EN

AX-C709

1. Introduction

Warning
Read“Safety Information”before using the meter. ProcessMeter (referred to as “the meter ”)is a handheld, battery-operated tool for measuring electrical parameters. It has all the features of a digital multimeter, it could also output signals of direct voltage, current and frequency as well.
If the meter is damaged or something is missing, contact the place of purchase immediately. Contact a distributor for information about DMM (digital multimeter) accessories.

2. Safety Information

The meter complies with IEC61010.1-93 Overvoltage CategoryII.Use the meter only as specified in this manual, otherwise the protection provided by the meter may be impaired. A Warning identifies conditions and actions that pose hazard(s) to the user; a Caution identifies conditions and actions that may damage the meter or the equipment under test; an Attention identifies symbols of the operation and explanations of the features. International symbols used on the meter and in this manual are explained below.
Warning
To avoid possible electric shock or personal injury:

- Do not use the meter if it is damaged. Before using the meter, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Make sure the battery door is closed and latched before operating the meter.
- Remove test leads from the meter before opening the battery door.
- Inspect the test leads for damaged insulation or exposed metal. Check test leads before using the meter.
- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter around explosive gas, vapor, or dust.
- Use only type AAA batteries, properly installed in the meter case to power the meter.
- When servicing the meter, use specified replacement parts.
- Use caution when working above 30V ac rms, 42V ac pk, or60V dc. Such voltages pose a shock hazard.
- When using the probes, keep fingers behind the finger guards on the probes.
- Connecting the common test lead before connecting the live test lead. When disconnecting test leads, disconnect the live test lead first.

- Do not touch the charging connector when the test lead is connected.

Caution!

To avoid possible damage to meter or to equipment under test:

- Disconnect the power and discharge all high-voltage capacitors before testing resistance or continuity.
- Use the proper jacks, function, and range for the measurement or sourcing application.

International Electrical Symbols

AC Current ~

DC Current ⎓

AC or DC ≂

Safety rules ⚠

Earth ground ⏚

Fuse

Double Insulated ⧈

Low Battery

CAT II - CAT11 Overvoltage (Installation) Category11, Pollution Degree 2 per IEC61010 refers to the level of Impulse Withstand Voltage protection provided. Typical locations include: Plug and the connecting electric

equipments, home appliance, convenient, tools, domestic plug, plugs 10m distant from type 3 circuit or 20m distant from type 4 circuit.

3. Measuring Electrical Parameters

The proper sequence for taking measurements follows:

1. Plug the test lead into the appropriate jacks
2. Set the rotary function switch to the desired function
3. Touch the probes to the test points
4. View the results on the LCD display

4. Input Impedance

For the voltage measurement functions, measuring impedance is 10 MΩ. See “Specifications” for more information.

5. Ranges

A measurement range determines the highest value and resolution at which the meter can measure. Most meter measurement functions have more than one range (see “Specifications”).
Make sure the correct range is selected:
- If the range is too low, the display shows OL (overload).
- If the range is too high, the meter will not be displaying its most precise measurement.
The meter normally selects the lowest range that will measure the applied input signal (<AUTO> showing on the display). Press <RANGE> to lock the range. Each time <RANGE> is pressed, the meter selects the next higher range for every press .At the highest range, it returns to the lowest range.

6. Testing Diodes

To test a single diode:
1. Insert the red test lead into the Hi (MEASURE) jack and black test lead into the COM jack.
2. Set the rotary function switch to Ω⇥⊢·))).
3. Press the blue button so that the⇥⊢ symbol is on the display.
4. Touch the red probe to the anode and the black probe to the cathode (side with band or bands).The meter should indicate the appropriate diode voltage drop.
5. Reverse the probes. The meter displays OL, indicating a high impedance.
6. The diode is good if it passes the tests in steps 4 and 5.

7. Using Display Hold

Warning
To avoid possible electric shock, do not use Hold to determine if dangerous voltage is present.
Activate Hold to freeze the meter’s display on each new stable reading. Press <HOLD> to activate Hold.

8. Using Relative Measuring Function

Press <REL> , the meter would show the present value in the sub-display district as a reference and the relative value (minus between present value and referenced value) in the main-display district. For next press <REL>, the meter would stop displaying the relative value.
Warning
In REL mode, be careful for possible dangerous voltage.

9. Measuring Frequency, Duty Cycle Ratio

Press <Hz> to show Frequency, Duty Cycle Ratio and Voltage (Current) in sequence when measuring voltage (DC mV voltage excluded) and current.

10. Measuring TC

- Insert the one end of the test lead into the Hi (MEASURE) and COM jack and connect the other end to the TC output.
- Set the rotary function switch to <mVTC>.
- Press the blue button and select TC measure function so that the corresponding unit and type of TC are on the display.
- Press <RANGE> to select corresponding type of TC.
- Automatic compensation for reference-junction temperature.

User could start the automatic compensation for reference-junction temperature function in systematic maintenance state (see “Power-Up Option” for information of entering into the systematic maintenance state), the measured value is the temperature yielded by the compensation.
Where:
Displayed temperature = THERMAL EMF corresponding to the set temperature + Thermal EMF corresponding to the room temperature

11. Measuring RTD

- Insert the one end of the test lead into the Hi (MEASURE) jack and COM jack and connect the other end to the RTD output.
- Set the rotary function switch to <RTD> .
- Press the blue button and select RTD measure function so that the corresponding unit and type of RTD are on the display.
- Press <RANGE> to select an appropriate type.

12. Output Function

The output terminal of the meter produces the simulating resistance, the simulating RTD, DC voltage, TC, frequency and simulating transmitter set by the user.
Caution!

Using: Do not append voltage to the output jack; otherwise the internal circuit would be damaged for impropriety.

13. Simulate Output of Resistance or RTD

Caution!
Resistance-simulation: The simulator produces the simulation resistance up to 400Ω at its output terminal (Ohms/RTD). The method of simulating resistance output is to send out an appropriate voltage 'VX' according to the exciting current 'IX' produced by the calibrated instrument. Because R (set resistance) =VX (output voltage)/IX (exciting current), the calibrated device must provide an exciting current to the simulator. The exciting current should range from 0.5mA to 2mA.
Caution!
Resistance-simulation: A 4-wire system is designed for the re s i s t a n c e ou t p u t du r i n g th e calibration. If the user adopts a two-wire system, he or she should take into consideration the error (ca.0.1Ω) arising from the lead resistance of the test leads. If the capacitance between the resistance output terminal of the simulator and the tested instrument is more than 0.1μf, the simulator will produce improper resistance.

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to <RTD> , and press the blue button to select resistance or RTD function and displays unit "Ω" or "°C" and the type of the RTD "Pt100".
- Press <RANG> to select corresponding type in RTD function.
- Press <LEFT> or <RIGHT> to select the set digits for output.
- Press <DOWN> or <UP> to change the numerical value of the set digits. The value can do carry or number decrement automatically. Hold the pressed key in one second and the value will keep varying.
- Press <HOLD> to turn on/off the output followed by displaying the symbol "ON" or "OFF".

14. DC Voltage Output

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to TCmV (or ⏦V), and press blue button to select mV (or V) function and displays unit "mV" (or "V").
- Press <LEFT> or <RIGHT> to select the set digits for output.
- Press <UP> or <DOWN> to change the numerical value of the set digits. The value can do carry or number decrement automatically. Hold the pressed key in one second and the value will keep varying.
- Press <HOLD> to turn on/off the output followed by displaying the symbol "ON" or "OFF".

15. Simulating output from thermocouple (TC)

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to TCmV, and press the blue button to select TC function and displays unit "°C" and the type of "R".
- Press <RANGE> to select an appropriate type.
- Press <LEFT> or <RIGHT> to select the set digits for output.
- Press <UP> or <DOWN> to change the numerical value of the set digits. The value can do carry or number decrement automatically. Hold the pressed key in one second and the value will keep varying.
- Automatic compensation for reference-junction temperature. During the direct calibration of an instrument with reference- junction temperature compensation, user could start the automatic compensation for reference-junction temperature function in systematic maintenance state (see "Power-Up Option" for information of entering into the systematic maintenance state), thus providing the required thermo-electromotive force for output followed by displaying the symbol "RJ-ON". Where: Output Thermal EMF = Thermal EMF corresponding to the set temperature –Thermal EMF corresponding to the room temperature. If there is no need for the Simulator to perform the function of automatic reference-junction compensation, user could turn off the automatic compensation for reference-junction temperature function in systematic maintenance state (see "Power-Up Option" for information of entering into the systematic maintenance state), and"RJ-ON" will not on display.
- Press <HOLD> to turn on/off the output followed by displaying the symbol "ON" or "OFF".

16. Frequency Output

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to⎍V , and press the blue button to select ⎍ function and displays unit "Hz" indicating frequency set.
- Press <LEFT> or <RIGHT> and or <UP> to <DOWN> select output frequency within 1-100Hz.
- Press <HOLD> and "ON" is on display, and begin output frequency signal.
- Press <RANGE> and displays unit "kHz", and repeat the 3-4 step to output 0.1-1.1kHz (1.0 - 11.0kHz) frequency signal.

17. Simulating Transmitter output (absorption current)

XMT refers to simulate a current loop circuit transmitter with the meter. Do this when you get external dc voltage (5-28 V) or have current loop in series.
Caution!
Set the rotary button in one of the mA output before connecting the testing leads with current loop circuit. Otherwise, low impedance from other parts of rotary will occur in the circuit and caused 35mA current in circuit.

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to XMT, and external loop power is necessary, select XMT function and displays "LOOP POWER" indicating XMT set.
- Other button operating is same as that described in direct current output.

Caution!

- Range of power supply:5-28VDC
- Using: During the operation at the current output, try your best to use an external 24VDC power source in a mode of connection with a transmitter, thus being able to prolong the battery life.

18. DC current output

- Insert one end of the test lead into the Hi (OUTPUT) jack and COM jack of the meter and connect the other end to the input of the user's instrument.
- Set the rotary function switch to and displays unit "mA".
- Press <REL> to select set value of manual waveform output, and display unit "mA", "25%_set" (or "100%_set"). Among them: 0%=4 mA, 100% =20 mA. In digital set output mode: press <LEFT> or <RIGHT> to select the set digits for output; press <DOWN> or <UP> to change the numerical value of the set digits. The value can do carry or number decrement automatically. Hold the pressed key in one second and the value will keep varying. In 25% (or 100%) mode: press <DOWN> or <UP> to change the set value. Press <HOLD> and "ON" is on display, and begin output current signal.
- Press <Hz> to select set value of auto waveform output, and displays unit "mA", "M". Press <HOLD> to turn on/off the output followed by displaying the symbol "ON" or "OFF". Press <RANGE> to start or stop auto waveform output, in which "AUTO "is on display .The present value will be held and enter into digital set output mode when the mode is stopped.

19. Replacing the Batteries

Warning

To avoid electrical shock or personal injury:
- Remove test leads from the meter before opening the battery door.
- Close and latch the battery door before using the meter.

Note
- The new and old Batteries can not be mixed.
- Take out the batteries if the meter won't be used for a long time.
- Dispose the old batteries in accordance with the local law.

Replace the batteries as follows:
- Remove the test leads and turn the meter OFF.
- Specific steps: take off the protector of the meter and then with a standard blade hand screwdriver, turn each battery door screw counterclockwise so that the slot is parallel with the screw picture molded into the case.
- Lift off the battery door.
- Remove the meter's batteries.
- Replace with four new AAA alkaline batteries.
- Reinstall the battery door and tighten screws.
- Install the protector.

Caution!
Make sure the battery's odes are in accordance with the symbols illustrated in battery pool when replacing them.

20. Replacing a Fuse

Warning
To avoid personnel injury or damage to the meter, use only the specified replacement fuse. F1 the specification is 63mA 250V and F2 is 0.5A 250V, which are fast-melt.
0.5A 250V-fuse (F2) protection is in the current input jack, while 63mA 250V-fuse (F1) protection is in the current output jack. To check whether fuses are blown:
- Turn the rotary function switch to mA.
- Plug the black test into COM, and the red test lead into the mA jack.
- Using an ohmmeter, check the resistance between the meter test leads .If the resistance is about 1Ω, the fuse is good. An open reading means that fuse F2 is blown.
- Fuse F1 is blown if the outputs do not alter with the change of the fixed value, and replace it as follows:
  1. Remove the test leads from the meter and turn the meter OFF.
  2. With a standard blade hand screwdriver, turn each battery door screw counterclockwise so that the slot is parallel with the screw picture molded into the case.
  3. Replace the blown fuse(s).
  4. Reinstall the meter.

21. Technical specifications

21.1.

All the speculations apply to +18℃to +28℃, 10% to 70%RH unless stated otherwise. All speculations assume a 5- minute warm- up period. Standard speculation is valid for one year.

Note

“Counts” refers to the number of increments or decrements of the least significant digit.

21.2. DC voltage measurement

1	2	3
4.000V	0.001V	0.2%+4
40.00V	0.01V	0.2%+4
400.0V	0.1V	0.2%+4

1 - Range
2- Resolution
3 - Accuracy
Measuring Impedance:10 MΩ(nominal),<100pF
Common mode rejection ratio: 50Hz or 60Hz > 100dB
Normal mode rejection ratio: 50Hz or 60Hz > 45dB
Overvoltage protection: 600Vp-p

21.3. DC mV Measurement

1	2	3
40.00mV	0.01 mV	0.5%+6
400.0mV	0.1 mV	0.2%+4

1 - Range
2- Resolution
3 - Accuracy
Measuring Impedance: 10 MΩ(nominal)
Overvoltage protection: 600Vp

21.4. TC Measurement

1	2	3	4
R	-40～1760℃	1℃	0.5%+3（≤100℃） 0.5%+2（＞100℃）
S	-20～1760℃	1℃	0.5%+3（≤100℃） 0.5%+2（＞100℃）
B	400～1800℃	1℃	0.5%+3（≤600℃） 0.5%+2（＞600℃）
E	-200～500℃	1℃	0.5%+2（≤-100℃） 0.5%+1（＞-100℃）
K	-200～950℃	1℃	0.5%+2（≤-100℃） 0.5%+1（＞-100℃）
J	-200～700℃	1℃	0.5%+2（≤-100℃） 0.5%+1（＞-100℃）
T	-200～400℃	1℃	0.5%+2（≤-100℃） 0.5%+1（＞-100℃）
N	-200～1000℃	1℃	0.5%+2（≤-100℃） 0.5%+1（＞-100℃）

1 - Range
2 - Set Range
3 - Resolution
4 - Accuracy

By using ITS-90 temperature scale
Note: The accuracy does not include the error of internal temperature compensation caused by a sensor. The range of the internal temperature compensation sensor is + 2℃.

21.5. AC Voltage Measurement

1	2	3
400.0mV	0.1mV	1.0%+4
4.000V	0.001V	0.5%+4
40.00V	0.01V	0.5%+4
400.0V	0.1V	0.5%+4

1 - Range
2- Resolution
3 - Accuracy
Specifications are valid from 5% to 100% of amplitude range
400mV is only confined to manual range
AC conversion: average value
Measuring Impedance: 10 MΩ(nominal),<100pF
Common mode rejection ratio: 50Hz or 60Hz > 100dB
Overvoltage protection: 600Vp

21.6. DC current measurement

1	2	3
40.00mA	0.01mA	0.2%+4
400.0mA	0.1mA	0.2%+4

1 - Range
2- Resolution
3 - Accuracy
Overload protection: 0.5A,250V fast-blow fuse
Measuring Impedance: 1Ω

21.7. AC current measurement

1	2	3
40.00mA	0.01mA	0.5%+4
400.0mA	0.1mA	0.5%+4

1 - Range
2- Resolution
3 - Accuracy
Specifications are valid from 5% to 100% of amplitude range
Overload protection: 0.5A,250V fast-blow fuse
Measuring Impedance: 1Ω

21.8. Resistance measurement

1	2	3
400.0Ω	0.1Ω	0.2%+4
4.000kΩ	0.001kΩ	0.2%+4
40.00kΩ	0.01kΩ	0.2%+4
400.0kΩ	0.1kΩ	0.2%+4
4.000MΩ	0.001 MΩ	0.5%+4
40.00 MΩ	0.01 MΩ	1.0%+4

1 - Range
2- Resolution
3 - Accuracy
Open circuit voltage:0.4v
Guide lead resistance is excluded in the accuracy
Overvoltage protection: 600Vp-p

21.9. RTD Measurement

1	2	3	4
Pt100	-200～700℃	1℃	0.5%+2
Cu50	-50～150℃	1℃	0.5%+4

1 - Range
2 - Input range
3 - Resolution
4 - Accuracy
By using Pt100-385 temperature scale
Measuring current 1 mA
Note: attached lead resistance is excluded

21.10. Frequency Count Accuracy

1	2	3
50.00Hz	0.01Hz	0.1%+3
500.0Hz	0.1Hz	0.1%+3
5.000KHz	1Hz	0.1%+3
50.00KHz	0.01KHz	0.1%+3
100.0KHz	0.1KHz	0.1%+3

1 - Range
2- Resolution
3 - Accuracy
Display updates 3 times/second (at >10Hz)

21.11. Diode Test and Continuity Test

- Diode test indication:
  Displays voltage drop across device, open circuit voltage: 1.1v-1.6v; short circuit current :<0.2mA (typical value). Accuracy± (2%reading +1count)
- Continuity test indication:
  Continuous audible tone for test resistance<50
  Open circuit voltage: <0.45v
  Short circuit current:130μA typical
  Overload protection: 600V (peak)

21.12. Basic Technical Specification of Output

(applicable to temperature range from 18 to 28 ℃, 10% to 70%RH , accuracy± (2%reading+1count), within one year after calibration).

1	2	3	4	5	6
OHM	400.0Ω	0 to 400.0Ω	0.1Ω	0.5+4	1mA exciting current Without accessory lead resistance
DC mV	100.00mV	-10.00mV to 10.00mV	0.01mV	0.5+4	Max. output current 5mA
DC V	5.0000V	-0.5000V to 5.5000V	0.1mV	0.2+4	Max. output current 5mA
FREQ	100.0Hz	1.0Hz to 110.0Hz	0.1Hz	0.2+2	Square-wave 50% duty cycle ratio 5V p-p
	1.000KHz	0.100KHz to 1.100KHz	10.0KHz	0.2+2	
	10.0KHz	1.0KHz to 11.0KHz	0.1KHz	0.2+2	
XMT	-20.000mA	0 to -22.000mA	0.001mA	0.2+4	External power supply: 28V Max. load:1kΩ at 20mA
DC mA	20.000mA	0 to 22.000mA	0.001mA	0.2+4	Internal power supply: 15V Max. load:500 Ω at 20mA
RTD	Pt100	-200.0 to 850.0	0.1°C	0.5+6	By using Pt100-385 temperature Without accessory lead resistance
	Cu50	-50.0 to 150.0			

1	2	3	4	5	6
TC	R	-40 to 1760	1°C	0.5%+3 (≤100℃) 0.5%+2 (>100℃)	By using ITS-90 temperature Note: The accuracy does not include the error of internal temperature compensation caused by a sensor.
	S	-20 to1760	0.1°C	0.5%+20 (≤-100℃) 0.5%+10 (>-100℃)	
	K	-200.0 to 1370.0			
	E	-200.0 to1000.0			
	J	-200.0 to 200.0			
	T	-200.0 to 400.0			
	N	-200.0 to 1300.0			
	B	-40 to 1760	1°C	0.5%+3 (≤600℃) 0.5%+2 (>600℃)	

1 - Function
2 - Range
3 - Set Range
4 - Resolution
5 - Accuracy
6 - Remark
Maximum voltage applied between any output jack and earth ground :30 V DC
Fuse-protection for output jacks: 63mA,250V fast-blow fuse

22. General Specifications

- Power supply: 6V batteries(4×1.5 V alkaline AAA batteries or 4×1.5 V Ni-MH AAA batteries)

- Maximum Voltage:600Vp-p(Maximum Voltage between all input jacks and earth ground) 30V DC (Maximum Voltage between all output jacks and earth ground)
- Operating temperature: 0℃-50℃
- Operating relative humidity:≤ 80% RH
- Storage temperature: -10 ℃-55 ℃
- Storage humidity:≤ 90%RH
- Size : 205 ×95× 42 mm (plus protector)
- Weight: about 500g (plus protector)
- Accessories: a copy of users manual, a set of CF-733370 industrial test lead (with alligator clips) and two 63mA/250 fast-blow fuses
- Options: battery charger (VCCHG)
- Safety: complied with IEC61010 terms(Safety Standard issued by International Electrotechnical Commission)

23. Appendix

Warning
To avoid electric shock, do not touch the charging jack when the testing circuit has been connected to the meter!
Caution!
Make sure that the batteries loaded in are Ni-MH batteries when charging the meter.

- Turn off the power when charging, connect the plug into the charging jack in the top of the meter, and turn on the charger's power ahead of the meter's power.
- Use the charger manufactured by our company only. The Company will not burden any responsibility for the damage of the meter caused by user's self -selected charger.
- Do not use the USB jack in the computer to charge the meter.