MAJOR TECH

MT2005

True-RMS Thermal MultiMeter

Content

1. INTRODUCTION

Professional True RMS Industrial Digital Multimeter with built-in Thermal Imager, and TFT color LCD display, providing fast A/D converting sampling time, high accuracy. It is a fast and easy solution to find and solve problems with production equipment, providing Bluetooth technology BLE.
It is a safe instrument with double molded plastic housing and has a IP65 waterproof rating.

Features

- 6000 count 2.8" TFT Color LCD display
- Built-in Thermal imager with MIN/MAX and Center crosshair targeting
- 50Hz fast Thermal image frame rate
- DC voltage
- AC, AC+DC TRMS Voltage
- DC current
- AC, AC+DC TRMS current
- Resistance and Continuity test
- Diode test
- Capacity
- Frequency
- Duty Cycle
- Temperature with K-type probe
- Flexible coils current

2. Safety

2.1. Safety Information

This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the meter and its test leads should not be handled when these terminals are energized.

Equipment is protected by double or reinforced insulation

This symbol advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case) 1000 VAC or VDC.

WARNING

This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result in damage to the product.

PER IEC1010 OVERVOLTAGE INSTALLATION CATEGORY
OVERVOLTAGE CATEGORY I

Equipment of **OVERVOLTAGE CATEGORY I** is equipment for connection to circuits in which measures are taken to limit the transient overvoltages to an appropriate low level.

Note: Examples include protected electronic circuits.

OVERVOLTAGE CATEGORY II

Equipment of **OVERVOLTAGE CATEGORY II** is energy-consuming equipment to be supplied from the fixed installation.

Note: Examples include household, office, and laboratory appliances.

OVERVOLTAGE CATEGORY III

Equipment of **OVERVOLTAGE CATEGORY III** is equipment in fixed installations.

Note: Examples include switches in a fixed installation and some equipment for industrial use with a permanent connection to the fixed installation.

OVERVOLTAGE CATEGORY IV

Equipment of **OVERVOLTAGE CATEGORY IV** is for use at the origin of the installation.

Note: Examples include electricity meters and primary over-current protection equipment

2.2 Safety Instructions

This meter has been designed for safe use, but must be operated with caution. The rules listed below must be carefully followed for safe operation.

NEVER apply voltage or current to the meter that exceeds the specified maximum:

Input Protection Limits	
Function	Maximum Input
V DC or V AC	1000V DC/AC RMS
mA AC/DC	800mA 1000V fast acting fuse
A AC/DC	10A 1000V fast acting fuse
Frequency, Resistance, Capacitance, Duty Cycle, Diode Test, Continuity	1000V DC/AC RMS
Temperature	1000V DC/AC RMS
Surge Protection: 8kV peak per IEC 61010	

USE EXTREME CAUTION when working with high voltages.

DO NOT measure voltage if the voltage on the "COM" input jack exceeds 1000V above earth ground.

NEVER connect the meter leads across a voltage source while the function switch is in the current, resistance or diode mode. Doing so can damage the meter.

ALWAYS discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.

ALWAYS turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.

NEVER operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3. Description and reference guide

3.1 Front and back descriptions

1. NCV detector area
2. LCD Display
3. Navigation/Menu buttons
4. MODE button
5. RANGE button
6. Rotary function switch
7. Positive(+) Probe input jack for A (Current).
8. Positive(+) Probe input jack for mA (Current).
9. COM(-) Probe input jack
10. Positive(+) Probe input jack for all Inputs except A and mA
11. Thermal mode/Light button
12. Hold/Capture button

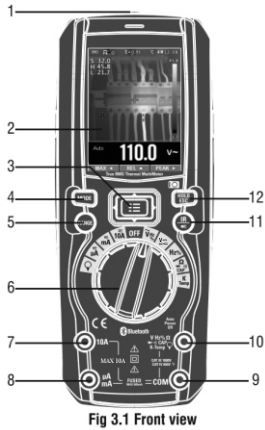


Fig 3.1 Front view

1. No-slip slope
2. Thermal imager lense
3. Lense cover
4. Work light
5. Laser
6. Support plate
7. Battery cover lock

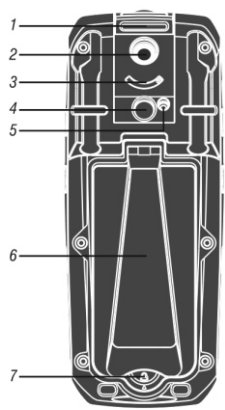
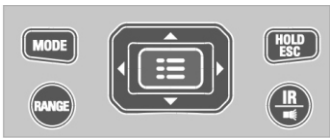


Fig 3.2 Back view

3.2 Understanding the Push Buttons

The 9 push buttons on the front of the Meter activate features that augment the function selected using the rotary switch, navigate



Cursor buttons MAX ◄ REL ▲ PEAK ►

Ÿ Select an item in the menu, adjust display contrast, scroll through information and perform data entry.

REL ▲ Use Navigation **UP** buttons to select **PEAK** function

MAX ◄ Use Navigation **LEFT** buttons to select **REL** function

PEAK ► Use Navigation **RIGHT** buttons to select **MAX** function

Physical buttons

HOLD ESC — Freezes the present reading in the display and allows the display to be saved. Also wake up for APO.

MODE — Press the **MODE** key to switch the functions

RANGE — Press the **RANGE** key to manual range.

Enter function of the menu selected.

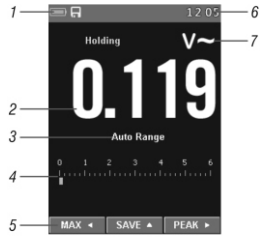
IR — Press the **IR** key to switch to **DMM MODE** and **IR+DMM** mode.

Navigation buttons.

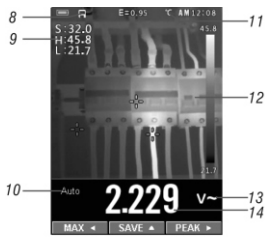
3.3. Understanding the Display

Measurement on LCD Dispaly

1. Indication of battery charge level
2. Indication of measuring result
3. Indication of Automatic/Manual mode
4. Analogue bargraph
5. Indications associated with function keys
6. Indication of the system's time
7. Indication of measuring unit
8. SD card
9. Temperature measuring result
10. Indication of Automatic/Manual mode
11. Temperature unit
12. IR Camera
13. Indication of measuring unit
14. Indication of measuring result



DMM MODE

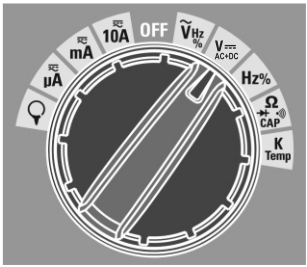


IR+ DMM MODE

Icons on LCD Display

- Voltage is over 30V (AC or DC)
- Warning
- Flexible Coils
- Traditional Clamps
- Relative
- High Edge time
- AC Voltage or Current
- DC Voltage or Current
- AC + DC Voltage or Current
- Continuity Function
- Diode Function
- Ohms

3.4. Understanding the Rotary Switch

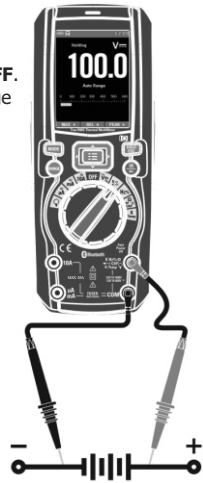


Select a primary measurement function by positioning the rotary switch to one of the icons around its perimeter. For each function, the Meter presents a standard display for that function (range, measurement units, and modifiers). Button choices made in one function do not carry over into another function.

V~	AC voltage measurements
V⎓	DC and AC+DC voltage measurements
HZ %	Frequency and Duty measurements
Ω CAP→▮+ •))	Resistance, Diode test, capacitance and CONTINUITY measurements
K Temp	Temperature measurements
A	AC, DC and AC+DC amps measurements
mA	AC, DC and AC+DC milliamps measurements
uA	AC, DC and AC+DC microampere measurements up to 6,000 μA
⚲	Flexible Coils Current

4. DMM Measurement and Setup

4.1. DC Voltage Measurements



CAUTION: Do not measure **DC** voltages if a motor on the circuit is being switched **ON** or **OFF**. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the **VDC** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Read the voltage in the display.

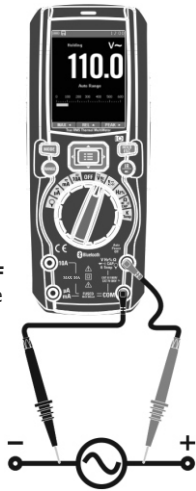
4.2. AC+DC Voltage Measurements

CAUTION: Do not measure **DC** voltages if a motor on the circuit is being switched **ON** or **OFF**. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the **VDC** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Press the **MODE** key to switch the **V AC +DC** Voltage functions.
5. Read the **AC+DC** voltage in the display.

4.3. AC Voltage Measurements

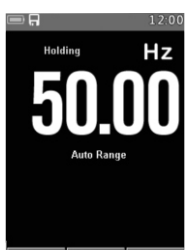
WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present



CAUTION: Do not measure **AC** voltages if a motor on the circuit is being switched **ON** or **OFF** Large voltage surges may occur that can damage the meter.

1. Set the function switch to the **VAC** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert red test lead banana plug into the positive **V** jack.
4. Read the voltage in the main display.

4.4. Frequency Measurements

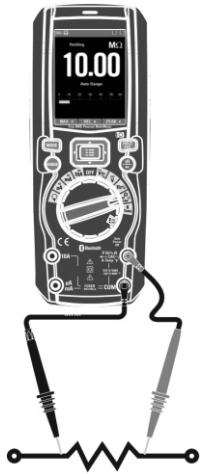


1. Set the function switch to the **Hz%** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Read the Frequency in the display.
5. Press the **MODE** key to switch the Duty functions.
6. Read the Duty in the display.

4.5. Resistance Measurements

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

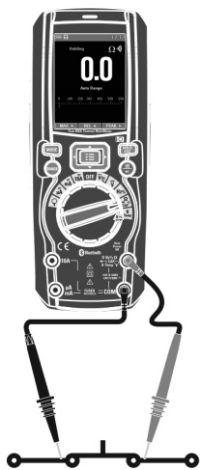
1. Set the function switch to the Ω CAP position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **Ω** Jack.
4. Read the resistance in the display.



4.6. Continuity Check

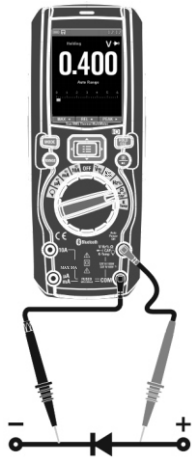
WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the Ω CAP position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive jack.
4. Press the **MODE** key to switch the continuity functions.
5. If the resistance is less than approximately **50Ω**, the audible signal will sound. If the circuit is open, the display will indicate **"OL"**.



4.7. Diode Test

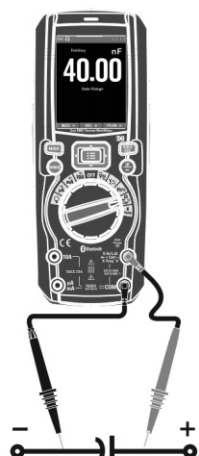
1. Set the function switch to the **Ω CAP** ▶| ·)) position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Press the **MODE** key to switch the Diode functions.
5. Forward voltage will typically indicate 0.400 to 3.000V. Reverse voltage will indicate "**OL**". Shorted devices will indicate near 0V and an open device will indicate "**OL**" in both polarities.



4.8. Capacitance Measurements

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements.

1. Set the rotary function switch to the Ω CAP▶|·)) position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Press the **MODE** key to switch the Capacitance functions.
5. Read the capacitance value in the Display.

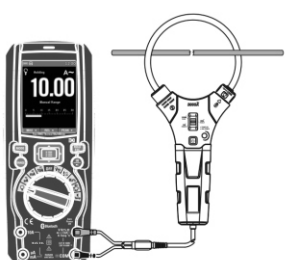


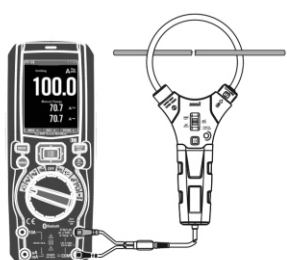
4.9. Temperature Measurements

1. Set the function switch to the **TEMP(°C or °F)** position.
2. Insert the Temperature Probe into the input jacks, making sure to observe the correct polarity.
3. Read the temperature in the display.
4. Press the **MODE** key to switch the **Unit (C° or F°)**

4.10. Fexible Coil Current Measurements (MT740 Optional Extra)

1. Set the function switch to the **Flexible coil** position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the positive **V** jack.
4. Read the current in the display.
5. Press the **MODE** key to switch the **AC ,DC** and **AC +DC** Current.
6. Press the **RANGE** key to switch to range. 1000mA, 10A, 30A, 40A, 100A, 300A, 400A, 1000A, 3000A.





4.11. DC Current Measurements

1. Insert the black test lead banana plug into the negative **COM** jack.
2. For current measurements up to **6000µA DC**, set the function switch to the **µA position** and insert the red test lead banana plug into the **µA/mA** jack.
3. For current measurements up to **600mA DC**, set the function switch to the **mA position** and insert the red test lead banana plug into the **µA/mA** jack.
4. For current measurements up to **10A DC**, set the function switch to the **10A position** and insert the red test lead banana plug into the **10A** jack.
5. Press the **MODE** button to indicate "⎓" on the display.
6. Read the current in the display.

4.12. AC Current Measurements

CAUTION: Do not make **10A** current measurements for longer than **30 seconds**. Exceeding **30 seconds** may cause damage to the meter and/or the test leads.

1. Insert the black test lead banana plug into the negative **COM** jack.
2. For current measurements up to **6000µA AC**, set the function switch to the **µA position** and insert the red test lead banana plug into the **µA/mA** jack.
3. For current measurements up to **600mA AC**, set the function switch to the **mA position** and insert the red test lead banana plug into the **µA/mA** jack.
4. For current measurements up to **10A AC**, set the function switch to the **10A position** and insert the red test lead banana plug into the **10A** jack.
5. Press the **MODE** button to indicate "〜" on the display.
6. Read the current in the display

4.13. AC+DC Current Measurements

CAUTION: Do not make **10A current** measurements for longer than **30 seconds**. Exceeding **30 seconds** may cause damage to the meter and/or the test leads.

1. Insert the black test lead banana plug into the negative **COM** jack.
2. For current measurements up to **6000µA AC+DC**, set the function switch to the **µA position** and insert the red test lead banana plug into the **µA/mA** jack.
3. For current measurements up to **600mA AC+DC**, set the function switch to the **mA position** and insert the red test lead banana plug into the **µA/mA** jack.
4. For current measurements up to **10A AC+DC**, set the function switch to the **10A position** and insert the red test lead banana plug into the **10A** jack.
5. Press the **MODE** button to indicate "≂" on the display.
6. Read the current in the display.

4.14. Using RANGE

1. Press the **RANGE** key to activate the manual mode and to disable the **Auto range** function. The message **Manual Range** appears on the upper left part of the display instead of **Auto Range**.
2. In manual mode, press the **RANGE** key to change the measuring range: the relevant decimal point will change its position.
3. The **RANGE** key is not active in positions →|•)) % Temp °C°F 10A ≂
4. In **Auto range** mode, the instrument selects the most appropriate ratio for carrying out measurement.
5. If a reading is higher than the maximum measurable value, the indication **O.L** appears on the display.
6. Press and hold the **RANGE** key for more than **1 second** to exit the manual mode and restore the **Auto range** mode.

4.15. Hold and AutoHold Mode

To freeze the display for any function, press the **HOLD** button.
To unfreeze the display press the **HOLD** button once again.

4.16. Capturing Minimum and Maximum Values

The **MIN/MAX** Record mode captures minimum, and maximum input values. When the input goes below the recorded **MINIMUM** value or above the recorded **MAXIMUM** value, the Meter beeps and records the new value. This mode is for capturing intermittent readings, recording **MINIMUM** and **MAXIMUM** readings unattended, or recording readings while equipment operation precludes watching the Meter. To activate the **MIN/MAX** mode, press the ◄ button. If the Meter is already in **MIN/MAX** function, pressing the ◄ button causes the Meter to turn off **MIN/MAX** function.

4.17. Relative Values

To activate the **RELATIVE** mode, press the ▲ button.
If the Meter is already in the **RELATIVE** function, press the ▲ button to deactivate **RELATIVE** mode.

4.18. Capturing Peak Values

To activate the **PEAK** mode, press the ► button. If the Meter is already in the **PEAK** function, press the ► button to deactivate **PEAK** mode.

4.19. Non-Contact AC Voltage Detector (100 to 1000V AC)

WARNING: Risk of Electrocution. Before use, always test the Voltage Detector on a known live circuit to verify proper operation.

WARNING: Insulation type and thickness, distance from the source, and other factors may effect operation. Always verify live voltage using other methods before working on electrical circuits.

1. The non-contact voltage detector operates when the meter is set to any measuring function. The detector does not operate when **AUTO POWER OFF** turns the meter off or when the rotary function switch is set to the **OFF** position.
2. Slowly move the detector probe closer to the conductor being tested.
3. If **AC** voltage within the specified range is present, the indicator light will illuminate.

NOTES: The detector is designed with high sensitivity. Static electricity and other sources of electrical energy may randomly activate the detector. This is a normal operation. The detector only activates the indicator light when **AC** voltage is present. It does not indicate the voltage level on the LCD display.

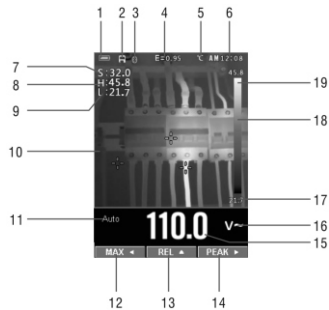
5. Thermal imager and DMM operation

5.1. Thermal imager basics

In the **Thermal imaging** and **DMM** mode. The user can measure a targeted surface's temperature and can use the Multimeter at the same time, the measured result will display under the **thermal image**.

- Press the red **IR** button to open the **Thermal Imager**.
  The thermal image is set to color palette **IRON**. Select

  other palettes in the **Menu** Settings.



1. The Battery capacity indicator.
2. SD card icon, if this icon is displayed, there is a SD card inserted.
3. Bluetooth icon, if this icon is displayed, the Bluetooth is activated.
4. The currently selected emissivity value, use the Thermal Settings Menu to change the emissivity value.
5. The temperature unit icon,
   use the Thermal Settings Menu to select °C,°F , K.
6. Current time Display
7. Center cross of the Thermal Imager Temperature Measurement, represents the center spot temperature of the scene.
8. Highest temperature spot of the Thermal Imager Temperature Measurement, represents the highest spot temperature of the scene.
9. Minimum temperature spot of the Thermal Imager Temperature Measurement, represents the Minimum spot temperature of the scene.

10. Current scene of the Thermal image frame
11. Range icon of the meter
12. Max button
13. REL button
14. PEAK button
15. DMM measurement is shown below the thermal image.
16. Unit of the meter
17. Lowest reading measured in the current frame
18. The Thermal scale shows the range color for thermal images, The lighter the color, the warmer the temperature; The darker the color, the cooler the temperature.
19. Highest reading measured in the current frame.

5.2. Using the thermal imager

For basic operation follow these steps:

1. Set the function switch to any position.
2. Press the **IR** button to switch the **THERMAL IMAGER ON**. Target the object by using the thermal imager lense.
3. The display will show the temperature measurement in the upper left hand corner for the targeted area, along with the currently selected emissivity value.
4. In the **THERMAL IMAGING** mode, the laser pointer and display cross hairs can be used to assist in targeting. These tools can be switched **ON** or **OFF** in the Setting menu.
5. In the **THERMAL IMAGING** mode, the highest temperature will be auto marked by a red cross, and the lowest temperature will be auto marked by a blue cross, the two spots can be switched **ON** or **OFF** in the Setting menu.
6. In the **THERMAL IMAGING** mode, the meter continues to operate normally as a Multimeter allowing any of the electrical functions to be used.
7. Press the **HOLD** button to freeze the thermal image frame. Press the **HOLD** button again to capture the screen and save a bitmap with measured data onto SD card. The saved bitmap can later be analyzed by the PC software or smart phone APP.

8. The thermal imager's **FOV** (Field of view) is 21 by 21 degrees.
9. **FOV** is the largest area that your imager can see at a set distance.
10. This table lists the horizontal **FOV**, vertical **FOV** and **IFOV** for the lense.

Focal Length	Horizontal FOV	Vertical	FOVIFOV
7.5mm	21°	21°	4.53mrad

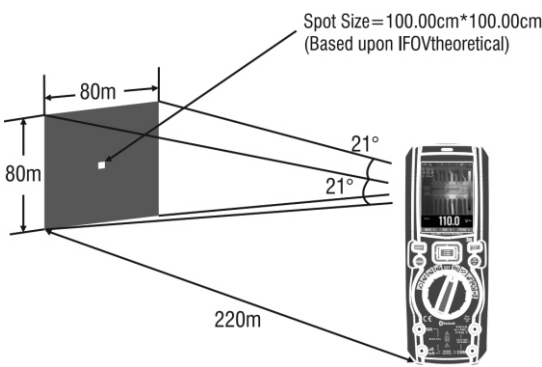
IFOV (Instantaneous Field of View) is the smallest detail within the **FOV** that can be detected or seen at a set distance, the unit is rad. The formula is this:

IFOV = (Pixel Size)/ (Lens focal length);

D:S (theoretical) [= 1/ **IFOV** (theoretical)] is the calculated spot size based on the pixel size of the Thermal Imager detector array and lens focal length.

Example: If the Thermal Imager uses a 9mm lens, the pixel size of the detector is 34um.

Horizontal **FOV** is 21°, Vertical **FOV** is 21°, the **IFOV** is 34um/7.5mm = 4.53mrad;
D:S (theoretical) [= 1/ **IFOV** (theoretical)= 220:1]

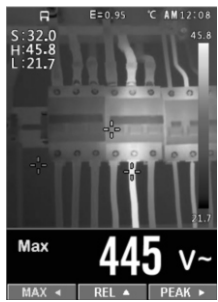


D:S (measure) [= 1/ **IFOV** (measure)] is the spot size needed to provide an accurate temperature measurement. Typically, D:S (measure) is 2 to 3 times smaller than D:S (theoretical), which means the temperature measurement area of the target needs to be 2 to 3 times larger than that determined by the calculated theoretical D:S.

Using the Multimeter with the thermal imager

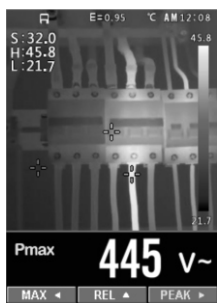
On **IR+DMM** mode, **MODE** key, **RANGE** key, **HOLD** key and **REL** Function is the same **DMM** mode.

5.3. Capturing MIN/MAX Values on IR+DMM mode



1. To activate the **MIN/MAX** mode, press the ◄ button, and display **MAX** value.
2. If the Meter is already in the **MIN/MAX** function, then Press the ◄ button to display the **MIN** value, then press the ◄ button to display current measurement value. Press once again to display the **MAX** value.
3. Press and hold the ◄ button for more than **1 second** to deactivate the **MIN/MAX** values.

5.4. Capturing Peak Values on IR+DMM mode

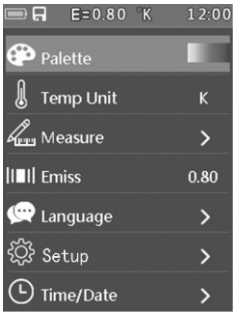


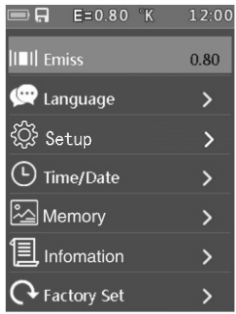
1. To activate the **PEAK** mode, press the ► button, and display **PEAK MAX** value.
2. If the Meter is already in the **PEAK** function, then Press the ► button to display **PEAK MIN** value, then Press the ► button to display current measurement value.
   Press again to display **PEAK MAX** value.
3. Press and hold the ► button for more than **1 second** to deactivate **PEAK** values.

6. Settings Menus

6.1. Using Settings Menus

Press **MENU** button to open the settings





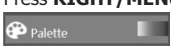
1. Press the **UP/DOWN** button to select menu item or change the value of current focus item.
2. Press the **RIGHT/MENU** button to enter the submenu or set focus on the current selected item. Press the **LEFT** button to return to the previous menu.
3. If want to exit settings menu, press **MODE/RANGE/HOLD/IR** button or press the **LEFT** button in root menu.

6.2. Settings details

1. Palette mode

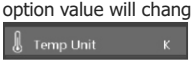
The Thermal imager has five kinds of palettes such as:

Press **RIGHT/MENU** button to select one of the display color palettes.



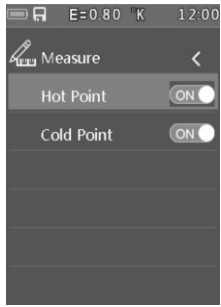
6.3. Temp Unit

Press the **RIGHT/MENU** button to set focus on this option and the color of option value will change to black °C.
In focus state, use the **RIGHT/MENU** button to toggle °C, °F and K, use **LEFT/RIGHT/MENU** button to exit focus state and the color of option value will change white K.



6.4. Measure

Press the **RIGHT/MENU** button to enter the **measure** menu.
There are two selections that are available: **HOT POINT** and **COLD POINT**.
Press the **RIGHT/MENU** button to set selected item to **ON** or **OFF**.



- **HOT POINT**: This option enables the thermal imager to automatically detect the highest temperature point.
- **COLD POINT**: This option enables the thermal imager to automatically detect the lowest temperature point.

6.5. Emissivity

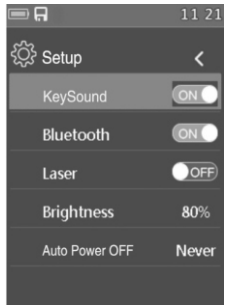
Press the **RIGHT/MENU** button to select this option. While selected, use the **UP/DOWN** button to increase or decrease emissivity's value, use the **LEFT/RIGHT/MENU** button to exit selection. The available range is 0.01 to 0.99, in 0.01 increments.

6.6 Language

- Press **RIGHT/MENU** button to to enter language menu.
- There are three language options available:
  Simplified Chinese, Traditional Chinese and English.
- Use the **UP/DOWN** button to select language and use **RIGHT/MENU** button to set selected language.

6.7. Setup

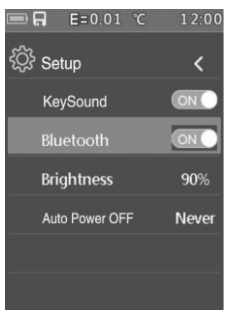
Press the **RIGHT/MENU** button to enter common menu.
There are Five options available: Beep, Bluetooth, Laser, Brightness and Auto Off.



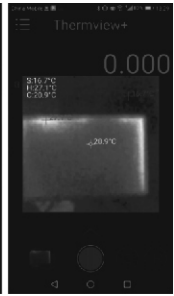
- **Beep**: Use the **RIGHT/MENU** button to set beep on or off.
- **Bluetooth**: Use **RIGHT/MENU** button to set bluetooth power **ON** or **OFF**.
- **LASER**: Use **RIGHT/MENU** button to set laser pointer **ON** or **OFF**.
- **Brightness**: Press the **RIGHT/MENU** button to select this option. While selected, use **UP/DOWN** button to change LCD's brightness, use the **LEFT/RIGHT/MENU** button to exit selection. The available brightness's range is 100% to 10% in 10% steps.
- **Auto Off**: Press **RIGHT/MENU** button to select this option. While selected, use the **UP/DOWN** button to choose the time period after which the meter enters the sleep mode.

6.8. Bluetooth Connect

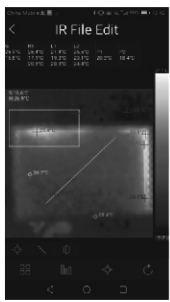
1. Turn on the Bluetooth function on the instrument.

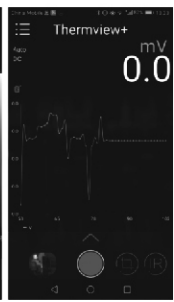


2. **Turn on** the bluetooth of the smartphone.
   Press the icon **Thermview+** and enter into the home interface, then press the **Connect Device** icon on the Home interface, the bluetooth device name will appear.



3. Touch the device name listed in Bluetooth devices list to connect to the device.





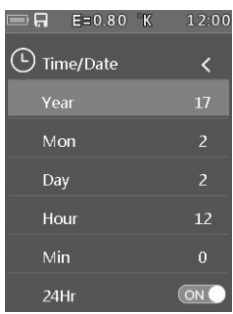
For detailed information about **Thermview+**, please refer to **Thermview+ APP** help file.

Thermview+ for Android:

- Search in Google Play with the keyword "**Thermview+**", download and run.
- **Thermview+ for iOS:**
  Please search in Apple store with the keyword "**Thermview+**", download and run.

6.9. Time/Date

Press the **RIGHT/MENU** button to enter the time menu.
In this menu the year, month, day, hour, minute and time format can be set. The changes take effect after exiting the settings menus.



6.10. Memory

Press **RIGHT/MENU** button to enter photo menu.
There are two options that are available: **PHOTO REVIEW** and **DELETE PHOTO**.

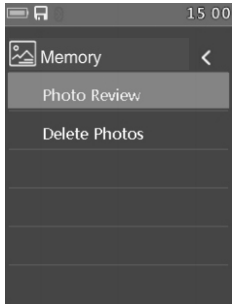


Photo Review:

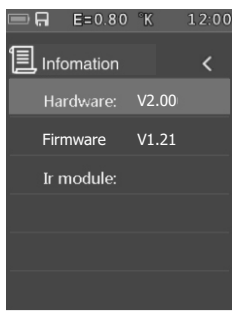
1. Press the **RIGHT/MENU** button to enter image browser function, and exit settings menus immediately.

Delete Photo:

1. Press the **RIGHT/MENU** button, a dialog box will be displayed as show below. **Warning**: Selecting **YES**, will delete all the photos in the memory card which captured by user.

6.11. Information

Press the **RIGHT/MENU** button to enter the system information menu.
This menu contains the software's version, the hardware's version and the thermal imager's version.
Hardware V2.00
Firmware V1.OP

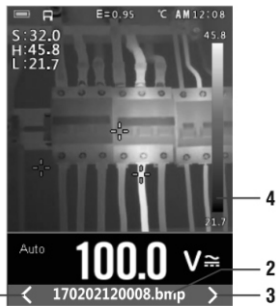


6.12. Factory Set

Once **Factory Set** option has been selected, press the **RIGHT/MENU** button, the dialog box, as shown on the right will be displayed. Select the **YES** button, the system parameter will be reset.

7. Image Browser

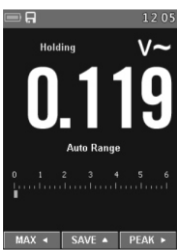
In the **Image Browser** mode, the User can browse the pictures in the memory card. Press the **LEFT/RIGHT** button to select previous or next picture. Press any other keys to exit **Image Browser** mode.

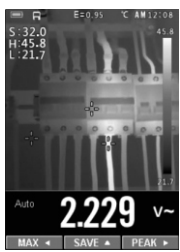


1. Left key instruction.
2. Current displayed picture's filename.
3. Right key instruction.
4. Picture display area.

7.1. How to capture screen

When in the **DMM** mode or **Thermal imaging + DMM** mode, use the **HOLD** button to enter **HOLD** mode, as show below. Then press the **UP** button to capture the screen. After saving to TF card completely, the multimeter will exit hold mode.





8. Technical Specifications

8.1. Technical characteristics

Thermal imager

Field of view (FOV) / Minimum focus distance	21° x 21°/ 0.5m
Spatial resolution (IFOV)	4.53mrad
IR resolution	80 x 80 pixels
Thermal sensitivity/NETD	< 0.1°C @ +30°C (+86°F) / 100 mK
Image frequency	50Hz
Focus mode	Focus free
Focal length	7.5mm
Focal Plane Array (FPA)/Spectral range	Uncooled nnicrobolometer / 8-14 pm
Object temperature range	—20°C to +260°C (-4°F to +500°F)
Accuracy	±3°C (±5.4°F) or ±3% of reading (Environment temperature 10°C-35°C, object temperature >0°C.)

Accuracy calculated as [%reading + (num. digits*resolution)] at
18°C ÷ 28°C <75%HR

DC Voltage

Range	Resolution	Accuracy	Input impedance	Protection against overcharge
600.0mV	0.1mV	±(0.09%reading + 5digits)	>10MΩ	1000V DC/AC RMS
6.000V	0.001V			
60.00V	0.01V			
600.OV	0.1V	±(0.2%reading + 5digits)		
1000V	1V			

AC TRMS Voltage

Range	Resolution	Accuracy(*)		Protection against overcharge
		(50Hz+60Hz)	(61 Hz+1 kHz)	
6.000V	0.001V	± (0.8%reading + 5digits)	±(2.4%reading + 5dgt)	1000V DC/AC RMS
60.00V	0.01V			
600.0V	0.1V			
1000V	1V			

(*) Accuracy specified from 10% to 100% of the measuring range, sine wave.
Input impedance: >9MΩ;
Accuracy PEAK function: ±10%rdg, PEAK response time: 1ms

AC+ DC TRMS Voltage

Range	Resolution	Accuracy	Input impedance	Protection against overcharge
6.000V	0.001V	±(2.4%reading + 20dgt)	>10MΩ	1000V DC/AC RMS
60.00V	0.01V			
600.0V	0.1V			
1000V	1V			

DC Current

Range	Resolution	Accuracy	Protection against overcharge
600.0uA	0.1uA	± (0.9%reading + 5digits)	Quick fuse 800mA/1000V
6000uA	1uA		
60.00mA	0.01 mA		
600.0mA	0.1mA	± (0.9%reading + 8digits)	
10.00A	0.01A	± (1.5%reading + 8digits)	Quick fuse 10A/1000V

AC TRMS Current

Range	Resolution	Accuracy(")(50Hz÷1 kHz)	Protection against overcharge
600.0uA	0.1uA	± (1.2%reading + 5digits)	Quick fuse 800mA/1000V
6000uA	1uA		
60.00mA	0.01 mA		
600.0mA	0.1mA		
10.00A	0.01A	± (1.5%reading + 5digits)	Quick fuse 10A/1000V

(*) Accuracy specified from 5% to 100% of the measuring range, sine wave.
Accuracy PEAK function: ±10%rdg , AC +DC TRMS
Current: accuracy (50Hz ÷ 1 kHz): ± (3.0%reading + 20dgt)

Flexible coil Current (MT740 Optional Extra)

Range	Resolution	(50Hz+60Hz)	(61Hz÷1 kHz)	Protection against overcharge
30.00A	0.01A	± (0.8%reading + 5digits)	±(2.4%reading + 5dgt)	1000V DC/AC RMS
300.0A	0.1A			
3000A	1A			

Diode test

Function	Test current	Max voltage with open circuit
	<1.5mA	3.3V DC

Resistance and Continuity test

Range	Resolution	Accuracy	Buzzer	Protection against overcharge
600.0Ω	0.1Ω	± (0.5%reading + 10dgt)	>50Ω	1000V DC/AC RMS
6.000kΩ	0.001kΩ	±(0.5%reading + 5digits)		
60.00kΩ	0.01kΩ			
600.0kΩ	0.1kΩ			
6.000MΩ	0.001MΩ			
60.00MΩ	0.01MΩ	± (2.5%reading + 10dgt)		

Frequency (electronic circuits)

Range	Resolution	Accuracy	Protection against overcharge
40.00Hz÷10kHz	0.01Hz÷0.001kHz	± (0.5%reading)	1000V DC/AC RMS

Sensitivity: 2V RMS

Frequency (electronic circuits)

Range	Resolution	Accuracy	Protection against overcharge
60.00Hz	0.01 Hz	± (0.09%rdg +5digits)	1000V DC/AC RMS
600.0Hz	0.1Hz		
6.000kHz	0.001kHz		
60.00kHz	0.01kHz		
600.0kHz	0.1kHz		
6.000MHz	0.001MHz		
10.00MHz	0.01MHz		

Sensitivity: >2V RMS (@ 20% 80% duty cycle) and f<100kHz;
> 5V RMS (@ 20% 80% duty cycle) and f>100kHz

Duty Cycle

Range	Resolution	Accuracy
5.00÷95.0%	0.1%	± (1.2%reading + 2digits)

Pulse frequency range: 40Hz÷10kHz,
Pulse amplitude: ±5V (100us+100ms)

Capacity

Range	Resolution	Accuracy	Protection against overcharge
60.00nF	0.01nF	± (1.5%reading + 20digits)	1000V DC/AC RMS
600.0nF	0.1nF	± (1.2%reading + 8digits)	
6.000uF	0.001uF	± (1.5%reading + 8digits)	
60.00uF	0.01uF	± (1.2%reading + 8digits)	
600.0uF	0.1uF	± (1.5%reading + 8digits)	
6000uF	1uF	± (2.5%reading + 20digits)	

Temperature with K-type probe

Range	Resolution	Accuracy	Protection against overcharge
-40.0°C ÷ 600.0°C	0.1°C	± (1.5%reading + 3°C)	1000V DC/AC RMS
600°C ÷ 1000°C	1°C		
-40.0°F ÷ 600.0°F	0.1°F	± (1.5%rdg+ 5.4°F)	
600°F ÷ 1800°F	1°F		

(*) Instrument accuracy without probe; Specified accuracy with stable environmental temperature at ± 1°C.
For long-lasting measurements, reading increases by 2°C

- **Reference standards**

Safety:	IEC/EN61010-1
EMC:	IEC/EN 61326-1
Insulation:	Double insulation
Pollution level:	2
Overvoltage category:	CAT IV 600V, CAT III 1000V
Max operating altitude:	2000m (6562ft)

- **General characteristics**
  Mechanical characteristics

Size (L x W x H):	175 x 85 x 55mm
Weight (batteries included):	540g

- **Power supply**

Battery type:	1x7.4V rechargeable Li-ION battery, 1500mAh
Battery charger power supply:	100/240V AC, 50/60Hz, 10/12VDC, 2A
Low battery indication:	Symbol "▭" on the display
Auto Power Off:	After 15-60min minutes' idling (may be disabled)
Fuses:	F10A/1000V, 10 x 38mm (input 10A) F800mA/1000V, 6 x 32mm (input mA uA)

- **Display**

Conversion:	TRMS
Characteristics:	Colour TFT, 6000 dots with bargraph
Sampling frequency:	3 times/s

8.2. Environment

Environmental conditions for use

Reference temperature:	18°C - 28°C (64°F - 82°F)
Operating temperature:	5°C - 40°C (41°F - 104°F)
Allowable relative humidity:	<80%HR
Storage temperature:	-20° - 60°C (-4°F - 140°F)
Storage humidity:	<80%HR

8.3. OPTIONAL EXTRA (MT740)

Technical Specifications

Function	Range	Best Measurement Range	Output Voltage	Accuracy
AC Current 50~400Hz True RMS	30A AC	≤30.00A	100mV/A	± (3.0% + 5mV)
	300A AC	30.0A-300.0A	10mV/A	± (3.0% + 3mV)
	3000A AC	300A-3000A	1mV/A	± (3.0% + 3mV)

Note:

- Accuracy is given as ±(% of reading + counts of least significant digit) at 23oC±5oC, with relative humidity less than 80%RH.
- Output Noise:< 5.5mV for each range.
- Max. output voltage: 5.8V.
- All scale, if the output voltage is greater than 3V, the results indicate that the measurement has been out of range, not to be used as indicator assessment.

8.4. General Specifications

Function	Range
Power indication:	Green LED light
Low Battery indication:	Red LED light
Operating Temperature:	5°C to 40°C (41°F to 104°F)
Storage Temperature:	-20°C to 60°C (-4°C to 140°C)
Operating Humidity:	Max 80% up to 31°C (87°F) decreasing linearly to 50% at 40°C (104°F)
Storage Humidity:	<80%
Operating Altitude:	2000m (7000ft.) maximum.
Battery:	1.5V AAA Size Battery X 2
Safety Standard:	EN61010-1, EN61010-2-032, EN61326-1.
Power supply:	9V Battery or 6V Exterior DC.
Over voltage:	Category III 1000V and Category IV 600V, Pollution Degree 2.
Weight:	210g
Dimensions:	180mm x 106mm x 28mm

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