

Metrix+™ 171TRMS+ Digital Multimeter Instruction

Ⅰ. Overview

This is a handheld industrial digital multimeter. It can measure True RMS AC voltage/current, DC voltage/current, resistance, frequency, capacitance, on-off test, diode forward voltage drop, Live wire or neutral wire, NCV electric field, etc. The instrument is dust-proof,resistant to falling and easy to operate.
In solar application,electronic and electrical,high voltage equipment testing environment, you can use it to test.

Ⅱ.Safety Rules and Notes

The design of this measuring appliance conforms to the safety standard of EN61010 CATⅢ 1000V , Please read this handbook carefully before use.

1. Safety Electrical Symbols
   - ⚠ Warning, be careful
   - ⚠ Risk of high voltage
   - ⧈ Double insulated
2. When measure, do not surpass the greatest stipulated input value.
3. In the process of measuring, do not turn switch to change the measuring range at random, in case to destroy the measuring appliance.
4. The measuring appliance can display the mark while the voltage is bigger than 30V, remind the user that the measured voltage has surpassed the safety voltage, please operate carefully.
5. Measuring appliances should avoid the straight sunlight, the high temperature, and moisture.
6. After using, please must release the power switch to turn off the power.
7. If it doesn't use for a long time,please take out the battery, in case the battery leaks to damage the parts.

Ⅲ. General Specifications

1. Greatest Display: 6000 or 9999 Counts.
2. Has the function of back light, data hold, the maximum/minimum value hold measure.
3. Automatic cathode display: Displays " - "
4. Batteries insufficient display: Displays "".
5. Auto power OFF

After turning on the instrument and without turning the function switch or pressing any button,the instrument will automatically enter into sleep mode after 15 minutes, to save battery power. when it is in the sleep mode you can press the any button to wake up the instrument. If you don't need the automatic sleep mode, you should hold down the SELECT button to turn on the instrument, and then the symbol"⏻" will not be display on the LCD.

6. Working condition：0°C-40°C, 75%RH.(max)
7. Storage environment: -10°C-50°C, 85%RH. (max)
8. Battery：AA1.5V×2
9. External dimensions ： 189(L) x 89(W) x 55（H）mm
10. Weight: Approximately 380g（contain battery）

Ⅳ. Technical Specifications

Accuracy: ± (a% reading + b digit). One year warranty Ambient.
Temperature: 23°C±5°C Relative : ≤75%

DC Voltage

Range	Accuracy	Resolution
6V~600V	±(0.5%+5)	1mV~0.1V
1000V	±(0.8%+5)	1V

Input resistance：about 10MΩ.

AC Voltage

Range	Accuracy	Resolution
6V~600V	±(1.2%+5)	1mV~0.1V
1000V	±(1.2%+5)	1V

Input resistance: about10MΩ.
Frequency：40Hz~1kHz. VFC 600V: 40Hz~400Hz.
ACV-Hz: amplitude greater than 2V.
Measurement range: 40Hz~20KHz.
Display: TRUE RMS(sinusoidal wave form RMS calibration).

3.2.3 DCA

range	Accuracy	Resolution
600μA~600mA	±(1%+5)	0.1μA~0.1mA
6A~20A	±(2%+5)	0.001A~0.01A

Overload protection: μA/mA:F 630mA/250V with fuse.
20A: F20 A/250V with fuse.
Input Electric Current：6A~20A（less than 10 seconds).
Voltage Drop Measure：full measure range is 600mV.

3.2.4 ACA

range	Accuracy	Resolution
600μA~600mA	±(1.5%+5)	0.1μA~0.1mA
6A~20A	±(2%+10)	0.001A~0.01A

Overload protection: μA / mA: F 630mA/250V with fuse.
20A: F2 0A/250V fuse.
Input Electric Current：6A~20A（less than 10 seconds).
Voltage Drop Measure: Full measure range is 600mV(20A is 100mV).
Frequency: 10Hz~1kHz(Warning: Frequency for square wave, Accuracy is specified from 10Hz to 400Hz).
Display：TRUE RMS(sinusoidal waveform RMS calibration).

Resistance

range	Accuracy	Resolution
600Ω~6MΩ	±(0.8%+5)	0.1Ω~0.001MΩ
60MΩ	±(2%+5)	0.01MΩ

Overload protection: 500Vvirtual value.
Plough voltage approximately 1V.

Capacitance

Range	Accuracy	Resolution
10nF	±（3%+20）	0.001nF
100nF~1mF	±（3%+5）	0.01nF~1uF
10mF~100mF	±（10%+5）	0.001mF~0.01mF

Overload protection ： 500Vvirtual value.

Frequency /Duty

Range	Accuracy	Resolution
10Hz~10MHz	±(0.5%+3)	0.001Hz~0.01MHz
1%~99%	±(0.5%+3)	0.1%

Overload protection ： 500Vvirtual value, input delicacy:1V.
⚠Note:If the measured frequency is above 30V, please press "SELECT" key at AC electric voltage measuring range to get to the frequency function, then carry on measure.

Temperature

Range	Accuracy	Resolution
-50~400℃	± (1.2%+4)	1℃
401~1000℃	±（1.9%+15）	1℃
-58～750 ºF	±（1.2%+6）	1ºF
751～1832 ºF	±（1.9%+25）	1ºF

Overload protection:500V virtual value

Diode

Display of similar diode positive voltage.
Measuring condition：positive DC electric current 1mA, reverse DC voltage approximate 3.3V.

Continuity

When the transited resistance is smaller than about 50Ω,the buzzer beeps. Test condition: Open-circuit voltage is about 1V.

Ⅴ. Application method

■ SELECT: Each measurement function of the gear can be selected in turn. Press this button to switch between AC voltage/Hz. Long press this button to enter VFC measurement at ACV600V position, long press again to back to normal voltage measurement mode.

■ RANGE: At voltage and resistance position, short press this button to switch to manual range, long press to back to auto range.

■ MAX/MIN▲: At voltage/current/ temperature position, short press this button to enter maximum and minimum value measurement, long press to back to auto mode. After pressing this key, the manual range mode will be automatically entered, the automatic shutdown function will be canceled, and the MAX value will be displayed. Then press this key to display the MIN value, and so on.

▲ is the relative value measurement key, effective when measuring small resistance, small capacitance, short press this key to display the value of zero, display ▲ symbol. The current displayed value is taken as the reference value, and then the difference between the measured value and the reference value is displayed.

■HOLD✷ : Short press this button to enter data hold mode. When this button is pressed for ≥2 seconds, the backlight will be turned on/off. When the backlight is turned on, it will automatically turn off after 30 seconds.

Ⅵ. Instructions for Measurement Operations

Please check the built-in AA 1.5V batteries firstly, if the battery is low after the meter is turned on, the LCD will show " ", please replace the batteries to ensure the test accuracy. Please pay special attention to the warning sign " ⚠ " near the terminal of test lead, this sign " ⚠ " warns that the voltage or current under test shall not exceed the specified value to assure measurement safety!

1. AC/DC Voltage

1) Set the range switch to ACV/DCV position.

2) Connect the red test lead to "VΩ" terminal, and black to "COM" terminal, make the two test probe tips contact the two ends of the measured voltage respectively (connect to the load in parallel).

3) At ACV position, long press SELECT to enter VFC600V voltage measurement, It has a low-pass filter function to improve anti-drying Disturbance capability. short press SELECT to enter the measurement of frequency at 10Hz~20KHz.

4) Read the test result from the LCD.

⚠Note: Do not measure ACV/DCV voltage over 1000Vrms. It is possible to measure higher voltage, but it may cause damage to the meter or the user! The input impedance is about 10MΩ, measuring high-impedance circuit may cause measurement error, if the impedance of circuit is less than 10KΩ, the error (0.1% or less) is negligible. Pay special attention to avoid electric shock when measuring high voltage. Before using the meter, a known voltage can be measured to verify if the product functions are good.

2. Measurement of AC/DC current

Set the range switch to current position. this time the measuring appliance is set as the direct current automatic shift gears in advance. Insert the black test lead into COM terminal, and the red t test lead into 10A or μA/mA terminal.

If one wants to measure DC, one can concatenate the test lead with the measured electric circuit, which can directly read the number on the liquid crystal display monitor; If one wants to measure alternating current, press SELECT key to alternating current measuring range.

⚠Note:If one does not know the measured electric current scope before survey, one should set the range key to the highest measuring range and adjust downward by the files.

When the display monitor only displays OL, that is to say, the measured electric current has surpassed the measuring range and the switch of measuring range needs to move the high one grade.

μA/mA terminal represents that the maximum input current is 600mA. The overload inputs can burn the internal installation fuse out and should be replaced immediately.

When measuring 6~20A current, the continuous measurement time should be less than 10 Second, after measuring the current, should wait 15 minutes before continuing to measure the current, to avoid line heating to affect accuracy.

3. Resistance/ Diode / Continuity

1) Set the range switch to resistance Ω⊣ •)) position.

2) Connect the red test lead to "VΩ" terminal, and black to "COM" terminal, make the two test probe tips contact the two ends of the measured resistance respectively (connect to the measured resistance in parallel). Read the test result from the LCD.

3)Press SELECT button to switch ⊣, make the two test probe tips contact the two measured ends of PN junction respectively. "OL" will be displayed when the measured diode is open or the polarity is reversed. The normal voltage of silicone PN junction is about 0.4~0.8V generally.

4) Press SELECT button to switch •)), If the resistance between the both measured ends is < 50Ω, the buzzer will make sounds continuously.

⚠Note: Before measuring resistance on line, turn off all the powers in the measured circuit and discharge all capacitors completely to ensure accurate measurement.

When measuring low resistance, the test lead will cause a measurement error of 0.1Ω~0.2Ω. For small resistance measurement, this value must be subtracted from the measured value, or you can use the REL function for doing the subtraction automatically.

If the resistance of test lead at short circuit is not less than 0.6Ω, please check the looseness for the test lead and other reasons.

If the measured resistance is open or the resistance exceeds the maximum range, the LCD will show "OL".

4. Capacitance

1) Set the range switch to capacitance position.

2) Connect the red test lead to "VΩ" terminal, and black to "COM" terminal, make the two test probe tips contact the two ends of measured capacitance respectively.

3) Read the test result from the LCD. When there is no input, the meter displays a fixed value (intrinsic capacitance). For small capacitance measurement, this value must be subtracted from the measured value, or you can use the REL function for doing the subtraction automatically.

⚠Note:If the measured capacitor is short-circuited or the capacitance value exceeds the maximum range, "OL" will appear on the display screen. It is normal to take several seconds to stabilize the reading for the measurement of large capacitance. Discharge all capacitors completely prior to measurement, especially for capacitors with high voltage.

5. Frequency/DUTY measure

（1）Set the range switch to Hz/% position.

（2）insert red pen to "VΩ" terminal, insert black pen to "COM" terminal.

（3）make the two test probe tips contact the two ends of the measured voltage respectively ，get the frequency value. Press SELECT button, change it to "%" to get the ratio.

⚠Note: If the measured frequency is above 30V, please press "SELECT" button at "ACV" measuring range to frequency function for measure. By this method, it can bear 1000V voltage，in case the voltage is too high to damage the meter .

6. Temperature measure

Set the range switch to ℃/°F，insert the k type black plug to "COM" terminal，insert red one to "VΩ" terminal，the meter displays the temperature now .

⚠Note: When the meter without inserted with temperature tool, it displays environment temperature （ normal temperature）.Attached K type WRNM-010,the temperature is 250℃(482 °F)。

7. Non-Contact AC Electric Field Sensing &Live Wire or Neutral Wire

1) To detect if there is AC voltage or electromagnetic field in the space, please set the range switch to ϟNCV position.

2) When the front end of the meter approaches the mains power, the buzzer will make sound and the LCD will display N segment, the stronger the electric fields, the more the segments shown, and the higher the frequency at which the buzzer sounds.

3) Segments to indicate the strength of the sensed electric field.

4）Connect the red test lead to "VΩ" terminal, suspend the black test lead, the red test probe contacts the socket or bare wire, distinguish live wire or neutral wire. Note that if the neutral wire

to ground voltage is greater than 30V, the meter will not recognize the neutral wire.

⚠Note: The insulated conductor is the detection condition of the sensitivity, the thickness of insulation should be less than 1.5mm, it is normal that there is sensitivity deviation for different conductors and sockets.

Ⅶ. Maintenance and Repair

⚠ Warning: Before opening the rear cover of the meter, please be sure that the power is turned off (the test leads are removed from the input terminal and disconnected with the measured circuit).

1. General Maintenance

1) Clean the meter casing with a soft cloth and mild detergent. Do not use abrasives or solvents.

2) If the meter is found abnormal, stop use and send for repair.

3) The maintenance and service must be implemented by qualified professionals or designated departments.

2. Battery & Fuse Replacement

When low battery symbol "⊟" appears on the LCD, please replace the batteries immediately to ensure measurement accuracy. Battery specification: 2×1.5 V AA.

* Set the power switch at "OFF" position, remove the test lead from the input terminal.

* Loosen the screw that fixes the battery cover by the screw driver, remove the battery cover, and then replace the battery. Please pay attention to the positive and negative polarity of the new battery.

*When the fuse is burned, please replace the fuse of the same specification: F630mA/250V, F20A/250V (size φ6×30mm).

Ⅷ. Accessories

Test lead: 1 set
users manual: 1 piece
K-type temperature sensor: 1 set