

DC Bidirectional Digital Multimeter

Introduction

SIN9020S is a multifunctional meter that is able to measure voltage, current, charge and discharge capacity, time, power and many other physical quantities. It also can set parameters to achieve protective functions like over voltage protection, over current protection, over-charge capacity protection and limited-time protection. The measured data will be displayed with colorful LCD, and the information is comprehensive and humane. This instrument is ideal for monitoring the output of voltage and current, as well as the battery charge and discharge applications.

Main Characteristics

1. Bidirectional detection of current makes it convenient for users who want to detect charge and discharge to detect bidirectional current without changing the wiring.
2. Power off memory function enables the instrument to remember the AH value before power failure, which makes observation and measurement convenient.
3. Time and AH value clear function will not affect the next measurement.
4. AH value can be filled and it doesn't affect the measurement of direct discharge.
5. Voltage, current, charge capacity (AH value), WH value, time, power are displayed simultaneously, and the displayed information are comprehensive and clear.
6. With a function key of output shutdown, turning on or off the output is flexible.
7. Protection features including over-voltage protection, over-current protection, over-power protection, limited-time protection, overcharge protection, etc.
8. Online calibration enables users to correct the error promptly.
9. LCD display can be turned off when necessary to reduce power consumption.

Technical Indicators

Project		Parameters
Voltage Measuring Range	Measuring Range for Self-supply Power	10V~90V
	Measuring Range for External-supply Power	0~90V
Input Current\ Output Current Measuring Range		0~20A
Display Method		Colorful LCD Display
Display Resolution	Voltage	0.01V
	Current	0.01A
	Capacity	0.01AH
	Time	0.01H
Precision	Voltage	± 1% + 2 digits
	Current	± 2% + 5digits
Measurement Rate		5 times / sec
Protection Type and Setting Range	VOP(Voltage Over Protection)	0.01V~90V
	OPP(Over Power Protection)	0.01W~9.99KW
	OCP(Over Current Protection)	0.1~100A
	OAH(Over AH Protection)	0.01AH~999AH
OFT (Out of Time Protection)		0.01H~99.9H
Dimensions (length × width × height)		79×43×52 (mm)
Open Hole (mm)		76.5×39.2 (mm)

Table 1 Technical indicators of SIN9020S

Note: This multimeter has LOP function display but cannot achieve LOP function because no relay is equipped.

Panel Description

This instrument is a split structure, composed of two parts, meter and power expansion board. The front panel is as Figure 1 while the power expansion board is as Figure 2.



Figure 1 Meter's Front Panel of SIN9020S

Grade	Explanation
1	Voltage values
2	Current values
3	Percentage of capacity and progress bar
4	AH value (blue), Power values (yellow)
5	WH value(blue), Time value (yellow)
6	Menu of protection option
7	Buttons

Table 2 Meter's Front Panel Description of SIN9020S



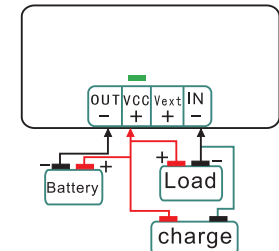
Figure 2 Power Expansion Board of SIN9020S

Wiring

There are four wiring ports on the back of the meter, which are "OUT -", "VCC +", "Vext +" and "IN -". "Vext +" is positive terminal for external-supply power in three-wire connection system. "VCC +" is not only the positive of the power supply, but also the positive of the load.

There are two-wire connection and three-wire connection for this instrument. For the two-wire wiring system, users can connect the instrument directly to the power supply, while the three-wire connection system requires an external supply power separately to support.

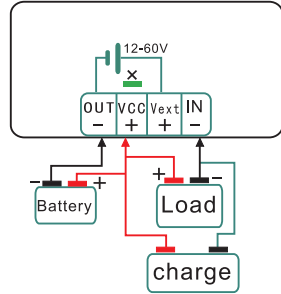
Wiring diagram and method for self-supply power (battery)



Two-wire connection system:

The positive of the battery, the positive of charge and the positive of the load should be connected to the common "VCC+". The negative of the battery should be connected to "OUT-". The negative of the load and negative of charge should be connected to "IN-". Attention to the direction of positive and negative when wiring, do not take the reverse.

Wiring diagram and method for external-supply power



Three-wire connection system:

Open the back cover of the instrument, and pick apart the short-circuit point with a soldering iron. Connect the positive of external power supply to the "Vext +", while the negative of external-supply power should be connected to the "OUT-". Then connect the positive of the load, battery and charge to "VCC +", while the negative of the load and charge should be connected to the "IN-". The negative of battery should be connected to "OUT-". Pay attention to the direction of positive and negative when wiring, be careful not to reverse.

Instructions

● Wiring

Select the appropriate wiring based on the range of the measured voltage. Ensure that the input voltage is within the tolerance range of the instrument.

Note:

The range of input voltage for self-supply power: 10V ~ 90V;
The range of input voltage for external-supply power : 0V ~ 90V.

● The Output

If the instrument is connected to a relay, click on the \uparrow \downarrow button to move the yellow cursor to the "OUT" point, and click on the "OK" button to control output. If the "OUT" light is shown

in green, it means the output is open. If the "OUT" light turns gray, then the output is off and the power state on the machine defaults to the state before last shutdown. If the instrument is not connected to a relay, the output stays on, and the OUT light fails.

● Expand Function Settings

If you want to open an expand functions, move the yellow cursor to the corresponding item, and click the "OK" button to make the corresponding indicating light turns green. The light turning green means this protection is on while turning gray means off. Before turning on the protection function, user should set protection parameters first by pressing "OK" button for three seconds or so to enter the protection parameters settings page. And then increase or decrease the parameter by the \uparrow \downarrow button. Click "OK" to return to the initial interface when all the parameters are set. Factory default parameters for each function are 000.

NOTE: If you didn't set any parameters in the adjustment page, you need to click on the \uparrow button for once and \downarrow button for once then click on the OK button to return to the original page.

● Expand Function Introduction

① **"OVP", Over Voltage Protection.** If user sets OVP value and opens the OVP protection option, when the input voltage exceeds the limited voltage, the instrument will cut off the output automatically and the "OUT" light will change from green to gray. To restore output after the protection option is turned off, move the yellow cursor to "OUT" and click the "OK" button to reopen output.

② **"OPP", Over Power Protection.** If user sets OPP value, and opens the OVP protection option, when the output power exceeds the limited power, the machine will cut off the output automatically and the "OUT" light will change from green to gray. To restore output after the protection option is turned off, move the yellow cursor to "OUT" and click the "OK" button to reopen output.

③ **"OCP", Over Current Protection.** If user sets OCP value, and opens the OCP protection option, when the input current exceeds the limited current, the machine will cut off the output automatically and the "OUT" light will change from green to gray. To restore output after the protection option is turned off, turn off the protection option and return to normal output.

④ **"OFT", Out of Time Protection.** If the OFT value is set, and the OFT protection option is selected, when the operating hours exceeds the set operating hours, the machine will cut off the output automatically and the "OUT" light will change from green to gray. To restore output after the protection option is turned off, move

the yellow cursor to "OUT", and click on the "OK" button to reopen output.

⑤ **"OAH", Over AH Protection.** If OAH value is set, and the OAH protection options is selected, when the accumulative AH value exceeds the set value, the machine will cut off the output automatically and the "OUT" light will change from green to gray. To restore output after the protection option is turned off, turn off the protection option and restore normal output. Percentage of the displayed capacity is the ratio of actual measured value and the set AH value. Percentage of capacity = (actual measured AH value / set AH value) * 100%.

⑥ Move the cursor to "OUT", press "OK" button for three seconds or so and the meter will enter sleep state. When the meter is in **sleep state**, though the LCD display will not show values, CPU still works properly. Clicking on the \uparrow button or \downarrow button can wake the LCD display.

⑦ **AH value and time clear function.** Move the yellow cursor to "LOP", and then click on the \downarrow button. Click on the "OK" button when the yellow cursor disappears, and then the time is cleared. Also, the AH value can be cleared or filled by setting the "OAH" value.

Current value clear function. When the no-load current value is not zero, user can move the yellow cursor to "OUT" and press "OK" button for three seconds to clear current value.

⑧ **"OUT" arrow function.** When the arrow behind "OUT" is green and points to left, it means the current is in inflow state and the AH value will increase with time. When the arrow behind "OUT" is red and points to right, it means the current is in outflow state and the AH value will reduce with time. Pay attention to wiring method when wiring.

Note

1. This multimeter does not have relay.
2. The measuring range must not exceed the voltage and current ranges, otherwise the instrument will be damaged.
3. Positive and negative cannot be reversed, the measuring is not correct if it's reversed.
4. Working temperature is 10 ~ 50°C. Storage temperature is 20 ~ 70°C. Keep the instrument in a dry environment.
5. Please do not move the instrument violently when the instrument is working properly, in order to avoid severe irreparable damage to the internal circuit.