

**RIGOL**

**Quick Guide**

**DM3068 Digital Multimeter**

**Jun. 2017**

**RIGOL TECHNOLOGIES, INC.**



# Guaranty and Declaration

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## Publication Number

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## Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.

E-mail: [service@rigol.com](mailto:service@rigol.com)

Websites: [www.rigol.com](http://www.rigol.com)

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# Safety Requirement

## General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injuries or damages to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only specified by this manual.

### **Use Proper Power Cord.**

Only the power cord designed for the instrument and authorized by local country could be used.

### **Ground The Instrument.**

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

### **Observe All Terminal Ratings.**

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

### **Use Proper Overvoltage Protection.**

Make sure that no overvoltage (such as that caused by a thunderstorm) can reach the product, or else the operator might expose to danger of electrical shock.

### **Do Not Operate Without Covers.**

Do not operate the instrument with covers or panels removed.

### **Use Proper Fuse.**

Please use the specified fuses.

### **Avoid Circuit or Wire Exposure.**

Do not touch exposed junctions and components when the unit is powered.

**Do Not Operate With Suspected Failures.**

If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations. Any maintenance, adjustment or replacement especially to circuits or accessories must be performed by **RIGOL** authorized personnel.

**Keep Well Ventilation.**

Inadequate ventilation may cause increasing of temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

**Do Not Operate in Wet Conditions.**

In order 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.**

In order 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 and/or moisture in air, please keep the surface of device clean and dry.

**Electrostatic Prevention.**

Operate in an electrostatic discharge protective area environment to avoid damages induced by static discharges. Always ground both the internal and external conductors of the cable to release static before connecting.

**Handling Safety**

Please handle with care during transportation to avoid damages to keys, knob and, interfaces as well as other parts on the panels.

**The disturbance tests of all models conform to the P/F values of A based on the standard of EN 61326: 1997+A1+A2+A3 instead of P/F values of B.**

## Input Terminal Protection Limit

The protection limit applies to input terminals:

### 1. Main input (HI and LO) terminals

**HI** and **LO** terminals are used for Voltage, Resistance, Capacitance, Continuity, Frequency and Diodes measurements and should be used under the following two conditions:

- 1) **HI-LO** protection limit: at most 1000 VDC or 750 VAC, this is also the maximum measurable voltage. The limit can be expressed as 1000 Vpk.
- 2) **LO-ground** protection limit: at most 500 Vpk (relative) is allowed to float at **LO** terminal with safety.

Since the HI terminal holds a maximum protection of 1000 Vpk relative to the ground, the sum of the "float" and measured voltages cannot exceed 1000 Vpk.

### 2. Sampling (HI Sense and LO Sense/200 mA) terminals

**HI Sense** and **LO Sense/200 mA** terminals are used for 4-Wire Resistance measurement and should be used under the following two conditions:

- 1) **HI Sense-LO Sense/200 mA** protection limit: 200 Vpk.
- 2) **LO Sense/200 mA-LO** protection limits: 0.5 Vpk. The current input fuse on the rear panel provides the current passing through **LO Sense/200 mA** up to 250 mA protection.

### 3. Current input (10 A and Sense/200 mA) terminals

**10 A** and **LO** terminals are used for current measurements of 2 A and 10 A. The maximum current which goes through the **10 A** terminal is limited to 10 A by the internal fuse. **LO Sense/200 mA** and **LO** terminals are used for current measurements ranging from 200  $\mu$ A to 200 mA. The maximum current which go through the **LO Sense/200 mA** terminal is limited to 250 mA by the internal fuse.

#### NOTE:

**In order to prevent the fuse from blowing out and protect the multimeter, please use the current input terminals according to the following requirements:**

- 1) Do not connect the **10 A** and **LO Sense/200 mA** input terminals into the current measuring circuit at the same time.
- 2) Only use **10 A** and **LO** terminals for measurements when the measured

current AC+DC RMS value goes within 200 mA and 10 A.

- 3) Select a proper current input terminal according to the estimated current magnitude before connect the multimeter to AC supplies if you want to use current measurement.
- 4) The current into **10 A** cannot exceed 13.5 A, otherwise it will blow out the internal fuse; while the current into the **LO Sense/200 mA** terminal cannot exceed 300 mA, otherwise the current fuse from the rear panel may be blown out.

### **IEC II Overvoltage Protection**

In order to prevent electric shock, DM3068 provides overvoltage protection for line-voltage mains connections meeting both of the following conditions:

1. The HI and LO input terminals are connected to the mains under Measurement Category II conditions, defined below.
2. The mains are limited to a maximum line voltage of 300 VAC.

**WARNING:** IEC II includes electrical devices connected to mains at an outlet on a branch circuit. Such devices include most small appliances, test equipments and other devices that inserted into a branch socket.

DM3068 may be used to make measurements with the HI and LO inputs connected to mains in such devices (up to 300 VAC), or to the branch socket itself. However, DM3068 may be used with its HI and LO inputs connected to mains from neither permanently installed electrical device such as a main circuit-breaker panel, sub-panel disconnected box nor wired motors. Such devices and circuits are readily to beyond the protection from DM3068.

**NOTE:** Voltages above 300 VAC may be measured only in circuits that are isolated from mains. However, a transient overvoltage is also present in such circuits. DM3068 was designed to safely withstand occasional transient overvoltage up to 2500 Vpk. Do not use this device to measure circuits whose transient overvoltage may exceed this level.



## Safety Terms and Symbols

**Terms in this Manual.** These terms may appear in this manual:



### **WARNING**

Warning statements indicate the conditions or practices that could result in injury or loss of life.



### **CAUTION**

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



### **CAT I (1000V)**

IEC Measurement Category I. The maximum voltage can be measured by HI-LO terminal is 1000Vpk.



### **CAT II (300V)**

IEC Measurement Category II. Inputs may be connected to mains (up to 300VAC) in the case of overvoltage in Category II.

**Terms on the Product.** These terms may appear on the product:

**DANGER** indicates an injury or hazard may immediately happen.

**WARNING** indicates an injury or hazard may be accessible potentially.

**CAUTION** indicates a potential damage to the instrument or other property might occur.

**Symbols on the Product.** These symbols may appear on the product:



**Hazardous  
Voltage**



**Safety  
Warning**



**Protective  
Earth  
Terminal**



**Chassis  
Ground**



**Test  
Ground**

## General Care and Cleaning

### General Care:

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

### Cleaning:

Clean the instrument regularly according to its operating conditions. To clean the exterior surface, perform the following steps:

1. Disconnect the instrument from all power sources.
2. Clean the loose dust on the outside of the instrument with a lint- free cloth (with a mild detergent and water). When clean the LCD, take care to avoid scarifying it.



#### **CAUTION**

To avoid damages to the instrument, do not expose them to liquids which are corrosive.

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#### **WARNING**

To avoid injury resulting from short circuit, make sure the instrument is completely dry before reconnecting into a power source.

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## Environmental Considerations

The following symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC on waste electrical and electronic equipment (WEEE) and batteries.



### Product End-of-Life Handling

The equipment may contain substances that could be harmful to the environment or human health. In order to avoid release of such substances into the environment and harmful to human health, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately. Please contact your local authorities for disposal or recycling information.



# Quick Start

## General Inspection

### 1. **Inspect the shipping container for damage**

Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has passed both electrical and mechanical tests.

The consigner or carrier shall be liable for the damage to the instrument resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the unit.

### 2. **Inspect the instrument**

In case of any damage, or defect, or failure, notify your **RIGOL** sales representative.

### 3. **Check the accessories**

Please check the accessories according to the packing lists. If the accessories are incomplete or damaged, please contact your **RIGOL** sales representative.

## Handle Adjustment

To adjust the handle position of the multimeter, grip the handle in both sides and pull it outward, then rotate the handle to a desired position, see figure below.

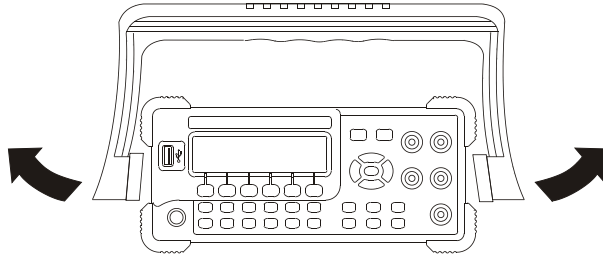


Figure 1 Handle Adjustment

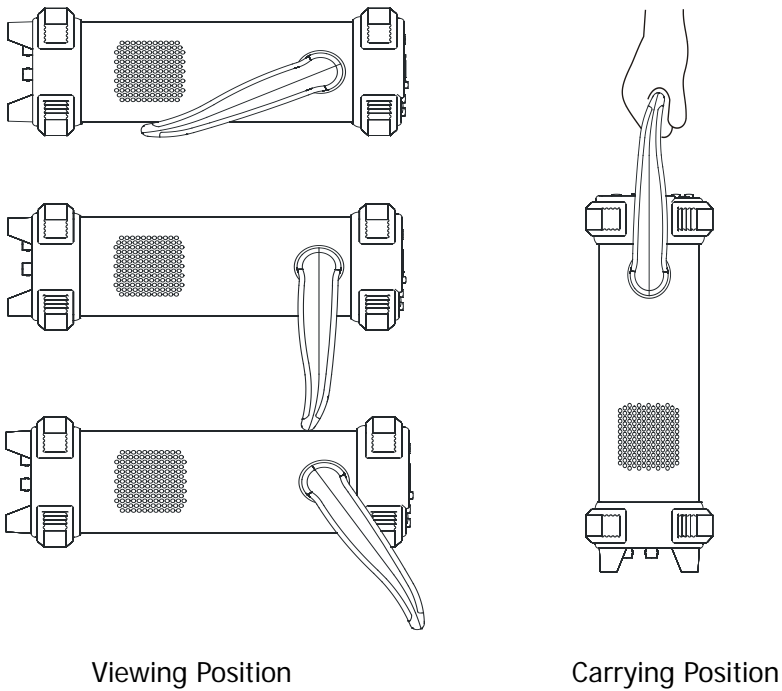


Figure 2 Locate the Multimeter

# Appearance and Dimensions

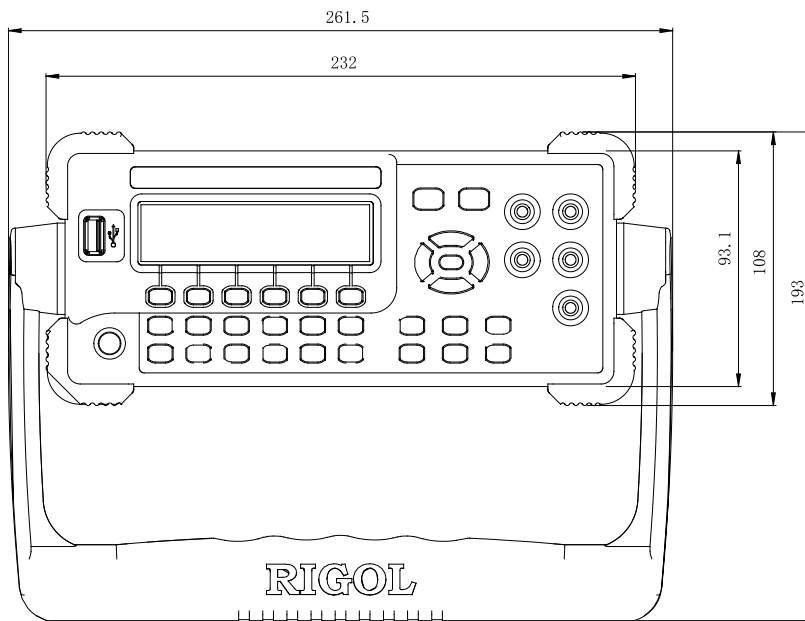


Figure 3 Front Elevation

Unit: mm

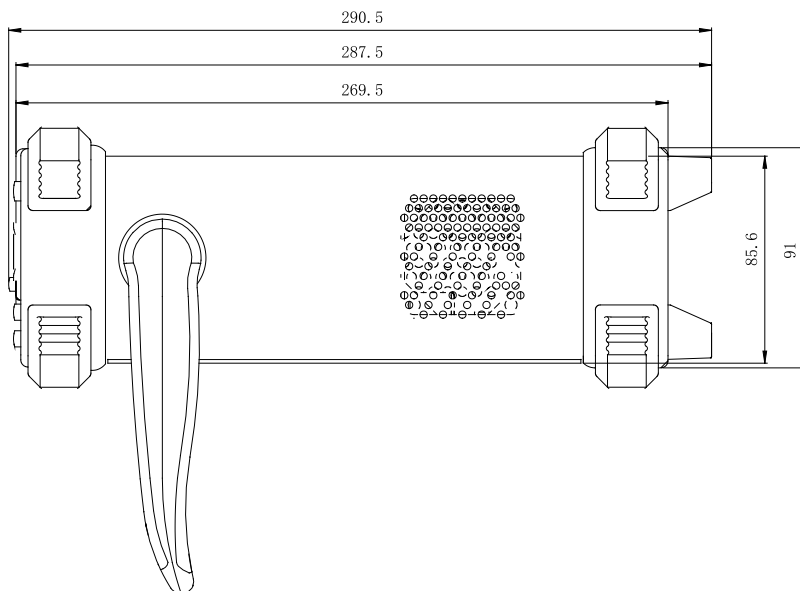


Figure 4 Side Elevation

Unit: mm

# The Front Panel

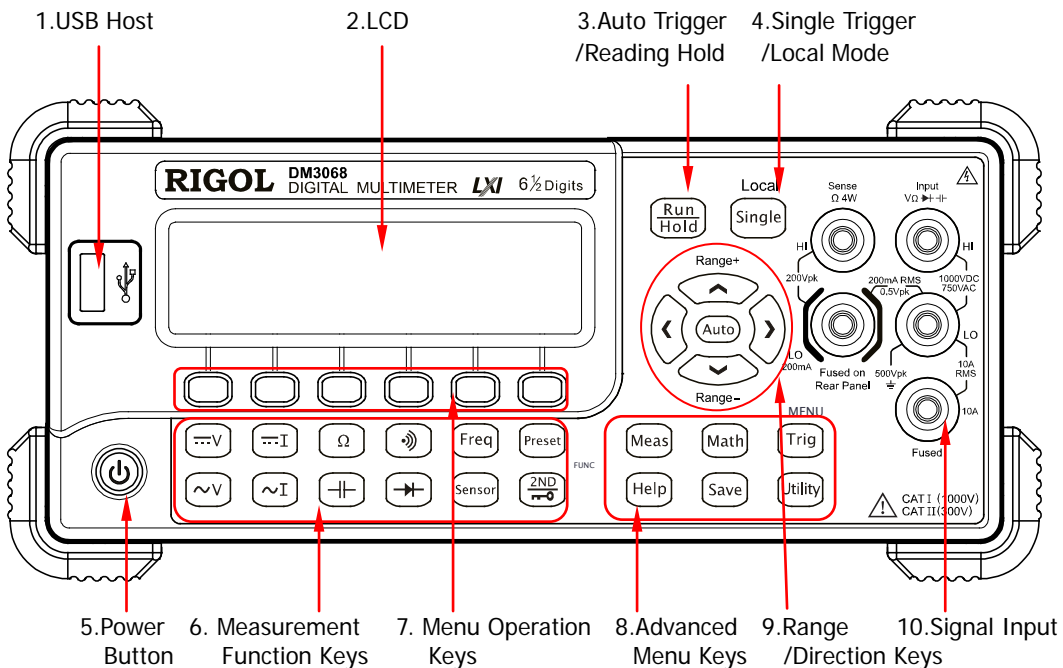


Figure 5 Front Panel Overview

### 1. USB Host

It supports all FAT-format USB flash devices. By using this interface, users can easily save the current instrument status and measured data into such device for future use.

### 2. LCD

This is a 256 x 64 monochrome LCD that can display the current function menus, measurement parameters, system configuration and status and so on.

### 3. Auto Trigger/Reading Hold

Continuously pressing this key can switch between auto trigger and reading hold functions.

- Auto Trigger: the backlight always on; the multimeter continuously takes readings at the fastest rate possible for the present configuration.




- Reading Hold: the backlight blinks; the multimeter obtains a stable reading and displays.

#### 4. Single Trigger/Local Mode











Pressing this key during the front panel operation will cause the multimeter generate one reading or specified number of readings (**S NO.**) and then wait for the next trigger. Whatever, this key is also an access to local mode from remote control.

#### 5. Power Button




Turns on or off the multimeter. Users can enable or disable this key as required. Press  → **System** → **Cfg** → **Switch** and select **On** or **Off**.

#### 6. Measurement Function Keys

##### Basic Measurement Keys

	DC Voltage Measurement (DCV)
	AC Voltage Measurement (ACV)
	DC Current Measurement (DCI)
	AC Current Measurement (ACI)
	Resistance Measurement (OHM)
	Capacitance Measurement (CAP)
	Continuity Test (CONT)
	Diode Test (DIODE)
	Frequency/Period Measurements (FREQ/PERIOD)
	Any Sensor Measurements (SENSOR), such as DCV, DCI, 2WR, 4WR, FREQ, TC (thermoelectric couple), RTD (resistance temperature detectors), THERM (thermistor).







##### Common Function Keys

	Quickly save or recall at least 10 groups of instrument settings.
	<p>Secondary Function key</p> <ul style="list-style-type: none"> <li>● Enables the dual display.</li> <li>● Quickly saves the current instrument configuration in connection with .</li> <li>● Quickly enters the setting interface of relative measurement.</li> </ul>




## 7. Operation Menu Keys

Activates the corresponding menu.

## 8. Assistant Functions

-  Sets all the measurement parameters.
-  Performs math operations (statistic, P/F, dBm, dB, REL) for measured results and displays real-time measurements in trend graph and histogram.
-  Provides auto, single, external and level trigger sources; enables to set the reading hold function, samples per trigger, delay time before reading and edge of the trigger input signal as well as the trigger output parameter.
-  Saves, recalls and deletes data and parameter files from both internal memory and external USB devices.
-  Sets the command set, interface parameters and system information, tests the multimeter and displays error messages.
-  Provides common help information and the method to use built-in help. The multimeter allows users to quickly recall the help information about any front panel keys and menu softkeys.

## 9. Range/Direction Keys

-  Enables auto range.
- 
  - Configures the measurement parameters.
  - Selects the digit position while entering a parameter.
- 
  - Increases or decreases the measurement range.
  - Enters desired numeric value while setting a parameter.
  - Pages up or down.

## 10. Signal Input Terminals

The measured signal (device) will be connected into the multimeter through these terminals. Different measured objects have different connection methods. for details please see "**Measurement Connections**".

## The Rear Panel

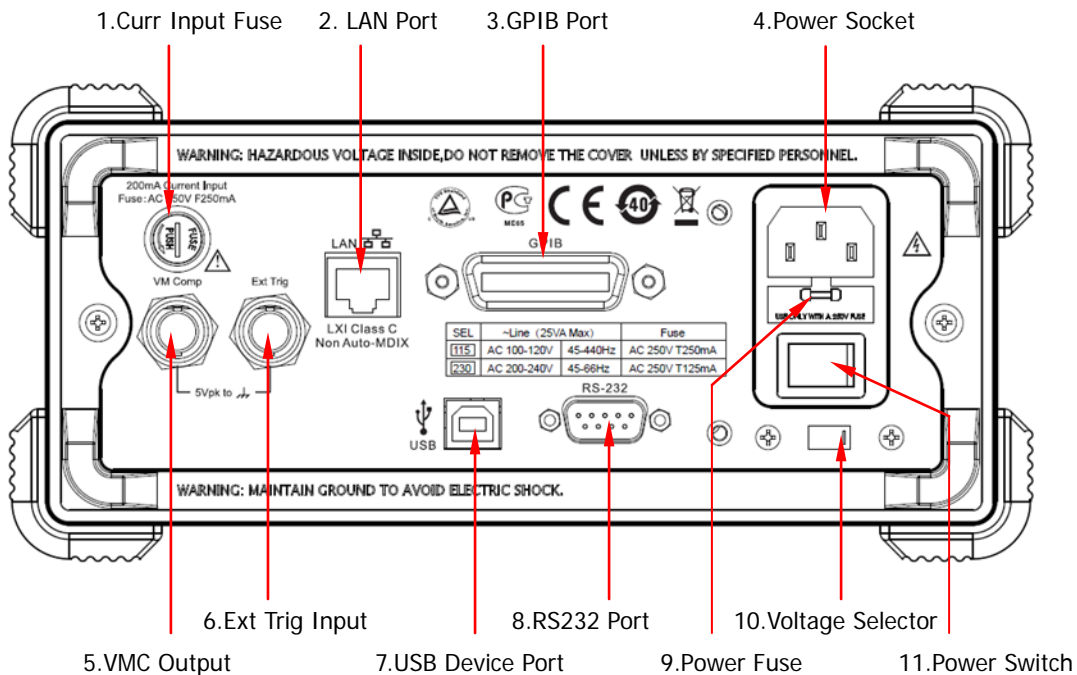


Figure 6 Rear Panel Overview

### 1. Curr Input Fuse

The multimeter uses two kinds of fuses for protecting high and low currents and both fuses were already installed before leaving factory. The current into **10 A** cannot exceed 13.5 A, otherwise it will blow out the internal fuse; while the current into **LO Sense/200 mA** terminal cannot exceed 300 mA, otherwise the current fuse from the rear panel may be blown out. To replace the low current fuse, please:

- 1) Cut off the power supply.
- 2) Pull out the fuse seat by turning a straight screwdriver counterclockwise as shown in the figure.
- 3) Place a new specified fuse.
- 4) Reinstall the fuse seat into the slot.

**NOTE: The high current fuse stands inside the multimeter and is not allowed to be replaced by users themselves. If such work must be done, send your multimeter back to the factory.**

## 2. LAN Port

Provides the multimeter an access to LAN for remote controlling. The multimeter conforms to LXI-C standards; it can be used in connection with other standard devices for a testing system built, easily approaching a LAN based system integration.

## 3. GPIB Port

Conforms to IEEE-488.2 standards.

## 4. Power Socket

The multimeter allows two types of AC supplies. Users should use the power cord that came with your multimeter to connect the multimeter to the AC power through this socket. Note a proper voltage scale must be first selected (through the **Voltage Selector**) before power connection.

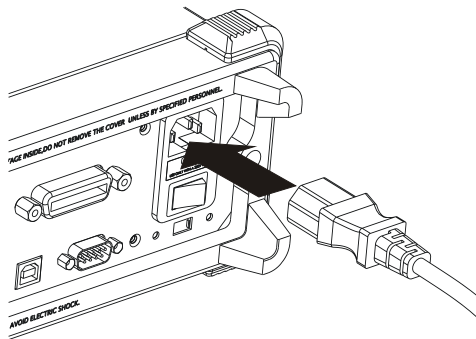


Figure 7 Connect the Power Cord

## 5. VMC Output

Outputs a low-true pulse from **[VM Comp]** terminal after every measurement when VM output is enabled (**Trig** → **VMC** → **ON**).

## 6. Ext Trig Input

Triggers the multimeter by connecting a trigger pulse through **[Ext Trig]** connector. Note the external trigger source must be selected (**Trig** → **Source** → **Ext**).

## 7. USB Device Port

Communicates with a computer and controls your multimeter through PC software. It is available for USB-TMC devices.

## 8. RS232 Port

Provides an access for multimeter controlling through PC software and outputs P/F test result.

## 9. Power Fuse

The multimeter is already installed a power fuse before leaving factory. To replace a new one, please:

- 1) Cut off the power supply.
- 2) Press down the block tongue using a straight screwdriver (in the direction of the dotted arrow in figure below) and pull out of the fuse seat.
- 3) Select a proper voltage scale.
- 4) Replace a specified fuse.
- 5) Reinstall the fuse seat into the slot.

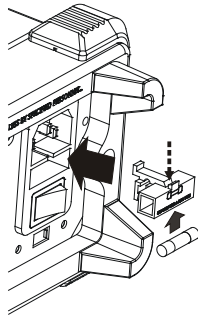


Figure 8 Replace the Power Fuse



### **WARNING**

In order to avoid electric shock or fire, please just use the specified fuse and make sure the fuse holder is in good connection and not shorted.

---

## 10. Voltage Selector

Select a proper voltage scale according to the used AC supply: 115 V or 230 V.

## 11. Power Switch

Connect or disconnect the AC supply. If the front power button is disabled (Utility → System → Cfg → Switch → OFF), turning on this switch will directly start up the multimeter.

# User Interface

## Single Display

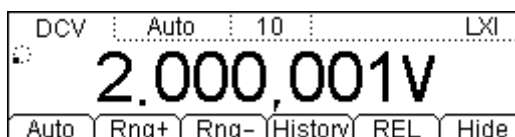


Figure 9 User Interface (Single Display)

## Dual Display

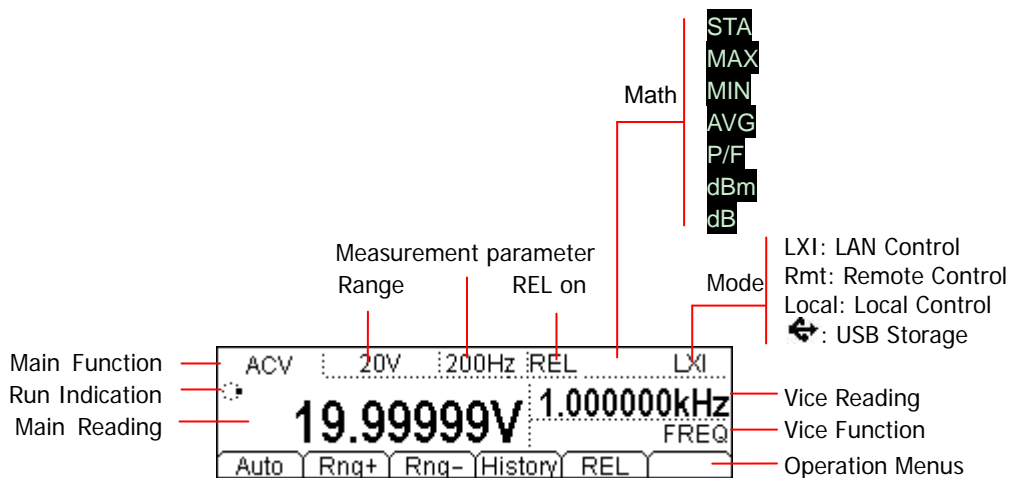


Figure 10 User Interface (Dual Display)

## First-use of Multimeter

Start your multimeter according to the following steps when first use.

### 1. Connect the AC Power Supply

- 1) Select an appropriate voltage scale according to the present AC power using the voltage selector on the rear panel.
- 2) Insert one end of the supplied power cord into the ac outlet and the other end into the power socket on the rear panel.

### 2. Turn On the Multimeter

Turn on the power switch under the power socket and the power button on the front panel. Note the multimeter will directly start after you turning on the rear power switch if the front power button is disabled (Utility → System → Cfg → Switch → OFF).

### 3. Boot Process

- 1) Normal start: the multimeter executes self-test and then enters the user interface.
- 2) Start with a USB device having update file inserted: the multimeter directly updates if an update file is detected and then starts.

### 4. If the multimeter does not starts normally, please:

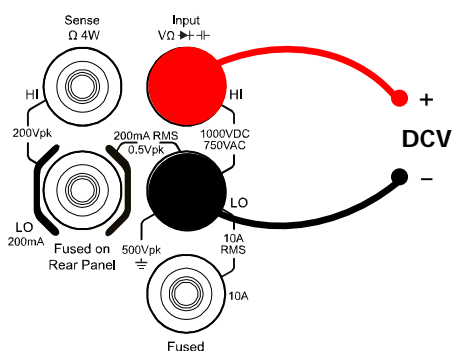
- 1) Make sure the power cord is in good connection.
- 2) Make sure the rear power switch is turned on.
- 3) Try to restart the multimeter, if it fails, check the power fuse and replace a new one when necessary.
- 4) If the problem still remains, contact **RIGOL**.



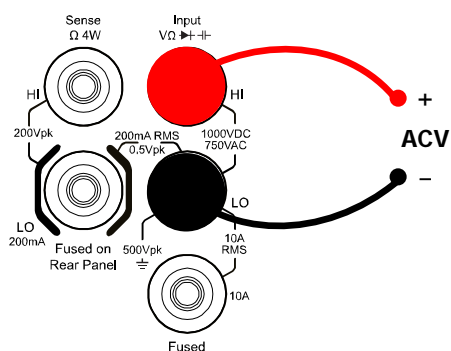
## Measurement Connections

DM3068 was designed with many measurement functions and different measurements have different connections. Do not discretionarily switch the measurement function when measuring as it may cause damage to the multimeter. For example, when the test leads are connected to the related current terminals, AC voltage measurement should not be taken.

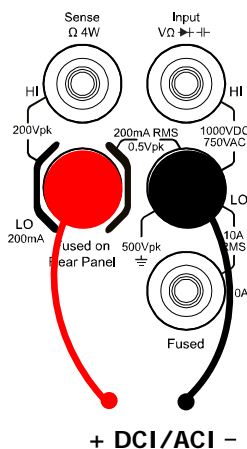
### DCV Measurement



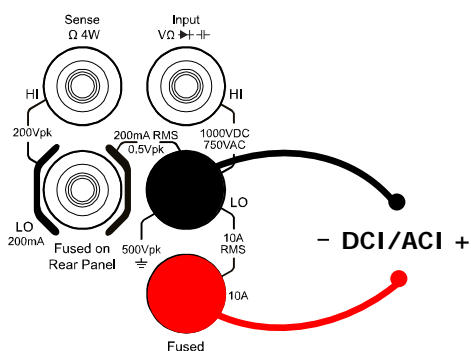
### ACV Measurement



### DCI/ACI Measurement (Low Current)



### DCI/ACI Measurement (High Current)



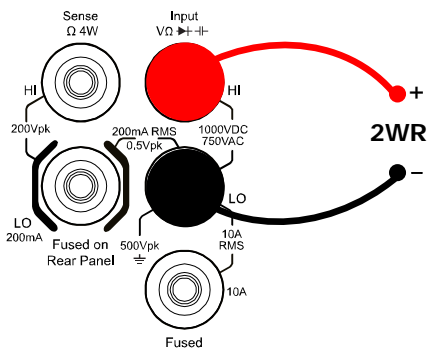
### NOTE:

In order to protect the multimeter, please execute DC/AC current measurement following the requirements below:

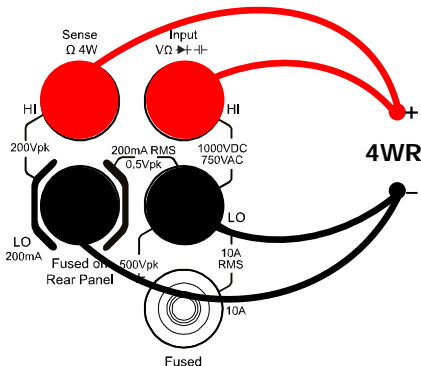
1. Do not connect the 10 A and LO Sense/200 mA input terminals into the current measuring circuit at the same time.

2. Select a proper current input terminal according to the estimated current magnitude before connect the multimeter to AC supplies if you want to use current measurement.
3. Only use **10 A** and **LO** terminals for measurements when the measured current AC+DC RMS value goes within 200 mA and 10 A.

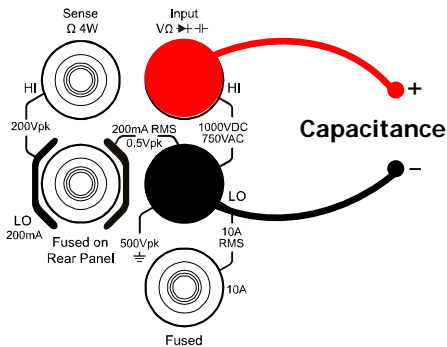
**Resistance Measurement (2-wire)**



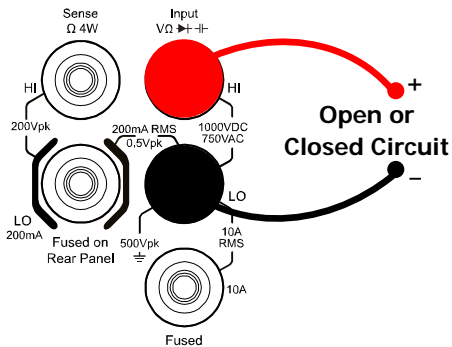
**Resistance Measurement (4-wire)**



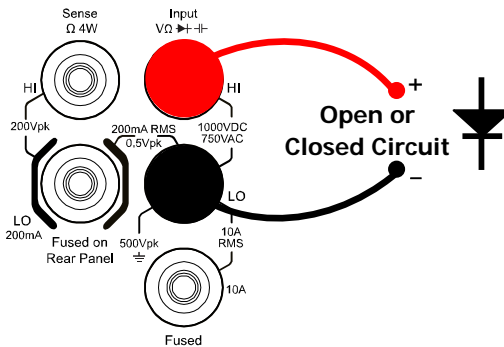
**Capacitance Measurement**



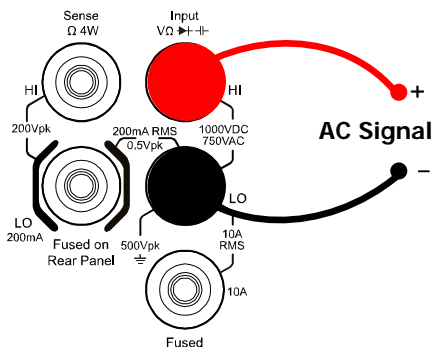
**Continuity Measurement**



**Diode Measurement**

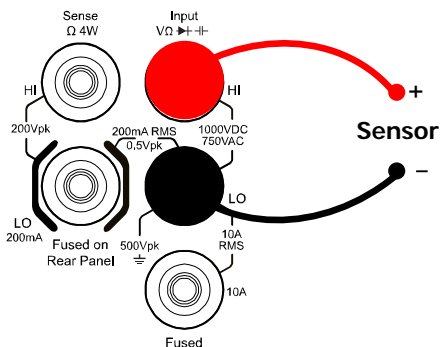


**Frequency/Period Measurement**



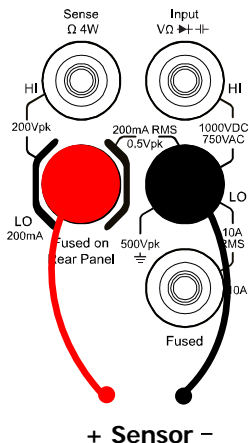
**Any Sensor Measurement**

(For DCV, 2WR, FREQ, TC, 2-wire RTD and THERM sensors)



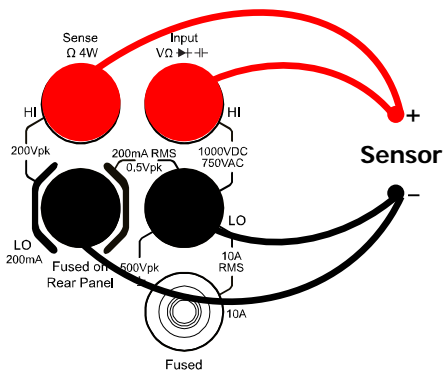
**Any Sensor Measurement**

(For DCI sensor)



**Any Sensor Measurement**

(For DCV, 2WR, FREQ, TC, 2-wire RTD and THERM sensors)



## Using the Built-in Help System

The built-in help system provides information for users to quickly recall and use the basic functions of the instrument as well as how to use the built-in help system, including key (front panel) help and menu help. Press **Help** to enter the following interface.

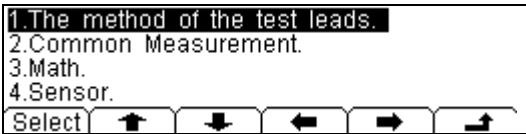


Figure 11 Help Topics

Table 1 Help Menu

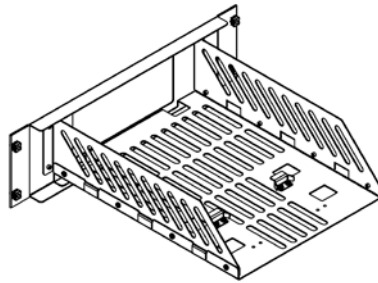
Menu	Description
Select	Go to the selected help topic
↑	Cursor up
↓	Cursor down
←	Page up
→	Page down
↶	Go to the previous menu

### Help Topics

1. **The method of the test leads.**
2. **Common measurement.**
3. **Math.**
4. **Sensor.**
5. **Store and recall.**
6. **Utility.**
7. **I/O interface.**
8. **Online help.**
9. **To change the power fuse.**
10. **Support.**

## Using a Rackmount Kit

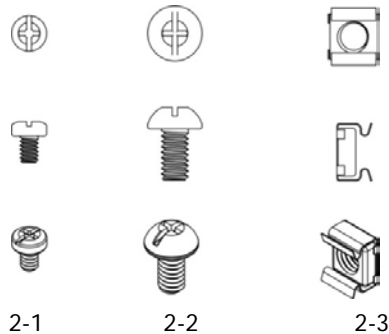
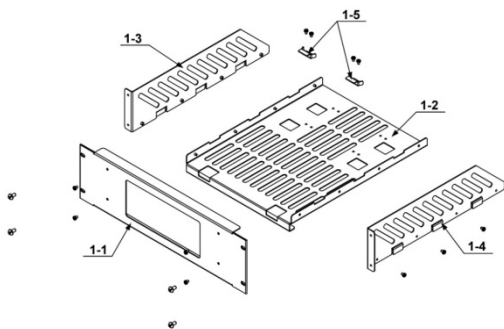
DM3068 can be mounted in a standard 19-inch rack cabinet. Before any kit installations, please remove the package or cushioning material from the multimeter body.



## Kit Parts List

Table 2 Kit Parts List

No.	Name	Qty	Part Number	Description
1-1	Front Panel	1	RM-DM-3-01	-
1-2	Support Board	1	RM-DM-3-02	-
1-3	Left Plate	1	RM-DM-3-03	-
1-4	Right Plate	1	RM-DM-3-04	-
1-5	Fixed Finger	2	RM-DM-3-05	-
2-1	M4 Screw	16	RM-SCREW-01	M4*8 Phil-Slot Pan Head Machine Screw Nail
2-2	M6 Screw	4	RM-SCREW-02	M6*20 Phil-Slot Pan Head Machine Screw Nail
2-3	M6 Nut	4	RM-SCREW-03	M6*4 Square Machine Female Screw with Lock Blade



## Tool Requirements

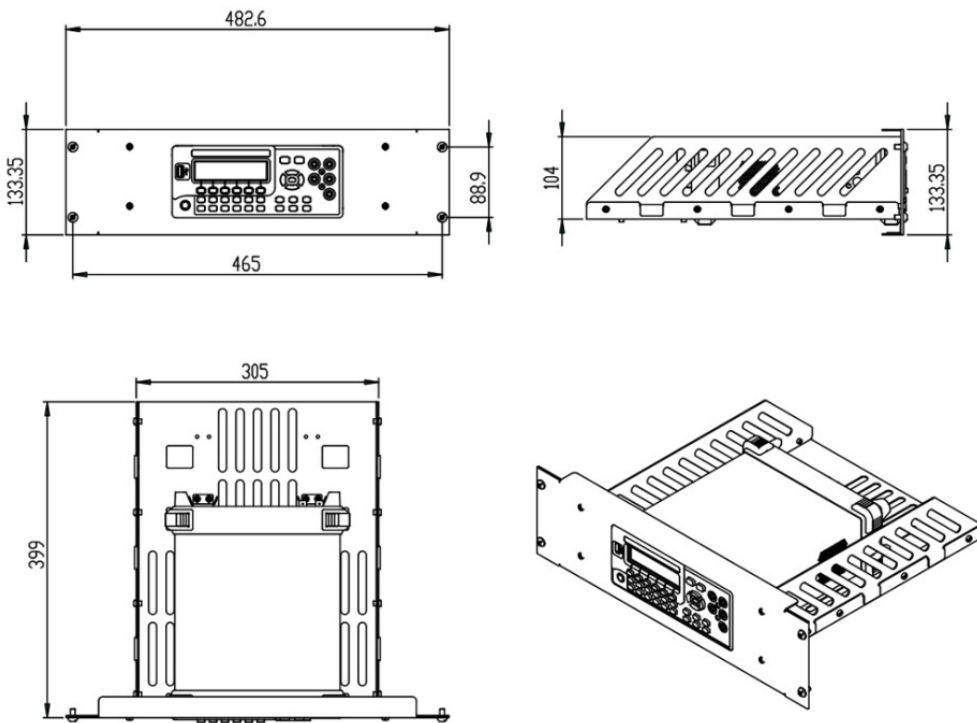
A PH2 cross screwdriver is recommended.

## Space Requirements

The DM3068 should be mounted under the following spaces:

- The machine cabinet should be a standard 19-inch one.
- At least a 3U space (133.5 mm) should be provided by machine cabinet.
- The depth inside the machine cabinet should not be less than 400 mm.

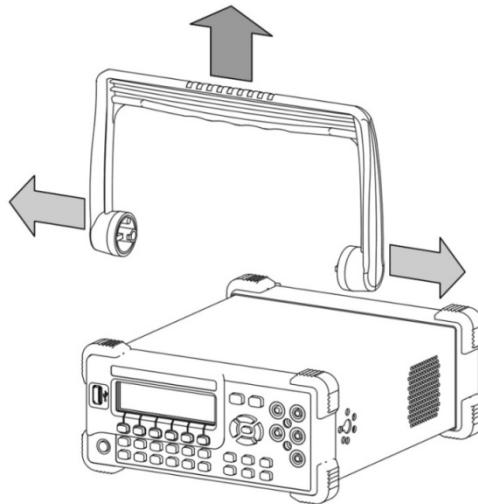
Dimensions after the rackmount kit on:



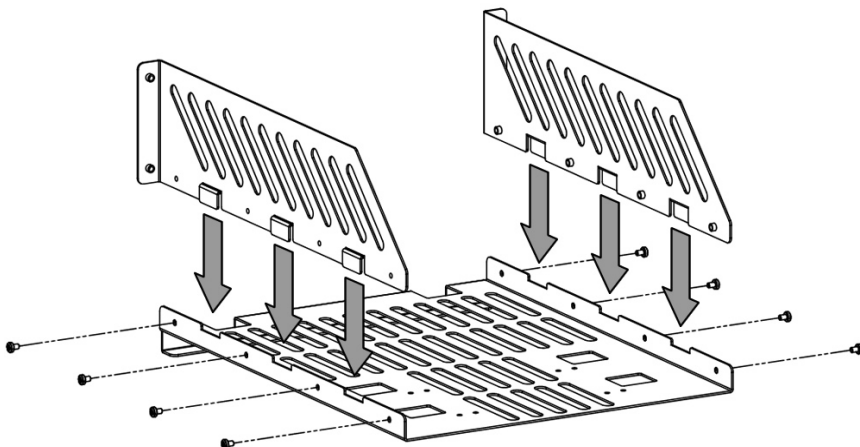
## Procedure of Installation

This operation should be executed only by authorized officer. Improper or incorrect operations may cause installation fails or damages to the multimeter.

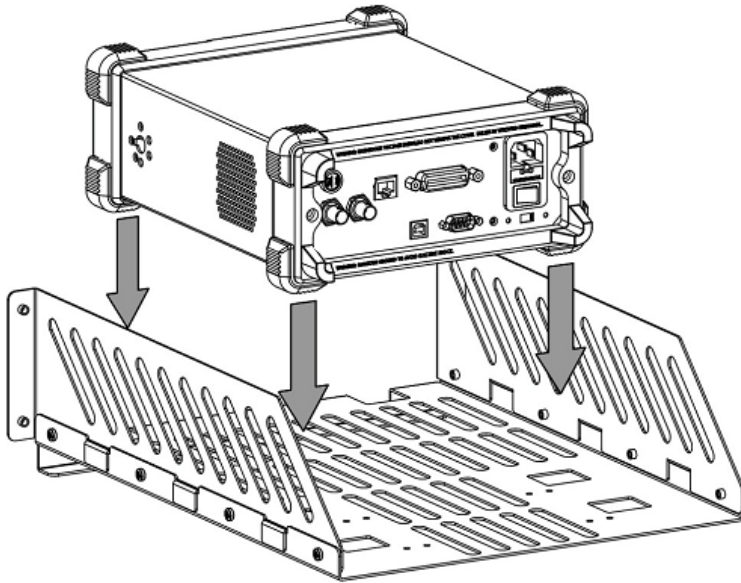
1. Remove the handle from the multimeter: grip the handle in both sides and pull it outward. Then, push the unit upward to release it from the instrument.



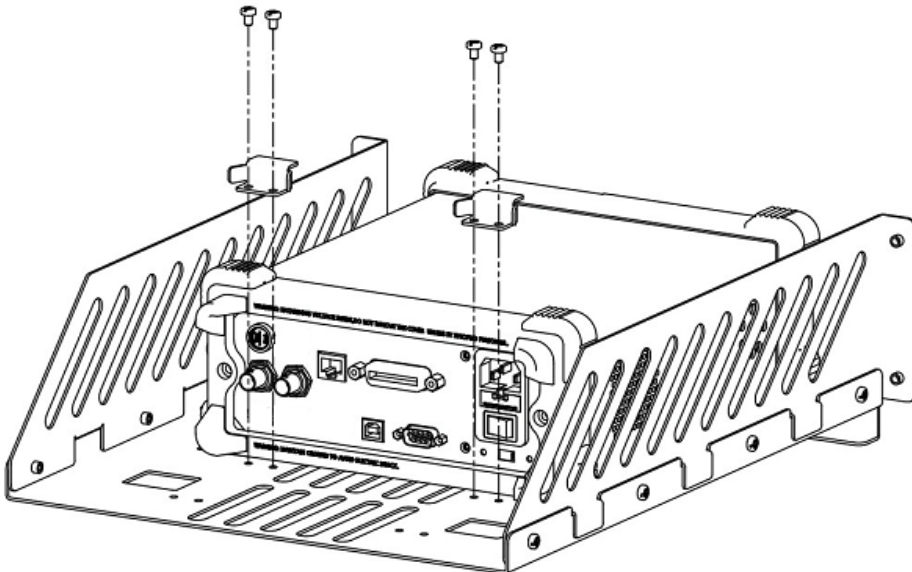
2. Install left and right plates: aim the detents of right and left plates at the openings on support board and insert selectively, then fix them using eight M4 screws.



3. Place the instrument: aim the parallels at the corresponding openings and then put the multimeter onto the support board.

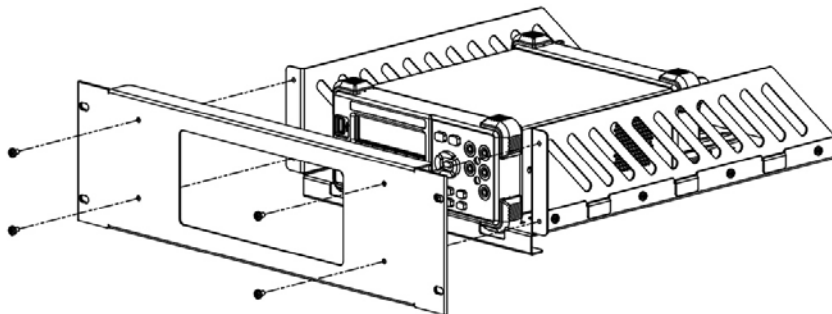


4. Fix the instrument: fasten or fit the instrument tightly into the support board using two fixed fingers in connection with four M4 screws.

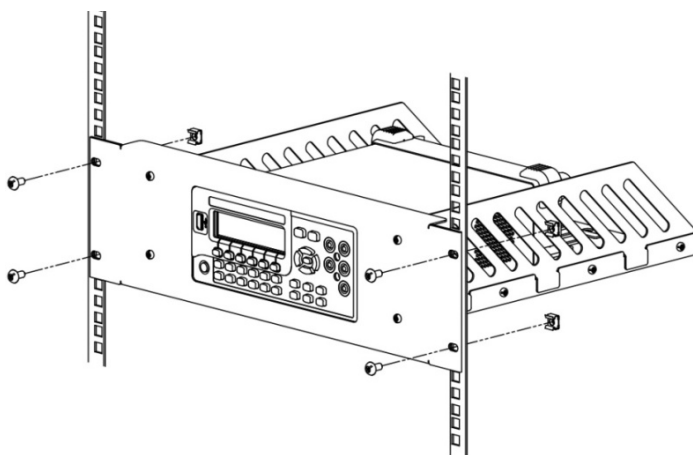




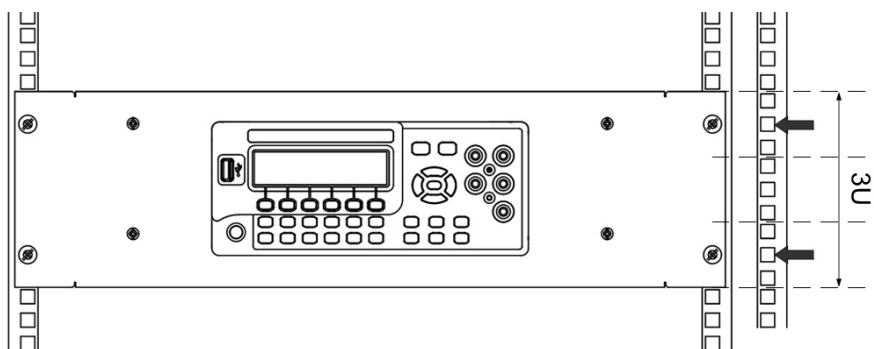
5. Mount the front panel: aim the front panel opening at the front of instrument and fix them using four M4 screws.



6. Load into machine cabinet: mount the rack with instrument-fixed onto a standard 19-inch machine cabinet using four M6 screws and four M6 square nuts, respectively.



7. Note the rack holds a height of 3U, holes in compliance with the arrow direction are the mounting holes for rack.



# Troubleshooting

To help you solve commonly encountered problems, we have listed some typical issues with their respective solutions. If the problems persist, contact **RIGOL** and prepare your device information (**Utility** → **T/C** → **Info**).

## 1. The screen still dark (no display) after power on:

- (1) Check if the power cord is well connected.
- (2) Check if the power switch on the rear panel is switched on.
- (3) Check if the safety fuse has melted and replace a new one when necessary.
- (4) Having done with the above steps, restart the instrument.
- (5) If the problem persists please contact **RIGOL** for service options.

## 2. The reading is constant when a current signal is input:

- (1) Check if the test lead is correctly inserted to the current and/or LO terminals.
- (2) Check if the current fuse on the rear panel has melted.
- (3) Check if the measurement function is switched to DCI or ACI.
- (4) Check if the enabled measurement function matches with the actual input current.

## 3. The reading is abnormal when a DC signal is input:

- (1) Check if the test lead is correctly inserted to the current and/or LO terminals.
- (2) Check if the current fuse on the rear panel has melted.
- (3) Check if the measurement function is switched to DCI or DCV.
- (4) Check if the enabled measurement function matches with the actual input current.

## 4. The USB flash device cannot be identified:

- (1) Check if the USB flash device is in good condition.
- (2) Make sure the USB device you used is a flash device.
- (3) Check the capacity of your USB device. A USB flash device with less than 4G bytes capacity is recommended.
- (4) Restart the multimeter and insert the USB flash device.
- (5) If the problem persists please contact **RIGOL** for service options.