VOLTCRAFT

PMM Series

Power supply & Multimeter

- **PMM 3005-20**
- **PMM 6010-60**

Content

1. Safety Information

1.1 Safety Considerations

Before use, please read the following safety precautions to avoid any possible bodily injury and to prevent this product or any other connected products from damage. To avoid any contingent danger, ensure this product is only used within the ranges specified.

Only a qualified person should perform internal maintenance.

To avoid Fire or Personal Injury:

- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Product Grounded.** This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminals.
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markings on this product. Refer to the user manual for more information about ratings before connecting to the instrument.
- **Do not operate without covers**. Do not operate the instrument with covers or panels removed.
- **Use the Proper Fuse.** Use only the specified type and rating fuse for this instrument.
- **Avoid exposed circuit**. Be careful when working on exposed circuitry to avoid risk of electric shock or other injury.
- **Do not operate if any damage.** If you suspect damage to the instrument, have it inspected by qualified service personnel before further use.
- **Use your instrument in a well-ventilated area.** Please keep well ventilated and inspect the intake and fan regularly.
- **Do not operate in damp conditions.** To avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.
- **Do not operate in an explosive atmosphere.** To avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.
- **Keep product surfaces clean and dry.** To avoid the influence of dust or moisture in air, please keep the surface of device clean and dry.
- Do not apply more than the rated voltage (as marked on the multimeter) between terminals, or between terminal and earth ground.
- When measuring current, turn off the circuit power before connecting the

multimeter in the circuit. Remember to place the multimeter in series with the circuit.

- Use caution when working above 60 V DC, 30 V AC RMS, or 42.4 V peak. Such voltages pose a shock hazard.
- When using the test leads, keep your fingers behind the finger guards on the test leads.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- **Use the proper terminals, function, and range for your measurements.** When the range of the value to be measured is unknown, set the rotary switch position as the highest range, or choose the auto ranging mode. To avoid damages to the multimeter, do not exceed the maximum limits of the input values shown in the technical specification tables.
- Connect the common test lead before you connect the live test lead. When you disconnect the leads, disconnect the live test lead first.
- Before changing functions, disconnect the test leads from the circuit under test.

1.2 Measurement Category

The multimeter has a safety rating of 600 V, CAT II.

Measurement category definition

Measurement CAT I applies to measurements performed on circuits not directly connected to the AC mains.Examples are measurements on circuits not derived from the AC mains and specially protected (internal) mains-derived circuits.

Measurement CAT II applies to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portable tools, and other household circuits.

Measurement CAT III applies to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.

Measurement CAT IV applies to measurements performed at the source of the low-voltage installation. Examples are electricity meters and measurements on primary over current protection devices and ripple control units.

1.3 Safety Terms and Symbols

Safety Terms

Terms in this manual (The following terms may appear in this manual):

Warning: Warning indicates conditions or practices that could result in injury or loss of life.

Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the product. The following terms may appear on this product:

Danger: Indicates an immediate hazard or injury possibility.

Warning: Indicates a possible hazard or injury.

Caution: Indicates potential damage to the instrument or other property.

Safety Symbols

Symbols on the product. The following symbols may appear on the product:

	Direct current (DC)		Fuse
	Alternating current (AC)		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Both direct and alternating current	CAT II	Category II overvoltage protection
	Public Ground	CAT III	Category III overvoltage protection
CE	Conforms to European Union directives	CAT IV	Category IV overvoltage protection
	Equipment protected throughout by double insulation or reinforced insulation		Hazardous Voltage
	Protective Earth Terminal		Chassis Ground

2. Quick Review

2.1 Panel and Interface

2.1.1 Front Panel

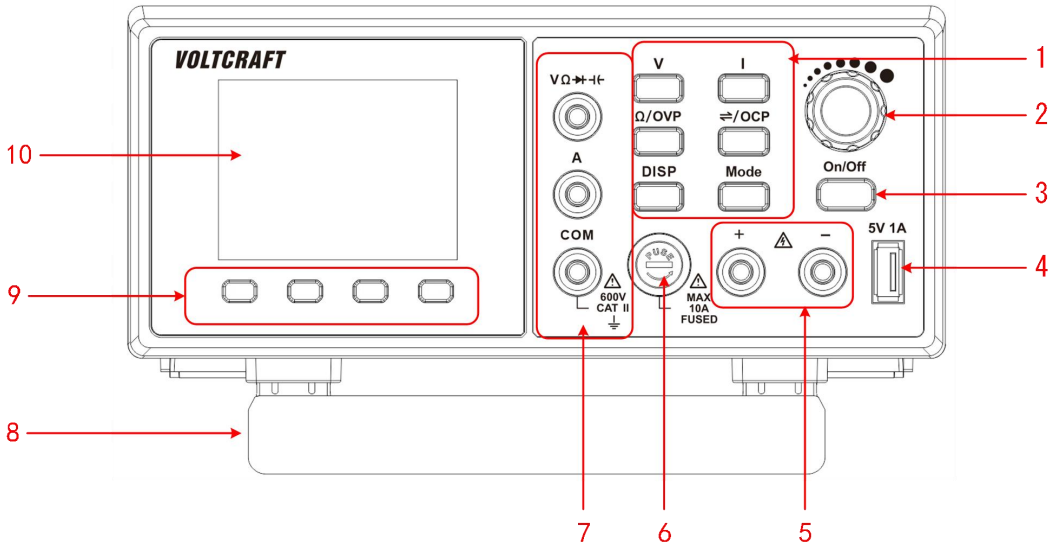


Figure 2- 1 Front Panel Overview

1	**Menu function**	V	**Voltage Key:** Under power supply state: Press movable cursor to set voltage and edit other parameters; Under multimeter state: Press the button to switch between AC/DC voltage state.
		I	**Current Key：** Under power supply state: Press movable cursor to set current and edit other parameters; Under multimeter state: Press the button to switch between AC/DC current state.
		Ω/OVP	**Multimeter measurement switching Key / overvoltage setting Key：** Under multimeter state: Press the button to switch the measuring state of multimeter resistance, on-off, diode and capacitance; Under power supply state: Press movable cursor to set overvoltage protection and edit other parameters.

		⇌/OCP	**Setting button of overcurrenting/switching：** Under power supply state: Press movable cursor to set overcurrent protection and edit other parameters; Under multimeter state: Press the button to enter manual range setting state, and press it again to switch the range of current measurement parameters. (Note: Manual range setting functions not available for capacitors, diodes and current).
		DISP	The interface will show switch button.
		Mode	Under dual display mode, press this button to switch the controlling state of power supply and multimeter.
2	**Knob**	Select main menu or change a specific value. Press the button for confirmation.	
3	**On/Off Key**	Enable/disable channel output setting.	
4	**USB interface**	USB charging port (no reading/writing function).	
5	**Channel output terminal**	Output connections for channels.	
6	**Fuse**	Power fuse.	
7	**Multimeter input**	Input connections for multimeter channels.	
8	**Foot frame**	Tilt the instrument for easy operation.	
9	**F1-F4 Keys**	Setting buttons of sub-menu options.	
10	**Display screen**	Display user interface.	

Button light instruction

On/Off key: The key lights up when the channel turns on.

2.1.2 Rear Panel

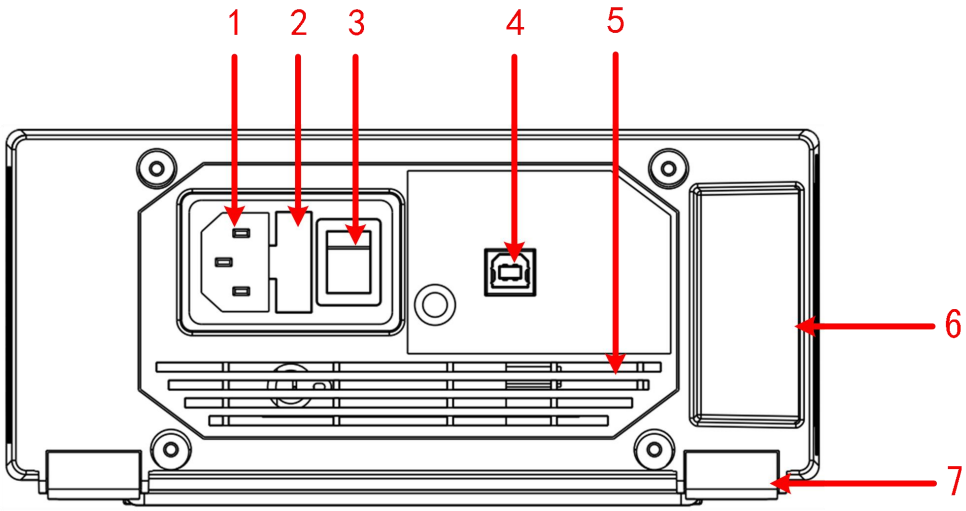
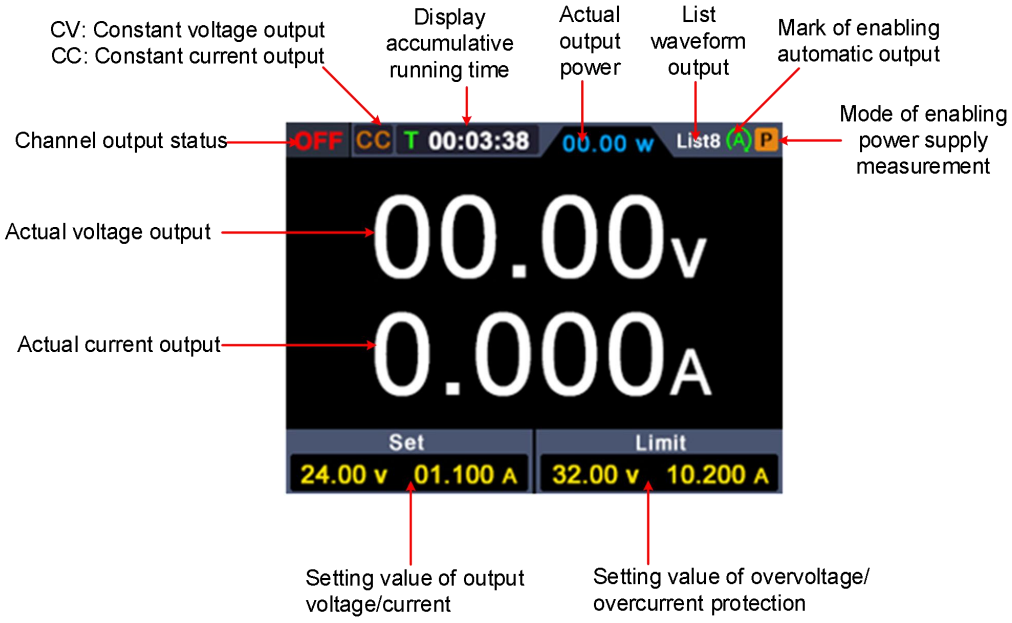


Figure 2- 2 Rear Panel Overview

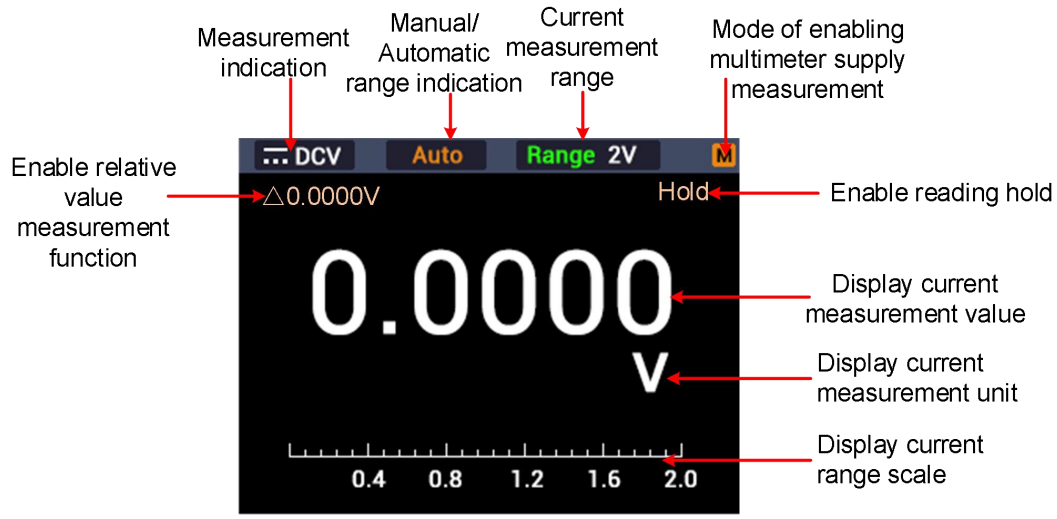
1	**AC Power Input Jack**	AC power input interface.
2	**Fuse**	Power fuse.
3	**Power Button**	Turn on/off the instrument.
4	**USB Device interface**	Update the firmware, PC software control port.
5	**Air Vent**	Air vent.
6	**Handle**	
7	**Foot mat**	Easy to prevent slip when placed.

2.1.3 User Interface

Power supply mode User Interface



Multimeter mode User Interface



Measurement indication:

DCV------ DC voltage measurement
ACV------ AC voltage measurement
DCI------ DC current measurement
ACI------ AC current measurement
Res------ Resistance measurement
Cont------ On-off measurement
Diode------ Diode measurement
Cap------ Capacitance measurement

Figure 2- 3 User Interface

2.2 General Inspection

After you get a new device, it is recommended that you should make a check on the instrument according to the following steps:

1. **Check whether there is any damage caused by transportation.**

   If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. **Check the Accessories**

   The supplied accessories have been already described in the "Appendix A: Enclosure" of this Manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with the distributor of our responsible for this service or our local offices.

3. **Check the Complete Instrument**

   If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance

test, please get in touch with our distributor responsible for this business or our local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or our distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by us.

2.3 Power Inspection

(1) Use the power cord supplied with the accessories to connect the instrument to the AC power.

> **Warning：**
> To prevent electric shock, make sure that the instrument is properly grounded.

(2) Press the **power button** on the back panel and the startup screen will be displayed on the screen.

2.4 Output Inspection

Output inspection is to ensure that the instrument can achieve its rated outputs and properly respond to operation from the front panel. For the procedures below, it is suggested that you read “Turn On/Off the Channel Output”on page 10 and “Set the Output Voltage/Current”on page 10.

2.4.1 Voltage Output Inspection

The following steps verify basic voltage functions without load：

(1) When the instrument is under no load, select a channel and ensure the output current setting for this channel is not at zero.

(2) Turn on the channel output, then ensure the channel is in Constant Voltage output mode.

(3) Set some different voltage values on this channel; check if the actual voltage value displayed is close to the set voltage value, and also that the actual current value displayed is nearly to zero.

(4) Check that if the output voltage can be adjusted from zero to the maximum rating, when it is set to the maximum or minimum, a beep is heard, indicating that the limit has been reached.

2.4.2 Current Output Inspection

The following steps check basic current functions with a short across the power supply's output：

(1) Starting up.

(2) Connect a short across (+) and (-) output terminals with an insulated test lead on this channel. Use a wire size sufficient to handle the maximum current.

(3) Set the output voltage to the maximum rating on this channel.

(4) Turn on the channel output. Ensure the channel you used is in Constant Current output mode.

(5) Set some different current values on this channel; check if the actual current value displayed is close to the set current value, and to check if the actual voltage value displayed is nearly zero.

(6) Check that if the output current can be adjusted from zero to the maximum rating.When it is set to the maximum or minimum, a beep is heard, indicating that the limit has been reached.

(7) Turn off the channel output and remove the short circuit from the output terminals.

3. Panel Operation

3.1 Use of power supply

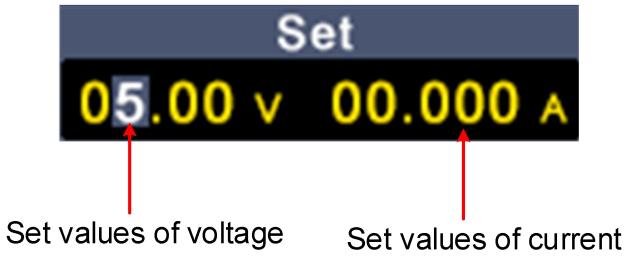
Press **DISP** button on the front panel to switch to power interface.Power supply operation mode will be enabled, when **P** icon appears at the upper right corner of the screen.

3.1.1 Turn On/Off the Channel Output

Press the **On/Off** key to turn on/off the channel.

3.1.2 Set the Output Voltage/Current

In the channel setting area, press the **V** / **I** key to move the gray cursor between different positions of the voltage/current value. After pressing the output voltage/current setting value, turn the **knob** to change the value of the current cursor, and press the **knob** or press the **V** / **I** key to move the cursor.



3.1.3 Over Voltage/Current Protection

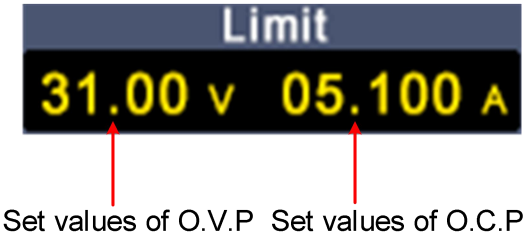
Overvoltage protection (O.V.P) or overcurrent protection (O.C.P): after the output is turned on, once the output voltage/current reaches the set value of O.V.P/O.C.P, the instrument will cut off the output, a warning will show on the screen.

Note:
When the instrument disables the output due to protection, after you make some adjustments, the channel must be restarted to output normally.

This function can keep the power output from exceeding the load rating to

protect the load.

In the channel setting area, press the **Ω/OVP** / **⇋ /OCP** keys to move the gray cursor between parameters. After selecting the overvoltage/overcurrent protection value, turn the **knob** to change the current cursor value, and press the **Ω/OVP** / **⇋ /OCP** direction key to move the cursor position.



3.1.4 Memory key shortcut settings

Press any button of **F1-F4** on the front panel under power supply interface and then press **F1** button to pop up options for storing 4 groups of channel parameters, M1, M2, M3 and M4 respectively, which can be used for shortcut output.

Shortcut Output

Steps for outputting a set of parameters from M1 to M4：

(1) Press any button of **F1-F4** on the front panel, and the power supply sub-menu will be displayed at bottom of the screen.

(2) Press **F1** button and the screen will display shortcut setting interface.

(3) Rotary the **knob** to move the purple selection box.

(4) After selecting a group of parameters, press and hold the **knob** to confirm they have been exported from the current setting.

Edit

To edit the channel parameters of M1 to M4, follow these steps：

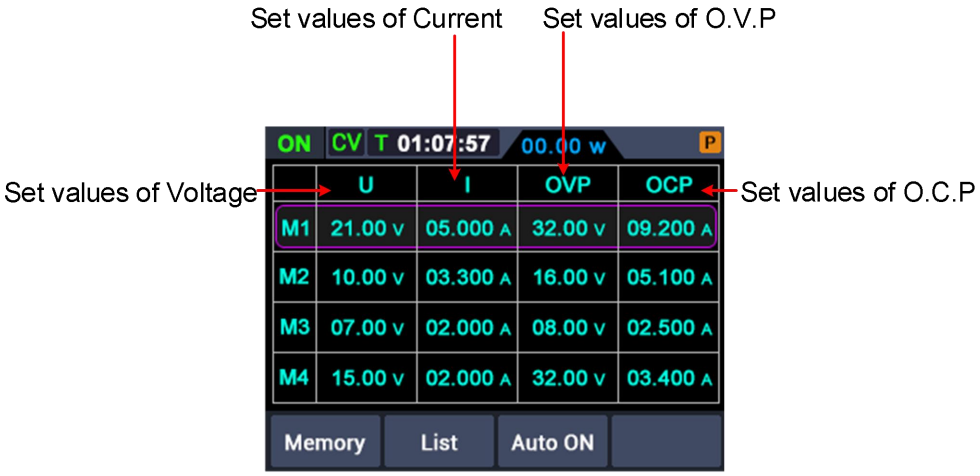
(1) Press any button of **F1-F4** on the front panel, and the power supply sub-menu will be displayed at bottom of the screen.

(2) Press **F1** button and the screen will display shortcut setting interface.

(3) Rotary the **knob** to move the purple selection box.

(4) Press the **V** / **I** / **Ω/OVP** / **⇋ /OCP** key to set the voltage / current / over voltage protection / over current protection value.

(5) Rotary the **knob** to change the value of the current cursor, press the **knob** or press the **V** / **I** / **Ω/OVP** / **⇋ /OCP** key to move the cursor.



3.1.5 Set List Waveform Output

The user can edit and output the waveform. A set of waveforms contains 10 editable points. The four editable parameters of each point include output voltage, output current, waveform duration and whether the point is selected. When the editing is completed, the instrument can output the expected waveform according to the time sequence edited by the user.

List waveform editing

To edit the List output waveform, the steps are as follows：

（**1**） Press any button of **F1-F4** on the front panel and the power supply sub-menu will be displayed at bottom of the screen.

（**2**） Press **F2** button to enter “interface of editing List waveform”.

（**3**） Rotary the **knob** under non-parameter setting state to move the

purple selection box.

（4） Press **V** / **I** / **Ω/OVP** / ⇋ **/OCP** buttons to enter parameter setting state, which is set voltage/ current/ duration/selection state respectively.

（5） Turn the **knob** under the parameter setting state to change the present value of cursor, and press the **knob** or **V** / **I** / **Ω/OVP** / ⇋ **/OCP** buttons to move the cursor position; press the **F2** button to exit parameter setting state.

（6） Press the **knob** for 3s under non-parameter setting state for confirmation. After entering the “List waveform output mode”, List n (n=1~10) will appear at the upper right corner of the screen; switch back to the main interface at the same time.

（7） Press any button of **F1-F4** on the front panel and the power supply sub-menu will be displayed at bottom of the screen; press **F2** button to exit “interface of editing List waveform”.

List waveform output

To perform List waveform output, the steps are as follows:

（1） Edit List waveform according to the steps in “List waveform editing”.

（2） After entering the “List output mode”, the first point of List waveform pre-output will be displayed at the upper right corner, such as “LIST1”.

（3） Press the **On/Off** function button on the front panel for a short time,

and the machine will output according to the List editing time sequence. Meanwhile, the current List output point and the duration countdown of this point will be displayed at the status bar on the upper part of the main interface.

（4） Press any button F1-F4 on the front panel under the List output mode and the power supply sub-menu will be displayed at bottom of the screen. Press F2 button to exit the “List output mode”.

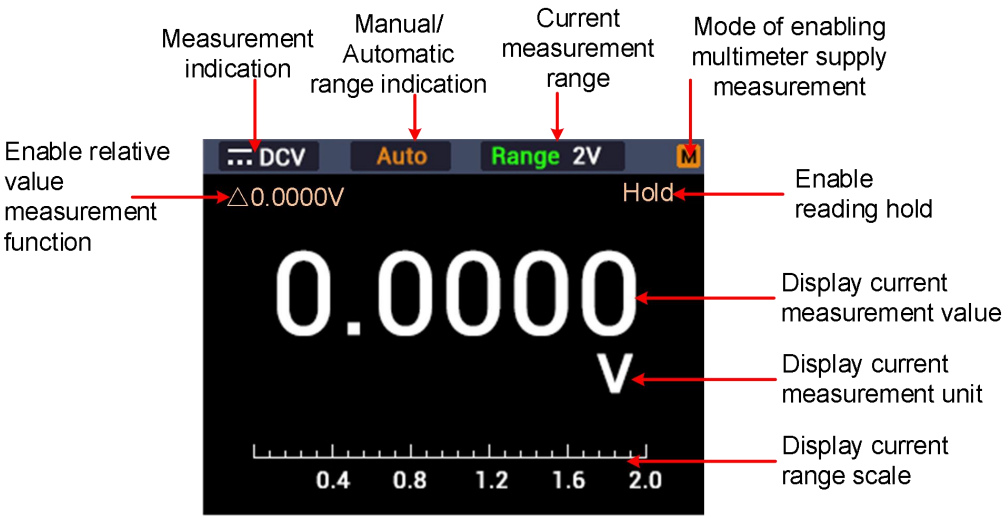
3.1.6 Settings of Auto Output after Startup

1. Press any button of F1-F4 on the front panel, and the power supply sub-menu will be displayed at bottom of the screen.
2. Press F3 button, to enable or disable the function of “Auto Output after Startup”.
   - When the “Automatic Output after Startup” is enabled, the A mark will be displayed at the upper right corner of the screen. After power-on for 3s, the machine will execute the “On/Off” operation automatically, and output according to the current output voltage and output current.
   - When the “Automatic Output after Startup" is disabled, the machine will enter standby state after power-on. In such case, user needs to execute the “On/Off” operation manually before the machine is able to output.

3.2 Use of Multimeter

Press the **DISP** button on the front panel to switch to the multimeter interface. Multimeter operation mode will be entered when the **M** icon is displayed at the upper right corner of the screen.

3.2.1 Multimeter Interface



3.2.2 Multimeter Measurement

Measurement of DC or AC Voltage

Warning: Do not measure any voltage of over 1000 Vdc or 750 Vac rms to avoid instrument damage or electric shock.Do not apply more than 1000 Vdc or 750 Vac rms between the common terminal and the earth ground to avoid instrument damage or

electric shock.

DC voltage valve and its polarity can be displayed on the multimeter interface. A negative DC voltage will be displayed at the left side of display screen in the form of a "-".

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Press **V** button on the front panel to enter the DC voltage measurement mode, and ⎓ **DCV** will be displayed at the upper left corner of the screen. Press **V** button to switch to AC voltage measurement mode, and ~ **ACV** will be displayed on the screen.

(3) Select gear according to the measured range, press any button of **F1-F4** on the front panel and the multimeter sub-menu will be displayed at bottom of the screen. Press **F4** button to select the mV or V gear required for voltage measurement.

(4) Insert the black test pen into **COM** input terminal and the red test pen into VΩ⊣◁⊢ input terminal respectively.

(5) Connect the other ends of the red and black test pens to the tested point respectively and read the displayed value. Press any button of **F1-F4** on the front panel and then press **F1** to enter and switch the manual range under the current gear.

Resistance Measurement

⚠ **Caution:** To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before measuring resistance.

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Press the **Ω/OVP** button on the front panel. Resistance measurement mode will be entered when **ΩRes** is displayed at the upper left corner of the screen.

(3) Insert the black test pen into **COM** input terminal and the red test pen into VΩ⊣◁⊢ input terminal respectively.

(4) Connect the other ends of the red and black test pens to the tested point respectively, and read the displayed value. Press **/OCP** button to enter and switch among manual ranges.

On-off Measurement

Caution: To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before testing for continuity.

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Press **Ω/OVP** button on the front panel. On-off measurement mode will be entered when **Cont** is displayed at the upper left corner of the screen.

(3) Insert the black test pen into **COM** input terminal and the red test pen into VΩ input terminal respectively.

(4) Measure the resistance of the tested circuit via the other ends of the red and black test pens. Buzzer will give out a sound continuously, if the resistance of the circuit under test is less than 50 Ω.

Diode Test

Caution: To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before testing diodes..

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Press **Ω/OVP** button on the front panel. Diode measurement mode will be entered when **Diode** is displayed at the upper left corner of the screen.

(3) Insert the black test pen into **COM** input terminal and the red test pen into VΩ input terminal respectively.

(4) Connect the other end of the red pen to anode of the diode measured and the other end of the black pen to cathode of the diode.

(5) Read the forward bias value of the diode measured. The display screen

will display “OL”, if the polarity of test pen is connected reversely.

Capacitance Measurement

Caution: To avoid possible damage to the multimeter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance. Use the DC voltage function to confirm that the capacitor is fully discharged.

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Press **Ω/OVP** button on the front panel. Capacitance measurement mode will be entered when **Cap** is displayed at the upper left corner of the screen.

(3) Insert the black test pen into **COM** input terminal and the red test pen into **VΩ** input terminal respectively.

(4) Measure the capacitance value via the other ends of the red and black test pens and read the displayed value.

DC or AC Current Measurement

Warning: Never attempt an in-circuit current measurement where the open-circuit potential to earth is greater than 250 V. Doing so will cause damage to the multimeter and possible electric shock or personal injury.

Caution: To avoid possible damage to the multimeter or to the equipment under test, check the multimeter’s fuse before measuring current. Use the proper terminals, function, and range for your measurement. Never place the test leads in parallel with any circuit or component when the leads are plugged into the current terminals.

(1) Press the **DISP** button on the front panel to switch to the multimeter interface, and the **M** icon will be displayed at the upper right corner of the screen.

(2) Disable the power supply of the circuit measured and discharge all high-voltage capacitors on the circuit measured.

(3) Insert the black test pen into **COM** input terminal and the red test pen into **A** input terminal respectively.

(4) Press **I** button on the front panel to enter DC voltage measurement mode.

(5) Select gear according to the measured range, press any button of **F1-F4** on the front panel, and the multimeter sub-menu will be displayed at bottom of the screen. Press **F4** button and select the mA or A gear required for current measurement.

(6) Disconnect the circuit to be tested. Connect a black pen to one end of the circuit disconnected (with a lower voltage) and a red pen to the other end of the circuit (with a higher voltage). If connection is made reversely, the reading will be negative, but the multimeter will not be damaged.

(7) Select DC or AC measurement mode (DC measurement mode by default). When ⎓ **DCI** is displayed at the upper left corner of the screen, press the **I** button to switch to AC voltage measurement mode, and ∼ **ACI** will be displayed on the screen.

(8) Connect power supply of the circuit and read the displayed value. Press any button of **F1-F4** on the front panel, and then press **F1** to enter and switch the manual range under the current gear. If “OL” appears on the display screen, it means the input has exceeded the selected range.

(9) Disable the power supply of the circuit measured, discharge all high-voltage capacitors, remove the test pen and restore the circuit to its original state.

Range Selection

(1) Auto Range is preset during start-up. Auto will be displayed at the top of the screen under auto range.

(2) Press any button of **F1-F4** on the front panel and the multimeter sub-menu will be displayed at bottom of the screen.

(3) Press **F1** under auto range to enter manual range mode.

(4) Press the ⇋ /**OCP** button once under manual range to switch to next higher range. Upon reaching the highest range, it will be switched to the lowest one and cycle in turn.

(5) Press **F1** button under manual range to enter automatic range mode.

Note: No manual range mode is available for capacitance measurements.

Reading Hold Mode

Under Reading Hold Mode, current reading can remain on the display screen.

(1) Press any button of **F1-F4** on the front panel, and the multimeter sub-menu will be displayed at bottom of the screen.

(2) Press **F2** button, and the current reading will be held and the display screen will show Hold.

(3) Then press **F2** button again to exit this mode.

Relative Measurement

Reading under relative measurement is the difference between the stored reference value and the input signal.

(1) Press any button of **F1-F4** on the front panel, and the multimeter sub-menu will be displayed at bottom of the screen.

(2) Press **F3** button to enter the relative value measurement mode, △ (current reading) will be displayed on the display screen. The measured value when pressing the button will be stored as the reference value. In this mode, △ (current reading)= input value – reference value.

(3) Press **F3** again or press the **V** / **I** / **Ω/OVP** / ⇋ /**OCP** button to exit this mode.Enter manual range automatically after entering this mode (Relative value measurement is allowed only within a certain range, i.e. only in manual range mode.).

Note: This function is unavailable when measuring AC voltage, AC current, diodes and on-off.

3.3 Display(DISP)

Press the **DISP** function button to switch the display: Power interface of digital measurement data, power interface of curve measurement data, multimeter interface and dual display interface of power and multimeter.

3.3.1 Interface of Digital Measurement Data

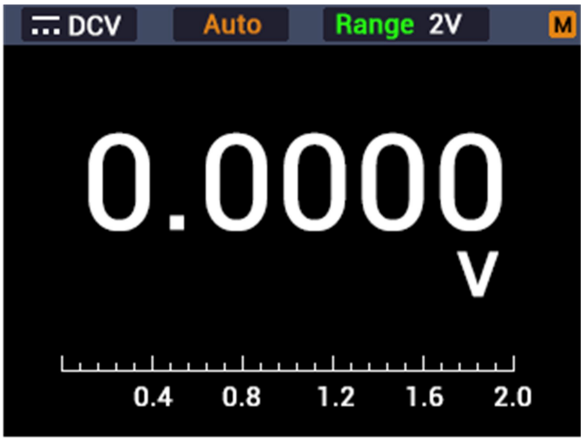
Press **DISP** function button to select power value reading in the form of curve.

3.3.2 Interface of Curve Measurement Data

Press **DISP** function button to select power value reading in the form of curve.

3.3.3 Interface of Multimeter Measurement

Press **DISP** function button to select the interface of multimeter measurement.



3.3.4 Dual-display Measurement Interface of Power Supply and Multimeter

Press **DISP** function button and select dual-display measurement interface of power supply and multimeter. After pressing the **Mode** button, it indicates that the measured value of power supply is editable, if **P** appears at the upper right corner of the screen; multimeter is under editable status, if **M** appears at the upper right corner of the screen.

4. Troubleshooting

1. The instrument is powered on but no display，follow these steps：

- Check if the power is connected properly.
- Check if the fuse which is below the AC Power socket is used appropriately and in good condition (The fuse cover can be pried off directly by straight screwdrive.).
- Restart the instrument after the steps above.
- If the problem still exists, please contact us for our service.

2. The output is abnormal：

- Check if the output voltage is set to 0V. If so, set it to other value.
- Check if the output current is set to 0A. If so, set it to other value.
- If the problem still exists, please contact us for our service.

5. Technical Specification

The instrument must be operated continuously for more than 30 minutes at the specified operating temperature to achieve the following specifications.

Power supply

Specifications	PMM 3005-20	PMM 6010-60
Input Characteristics		
Supply Voltage	200 - 240 V/AC	
Input Frequency	45~65Hz	
Input Parameter		
Input Voltage Range	200 - 240 V/AC	200 - 240 V/AC
Full Load Input Current	≤1.4A	≤2.8A
No-Load Input Current	≤100mA	≤150mA
Input Fuse	250V, F3A	250V, F5A
Rated Output		
Voltage	0~30V	0~60V
Current	0~5A	0~10A
Power	150W	300W
Efficiency (220Vac, rated load)	85%	85%
Regulation(CV)		
Load	≤30mV	≤30mV
Line	≤20mV	≤20mV
Regulation(CC)		
Load	≤30mA	≤30mA
Line	≤20mA	≤20mA
Ripple & Noise (Noise bandwidth 20MHz, ripple bandwidth 1MHz, connect 10uF electrolytic capacitor in parallel with 0.1uF ceramic capacitor to the output terminal for testing)		
Voltage(Vp-p)	≤30mV	≤50mV
Voltage(rms)	≤3mV	≤5mV
Current (Ap-p)	≤30mA	≤30mA
Set the resolution		
Voltage	10mV	10mV
Current	1mA	1mA
Readback resolution		

Specifications	PMM 3005-20	PMM 6010-60
Voltage	10mV	10mV
Current	1mA	1mA
Setting Accuracy		
Voltage	≤0.1%±20mV	≤0.1%±30mV
Current	≤0.1%±10mA	≤0.1%±10mA
Readback accuracy		
Voltage	≤0.1%±20mV	≤0.1%±30mV
Current	≤0.1%±10mA	≤0.1%±10mA
Response time		
Transient recovery time(50%~100% rated load)	≤1ms	
Protective function		
OVP	0~31V	0~61V
OCP	0~5.1A	0~10.1A
OTP	85℃	85℃
Temperature coefficient of output		
Voltage	100ppm/℃	
Current	200ppm/℃	
Temperature coefficient of readback value		
Voltage	100ppm/℃	
Current	200ppm/℃	

Multimeter

Specifications	PMM 3005-20			PMM 6010-60		
Characteristics						
Display	19999			59999		
Measurement	Voltage, Current, Resistance, Capacitor, Diode, On-Off					
Input Impedance	≥10 MΩ					
	Range[2]	Minimum resolution	Precision	Range[2]	Minimum resolution	Precision
DC Voltage	200.00mV	0.01mV	±(0.43%+ 14dig)	60.000mV	0.001mV	±(0.14%+ 28dig)
				600.00mV	0.01mV	±(0.07%+ 14dig)
	2.0000V	0.1mV	±(0.43%+	6.0000 V	0.0001 V	±(0.07%+ 14dig)

	20.000V	0.001V	7dig)	60.000 V	0.001 V	±(0.07%+ 14dig)
	200.00V	0.01V		600.00 V	0.01 V	±(0.14%+ 14dig)
	1000.0V	0.1V		1000.0 V[3]	0.1 V	±(0.14%+ 14dig)
AC Voltage [4]	200.00mV	0.01mV	±(1.14%+ 14dig)	600.00mV	0.01mV	20Hz-45Hz ±(1.43%+ 43dig) 45Hz-65Hz ±(0.7%+ 43dig) 65Hz-1kHz ±(1.14%+ 43dig)
	2.0000V	0.0001V		6.0000 V	0.0001 V	
	20.000V	0.001V		60.000 V	0.001 V	
	200.00V	0.01V		600.00 V	0.01 V	
	750.0V	0.1V	±(1.43%+ 14dig)	750.0V	0.1 V	
DC Current	--	--	--	60.000mA	0.001mA	±(0.29%+ 28dig)
	200.00mA	0.01mA	±(1.14%+ 14dig)	600.00mA	0.01mA	±(0.21%+ 14dig)
	--	--	--	6.0000 A	0.0001 A	±(0.71%+ 14dig)
	10.000A	0.001A	±(3.57%+ 14dig)	10.000 A[5]	0.001 A	±(0.71%+ 14dig)
AC Current[6]	200.00mA	0.01mA	±(1.43%+ 14dig)	60.000mA	0.001mA	±(0.71%+ 42dig)
				600.00mA	0.01mA	
	10.000A	0.001A	±(4%+ 14dig)	6.0000 A	0.0001 A	±(2.14%+ 42dig)
				10.000 A	0.001 A	
Resistance[7]	200.00Ω	0.01Ω	±(1.14%+ 14dig)	600.00 Ω	0.01 Ω	±(0.21%+ 14dig)
	2.0000kΩ	0.1Ω		6.0000kΩ	0.0001kΩ	±(0.21%+ 14dig)
	20.000kΩ	1Ω		60.000kΩ	0.001kΩ	±(0.21%+ 14dig)
	200.00kΩ	0.01kΩ		600.00kΩ	0.01kΩ	±(0.21%+ 14dig)
	2.0000MΩ	0.0001MΩ		6.0000MΩ	0.0001MΩ	±(1.0%+

						14dig)
	20.000MΩ	0.001MΩ	±(1.43%+ 14dig)	60.000MΩ	0.001MΩ	±(5.0%+ 14dig)
	100.00MΩ	0.01MΩ	±(7.14%+ 14dig)			
Capacitance [8](F)	20.000nF	0.001nF	±(4.3%+14dig)	60 .000nF	0.001nF	±(3.57%+ 14dig)
	200.00nF	0.01nF		600.00nF	0.01nF	
	2.0000uF	0.0001uF		6.0000uF	0.0001uF	
	20.000uF	0.001F		60.000uF	0.001uF	
	200.00uF	0.01uF		600.00uF	0.01uF	±(7.14%+ 14dig)
	2.0000mF	0.0001mF		6000.0uF	0.1uF	
				60.000mF	0.001mF	
Diode	--	--	--	3.0000 V	0.0001 V	±(1.43% + 14dig)
Continuity	--	--	--	1000.0 Ω	0.1 Ω	50
Frequency Response(Hz)	(40 - 1000)Hz					

[1] Specifications are for 30-minute warm-up, "Low" measurement rate and calibration temperature 18℃ - 28℃.
[2] For each additional volt over ± 500 VDC add 0.02 mV of error.
[3] When measuring AC voltage,accuracy guarantee range is 5% to 100% of the range.
[4] 30 seconds OFF after 30 seconds ON is recommend for the continuous current that higher than DC 7 A or AC RMS 7 A.
[5] When measuring AC current,accuracy guarantee range is 5% to 100% of the range.
[6] Without relative operation, add ±0.20 Ω additional error in ohms function.
[7] Specifications are for using the relative operation of math. Using of non-film capacitor may generate additional errors. Specifications are for from 10% to 120% ranges.
[8] Except for special marks,when frequency≤10 MHz and >1V to AC input voltage;when frequency >10 MHz and >3V to AC input voltage.

Other

Display	
Display Type	2.8 inches color LCD
Resolution	240 × 320 pixels
Color	65536 color,TFT
Environment	
Temperature	Working Temperature:0℃～40℃ Storage Temperature:-20℃～60℃

Relative Humidity	≤90%RH; no condensation
Height	2,000 meters
Cooling	Fan cooling, temperature intelligent speed control
Other	
Communication	USB communication, compatible with SCPI communication
USB Charging Port	5V/1A charging
Dimension	Approx. 1.2 kg
Weight	200mm(Width)×92mm(Height)×185mm(Length)

6. Appendix

6.1 Appendix A：Accessories

(The accessories subject to final delivery.)
Power cord x 1
User manual EN x 1
User manual DE x 1
Safety Hintsheet x 1
Fuse x 1
CD ROM x 1
USB Cable x 1
Mutimeter test leads (1 pair)

6.2 Appendix B：General Care and Cleaning

General Care

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

Caution: To avoid any damage to the instrument, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument as often as operating conditions require. To clean the instrument exterior, perform the following steps：

1. Wipe the dust from the instrument surface with a soft cloth. Take care not to scratch the transparent LCD protection screen when cleaning.

2. Disconnect power before cleaning your instrument. Clean the instrument with a damp soft cloth (not dripping with water). It is recommended to clean with soft detergent or fresh water. To avoid damage to the instrument, do not use any corrosive chemical cleaning agents.

⚠ **Warning:** Before re-applying power, ensure that the instrument is completely dry, avoiding any electric shock or electrical short circuit resulting from moisture.