

# multicomp<sup>PRO</sup>



**TRUE RMS DIGITAL MULTIMETER  
MP171B and MP171C**

## SAFETY INFORMATION

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


- This Meter complies with the standards EN 61010-1, EN 61010-2-033: in pollution degree 2, overvoltage category (CAT II 1000V and CAT IV 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 the display shows the low battery icon, it is required to recharge the battery immediately to ensure the measurement accuracy.
- 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 30V 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
- Check that the rated input on the battery charger is correct for the mains supply in your region.

## WHATS INCLUDED

- Multimeter
- Instructions
- Test Pen
- K-type thermocouple
- USB cable
- Current calipers (MP171C only). Part number MP731027 also sold separately.

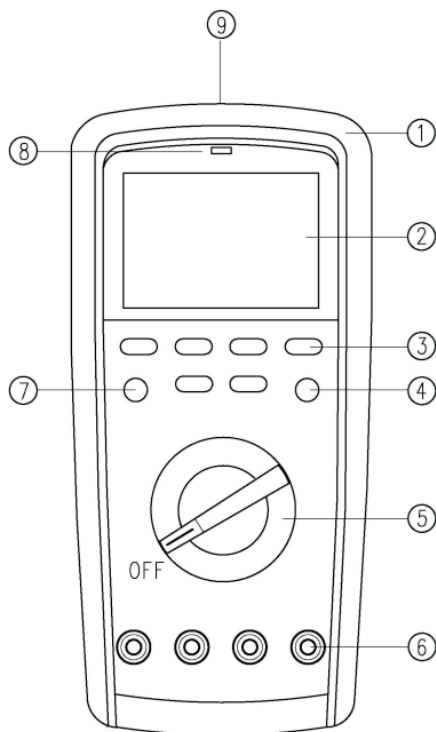
## OVERVIEW

- These DMM are small-size handheld automatic-ranging digital multimeter in  $4^{3/4}$  -  $4^{5/6}$  digit true RMS, which are comprehensive in functions, high in quality and reliability, tough construction, safe and displays using a large screen.
- They are capable of measuring AC/DC voltage/current, resistance, diode, continuity, capacitance, frequency, duty ratio, centigrade/ Fahrenheit, % (4-20mA), conductivity, voltage to frequency converter (V.F.C), NCV non-contact AC voltage sensing, and it is also equipped with such features as 600A AC/DC current calipers (MP171C only), square-wave output, data storage, warning alarm and USB / Bluetooth interfaces.

- Frequency: 60,000 counting
- Duty ratio: 1-99.9%
- Diode: 0-3.0000V
- % (4-20mA): 0-100.0%
- Simulated pointer: 31 pointers 5 others:
  1. Range: automatic/manual
  2. Polarity: automatic
  3. Update 4-5 times per sec (except for some functions). "OL" displayed in overrange.
  4. Operating temperature: 0°C-40°C
  5. Relative humidity: 0°C-30°C,<75%, 30°C-40°C,<50%
- Storage temperature: -10°C-50°C
- Indoor use only.
- Operating altitude: 0-2,000m.
- Battery type: lithium battery 7.4V/2,000mAh rechargeable.
- Low battery: Screen displays the "  " symbol
- Display type: MP171B: VT-WLCD MP171C: OLED.
- Dimensions (mm): approx 206H x 95W x 53D.
- Weight: approx 500g (including battery).

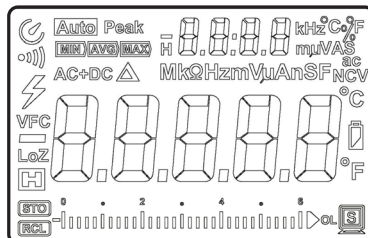
1. Case
2. Display screen
3. Function buttons
4. Select/VFC button
5. Range Selection Rotary Switch\*
6. Measuring input terminals
7. Hold/Backlight button
8. Alarm warning LED
9. USB socket/ NCV Sensor

\*Some functions are model specific





**MP171B Display**



**MP171C Display**

| Symbol     | Indication                                  |
|------------|---|
| RCL        | Data recall                                 |
| STO        | Data storage                                |
| H          | Data Hold                                   |
| LoZ        | AC low impedance                            |
| -          | Negative reading                            |
| VFC        | Measure of voltage to frequency converter   |
| ⚡          | High voltage alarm                          |
| 🔊          | Continuity indicator                        |
| 🔄          | Auto shutdown                               |
| AUTO       | Auto ranging                                |
| Peak       | Peak measurement                            |
| MN/AVG/MAX | Minimum/maximum/average value               |
| AC/DC      | AC or DC measurement                        |
| Δ          | Relative measurement indicator              |
| mV/V       | Volatage unit indicator                     |
| μA/mA/A    | Current value indicator                     |
| Ω/kΩ/MΩ    | Resistance unit indicator                   |
| nF/μF/mF   | Capacitance unit indicator                  |
| Hz/kHz/MHz | Frequency unit indicator                    |
| mS         | Period (time) unit indicator                |
| %          | Duty ratio unit                             |
| AC         | AC indicator                                |
| nS         | Conductivity unit (nano siemens)            |
| NCV        | Non-contact voltage sensing                 |
| °C / °F    | Temperature unit                            |
| 🔋          | Low battery warning                         |
| S          | Interface output                            |
| -00000     | Main value display                          |
| -0000      | Auxilliary value display                    |
| XXXX       | Display of storage number and setting value |
| H.XX:X     | Auxilliary display time value               |
| -          | Simulated pointer graphical display         |

## Range selection rotary control functions

- AC/DC voltage measurement
- AC low impedance voltage measurement
- Resistance measurement
- Conductivity measurement
- Diode PN junction voltage measurement
- Circuit on-off measurement
- Capacitance measurement
- Frequency measurement
- Duty ratio measurement
- For measurement on (4-20mA) current transducer only
- Temperature measurement
- AC/DC measurement
- (AC + DC) measurement
- ACA/DCA current calipers measurement (MP171C only)
- Square-wave output measurement (MP171C only)
- Non-contact AC voltage sensing
- Power OFF and internal lithium battery charge mode

**RANGE button:** click to switch over automatic/manual range. Screen “Auto” prompt disappears. Each press results in one step of range upwards. After reaching the highest step of range, press to jump to the lowest gear of range. The sequence repeats. Press the button for more than 2 seconds or change the rotary selector and it will exit mode of manual range (applicable to V/ $\Omega$ /A only).

**STORE button:** short press to save a piece of data: long press to enter automatic storage setting menu.

In automatic storage setting menu, when auxiliary display shows “SET.1”, (MP171C auxiliary shows “SET:INTERVAL”) it is advised to set interval for automatic storage (1-240) seconds. Short press HOLD button to exit setting.

**SELECT button:** short press to enter next interface and auxiliary display shows “SET.2” (MP171C auxiliary shows “SET:DURATION”), it is recommended to set the duration for automatic storage in minutes.

**HOLD button:** short press to return to SET.1 (MP171C auxiliary show “SET:INTERVAL”) and short press SELECT button to start the function of automatic recording based on parameters set. In automatic recording, short press HOLD/Esc button to exit automatic storage.

**Caution:** in automatic storage, it is necessary to short press HOLD button or turn the rotary selector to any position (NOT OFF) to exit the function of automatic storage. If set to OFF position without exiting the store function all data will be lost.

**RECALL button:** short press the button to enter recall mode and LCD displays “RCL “ (MP171C displays “VIEW”). In recall mode, auxiliary display shows No. for current data. Short press REL or Hz button to rapidly recall one piece of data forward or backward and long press REL or HZ button to rapidly location data required for recall forward or backward. Short press RANGE button and HOLD button to delete current data and exit recall mode respectively. If it is necessary to delete all the data, please select in system setting menu and execute DEL function. (MP171C use “FORMAT” function).

MAX/AVG/MIN/Peak Hold button. Short press MAX MIN to enter the mode of manual range recording. The function of automatic power off is cancelled. LCD will display "MAX" and auxiliary display will show "MAX"; then click. LCD will display "AVG" and auxiliary display will show AVG;

Press again. LCD will display "MIN" and auxiliary display will display "MIN"; (the sequence is MAX~AVG~MIN); then long press MAX MIN button to exit the data recording mode.

In AC voltage/current functional state, long press Peak hold button to enter the function of peak measurement. LCD will display "Peak". Short press it to switch between P-Max and P-Min modes. Long press the MAX/AVG/MIN/Peak Hold button to exit the function of peak measurement. The response time is about 1mS.

HOLD button: Press HOLD/backlight button. Press the button and the displayed value will be locked and retained. LCD displays "H" prompt. Press once again to return to general measuring mode. Long press the button: turns the display backlight on or off through three levels of brightness.

REL button: Press to automatically enter manual range mode for relative measurement. Take current displayed value as reference value displayed on the auxiliary display. Then, make the difference between measured value and reference value display on the main display. Press again to re-select current original data as reference value. Long press the button to exit REL mode (applicable to V/ $\Omega$ /A/ $^{\circ}$ C/ $^{\circ}$ F only).

Hz/% button: Press to make frequency/duty ratio selection (applicable to: V/A/Hz/% only). Long press the button to enter system setting menu. Main display shows item and auxiliary display shows setting parameters. Setting items include "brt" (BRIGHTNESS) for backlight, "Usb" (USB) for communication on/off, "bEEP" (KEY BEEP) for buzzer switch on/off, "ALO" (ALO TIME) for automatic light off, "APO" (APO TIME) for automatic power supply off, "RTC DATE" for Date setting (MP171C only), "RTC TIME" for time setting. "DEL" (FORMAT MEM) for memory formatting (MP171C only).

Short press the < or > button to select setting option.

In the setting items, alter parameters of settings using RANGE button or MAXMIN button. In the setting for format memory, if parameter displayed on the auxiliary display is "YES", memory formatting will be executed by short pressing SELECT button and all the data saved will be cleared.

Caution: after setting parameters are altered, or to exit without making any changes it is necessary to short press HOLD button or turn the rotary control to any position (NOT OFF) to exit the function of setting menu. If set to OFF position without exiting the settings data will be lost.

SELECT/ V.F.C button: press to select function (applicable to complex function only).

V.F.C in AC voltage mode, long press the button for 2 seconds or more and LCD will display "V.F.C". The meter will enter the V.F.C measurement mode for stable measurement on voltage to frequency conversion. Long press the button for 2 seconds or more again to exit the mode of V.F.C measurement.

SELECT in mV mode, long press the button to enter or exit the function of temperature measurement,

SELECT in mA mode, long press the button to enter or exit % (4-20mA)

SELECT in uA mode, long press the button to enter or exit square-wave function (MP171C only);

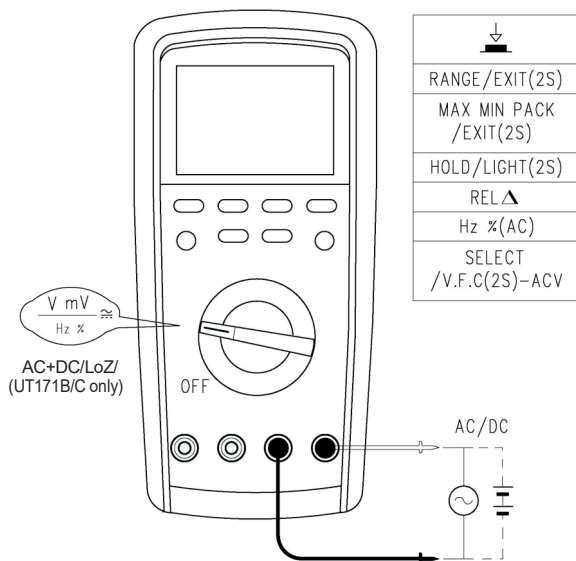
## OPERATION

### Measuring AC/DC voltage

- AC measuring displayed value is true virtual value. During in-circuit measurement, press Hz/% button to select the mode of measurement on frequency/duty ratio for auxiliary displayer.
- In the DC voltage function mode, press SELECT button to select mode of AC+DC measurement; press HZ/% button and auxiliary display will display AC/DC/Hz values orderly and "(AC+DC)" value will be displayed on main display.
- In low resistance LoZ: in AC mode, auxiliary display displays Hz or duty ratio (press Hz% button to switch)

### Caution:

- When the input impedance of the instrument is about 10M $\Omega$ , the load may cause measurement error in the circuit with high impedance. In most cases, the error can be ignored (0.1% or lower) if the circuit impedance is under 10k.
- DO NOT input voltage higher than 1000Vrms, despite of the possibility of measuring higher voltage, as it may damage the instrument.



## Measuring of resistance/conductivity

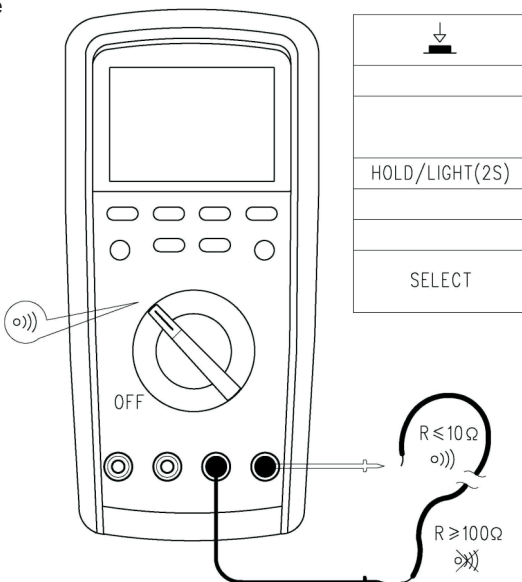
- When measuring ultra-high resistance higher than  $40\text{M}\Omega$ , it is advised to use nS range to measure its conductivity  $G: G=1/R(0)$ . The unit is Siemens (S)= $10^9/R(0)$ . The unit is (nS).
- By virtue of function of resistance measuring, it is allowed to make self-check on built-in fuse.
- Open-circuit voltage is about 1V.

### Caution:

- If the resistance under test is in open circuit or resistance is beyond maximum range of instrument, it shall display "OL" on screen.
- Prior to measuring online resistance, it is necessary to switch off all power in the circuits to be measured, and release all residual charges in capacitors to ensure the measurement accuracy.
- In measuring low resistance, a measurement error in resistance of about  $0.1\Omega \sim 0.2\Omega$  will be resulted by the test probes. In order to acquire accurate reading, it is required to short circuit the test probe, and adopt REL measurement mode to ensure precision.
- If the test probe resistance is higher than  $0.5\Omega$  in short circuit, check whether the probe is loose or damaged.
- 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 possible to make self-checking of the built-in fuse.
- DO NOT input higher than DC 30V or AC 30V.

## Continuity measurement

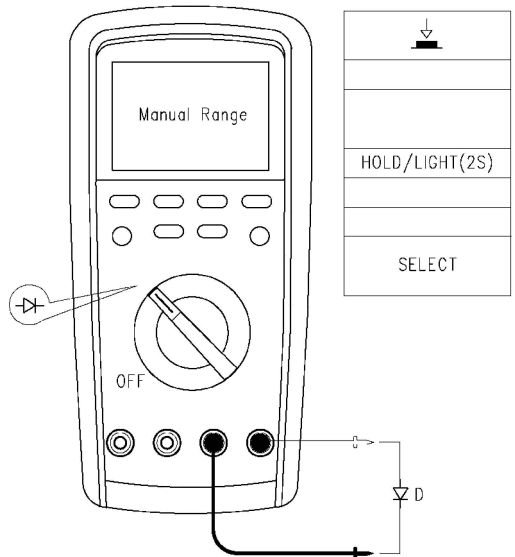
- If the resistance between two points to be measured is higher than  $100\Omega$ , there will be a circuit break and buzzer will make no sound; if the resistance is  $<10\Omega$ , the circuit is deemed to have good conductivity and the buzzer will continuously sound.
- Prior to measuring in-circuit continuity it is necessary to switch off all power supply to the circuit to be measured and release all residual capacitor charges to ensure the measurement accuracy.
- DO NOT input higher than DC 30V or AC 30V.





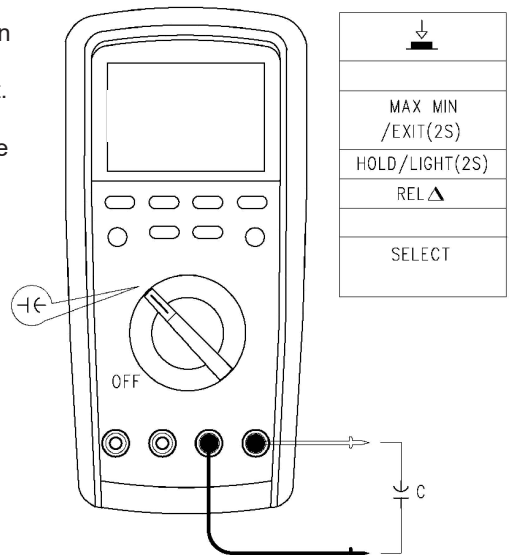
## Diode measurement

- “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 in-circuit diodes, it is necessary to switch off all power supply to the circuit to be measured and release all residual capacitor charge the measurement accuracy.
- Test voltage for diodes is about 2.1V.
- DO NOT input higher than DC 30V or AC 30V.



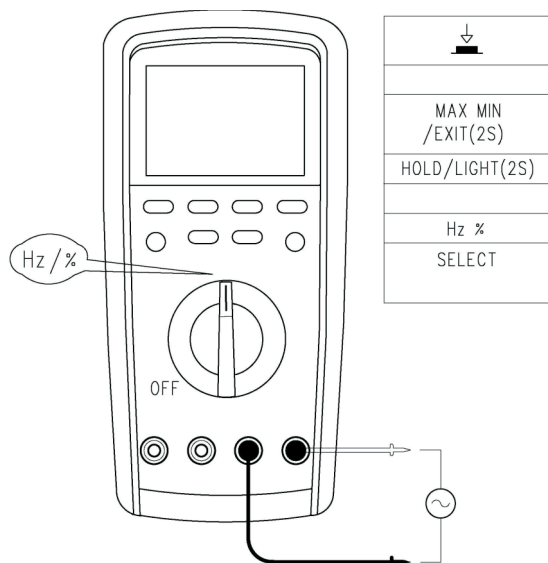
## Capacitance measurement

- The instrument without any input, will display a fixed reading which is the internal fixed capacitance value.
- When measuring small value capacitance, this figure should be subtracted from the measured value to ensure accuracy.
- The relative measurement REL function can be used to automatically subtract the value to facilitate the measurement.
- 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.
- If any residual voltage is present the display will show “DISCHARGE”.
- The display will show “OL” when the capacitor becomes short-circuited or the capacitance value exceeds the maximum range of the instrument.
- Several seconds will be taken to measure high-capacity capacitors.



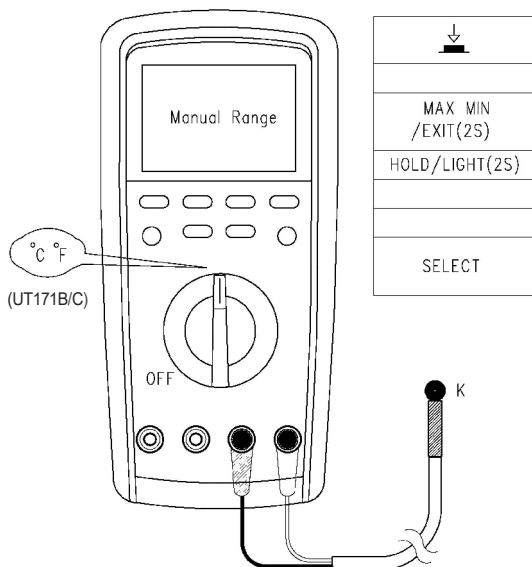
## Frequency/Duty Ratio Measurement

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




## Temperature Measurement

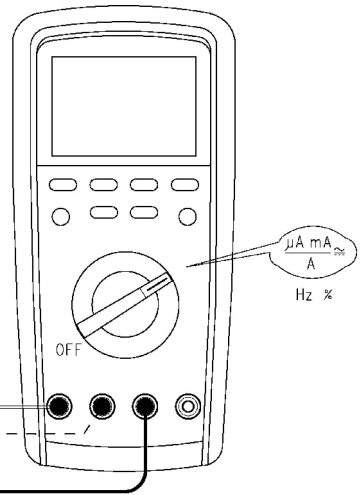
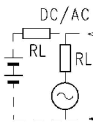
- Long press SELECT in mV mode to enter or exit the temperature measurement function.
- Initial display shows “OL”, until the K-type temperature sensor has been plugged in to the meter.
- Short press SELECT while in the temperature measurement function, to switch the display between °C (Celsius) and °F (Fahrenheit).
- Temperature sensor: use only the K-type (nickel-chromium-nickel silicon) thermocouple included.



## AC and DC current measurement

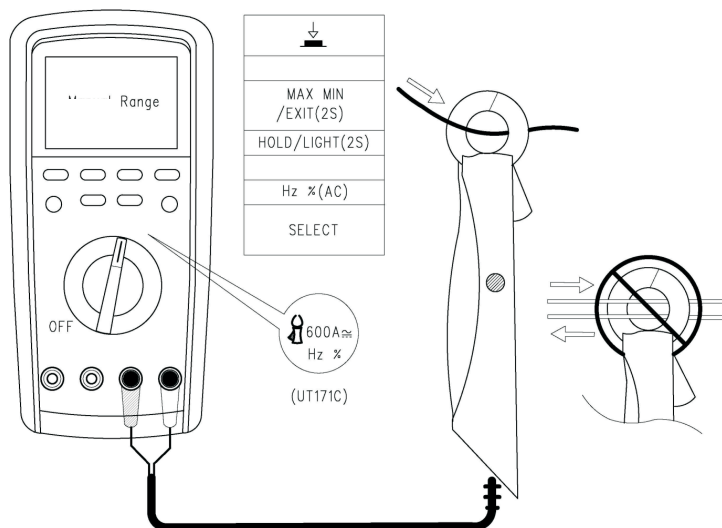
- Connect the instrument with the load in serial for measurement. AC measurement value will be true RMS.
- Before connecting the instrument in serial with the circuit to be measured, switch off the power.
- It is required to use correct input terminal and function setting. If unable to estimate the current, start with the range set to the highest setting.
- When measuring AC, click Hz/% button to select the auxiliary display frequency/duty ratio measuring mode.
- Press SELECT to select the AC + DC measuring mode: "AC+DC" value will be displayed on main display. When clicking the Hz/% button, the status on the auxiliary display is AC component / DC component / frequency in sequence.
- Long press SELECT in mA function range, to access % (4-20mA) measuring function, and the percentile calibration of measured current will be displayed: 4mA for 0%; 20 mA for 100%
- 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.**
- When measuring current higher than 5A, the duration of measurement should be less than 10seconds with an interval of 15minutes between measurements.
- When measuring AC current it is permissible to press the HZ/% button to display the AC frequency duty rate.

|   |
|---|
|  |
| RANGE/EXIT(2S)  |
| MAX MIN PACK<br>/EXIT(2S)   |
| HOLD/LIGHT(2S)  |
| REL $\Delta$  |
| Hz % (AC)   |
| SELECT  |



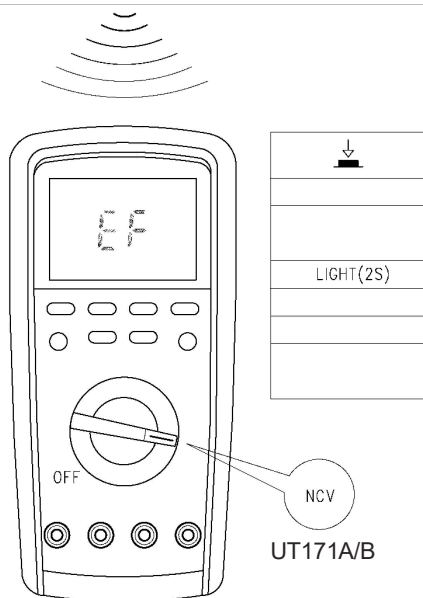
## 60A/600A AC/DC External current calipers measurement (MP171C only)

- Press RANGE button to change to the 60A/600A measurement,
- Press SELECT button to select mode of the AC A/DC A function.



## NCV Non-contact AC voltage sensing

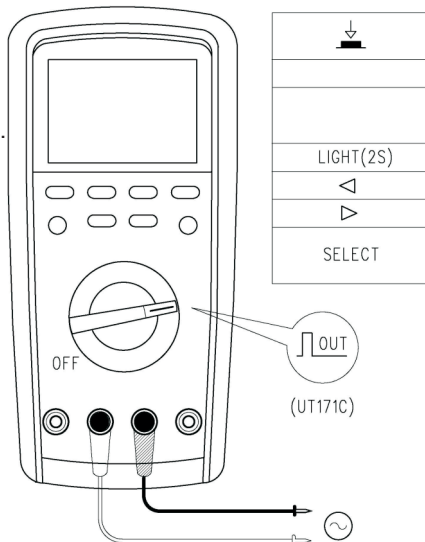
- If it is required to detect whether there is a AC voltage or electromagnetic field, remove all test leads and place the top edge of the instrument close to the object to be sensed.
- When the analogue element of sensed AC voltage is detected: "EF" is displayed,
- When the meter detects critical voltage, a five-level sound effect (beeping sound) is generated according to the voltage electromagnetic field detected and a sequence of "-" is displayed plus a five level beeping sound is generated according to the voltage detected.
- The red LED will also illuminate at the top of the meter.
- If the distance from the sensed voltage is within 12mm-50mm, the acoustic prompt will sound (unless optionally turned off); if greater than 50mm, the sensing will not sound the bleeper.



## Square-wave output

Long press SELECT to enter or exit the square-wave output interface.

- Square-wave frequency output can be selected with RANGE and MAXMIN button.
- Square-wave duty ratio % can be selected with (REL) (Hz%) button.
- Square-wave output amplitude is about 0.8Vp.
- Square-wave output cycle/duty ratio is 1% - 100%.



## OTHER MODES

- The instrument will auto power-off to save energy in case of no operation of the buttons or rotary switch within 5-30min (selectable from the Setup menu option).
- About 1min prior to auto power-off the sounder will make three beeps and APO will be displayed and then make three beeps at 40, 20 and 10 seconds and one beep when finally powering off.
- Pressing any button will cancel the power off function.
- During powered-off status, pressing any button or turning the rotary selector and the meter will power back on, or restart the instrument by turning the knob switch to OFF and back to the required setting. This will restart the auto power-off timer,
- A short beep (about 0.25s) from the sounder indicates the function button is valid when pressing any button for the mode setting on the rotary control.
- If the button function is invalid, two short beeps will be heard.
- If the test probes are inserted into the wrong jacks for the mode set the buzzer will sound continuously.
- When the internal lithium battery voltage is lower than 7.3V, the low battery symbol "🔋" will be displayed, and normal operation is still available but accuracy may be affected.
- When the voltage drops too low, normal operation is disabled until the battery has been charged.

## 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 - 28°C.

Temperature Coefficient = 0.1°(specified accuracy)/°C (<18°C or >28°C).

If the change of ambient temperature is greater than ± 5°C, the accuracy is valid after 2hrs.

Upon the completion of battery charging, the accuracy is also valid after 2hrs.

### Measuring DC Voltage

| *Range  |         | Resolution | Accuracy ±(a% of reading+ b counts) |                   |            |            |
|---------|---------|------------|-------------------------------------|-------------------|------------|------------|
| MP171B  | MP171C  |            | DC                                  | Frequent response | 45Hz-1kHz  | >1kz-20kHz |
| 400.0mV | 600.0mV | 10μV       | ±(0.025%+5)                         | *AC+DC            | ±(1.2%+40) | ±(6.0%+40) |
| 4.000V  | 6.000V  | 100μV      |                                     |                   |            |            |
| 40.00V  | 60.00V  | 1mV        |                                     |                   |            |            |
| 400.0V  | 600.0V  | 10mV       | ±(0.03%+5)                          | Undefined         |            |            |
| 1000V   | 1000V   | 100mV      |                                     |                   |            |            |

\*Range >1GΩ, input impedance for other ranges is 10MΩ.

(Unstable digits displayed in open circuit, digits <±5 shall stabilize after connecting up to load).

\*AD+DC the specifications are defined for signal input >10% of range

### Measuring AC Voltage

| *Range           |         | Resolution | Accuracy ±(a% of reading+ b counts)     |             |              |               |
|------------------|---------|------------|---|-------------|--------------|---------------|
| MP171B           | MP171C  |            | 45Hz-1kHz                               | >1kz-10kHz  | > 10kz-20kHz | > 20kz-100kHz |
| 400.0mV          | 600.0mV | 10μV       | ±(0.4%+40)                              | ±(0.025%+5) | ±(5.5%+40)   | ±(8.0%+40)    |
| 4.000V           | 6.000V  | 100μV      |   | ±(5.0%+40)  | ±(3.0%+40)   | ±(8.0%+40)    |
| 40.00V           | 60.00V  | 1mV        |   | ±(1.2%+40)  | ±(3.0%+40)   | ±(6.0%+40)    |
| 400.0V           | 600.0V  | 10mV       |   | ±(3.0%+40)  | Undefined    |               |
| 1000V            | 1000V   | 100mV      | ±(0.6%+40)                              | ±(3.5%+40)  |              |               |
| LoZ /1000-V      |         | 0.1V       | ±(2%+40)                                |             |              |               |
| V.F.C 600V/1000V |         | 0.01V/0.1V | ±(4%+10) Frequency Response: 45 - 400Hz |             |              |               |

Input impedance: about 10MΩ. Display the true RMS.

\*Range of accuracy guarantee: 10-100% of range (the 1000V range is 20-100%); it is allowed to have residual readings < 50 digits in short circuit.

AC wave peak factor: can reach 3.0 in full-range value (excluding 750V range which is 1.5 in full-range value)

Non-sinusoidal waveform: the accuracy shall be increased by 3.0% if the wave peak factor is within 1.0-2.0

The accuracy shall be increased by 5.0% if the wave peak factor is within 2.0-2.5

The accuracy shall be increased by 7.0% if the wave peak factor is within 2.5-3.0

## Measuring DC Current

| Range          | Resolution   | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |                    |                 |                 |
|----------------|--------------|---|--------------------|-----------------|-----------------|
|                |              | DC  | Frequency Response | 45Hz-1kHz       | > 1kHz-10kHz    |
| 600.00 $\mu$ A | 0.01 $\mu$ A | $\pm(0.25\%+20)$  | AC+DC              |                 |                 |
| 6000.0 $\mu$ A | 0.1 $\mu$ A  | $\pm(0.25\%+2)$   |                    | $\pm(1.5\%+20)$ | $\pm(2.0\%+40)$ |
| 60.000mA       | 1 $\mu$ A    | $\pm(0.15\%+10)$  |                    | $\pm(1.5\%+20)$ | $\pm(2.0\%+40)$ |
| 600.00mA       | 10 $\mu$ A   | $\pm(0.15\%+10)$  |                    | $\pm(1.5\%+20)$ | $\pm(3.0\%+40)$ |
| 6.0000A        | 100 $\mu$ A  | $\pm(0.5\%+10)$   |                    | $\pm(2.0\%+20)$ | $\pm(6.0\%+40)$ |
| 10.000A        | 1mA          | $\pm(0.5\%+2)$  |                    | $\pm(1.5\%+10)$ | $\pm(5.0\%+10)$ |
| %(4-20mA)      | 0.01%        | $\pm(0.5\%+2)$  |                    |                 |                 |

AD+DC the specifications are defined for signal input >10% of range

## Measuring AC Current

| Range          | Resolution   | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |                 |                 |
|----------------|--------------|---|-----------------|-----------------|
|                |              | 45Hz-1kHz   | >1kz-20kHz      | >20kz-100kHz    |
| 600.00 $\mu$ A | 0.01 $\mu$ A | $\pm(0.75\%+20)$  | $\pm(1.2\%+40)$ | $\pm(6.0\%+40)$ |
| 6000.0 $\mu$ A | 0.1 $\mu$ A  | $\pm(0.75\%+20)$  | $\pm(1.2\%+40)$ | $\pm(3.0\%+40)$ |
| 60.000mA       | 1 $\mu$ A    | $\pm(0.75\%+20)$  | $\pm(1.2\%+40)$ | $\pm(9.0\%+40)$ |
| 600.00mA       | 10 $\mu$ A   | $\pm(0.75\%+20)$  | $\pm(1.5\%+10)$ | $\pm(4.0\%+40)$ |
| 6.0000A        | 100 $\mu$ A  | $\pm(1.5\%+20)$   | $\pm(6.0\%+40)$ | Undefined       |
| 10.000A        | 1mA          | $\pm(1.5\%+5)$  | $\pm(5.0\%+10)$ |                 |

Display: true virtual value; range of accuracy guarantee: 10-100% of range; it is allowed to have residual readings < 50 digits in short circuit.

AC wave peak factor: can reach 3.0 in full-range value

Non-sinusoidal waveform: the accuracy shall be increased by 3.0% if the wave peak factor is within 1.0-2.0

The accuracy shall be increased by 5.0% if the wave peak factor is within 2.0-2.5

The accuracy shall be increased by 7.0% if the wave peak factor is within 2.5-3.0

## Measuring Resistance/ conductance MP1718C only

| Range            | Resolution     | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |
|------------------|----------------|---|
| 600.000 $\Omega$ | 0.010 $\Omega$ | $\pm(0.05\%+10)$  |
| 6.0000k $\Omega$ | 0.10 $\Omega$  | $\pm(0.05\%+2)$   |
| 60.000k $\Omega$ | 10 $\Omega$    | $\pm(0.05\%+2)$   |
| 600.00k $\Omega$ | 100 $\Omega$   | $\pm(0.05\%+2)$   |
| 6.0000M $\Omega$ | 1000 $\Omega$  | $\pm(0.15\%+5)$   |
| 60.000M $\Omega$ | 1k $\Omega$    | $\pm(3\%+2)$  |
| 60.00nS          | 0.01nS         | $\pm(1\%+10)$   |

## Measuring Capacitance

| Range                 | Resolution           | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |
|-----------------------|----------------------|---|
| 6.000nF               | 1pF                  | $\pm(3.0\%+30)$   |
| 60.00nF~600.0 $\mu$ F | 10pF~100nF           | $\pm(2.5\%+5)$  |
| 6.000mF~60.00mF       | 1 $\mu$ F~10 $\mu$ F | $\pm 10\%$  |

## Measuring Frequency/dutyratio/cycle

| Range                 | Resolution          | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |
|-----------------------|---------------------|---|
| 60.000Hz~10.000MHz    | 0.001Hz~0.001MHz    | $\pm(0.01\%+5)$   |
| 1.0%~99.0%            | 0.1%                | $\pm(3.0\%+40)$   |
| 100.0mS~0.100 $\mu$ S | 0.1mS~0.001 $\mu$ S | $\pm(0.1\%+5)$  |

Input range a: 100kHz: 500mVrms <a> 30Vrms

> 100kHz-1MHz: 600mVrms <a> 30Vrms

>1 MHz: 1Vrms <a> 30Vrms

Duty ratio% is applicable to measuring >100kHz only

During AC voltage or AC current measuring, when frequency or duty ratio is required to be read online, the following requirements must be met:

a. Frequency response: >100 kHz

b. AC voltage: input range for 400.00mV or 600mV >range x10%

input range for 4.0000V/ 40.000V/ 400.00V >range x10%

input range for 6.0000V/ 60.000V/ 600.00V >range x10%

input range for 1000.0V >range x 30%

c. AC current: input range for 4000.0 $\mu$ A / 400.00mA >range x10%

input range for 400.00 $\mu$ A / 40.000mA / 4.0000A >range x10%

input range for 6000.0 $\mu$ A / 600.00mA >range x10%

input range for 600.00 $\mu$ A / 60.000mA / 6.0000A >range x10%

input range for 10.000A >range x 30%

## Measuring with current caliper MP171C only

| Range      | Resolution   | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |
|------------|--------------|---|
| 60A/600ADC | 0.001A/0.01A | $\pm(1.0\%+30)$   |
| 60A/600AAC | 0.001A/0.01A | $\pm(1.2\%+30)$   |

When the outer caliper head is used for current measuring, the corresponding relationship between its input range and adaptive conversion ratio is (60A; 10mV/A) or (600A; 1mV/A).

The frequency response range is not defined under AC A mode and it can be determined according to the frequency response of caliper.

These specifications are defined for signal input >10% of range.



### Square wave output MP171C only

| Range       | Resolution                                    | Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$ |
|-------------|---|---|
| Frequency   | 0.5Hz-4800Hz<br>(0.1Hz is the stepping level) | $\pm(0.01\%+5)$   |
| Duty ratio% | 0%-100%<br>(0.1% is the stepping level)       | $\pm(0.5\%)$  |
| Amplitude   | about 0.8Vp                                   | $\pm 0.2Vp$   |

The maximum square-wave output impedance is  $50\Omega$ .

The positive or negative pulse width during adjusting the duty ratio must be more than  $50\mu s$ .

### MAINTENANCE

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

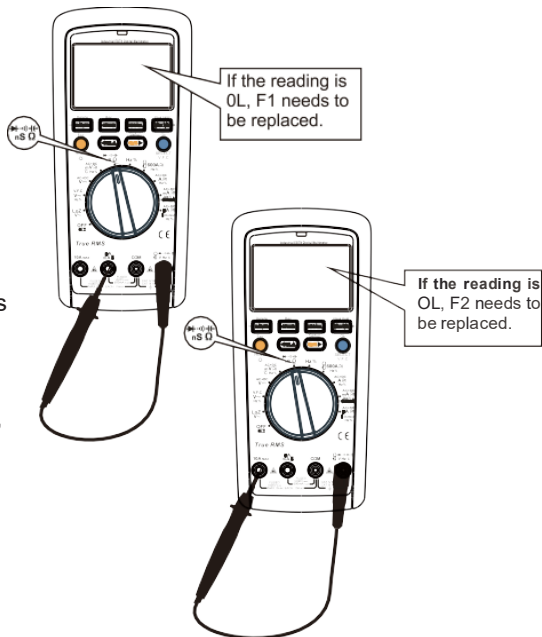
#### Cleaning

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 display 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.

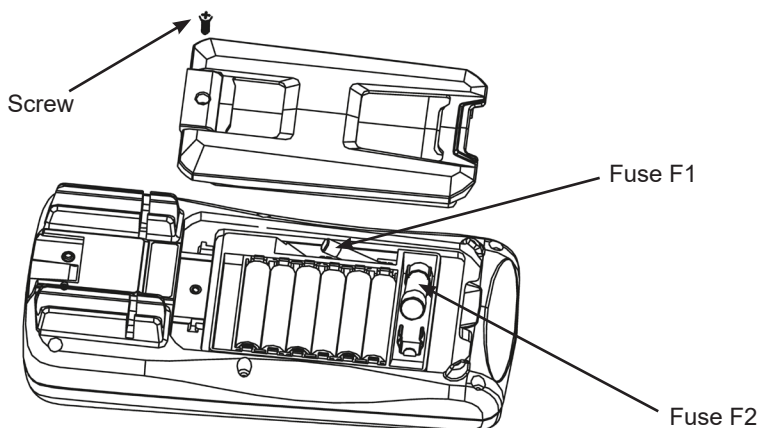
## Testing Fuse

- Set the measurement of the meter for resistance function.
- Insert a test lead into the terminal as shown and contact the probe tip at the other end of test lead with the metal in the terminal of current input.
- If the message "Lead Error!" (connection error for test lead) appears, the probe tip is inserted too deeply in the current input terminal. Withdraw the test lead a little until the error message disappears and 0L (overload) or resistance reading appears on the display.
- If the resistance reading for A terminal is less than 0.500, it shows that the fuse F2 is normal.
- If the reading is 0L, you need to replace F2; If the resistance reading of uAm is less than 1.2M $\Omega$ , shows that the fuse F1 is normal.
- If the reading is 0L, F1 needs to be replaced;



## Charging the battery

- Always select power off/battery recharge on the rotary control and remove all test leads before charging.
- Connect the output lead from the charger to the input socket on the meter,
- Plug the charger in to a mains socket and turn on the power.



## Replacing the fuses

- Always switch the power off and remove all test leads before opening the rear cover of the instrument.
- Remove the screw on the rear support with a screwdriver, and remove the rear cover to reveal the fuses below the lithium battery pack.
- Replace the required fuse for mA or  $\mu$ A input terminal (F1): 0.8AH 1000V 6 x 32mm
- Replace the required fuse for A input terminal (F2): 10AH 1000V 10 x 38 mm
- Replace the rear cover and tighten the screw to lock.



## 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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