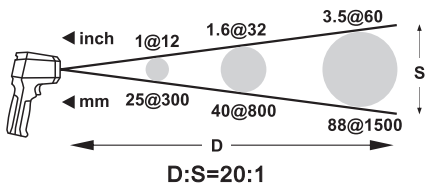
Field of View

Ensure that the target is larger than S. The smaller the target is, the closer the measurement distance should be. Optimum result is obtained when diameter of the target is more than 2.0 times of S.
The spot diameter is approximately equal to the distance between the two laser points.
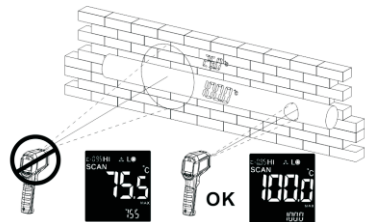
Emissivity

Emissivity characterization reflects the material's radiated energy. Emissivity for most organic materials, paints or oxidized surfaces are about 0.95. Total emissivity of selected metals and non-metals are listed in the following table.

Measured Surfaces	Emissivity
Metal	
Aluminum	
Oxidization	0.2-0.4
A3003 Alloy	
Oxidization	0.3
Rough	0.1-0.3
Brass	
Burnishing	0.3
Oxidization	0.5
Copper	
Oxidization	0.4-0.8
Electric Terminal Board	0.6
Hastelloy	
Alloy	0.3-0.8
Inconel	
Oxidization	0.7-0.95
Sand-Blasting	0.3-0.6
Electro Burnishing	0.15
Iron	
Oxidization	0.5-0.9
Rusting	0.5-0.7
Iron (Casting)	
Oxidization	0.6-0.95
Non-Oxidization	0.2
Casting	0.2-0.3
Iron (Forging)	
Passivation	0.9
Lead	
Rough	0.4
Oxidization	0.2-0.6
Molybdenum	
Oxidization	0.2-0.6
Nickel	
Oxidization	0.2-0.5
Platinum	
Black	0.9
Steel	
Cold Rolling	0.7-0.9
Steel Plate Rubbing	0.4-0.6
Steel Plate Burnishing	0.1
Zinc	
Oxidization	0.1
Non-Metal	
Asbestos	0.95
Asphalt	0.95
Basalt	0.7
Carbon	
Non-Oxidization	0.8-0.9
Graphite	0.7-0.8
Silicon Carbide	0.9
Ceramics	0.95
Clay	0.95
Concrete	0.95
Cloth	0.9
Glass	
Convex Glass	0.76-0.8
Smooth Glass	0.92-0.94
Lead-Boron Glass	0.78-0.82
Plates	0.96
Plaster	0.8-0.95
Ice	0.98
Limestone	0.98
Paper	0.95
Plastics	0.95
Water	0.93
Soil	0.9-0.98
Wood	0.9-0.95

Maintenance

Clean

Use clean compressed air to blow away falling particles.
Use wet cotton swab to carefully wipe lens surface.
Use wet sponge or soft cloth to clean product exterior.

Battery Replacement

Install or replace 1604A 9V battery according to the picture on the right.

The contents of this manual are subject to change without prior notice