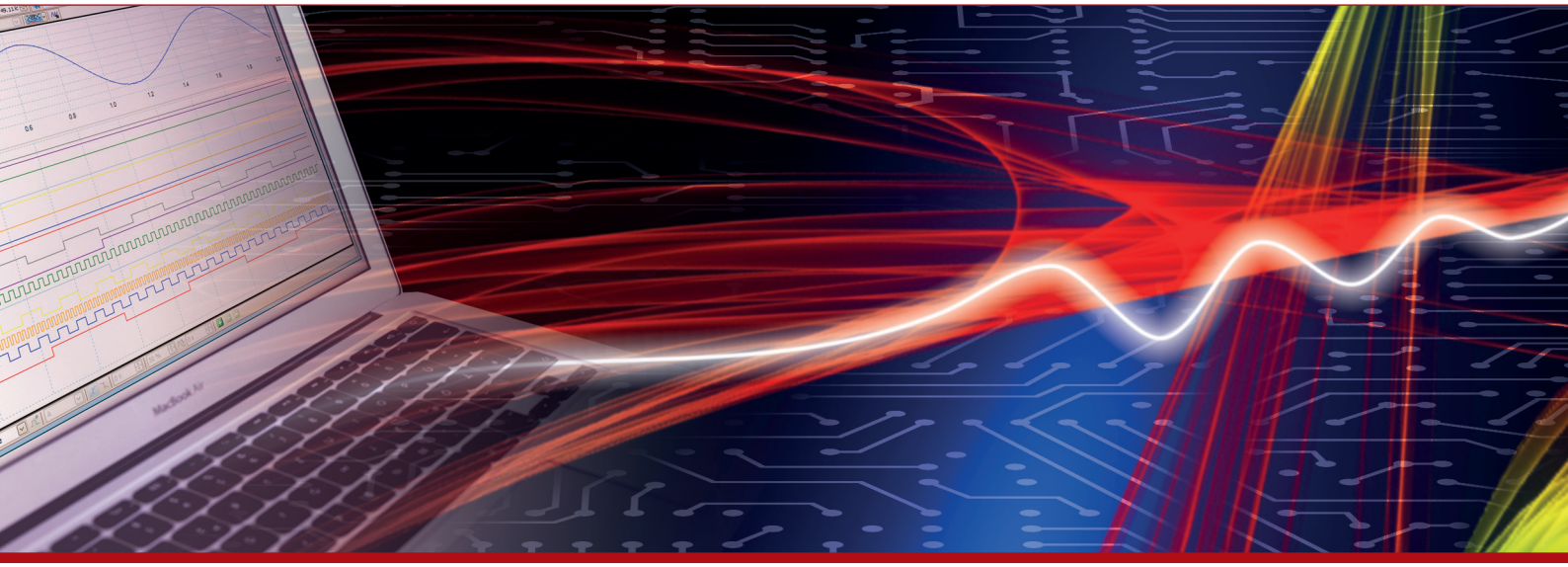
Product Datasheet - Technical Specifications



More information in our Web-Shop at ▸ **www.meilhaus.com** and in our download section.

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PeakTech®

Prüf- und Messtechnik

Spitzentechnologie, die überzeugt

PeakTech® 3450

Bedienungsanleitung /

Operation Manual

Digitalmultimeter & Wärmebildkamera

Digital Multimeter & Thermal Imager

EU Declaration of Conformity

Peak Tech 3450

Hereby PeakTech Prüf- und Messtechnik GmbH declares that the radio equipment type [P 3450 - Multimeter with Bluetooth interface] complies with the directive 2014/53 / EU, electromagnetic compatibility of Directive 2014/30 / EU and equipment safety of the Low Voltage Directive 2014/35 / EU.

CE

1. Safety Precautions

This product complies with the requirements of the following European Community Directives: 2014/30/EU (Electromagnetic Compatibility) and 2014/35/EU (Low Voltage) as amended by 2014/32/EU (CE-Marking).
Overvoltage category III 1000V; overvoltage category IV 600V; pollution degree 2.

CAT I: For signal level, telecommunication, electronic with small transient over voltage
CAT II: For local level, appliances, main wall outlets, portable equipment
CAT III: Supplied from a cable under earth; fixed installed switches, automatic cut-off or main plugs
CAT IV: Units and installations, which are supplied overhead lines, which are stand in a risk of persuade of a lightning, i.e. main-switches on current input, overvoltage-diverter, current use counter.

To ensure safe operation of the equipment and eliminate the danger of serious injury due to short-circuits (arcing), the following safety precautions must be observed.

Damages resulting from failure to observe these safety precautions are exempt from any legal claims whatever.

- Do not use this instrument for high-energy industrial installation measurement.
- Do not place the equipment on damp or wet surfaces.
- Do not exceed the maximum permissible input ratings (danger of serious injury and/or destruction of the equipment).
- The meter is designed to withstand the stated max voltages. If it is not possible to exclude without that impulses, transients, disturbance or for other reasons, these voltages are exceeded a suitable presale (10:1) must be used.
- Replace a defective fuse only with a fuse of the original rating. Never short-circuit fuse or fuse holding.
- Disconnect test leads or probe from the measuring circuit before switching modes or functions.
- Do not conduct voltage measurements with the test leads connected to the µA/mA/A- and COM-terminal of the equipment.
- The 10A-range is protected by fuse 10A/1000V.
- To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements.
- Do not conduct current measurements with the leads connected to the V/Ω-terminals of the equipment.
- Check test leads and probes for faulty insulation or bare wires before connection to the equipment.
- Please use only 4mm-safety test leads to ensure immaculate function.
- To avoid electric shock, do not operate this product in wet or damp conditions. Conduct measuring works only in dry clothing and rubber shoes, i. e. on isolating mats.
- Never touch the tips of the test leads or probe.

- Comply with the warning labels and other info on the equipment.
- The measurement instrument is not to be to operated unattended.
- Always start with the highest measuring range when measuring unknown values.
- Do not subject the equipment to direct sunlight or extreme temperatures, humidity or dampness.
- Do not subject the equipment to shocks or strong vibrations.
- Do not operate the equipment near strong magnetic fields (motors, transformers etc.).
- Keep hot soldering irons or guns away from the equipment.
- Allow the equipment to stabilize at room temperature before taking up measurement (important for exact measurements).
- Do not input values over the maximum range of each measurement to avoid damages of the meter.
- Do not turn the rotary function switch during voltage or current measurement, otherwise the meter could be damaged.
- Use caution when working with voltages above 35V DC or 25V AC. These Voltages pose shock hazard.
- Charge the battery as soon as the battery indicator “BAT” appears. With a low battery, the meter might produce false reading that can lead to electric shock and personal injury.
- Fetch out the battery when the meter will not be used for long period.
- Periodically wipe the cabinet with a damp cloth and mid detergent. Do not use abrasives or solvents.
- The meter is suitable for indoor use only
- Do not operate the meter before the cabinet has been closed and screwed safely as terminal can carry voltage.
- Do not store the meter in a place of explosive, inflammable substances.
- Do not modify the equipment in any way
- Do not place the equipment face-down on any table or work bench to prevent damaging the controls at the front.
- Opening the equipment and service – and repair work must only be performed by qualified service personnel
- **Measuring instruments don’t belong to children hands.**

Cleaning the cabinet

Clean only with a damp, soft cloth and a commercially available mild household cleanser. Ensure that no water gets inside the equipment to prevent possible shorts and damage to the equipment.

1.2 Safety Symbols

Attention! Read the corresponding Section in the manual. Failure to comply entails risk of injury and / or the risk of damage to the device.

max. allowable voltage difference of 1000 V DC/ACrms between COM / V or ohm input and earth does not exceed for safety reasons.

Dangerous high voltage is applied between the inputs. Extreme caution in the measurement. Do not touch inputs and measuring tips. Safety instructions in the user manual note!

~ Alternating Current (AC)
⎓ Direct Current (DC)
⎓~ AC or DC
⏚ Earth
⧈ Double insulation
⏤ Fuse
CE Conforms to European Union directives

2. Introduction

Professional True RMS Digital Multimeter with built-in Thermal Imager and TFT color LCD display, providing fast A/D converting sampling time and high accuracy. It is easy to find and solve the problems of the production equipment with additional Bluetooth interface. Built for safe measurements with double molded plastic IP65 housing.

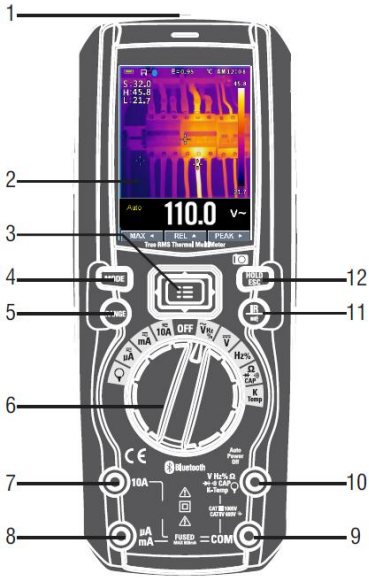
Key features

- 6000 counts 2.8" TFT Color LCD display
- Built-in Thermal Imager with Max, Min and Center crosshair targeting
- 50 Hz 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
- Current measurements via optional Clamp Adapter
- PC Software for thermal analysis
- Bluetooth 4.0 Interface
- Android & iOS App available

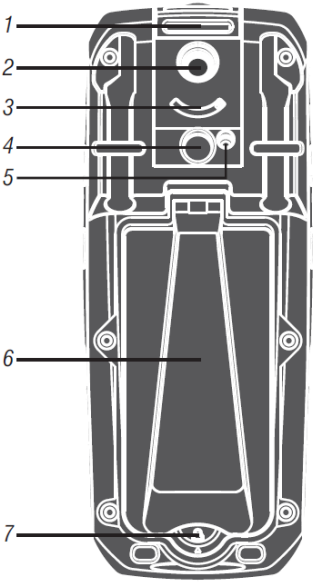
3. Description and Reference Guide

3.1. Front and back side descriptions

13. NCV detector area
14. LCD Display
15. Navigation/Menu buttons
16. MODE button
17. RANGE button
18. Rotary function switch
19. Positive (+) Probe input jack for A (Current).
20. Positive (+) Probe input jack for mA (Current).
21. COM(-) Probe input jack
22. Positive(+) Probe input jack for all Inputs except A and mA
23. Thermal mode/Light button
24. Hold/Capture button



8. No-slip slope
9. Thermal Imager Lense
10. Lense cover
11. Work light
12. Laser
13. Stand
14. Battery cover lock



3.2. Understanding the Push Buttons

The 9 push buttons on the front of the Meter activate features that augment the functions selected using the rotary switch, navigate menus or control power to Meter circuits.

Cursor buttons: MAX ◄ REL ▲ PEAK ►

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

REL ▲ Use Navigation UP buttons to select REL function

MAX ◄ Use Navigation Left buttons to select MAX function

PEAK ► Use Navigation Right buttons to select PEAK function

Physical buttons:

- Freezes the present reading in the display and allows the display to be saved. Also wake up for APO.
- Press the MODE key to switch the functions;
- Press the RANGE key to manual range.
- Enter function of the menu selects.
- Press the IR key to switch DMM MODE and IR+DMM MODE.
- Navigation buttons.

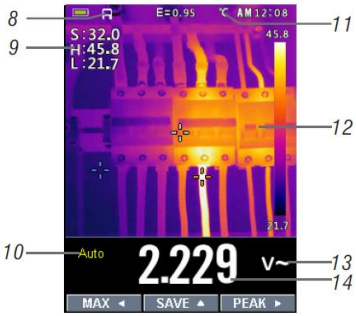
3.3. Understanding the Display

Measurement on LCD Display

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

DMM MODE

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

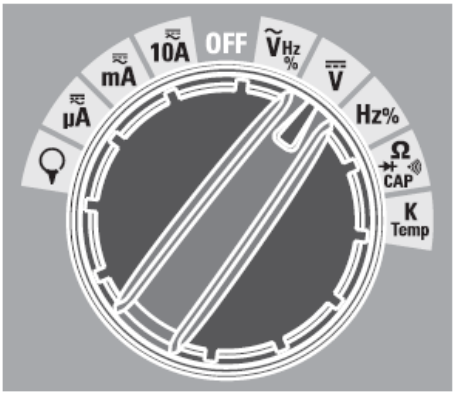


IR+ DMM MODE

Icons on LCD Display:

- Voltage is over 30V (AC or DC)
- Warning
- Flexible Coil
- (Delta) Relative Measurement
- 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

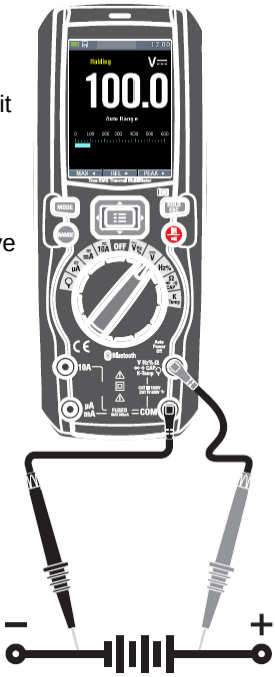


Select a primary measurement function by positioning the rotary switch to one of the icons around its perimeter. For each function, the Meter presents a standard display for that function (range, measurement units, and modifiers). Button choices made in one function do not carry over into another function.

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
μA	AC, DC and AC+DC microampere measurements up to 6,000 μA
	Flexible Coil Current measurement

4. DMM Measurement and Setup

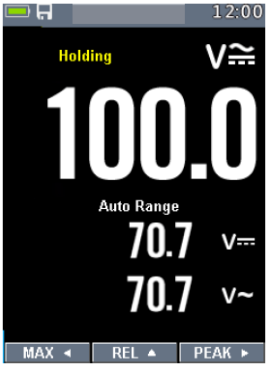
4.1 DC Voltage Measurements



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

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

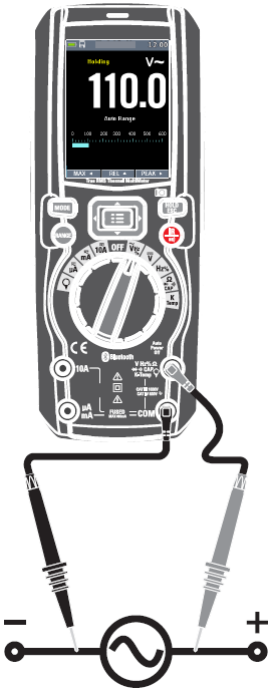
4.2 AC+DC Voltage Measurements



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.

- Set the function switch to the VDC position.
- Insert the black test lead banana plug into the negative COM jack.
- Insert the red test lead banana plug into the positive V jack.
- Press the MODE key to switch the ≂ ✓ AC+DC Voltage functions.
- Read the AC+DC voltage in the display.

4.3 AC Voltage Measurements

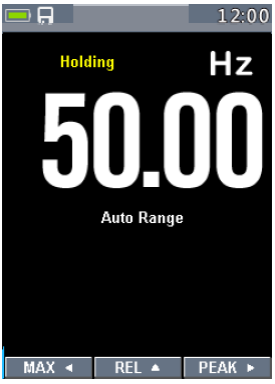


WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 230V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips 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.

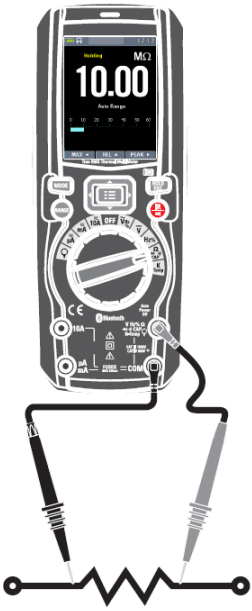
- Set the function switch to the VAC position.
- Insert the black test lead banana plug into the negative COM jack. Insert red test lead banana plug into the positive V jack.
- Read the voltage in the main display.

4.4 Frequency Measurements



- Set the function switch to the Hz % position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Read the Frequency in the display.
- Press the MODE key to switch the Duty functions.
- Read the Duty in the display.

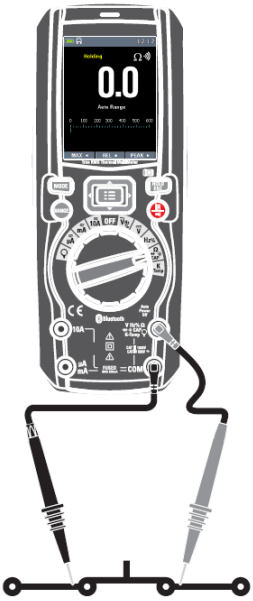
4.5 Resistance Measurements



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.

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

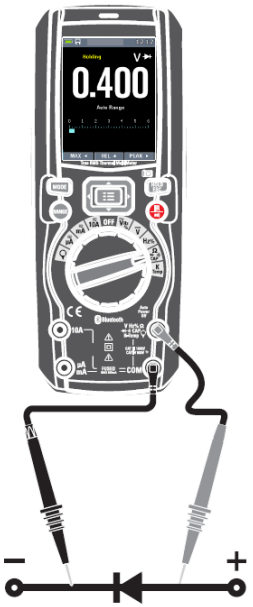
4.6 Continuity Check



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.

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

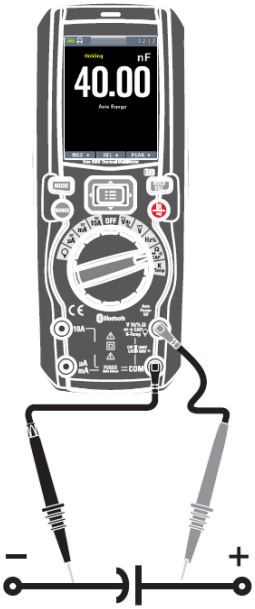
4.7 Diode Test



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

- Set the function switch to the Ω **CAP** position.
- Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive V jack.
- Press the MODE key to switch the Diode functions.
- 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

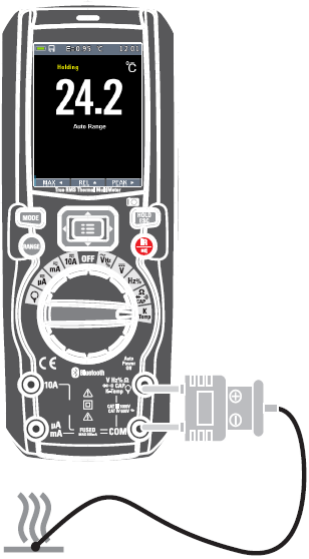


WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

- Set the function switch to the Ω **CAP** position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Press the MODE key to switch the Capacitance functions.
- Read the capacitance value in the Display

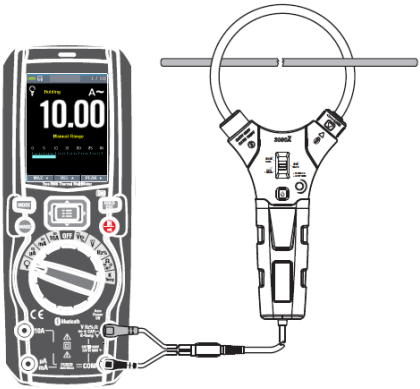
4.9 Temperature Measurements

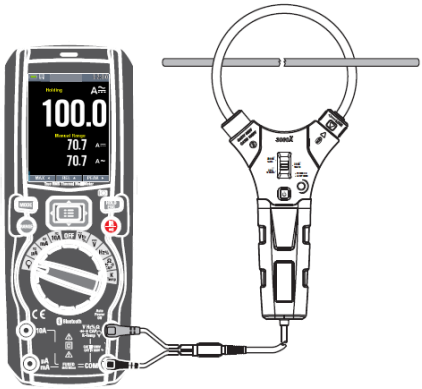
- Set the function switch to the TEMP (°C or °F) position.
- Insert the Temperature Probe into the input jacks, making sure to observe the correct polarity.
- Read the temperature in the display.
- Press the MODE key to switch the Unit (°C or °F).



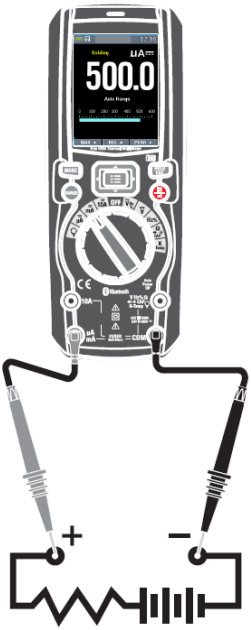
4.10. Flexible Coil Current Measurements (AC)

- Set the function switch to the Flexible coil position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Read the current in the display.
- Press the RANGE key to switch between ranges:
  (30 A at 100 mV/A, 300 A at 10 mV/A, 3,000 A at 1 mV/A)



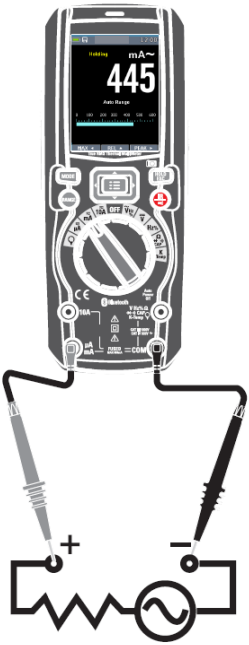


4.11. DC Current Measurements



- Insert the black test lead banana plug into the negative COM jack.
- 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.
- 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.
- 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.
- Press the MODE button to indicate " ⎓ " on the display.
- Read the current in the display.

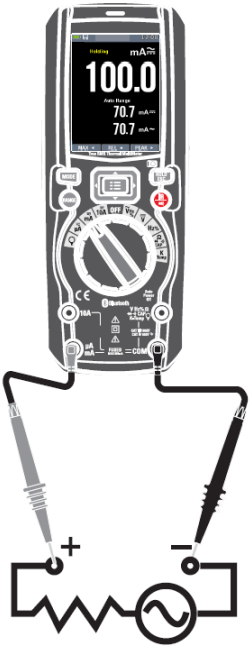
4.12. AC Current Measurements



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.

- Insert the black test lead banana plug into the negative COM jack.
- 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.
- 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.
- 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.
- Press the MODE button to indicate " ~ " on the display.
- Read the current in the display

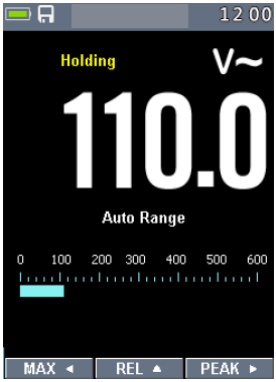
4.13 AC+DC Current Measurements



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.

- Insert the black test lead banana plug into the negative COM jack.
- 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.
- 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.
- 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.
- Press the MODE button to indicate " ≂ " on the display.
- Read the current in the display.

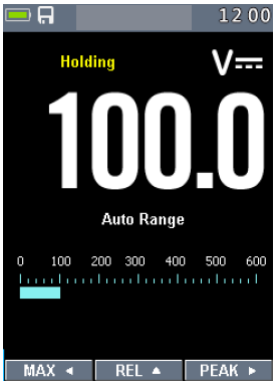
4.14 Using RANGE



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

4.15 Hold Mode

To freeze the display for any function, press key HOLD. And again press key HOLD to release freeze.



4.16 Capturing Minimum and Maximum Values

The MAX MIN 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 MAX MIN mode, press soft key labeled ◄. If the Meter is already in MAX MIN function, pressing ◄ causes the Meter to turn off MAX MIN function.

4.17 Relative Values

To activate the relative mode, press the soft key labeled ▲.

If the Meter is already in the relative function, pressing ▲ causes the Meter to turn off relative.

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

- 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.
- Slowly move the detector probe closer to the conductor being tested.
- If AC voltage within the specified range is present, the indicator light will illuminate.

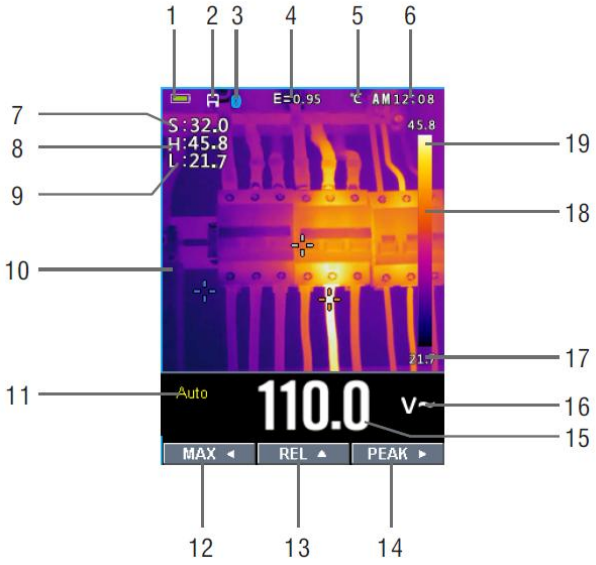
NOTES: The detector is designed with high sensitivity. Static electricity and other sources of electrical energy may randomly activate the detector. This is normal operation. The detector only activates the indicator light when AC voltage is present. It does not indicate the voltage level on the LCD 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 use the Multimeter at the same time, the measured result will display under the thermal image.

- Press the red "IR" button to activate the Thermal Imager. In Fig5-1 the thermal image is set to color palette IRON. Select other palettes in the Menu Settings.
- Open the protective lens cover on the back of the meter.



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 active.
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,℉, 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 soft button
13. REL soft button
14. PEAK soft 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 the thermal imager len.
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 dispay 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 auto marked by a red cross, and the lowest temperature will 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 hold the thermal image frame, then long press the HOLD button, you will capture the screen and save a bitmap with measure data into SD card, the saved bitmap later can be analysed by the PC software or smartphone APPs.
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 lens:

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

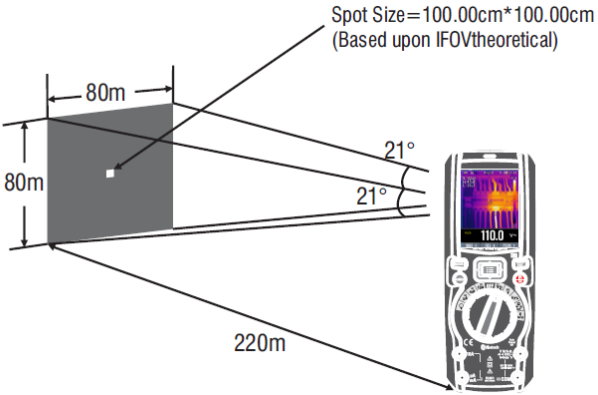
IFOV (Instantaneous Field of View) is the smallest detail within the FOV that can be detected or seen at a set distance, the unit is rad. The formula is this:

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.

Horizontal FOV is 21°, Vertical FOV is 21°, the IFOV is 34um/7.5mm = 4.53mrad;

$D:S_{theoretical}$ (= 1/ $IFOV_{theoretical}$) = 220:1

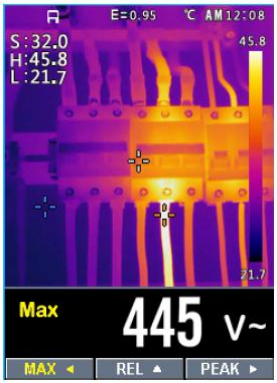


$D:S_{measure}$ (= 1/ $IFOV_{measure}$) is the spot size needed to provide an accurate temperature measure. Typically, $D:S_{measure}$ is 2 to 3 times smaller than $D:S_{theoretical}$, which means the temperature measurement area of the target need to be 2 to 3 times larger than that determined by the calculated theoretical D:S.

5.3 Using the Multimeter with the Thermal Imager

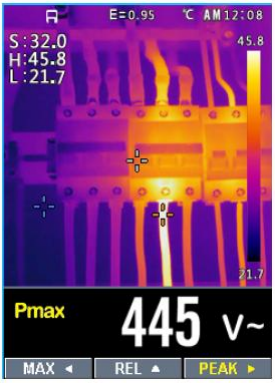
In IR+DMM mode, MODE key, RANGE key, HOLD key and REL Function are the same as in DMM mode.

Capturing MAXMIN Values on IR+DMM mode



1. To activate the max/min mode, press the softkey labeled◄ , and display max value.
2. If the Meter is already in the max/min function, then Press the ◄ key to display min value, then Press the ◄ key to display current measurement value. next press again display max value.
3. Press and hold the ◄ key for more than 1 second to cause the Meter to turn off max/min.

Capturing Peak Values on IR+DMM mode



1. To activate the peak mode, press the softkey labeled ►, and display Peak max value.
2. If the Meter is already in the peak function, then Press the ► key to display Peak min value, then Press the ► key to display current measurement value. next press again display Peak max value.
3. Press and hold the ► key for more than 1 second to causes the Meter to turn off peak.

6 Settings Menus

6.1 Using Settings Menus

Press MENU button to open the Settings Menus, as show below.

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

6.2 Settings Details

Palette mode

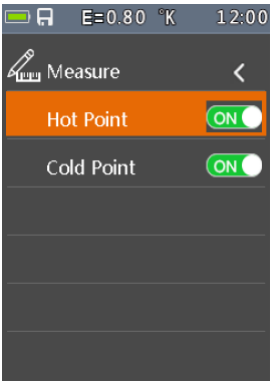
Thermal imager has five kinds of palette, such as:

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

6.3 Temp Unit

Press RIGHT/MENU button to set focus on this option and the color of option value will change to black ℃. In focus state, use the RIGHT/MENU button to toggle ℃, ℉ 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 RIGHT/MENU button to enter measure menu.
Two selections are available: HOT POINT and COLD POINT. Press RIGHT/MENU button to set cur select item on or off.

Hot point: This option enables thermal imager automatically detect the highest temperature point.

Cold point: This option enables thermal imager automatically detect the lowest temperature point.

6.5 Emissivity

Press RIGHT/MENU button to set focus on this option. In focus state, use UP /DOWN button to increase or decrease emissivity's value, use LEFT/RIGHT/MENU button to exit focus state. The available range is 0.01 to 0.99 in 0.01 steps.

6.6 Language

Press RIGHT/MENU button to enter language menu.
Three options are available: Simplified Chinese, Traditional Chinese and English.
Use UP/DOWN button to select language and use RIGHT/MENU button to set selected language to be valid.

6.7 Setup

Press RIGHT/MENU button to enter Setup menu.
Five options are available: Beep, Bluetooth, Laser, Brightness and Auto Off.
Beep:Use 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.

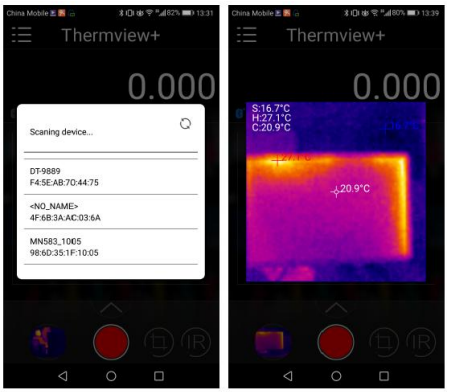
Brightness: Press RIGHT/MENU button to set focus on this option. In focus state, use UP/DOWN button to change LCD's brightness, use LEFT/RIGHT/MENU button to exit focus state. The available brightness's range is 100% to 10% in 10% steps.

Auto Off: Press RIGHT/MENU button to set focus on this option. In focus state, use UP/DOWN button to choose the time period after which the meter enters the sleep mode

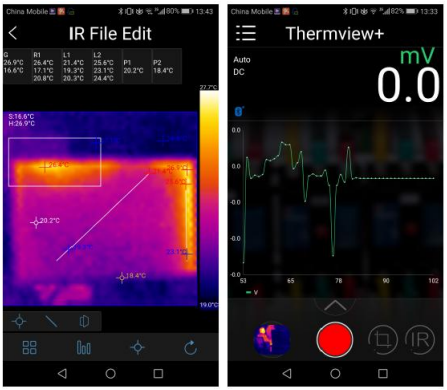
6.8 Bluetooth Connect

4. Turn on the Bluetooth function on the instrument.

5. Turn on the Bluetooth of smartphone, press the icon Thermview+ and enter the home interface. Then press Connect Device icon on the Home interface, Bluetooth device name will appear.



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



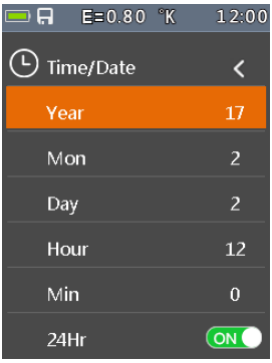
The detail information about Thermview+, please refer to Thermview+ APP help file.

Thermview+ for Android:
Please search in Google Play with keyword
“Thermview+”, download and run.

Thermview+ for iOS:
Please search in Apple store with keyword
“Thermview+”, download and run.

6.9 Time/Date

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



6.10 Photo

Press RIGHT/MENU button to enter photo menu.
Two options are available: Photo Review and Delete Photo.

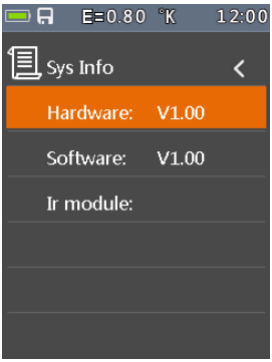
Photo Review: Press RIGHT/MENU button to enter image browser function, and exit settings menus immediately.

Delete Photo: After Press RIGHT/MENU button, dialog box will be displayed as show below.

Warning: Select 'YES', will delete all the photos on the memory card which were captured by user.

6.11 Sys Info

Press RIGHT MENU button to enter system information menu. This menu contains software version, hardware version and thermal imager version.



6.12 Factory Reset

When select Factory Set option, after press RIGHT/MENU button, the dialog box will be displayed as show below. Select 'YES' button, system parameter will be reset.

6.13 Record Measurements

With a measurement on the display (Fig130), press Button key Menu to enter the instrument's general menu (Fig131). The screen is shown on the display. Press the Button ▲ or ▼ key to select Record Item. Press the Button ▸ Enter Record Menu(Fig132).

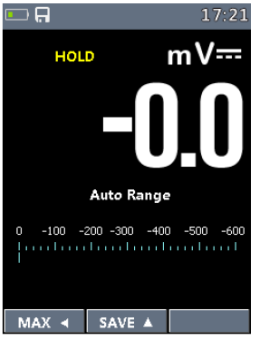


Fig130

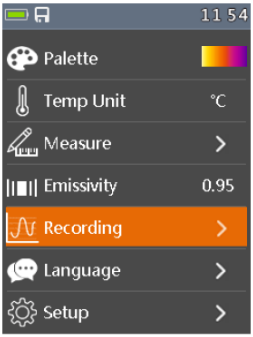


Fig131

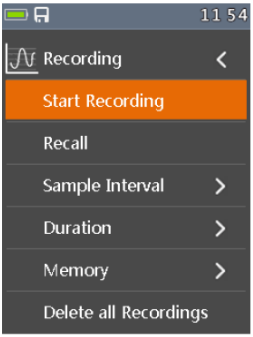


Fig132

In Record Menu. Press the Button ▲ or ▼ key to select Sample Interval Item or Duration Item. Press the Button ▸ Enter Record setting. Then Press the Button▲ or ▼ key to adjust time.
(Fig133)Setting of sampling interval from 1s to 59min:59s.
(Fig134)Setting of recording duration, from 1min to 9h:59min.

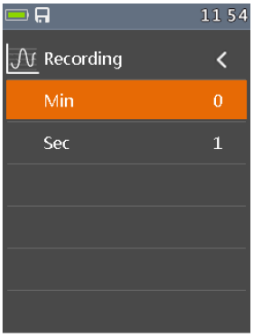


Fig133

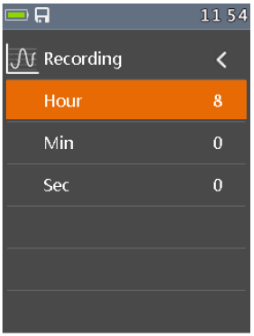


Fig134

In Record Menu. Press the Button ▲ or ▼ key to select Start record Item.
Press the Button ▸ Enter Save Record measurement (Fig135). In Save Record measurement, Press the Button ▸ to stop record. And Press the Button ▲ Save.

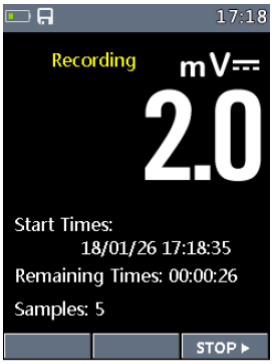
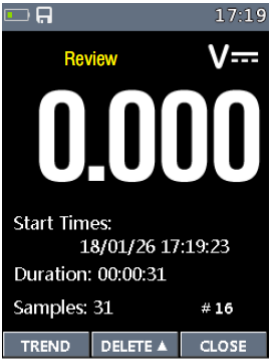


Fig135

In Record Menu. Press the Button ▲ or ▼ key to select Review Item. Press the Button ▸ Enter View Record measurement (Fig136).



Press the Button MODE key to Trend record (Fig137). And Press the Button ◄ or ▸ key to select previous record measurement or next record measurement. And press the Button ESC key to exit view record measurement.

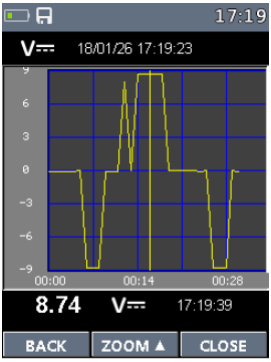


Fig137

In Record View Display, Press the Button ◄ or ► to move the cursor on the graph. And the Button ▲ to activate the Zoom function of the graph

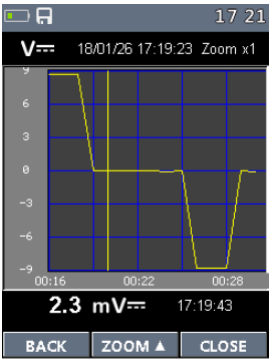


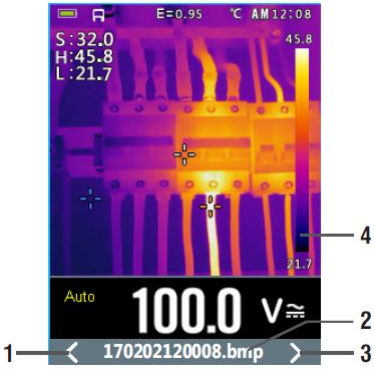
Fig138

In Record Menu. Press the Button ▲ or ▼ key to select Delete all Recordings Item (Fig139). Press the Button ► Enter Delete Box. And select Yes or No.

Fig139

7 Image Browser

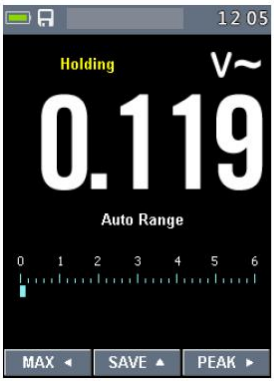
In Image Browser mode. User can browse the pictures in the memory card.
Press LEFT/RIGHT button to select prev or next picture. Press any other keys to
exit Image Browser mode.

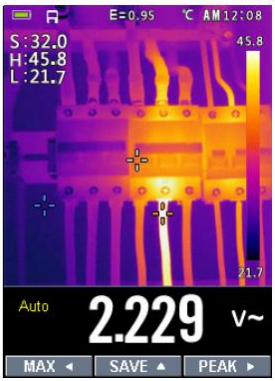


1.LEFT key instruction..
2.Current displayed picture's filename.
3.RIGHT key instruction.
4.Picture display area.

How to capture screen

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





8 Technical Specifications

8.1 Thermal Imager

Field of view (FOV) / Minimum focus distance	21° x 21° / 0.5m
Spatial resolution (IFOV)	4.53mrad
IR resolution	80 × 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 microbolometer / 8–14 µm
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℃-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	1000VDC/ACrms
6.000V	0.001V			
60.00V	0.01V			
600.0V	0.1V	±(0.2%reading + 5digits)		
1000V	1V			

AC TRMS Voltage

Range	Resolution	Accuracy(*)		Protection against overcharge
		(50Hz÷60Hz)	(61Hz÷1kHz)	
6.000V	0.001V	±(0.8%reading+5digits)	±(2.4%reading+5dgt)	1000VDC/ACrms
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 (50Hz÷1kHz)	Input impedance	Protection against overcharge
6.000V	0.001V	±(2.4%reading +20dgt)	>10MΩ	1000VDC/ACrms
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	0.01mA		
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÷1kHz)	Protection against overcharge
600.0uA	0.1uA	±(1.2%reading + 5digits)	Quick fuse 800mA/1000V
6000uA	1uA		
60.00mA	0.01mA		
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÷1kHz):
±(3.0%reading + 20dgt)

Flexible coil Current

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

Diode test

Function	Test current	Max voltage with open circuit
→|←	<1.5mA	3.3VDC

Resistance and Continuity test

Range	Resolution	Accuracy	Buzzer	Protection against overcharge
600.0Ω	0.1Ω	±(0.5%reading + 10dgt)	<50Ω	1000VDC/ACrms
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)	1000VDC/ACrms

Sensitivity: 2Vrms

Frequency (electronic circuits)

Range	Resolution	Accuracy	Protection against overcharge
60.00Hz	0.01Hz	±(0.09%rdg+5digits)	1000VDC/ACrms
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: >2Vrms (@ 20% 80% duty cycle) and f<100kHz;

>5Vrms (@ 20% 80% duty cycle) and f>100kHz

Duty Cycle

Range	Resolution	Accuracy
5.0%÷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 + 20dgt)	1000VDC/ACrms
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 + 20dgt)	

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)	1000VDC/ACrms
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)
Laser:	Class 2, <1mW, 630-670 nm EN 60825-1:2014
IP65:	EN 60529

Bluetooth

Type	Bluetooth 4.0 Low Energy
Frequency	2379~2496 MHz
Power	0 dB

Power supply

Battery type:	1x7.4V rechargeable Li-ION battery, 1500mAh Battery
charger power supply:	100/240VAC, 50/60Hz, 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%RH
Storage temperature:	-20° ÷ 60°C (-4°F ÷ 140°F)
Storage humidity:	<80%RH

This manual is according the latest technical knowing. Technical alterations reserved.

We herewith confirm that the units are calibrated by the factory according to the specifications as per the technical specifications.

We recommend to calibrate the unit again, after 1 year.