multicomp PRO


# TRUE RMS DIGITAL MULTIMETER
# MP139A and MP139B

## SAFETY INFORMATION

**Please read these instructions carefully before use and retain for future reference.**

- This Meter complies with the standards EN 61010-1,EN 61010-2-030: in pollution degree 2, overvoltage category (CAT III 600V) and double insulation.
- There are no user-serviceable parts in this product. Refer servicing to qualified personnel.
- Never operate the meter with the cover removed or the battery door open.
- When LCD display shows the low battery icon, it is required to replace the battery immediately to ensure the measurement accuracy.
- Remove dead batteries from the meter or if it is not going to be used for a long time.
- Never mix old and new batteries together, or different types of batteries.
- Never dispose of batteries in a fire, or attempt to recharge ordinary batteries.
- The range switch should be set to the correct measurement position. If in doubt set the range higher than you may require initially.
- To avoid electric shock and damage to the instrument, signals being measured shall not exceed rated limit value.
- To prevent any damage to the instrument, do not change the range while readings are being taken.
- After each measurement, disconnect the meter from the circuit being measured.
- After taking current measurement, especially the measurement of large current, it is necessary to power the meter off before disconnecting from the circuit being measured.
- Always take care when voltage being measured is higher than DC 60V or AC 30Vrms.
- Do not use the meter in high-temperature or high-humidity environments, particularly in the damp environment in where the instrument performance may be severely degraded.

## WHATS INCLUDED

- Multimeter
- Instructions
- Test Probes (Cat III 600V) 10A

## FEATURES

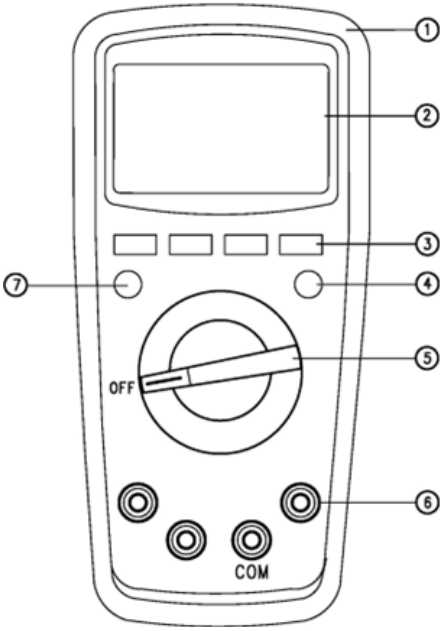
- This DMM is a small auto range, hand-held $3^{1}/_{2}$-$3^{5}/_{6}$ bit true RMS multimeter featuring comprehensive functions, tough construction, high reliability and safety as well as having a large screen for display.
- It can be used for measuring AC/DC voltage and current, variable frequency voltage (V.F.C), resistance, diode, circuit on-off, capacitance, frequency ratio and NCV non-contact AC voltage sensing.

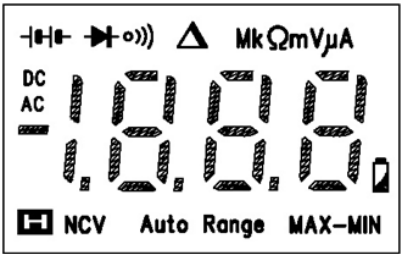
### Range selection rotary control functions

- AC or DC Voltage
- Resistance
- Diode
- Continuity
- Capacitance
- Frequency
- Duty Ratio
- Temperature
- AC or DC Current
- Non-contact sense
- Off

1. Case
2. LCD Display
3. Range/Max-Min/REL/NCV-Hz buttons*
4. Select/VFC button
5. Range Switch
6. Measuring input terminals
7. Hold/Backlight button

*Some buttons are model specific




| Symbol | Indication |
|---|---|
| H | Data Hold |
| - | Negative reading |
| AC/DC | Measurement range |
| Max-Min | Maximum or Minimum value |
| | Low Battery Indicator |
| Auto Range | Automativ range mode |
| ■ ■ ■ | Diode measurement |
| | Circuit power indicator |
| Δ | Relative measurement indicator |
| Ω/kΩ/MΩ | Resistance units (ohms) |
| Hz/kHz/MHz | Frequency units (hertz) |
| % | Duty ratio measurement |
| mV/V | Voltage units (volts) |
| μA/mA/A | Current units (amps) |
| nF/μF/mF | Capacitance units (farads) |
| °C | Centigrade temperature units |
| °F | Farenheit temperature units |
| (EF)NCV | Non-contact voltage sensing |
| | Auto power off |

RANGE button: used for selecting auto/manual range (Only applicable for V/Ω/A).

MAX/MIN button: used to automatically enter the manual range mode. In such case, auto shutdown function is disabled and maximum value is displayed, press again and the minimum value will be displayed then values are displayed in turn for each press (maximum value-minimum value). Press >2s or switching a range will exit this mode (only applicable for V/Ω/A and °C/°F).

REL button: used to automatically enter the manual range mode. The current displayed value will be taken as the reference value and then the difference between the measured value and reference value will be displayed, after another press, you'll exit the relative measurement mode (only applicable for V/Ω/A and °C/°F).
The backlight will be illuminated when the time of pressing button is >2s, the backlight will be automatically turned of after 15sec or pressing the key again for >2s while the backlight is illuminated, (Only applicable for MP139A full range: REL/LIGHT button).

NCV/mV~ button: used to switch NCV/mV~. For detailed information, see the operation instruction for non-contact AC voltage sensing. (Only applicable for MP139A).

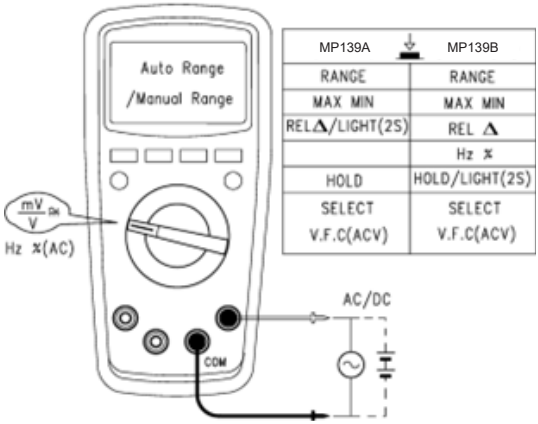
SELECT button: used to select range. Under AC mode, press the button >2s, display "UFC", enter V.F.C measurement mode and measure the variable frequency voltage. After another >2s press on the button, display shows "End" and exits the V.F.C measurement mode.

HOLD button: used to lock and hold the displayed value, in such case, LCD displays the prompt " H ", press again to re-enter the normal measurement mode.
The backlight will be illuminated when the time of pressing button is >2s, the backlight will be automatically turned of after 15sec or pressing the key again for >2s while the backlight is illuminated (Only applicable for MP139B HOLD / LIGHT button).

## OPERATION

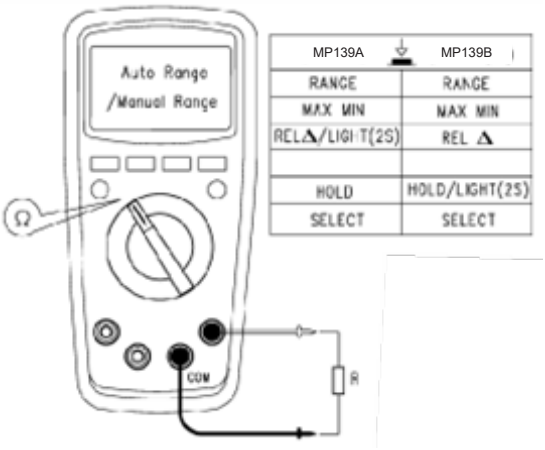
**AC and DC Voltage Measurement**

- Connect the instrument with the load in parallel for measurement.
- When the input impedance of the instrument is about 10MΩ, the load may cause measurement error in the circuit with high impedance. In most cases, the error can be neglected (0.1% or lower) if the circuit impedance is under 10k.
- DO NOT input voltage higher than 600Vrms, despite of the possibility of measuring higher voltage, as it may damage the instrument.




| MP139A | MP139B |
|---|---|
| RANGE | RANGE |
| MAX MIN | MAX MIN |
| REL Δ/LIGHT(2S) | REL Δ |
| | Hz ⧖ |
| HOLD | HOLD/LIGHT(2S) |
| SELECT V.F.C(ACV) | SELECT V.F.C(ACV) |

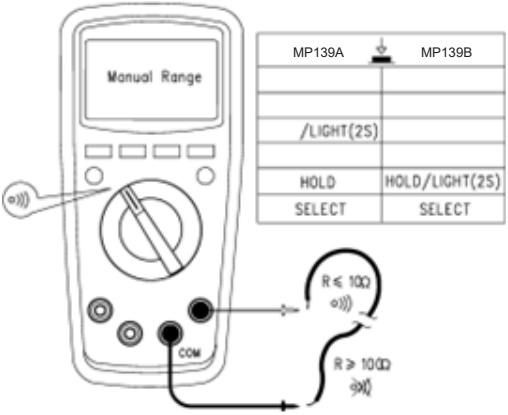
**Resistance Measurement**




| MP139A | MP139B |
|---|---|
| RANGE | RANGE |
| MAX MIN | MAX MIN |
| REL Δ/LIGHT(2S) | REL Δ |
| | |
| HOLD | HOLD/LIGHT(2S) |
| SELECT | SELECT |

- Connect the instrument with the load in parallel for measurement.
- The display will show “OL” when the measured resistance open-circuit or resistance value exceeds the maximum range of the instrument.
- Prior to measuring online resistance, it is necessary to switch off all power in the circuits to be measured, and release all residual charges to ensure the measurement accuracy.
- In measuring low resistance, a measurement error in resistance of about 0.1Ω ~ 0.2Ω will be resulted by the test pen. In order to acquire accurate reading, it is required to short circuit the test pen, take REL relative measurement mode to ensure the
- Check the test pen for any loose connections in case there is a resistance value no less than 0.5Ω when test probes are short cicuited.
- Several seconds may be required for the reading stability when measuring high resistance, which is normal for high resistance measurement.
- By using the resistance measurement function, it is allowed to make self-checking of the built-in fuse as indicated on the front panel.
- DO NOT input higher than DC 60V or AC 30V.

**Continuity measurement**




| MP139A | MP139B |
|---|---|
| | |
| | |
| /LIGHT(2S) | |
| | |
| HOLD | HOLD/LIGHT(2S) |
| SELECT | SELECT |

- If the resistance of two terminals to be measured is higher than 150Ω, there will be a circuit break and buzzer will make no sound; if the resistance is <10Ω, the circuit is deemed with good conductivity and buzzer will continuously sound.
- Prior to measuring online circuit on-off, it is necessary to switch off all power supplies in the circuits to be measured and release all residual charges to ensure the measurement accuracy.
- DO NOT input higher than DC 60V or AC 30V.

**Diode measurement**

- “OL” will be displayed when the diode to be measured is an open circuit or polarity is reversely connected. For Silicon PN junction, the normal value is normally 500~800mV.
- Prior to measuring online diode, it is necessary to o switch off all power supplies in the circuits to be measured and release all residual charges to ensure the measurement accuracy.
- Test voltage for diodes is about 2.1V (MP139A) or 3.2V (MP139B).
- DO NOT input higher than DC 60V or AC 30V.

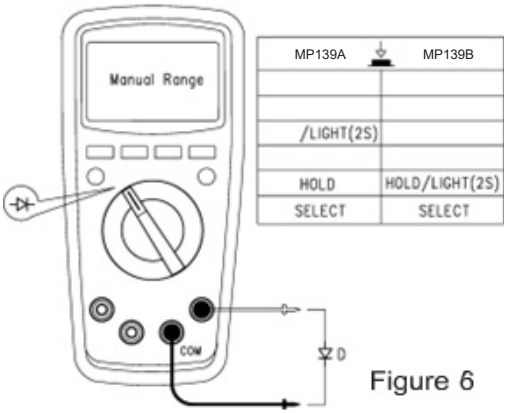
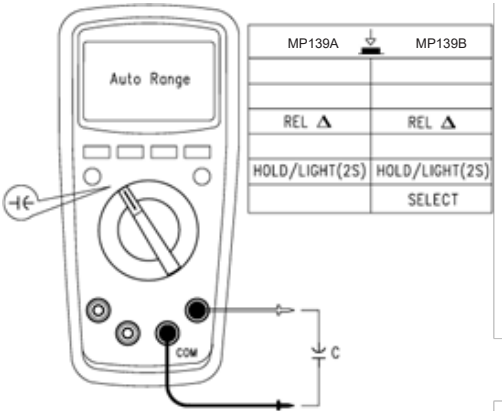


Figure 6

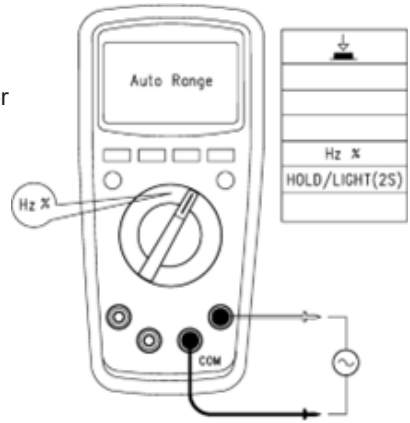
**Capacitance measurement**

- The instrument without any input, will display a fixed reading which is the internal fixed capacitance value.
- When measuring small range gear capacitance, the above value shall be subtracted from the value to be measured to ensure accuracy.
- The relative measurement REL function can be used to automatically subtract the value to facilitate the measurement.
- The display will show “OL” when the capacitor to be becomes short-circuited or the capacitance value exceeds the maximum range of the instrument.
- Several seconds will be taken to measure high-capacity capacitors.
- To prevent damage to the instrument and personal injury, it is required before testing to release all residual charges, which is particularly important for capacitor with high voltage.



**Frequency/Duty Ratio Measurement** (Only applicable for MP139B)

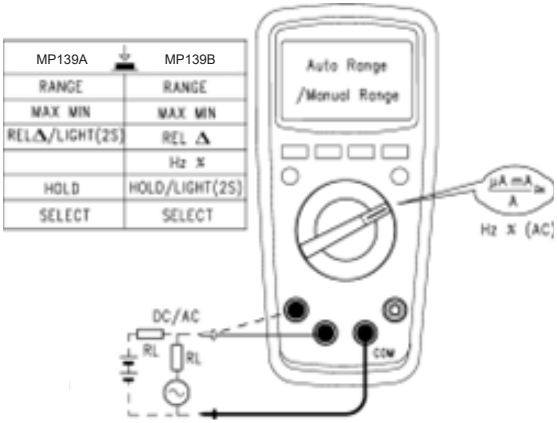
- In the frequency measurement mode, press the button Hz/% to select frequency/duty ratio measurement mode.
- DO NOT input the voltage higher than DC 60V or AC 30V.




**AC and DC current measurement**

- Connect the instrument with the load in serial for measurement. AC measurement value will be true RMS.
- Before connecting the instrument in serial with he ciruit to be measured, switch off the power.
- It is required to use correct input terminal and function setting. If unable to estimate the current, start with the range set to the highest setting.
- Fuses are provided inside the 10A and mA input jacks.
- DO NOT connect the test leads in parallel with any circuit as this will cause permanent damage to the meter and may cause personal injury.

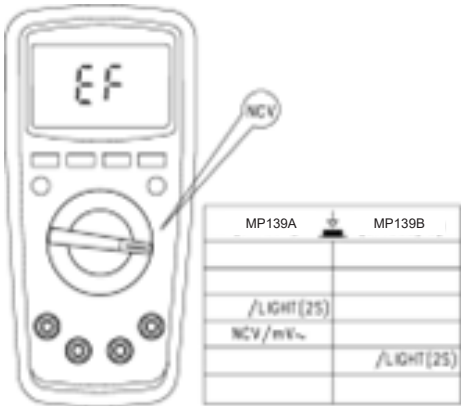
| MP139A | MP139B |
|---|---|
| RANGE | RANGE |
| MAX MIN | MAX MIN |
| REL Δ/LIGHT(2S) | REL Δ |
| | Hz % |
| HOLD | HOLD/LIGHT(2S) |
| SELECT | SELECT |




- When measuring current higher than 5A, the duration of measurement should be less than 10s with an interval of 15M between measurements.
- When measuring AC current it is permissable to press the HZ/% button to display the AC frequency duty rate.

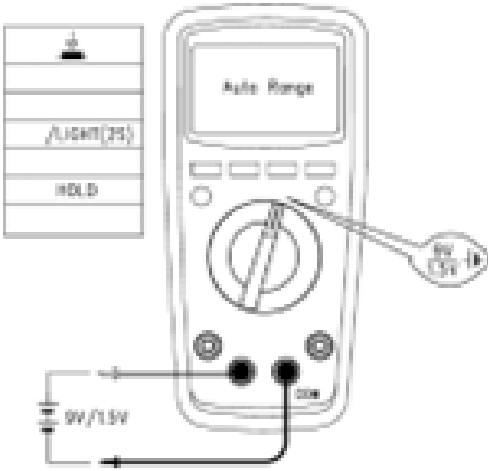
**NCV Non-contact AC voltage sensing**

- If it is required to detect whether there is a AC voltage or electromagnetic field, remove all test leads and place the top edge of the instrument close to the object to be sensed.
- When the analogue element of sensed AC voltage is detected: “EF” is displayed.
- When critical voltage is detected, a five-level beep sound effect is generated according to the voltage detected.
- Also a sequece of “-” is displayed when MP139B detects critical voltage.
- Pressing NCV/mV button to display the analogue quantity of sensed mV to display the difference of AC voltage (only applicable for MP139A).




**Internal battery voltage measurement** (only applicable for MP139A)

- The range setting 1.5V is only applicable for the measurement of battery <2V, with load resistance of about 51Ω.
- The range setting 9V is only applicable for the measurement of battery <15V, with
- load resistance of about 1kΩ.
- To prevent built-in fuse F1 inside the instrument from burning out due to over-load, it is not recommended to measure the battery or power supply beyond the rated range.
- The measuring time for battery voltage should be as short as possible since there will be built-in analogue load power consumption which may shorten the service life of battery.



## OTHER MODES

- The instrument will auto power-off to save energy in case of no operation of the buttons or rotary switch within 15min.
- During auto power-off status, pressing SELECT button of MP139A or any button of MP139B will power back on the instrument, or restart the instrument by turning the rotary switch to OFF and back to the required setting.
- The buzzer make make 5 continuous beeps about 1min before auto power-off and then make one long beep prior to powering-off.
- Restarting the instrument after power-off will restart the auto power-off after 15 minutes of no usage.
- Under power-off status, press SELECT to cancel the auto power off function and power the meter back on, then the buzzer will make five beep sounds every 15 mins to remind the user that the auto power-off function has been disabled.
- A short beep (about 0.25s) from the buzzer indicates the function button is valid when pressing any button or turning the function button.
- When measuring voltage or current: AC or DC voltage >600V, AC or DC current >190mA (MP139A), >390mA (MP139B) or AC/DC current is >10A, the buzzer will make continuous sound to indicate the over-range has occurred.
- When the internal battery voltage is lower than 2.4V, the low battery symbol “  ” will be displayed, and normal operation is still available but accuracy may be affected, and when the voltage drops below 2.2V normal operation is disabled until the battery has been changed.
- If after initial start up and selecting a measurement mode ”ErrE” is displayed, there may be a fault with the internal EEPROM.

## SPECIFICATIONS

Ambient temperature: 23°C ±5°C (73.4°F ±9°F) Relative humidity: <75%.
To ensure accuracy, operating temperature should be within 18°C - 25°C.
Temperature Coefficient = 0.1°(specified accuracy)/°C (<18°C or>28°C).

**DC Voltage**

| Range | | Resolution | Accuracy |
|---|---|---|---|
| MP139A | MP139B | | |
| 20.00mV | 40.00mV | 10μV | ± (0.5%+2) |
| 200.0mV | 400.0mV | 0.1mV | |
| 2.000V | 4.000V | 1mV | ± (0.7%+3) |
| 20.00V | 40.00V | 10mV | |
| 200.0V | 400.0V | 0.1V | |
| 600V | 600V | 1V | |

10MΩ. (There will be unstable digital display in case of */** range open-circuit; after connecting with the load, it can be controlled < ±1)
Maximum input voltage 600V

**AC Voltage**

| Range | | Resolution | Accuracy | |
|---|---|---|---|---|
| MP139A | MP139B | | MP139A | MP139B |
| 20.00mV | 40.00mV | 10μV | ± (1.0%+3) | ± (1.0%+3) |
| 200.0mV | 400.0mV | 0.1mV | | |
| 2.000V | 4.000V | 1mV | | ± (0.8%+3) |
| 20.00V | 40.00V | 10mV | | |
| 200.0V | 400.0V | 0.1V | | |
| 600V | 600V | 1V | ± (1.2%+3) | ± (1.0%+3) |
| VFC 200 - 600V | | 0.1/1V | ± (4.0%+3) | |

Input impedance: about 10MΩ. Display the true RMS.
Frequency response: MP139A 45~400Hz, MP139B 45~1kHz. (VFC: 45-400Hz)
Assurance of accuracy: 5~100% range, an allowance of <10 words of residual reading for short-circuit.
It will be up to 3.0 when AC crest factor reaches full value (with except for 600V range, which is up to 1.5 when the range reaches the full value).
Maximum input voltage: 600Vrms

**Resistance**

| Range | | Resolution | Accuracy | |
|---|---|---|---|---|
| MP139A | MP139B | | MP139A | MP139B |
| 200.00Ω | 400.00Ω | 0.1Ω | ± (1.0%+2) | ± (1.0%+2) |
| 2.000kΩ | 4.000kΩ | 1Ω | | ± (0.8%+2) |
| 20.00kΩ | 40.00kΩ | 10Ω | | |
| 200.0kΩ | 400.0kΩ | 100Ω | | |
| 2.000MΩ | 4.000MΩ | 1kΩ | | ± (1.2%+3) |
| 20.00MΩ | 40.00MΩ | 10kΩ | ± (1.2%+3) | ± (1.5%+3) |

Range: measured value = displayed value - short circuit value of test pen.
Overload protection: 600V-PTC

**Continuty - Diode**

| Range | Resolution | Remark |
|---|---|---|
|  | 0.10 | Circuit breakage resistance is set as: >150Ω, buzzer is soundless.<br>Good conductivity is set as: <10Ω buzzer sounds. |
|  | 1mV | Open circuit voltage is about 2.1V (MP139A), 3.2V (MP139B)<br>Normal voltage value of silicon PN junction is about 0.5~0.8V |

Overload protection: 600V-PTC

**Capacitance (MP139B only)**

| Range | Resolution | Accuracy |
|---|---|---|
| 9.999nF | 1pF | Under REL status: ±(4%+10). |
| 99.99nF~999.9μF | 10pF~0.1μF | ±(4%+5) |
| 9.999mF~99.99mF | 1μF~10μF | ±10%(<2mF) |

Overload protection: 600V-PTC
For capacitor <1μF, it is recommended to adopt REL measurement mode to ensure measurement accuracy.
Accuracy guarantee range: <99.99nF, 10%-90% of the range.Undefined, 5%-100% of the range.

**Frequency/duty ratio measurement (MP139B only)**

| Range | Resolution | Accuracy |
|---|---|---|
| 9.999Hz~9.999MHz | 0.001 Hz~0.001 MHz | ±(0.1%+4) |
| 1%~99.9% | 0.1% | Not Defined |

Overload protection: 600V-PTC
Input range a: (DC level is zero)
<100kHz:100mVrm<a<20Vrms
>100kHz~1MHz : 200mVrm<a<20Vrms
>1MHz : 500mVrm<a<20Vrms
5MHz~10MHz: 900mVrm<a<20Vrms
Duty ratio %: only applicable for measurement <100kHz
During measurement of AC voltage or AC current, if need to read online frequency value or duty ratio, following input should be met: frequency response: <1kHz;
AC voltage: mV range input >100mV; V range input > range x 6%
AC current: input range a
4000/6000μA, 400/600mA, 10A range: a> range x20% 400/600μA, 40/60mA, 4/6A range: a > range x 60%

**DC Current measurement**

| Range | | Accuracy | | Resolution |
|---|---|---|---|---|
| MP139A | MP139B | MP139A | MP139B | |
| 200.0μA | 400.0μA | ± (0.7%+2) | ± (0.7%+2) | 0.1μA |
| 2000μA | 4000μA | | | 1μA |
| 20.00mA | 40.00mA | | | 10μA |
| 200.0mA | 400.0mA | | | 0.1mA |
| 2.000A | 4.000A | | | 1mA |
| 10.00A | 10.00A | ± (1.0%+3) | ± (1.0%+3) | 10mA |

Overload protection: 600V-PTC
F1 fuse: (6x32)mm FF 0.2AH 600V (CE) MP139A FF 0.5AH 600V (CE) MP139B

**DC Current measurement**

| Range | | Accuracy | | Resolution |
|---|---|---|---|---|
| MP139A | MP139B | MP139A | MP139B | |
| 200.0μA | 400.0μA | ± (1.0%+3) | ± (1.0%+3) | 0.1μA |
| 2000μA | 4000μA | | | 1μA |
| 20.00mA | 40.00mA | | | 10μA |
| 200.0mA | 400.0mA | | | 0.1mA |
| 2.000A | 4.000A | | | 1mA |
| 10.00A | 10.00A | ± (1.2%+3) | ± (1.2%+3) | 10mA |

Overload protection: 600V-PTC
Frequency response: MP139A 45~400Hz, MP139B 45~1kHz Display: true RMS.
Assurance of accuracy: 5~100% range, an allowance of <2 words of residual reading for short-circuit. It will be up to 3.0 when AC crest factor reaches full value.

**Battery capacity measurement (MP139A only)**

| Range | Resolution | Load Current | Accuracy |
|---|---|---|---|
| 1.500V | 1mV | *30mA | ±5% |
| 9.00V | 10mV | *10mA | |

Over-load protection: F1 fuse: (6 x 32)mm FF 0.2AH 600V (CE)

## MAINTENANCE

Do not store or leave the instrument where the liquid crystal display will be exposed to direct sunlight for long periods of time.

**Cleaning**
Inspect the instrument and probes regularly. To clean the instrument exterior perform the following steps:
1.Disconnect power before cleaning your instrument.

2.Wipe any dust from the instrument and probe surface with a soft cloth. Do not scratch the transparent LCD protection screen when cleaning the display.

3.Clean the instrument further with a moist soft cloth. Mild detergent may be used on stubborn marks. To avoid damage to the instrument or probe, do not use any corrosive chemical cleaning agent.

Always switch the power off and remove all test leads before opening the rear cover of the instrument to replace the battery.
To replace the batteries unscrew and remove the rear battery cover.
Replace the 2 x AA 1.5V batteries noting the polarity.

To replace the F1 fuses with exactly the same fuse type: (cp 6 x 32)mm
FF 0.2A H 600V (CE) (MP139A)
FF 0.5A H 600V (CE) (MP139B)
To replace the F2 fuse remove the 2 screws and lift off the rear cover and replace with exactly the same fuse type:
(cp 6 x 25)mm FF10AH 600V (CE).

**INFORMATION ON WASTE DISPOSAL FOR CONSUMERS OF ELECTRICAL & ELECTRONIC EQUIPMENT.**

When this product has reached the end of its life it must be treated as Waste Electrical & Electronic Equipment (WEEE). Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Contact your local authority for details of recycling schemes in your area.

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