MT-1706
3-5/6 True-RMS Digital Multimeter

User's Manual

1st Edition, 2020

1. General Information

This digital multimeter is designed and manufactured in compliance with IEC-61010 safety requirements on electronic measuring instruments and hand-held digital multi-meters. It is compliant with IEC-61010 requirements pertaining to 600V CAT IV, 1000V CAT. III and requirements on pollution degree 2. Please read carefully this operation manual and pay attention to safety guidelines before operating this meter.

1.1 Safety information

1.1.1 Safety instructions

* Before operating this meter, the operator must observe all standard safety procedures in the two respects below:
  A. Safety procedures against electric shock
  B. Safety procedures against unintended use
* To ensure your personal safety, please use the test lead that accompanies the meter. Before operating this meter, ensure that the test lead is flawless.

1.1.2 Safety considerations

* When the meter is used in the vicinity of the equipment that produces strong electromagnetic interferences, the reading on the meter will grow unstable and even produce serious errors.
* Don't operate the meter or pen-shaped meter whose appearance is damaged.
* The safety function of the meter will become null if the meter is not properly operated.
* The meter must be operated with great care when working in the vicinity of an exposed conductor or bus line.
* The meter is prohibited from being used in the vicinity of any explosive gas, vapor or dust.
* The measurement must be made with correct input terminals and functions and within the allowable measuring range.
* To prevent the meter from being damaged, the value to be input shall not exceed the extremes allowed by each measuring range.
* When the meter has already been connected to the line being measured, the operator is prohibited from touching the input terminal that is not in service.
* When the voltage measured exceeds 60Vdc or 30Vac (valid value), the operator shall be careful enough to avoid electric shock.
* When making measurement with a test lead, place your fingers behind its protective ring.
* When switching to another measuring range, be sure that test lead has already been taken off the measured circuit.

* For all DC functions, to prevent potential electric shock as a result of incorrect reading, please first use AC functions to check the absence of any AV voltage. Then, select DC voltage measuring range equivalent to or greater than that for AC voltage.
* Before the tests on electric resistance, diode, capacitor or continuity, the operator must cut off the power supply to the circuit to be measured, and discharge all high-voltage capacitors within the circuit to be measured.
* The electric resistance measurement or continuity test cannot be carried out in any live electrical circuit.
* Before the current measurement, the operator must first examine the protective tube of the meter. Before connecting the meter to the circuit to be measured, the operator must first power off the aforesaid circuit.
* Before repairing TV sets or measuring power switching circuit, the operator must be careful enough to prevent high amplitude voltage impulse from damaging the meter.
* This meter uses 1 x 9V 6F22 batteries that must be correctly installed into the battery compartment.
* When  appears, the batteries must be replaced immediately. The low level of a battery will result in incorrect reading on the meter, which is likely to bring electric shock or personal injury to the operator.
* In measurement, category III voltage and category IV voltage shall not exceed 1000V and 600V respectively.
* The meter shall not be in service if its case (or part of its case) is dismantled.

1.1.3 Safety symbol:

The safety symbols that appear on the meter's body and in this Operation Manual:

	Warning, an important safety symbol. The operator must consult this Operation Manual before using the meter. Unintended use may lead to the damage to the device or its components.
	AC (alternating current)
	DC (direct current)
	AC/DC
	Ground
	Double insulation protection
	Fuse
	High voltage warning
CAT. III 1000 V	Over-voltage protection
CAT. IV 600 V	Over-voltage protection

1.1.4 Maintenance practices for safety

* The operator must first pull out the test lead when the meter's case is opened or the battery cover is dismantled.
* The designated replacement parts must be used at the moment of maintenance.
* The operator must cut off all relevant power supplies before opening the meter. At the same time, the operator must avoid damage to the meter's elements by ensure that he himself doesn't carry any static.
* The meter can only be calibrated, repaired and maintained by professionals.
* When the meter's case is opened, the operator must understand the fact that the presence of some capacitance may promise the dangerous voltages even if the power supply to the meter is cut off.
* The operator should stop using and maintain the meter immediately if any abnormality has been observed on the meter. The operator must see to it that the meter cannot be in service unless it is proved conforming.
* When the meter is left idle for a long period, the operator shall remove the battery and place it in a place free from high temperature and humidity.

1.2 Input protection measures

* The meter can sustain the maximum input voltage of 1000V (DC) or 750V (AC) at the moment of voltage measurement.
* The meter can sustain the maximum AC voltage of 600V or equivalent voltage (valid value) when the tests on frequency, electric resistance, continuity and diode are carried out.
* The protective tube (F500mA/250V) is used for protection purpose when μA and mA current measurements are carried out. The protective tube (F10A/250V) is used for protection purpose when A current measurements are carried out.

2. A Schematic Diagram for the Meter

This meter is a hand-held digital multi-meter with the function of displaying True RMS. it is a large-screen LCD unit with backlight and illumination light functions so that the user can easily recognize reading. It is equipped with the function of overload protection and the indicator of battery under voltage. Either for professionals, factories, schools, enthusiasts or households, it is an ideal multi-functional meter.

2.1 A Schematic Diagram for the Meter

Physical appearance

① Non-contact voltage detection area
② LED Light
③ Non-contact voltage indicator
④ LCD screen
⑤ Select key
⑥ Hold key
⑦ Backlight key
⑧ hFE socket
⑨ LED light key
⑩ Rotary switch
⑪ Input socket

2.2 Description of the symbols on the display unit

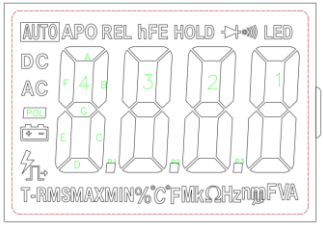

Fig. 1 (Display panel)

Table.1 Symbols

Symbol	Description
	Battery Under Voltage indicator/ Low Battery ⚠ **To avoid electric shock or personal injury as a result of incorrect reading, promptly replace the battery when the battery under voltage indicator appears.**
APO	Auto power off indicator
	High voltage warning
	Negative input polarity indicator
AC	Input voltage AC
DC	Input voltage DC
	Switching on/off test mode
	Diode test mode
AUTO	Automatic range measurement mode
Hold	Data hold mode
℃，℉	Unit of temperature(℃: Celsius; ℉: Fahrenheit)
NCV	Non-contact AC voltage detection mode
T-RMS	True-RMS value
hFE	HFE test mode

Table.1 Symbols (Continued)

V, mV	V: mV：	V: the unit of volt Millivolt，$1x10^{-3}$ or 0.001 volt.
A, mA	A: mA:	Ampere, the unit of current. Milliampere, $1x10^{-3}$ or 0.001 ampere.
Ω, kΩ, MΩ	Ω: kΩ: MΩ:	Ohm, the unit of electric resistance. Kilohm, 1000 Ohm Megaohm, 1,000,000 ohm.
Hz	Hz: KHz:	Hz, the unit of frequency KHz, $1x10^{3}$ Hz.
mF,μF, nF	F: mF: μF: nF:	Farad, the unit of capacitance. Millifarad, $1x10^{-3}$ or 0.001 farad. Microfarad, $1x10^{-6}$ or 0.000001 farad. nF, $1x10^{-9}$ or 0.000000001 farad.

2.3 Description of functional keys

Key	Description of functions
Select	SEL keys, e.g. Temperature measurement position: ℃ mode or ℉ mode. AC voltage position: press the key to select voltage/frequency mode in the AC voltage measurement mode.
Hold	Press the key to hold the measured value for the current moment Press the key again to cancel this function.
	Press the key, the backlight and the illumination indicator will be on; and press the key anther , you will turn off backlight and illumination indicator. If you don't press the key at all, the function will automatically be disenabled in 15 minutes.
	LED light key. Press the key, the led light will be on, and press the key another, the led light will be off.

2.4 Description of input socket

input socket	Description
COM	All public input terminals to be measured are connected to test leads in black or the public output plugs of exclusive multi-function test sockets.
VΩHz 	Positive input terminals (connected to a test lead in red) for capacitor measurement, diode measurement, beep on/off test, temperature measurement, voltage measurement, electric resistance, frequency, duty ratio and live/earth line judgment.
mA	mA positive input terminal (connected to a test lead in red).
20A	20A positive input terminal (connected to a test lead in red).

2.5 Accessories

1.Operation Manual	X 1
2. Test lead	X 1 pair
3.K-Type thermocouple	X 1

3. Operational guidelines

3.1 Normal operation

3.1.1 Hold mode

In the hold mode, the reading can be maintained on the display unit.
Changing the measurement function position or pressing the key.
Hold again to exit the hold mode
Hold mode: entry and exit

1. Press the key “**Hold** ” and the reading will be held and the symbol “HOLD” will appear on the LCD screen.
2. Press the key “**Hold**” again to restore the meter to its status for normal measurement.

3.1.2 Backlight

The meter is equipped with the functions of backlight so that the operator can access measurement results even if he is in a darker place. The backlight function can be enabled or disenabled by the steps below: