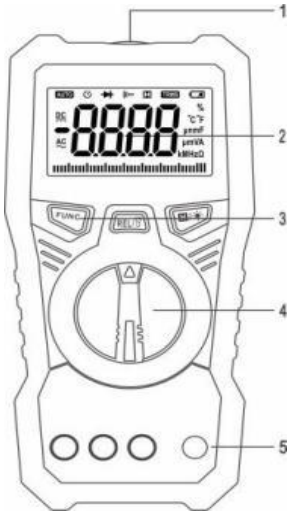
BEETECH®

SOLAR MULTIMETER

Model: **B - 595**

Instruction Manual

FRONT PANEL DESCRIPTION



1) Flashlight
2) LCD Display
3) Function Keys
4) Rotary Switch
5) Input Jacks

INTRODUCTION

Congratulations on your purchase of B-595 solar digital multimeter, which has been designed according to IEC-61010-2-032 concerning electronic measuring instruments with CAT III 1000V & CAT IV 600V and pollution control. Excellent reliability brings high efficiency and convenience to your measurement and ensures B-595 to be an ideal tool for field application, laboratories, factory, hobbyist, as well as household applications.

To fully utilize this multimeter, please keep this manual for reference carefully.

FEATURES

- Stable performance with comfortable hand grip and solid housing.
- Withstand 1.5 meters fall test.
- Max.6000 count display with LCD size: 60x36.5mm.
- Full function protection, withstand max.2000V overvoltage impact, as well as overvoltage and overcurrent alert.
- Large capacitance extension range with fast response.
- Audio visual alert featured NCV detection.
- Max ACV/DCV up to 2000V and AC / DC Current.
- Backlight and inbuilt flashlight for visibility in any conditions.

SAFETY SYMBOLS

⚠ This symbol indicates that the operator must refer to an explanation in the Operating Instruction for further information.

⏚ Earth ground

⧈ Double insulation

⚠ Danger voltage

SAFETY CAUTION

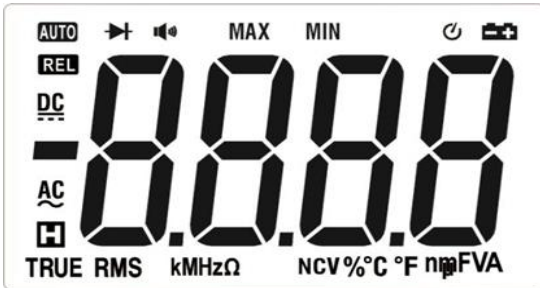
- Before operating this instrument, warm-up for 30 seconds is required.
- Inspect the condition of the test leads and the meter for any damage before operating the meter.
- The multimeter can only be used with the equipped test leads to measure. If the test leads need to be replaced, they must have the same electrical specification as the original test leads.
- If multimeter is operated in a noisy condition, the readings of meter might be unstable, or even with the large errors due to interference.
- Always remove the test leads before replacing the battery or fuses.
- Use great care when making measurements if the voltages are greater 30VAC RMS or 60V DC, these voltages are considered a shock hazard.
- To avoid damage to the meter, do not exceed the maximum limits of the input values shown in the specification.
- Always discharge capacitors and remove power from the device under test before performing Diode, Resistance or Continuity tests.
- Once "  " appears in LCD, to replace the battery for accurate readings.

MAINTENANCE

To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.

To avoid electric shock, do not operate the meter until the battery and fuse covers are in place and fastened securely.

SYMBOLS OF LCD DISPLAY



DESCRIPTION OF FUNCTIONAL KEYS

Symbol	Description	Symbol	Description
H	Data Hold		Low Battery indication
	Diode Test		Continuity Check
Hz KHz MHz	Units of frequency	**nF uF mF**	Units of Capacitance
Ω KΩMΩ	Units of Resistance	**uA mA A**	Units of Current
DC	Direct Current	**AC**	Alternating Current
℉	Fahrenheit	**℃**	Centigrade
TRMS	True RMS		

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Press this button to shift the functions among ℃/℉; Hz/%; Ω/•))) /⊣⊢/Capacitance; DCV/ACV/Hz/%; DCA/ACA/Hz/%; NCV/LIVE. Hold this button to activate manual mode, hold again to return auto mode.

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Hold this button to activate backlight and flashlight function, press again to exit; slightly press to active data hold mode.

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Slightly press this button to activate relative measurement function, the meter reads the value as reference, after that the displayed values is the real measurement minus the reference value, press this button again to exit, press again to exit REL mode; Hold this button to activate MAX/MIN shift, press again to exit MAX/MIN mode.

TECHNICAL SPECIFICATIONS

Operating Temperature	0-40 °C（<80%RH）
Storage Temperature	-10~60 °C（<70%RH) Battery excluded
Max. input voltage between input socket and the earth	AC/DC 2000V
Measurement Principle	Double integral A/D conversion
Sampling rate	Approx. 3 times/sec
Input polarity indicator	Automatically display "–"
Low battery indicator	When battery is running shortly,  will appear in LCD display
Product size	185(W)x88(L)x54(H)mm
Weight	About 355g (battery included)
Accuracy	±（%readings + digit）,
Environmental temperature	18℃~28℃, humidity: ≤80%
Accessories • User manual-1pc • Test leads-1Set • Temperature probe-1pc	

DC VOLTAGE (DCV) /AC VOLTAGE (ACV)

Range	Resolution	DCV	ACV
600mV	0.1mV	±(0.5%+3d)	±(0.8%+3d)
6V	0.001V		
60V	0.01V		
600V	0.1V		
1000V	1V	±(0.8%+5d)	±(1%+5d)
2000V	1V	±(2%+2d)	±(2%+5d)

- Input impedance: 10MΩ
- Max. input voltage: mV range250V RMS DC/AC.
- 1000 V range 1000V RMS DC/AC; 2000V range 2000V RMS DC/AC

DC CURRENT (DCA) / AC CURRENT (ACA)

Range	Resolution	DCC	ACC
600uA	0.1uA	±(1.0%+3d)	±(1.0%+5d)
6000uA	1uA		
60mA	0.01mA		
600mA	0.1mA		

- Max. current：uA mA jack: 600mA/1000V fuse

FREQUENCY / DUTY CYCLE

Range	Resolution	Accuracy
1Hz～10MHz	0.001Hz～0.01MHz	±(0.1%+4d)
0.1-99.9%	0.1%	±(2.0%+5d)

- Overload protection: 600VDC/AC RMS

RESISTANCE (Ω)

Range	Resolution	Accuracy
600Ω	0.1Ω	±（0.8%+3d）
6kΩ	0.001KΩ	
60kΩ	0.01KΩ	
600kΩ	0.1KΩ	
6MΩ	0.001MΩ	
60MΩ	0.01MΩ	±(1.0%+5d)

- Overload protection：600VDC/AC RMS
- Measured resistance value = displayed value – test lead circuit short value.

DIODE/CONTINUITY

Range	Description
	Built-in buzzers will be sounded if resistance is less than 50Ω
	Display forward voltage drop of diode, opposite displays “OL”

- Overload protection: 600VDC/AC RMS

TEMPERATURE (TEMP)

Range	Resolution	Accuracy
-50℃ ~ 0℃	1℃	±4
0℃~300℃		± (1.0% + 3d)
300℃~1300℃		±(2.0% + 3d)
-58℉ ~ 32℉	1℉	±6
32℉ ~ 572℉		±(1.0% + 4d)
572℉~2372℉		±(2.0% + 5d)

- Overload protection: 300VDC/AC RMS

CAPACITANCE(CAP)

Range	Resolution	Accuracy
6nF	0.001nF	±(3.5%+5d)
60nF	0.01nF	
600nF～6uF	0.1nF～0.001uF	
60uF～600uF	0.01uF～0.1uF	
6mF~60mF	0.001mF~0.01mF	±(10%+5d)

- Overload protection: 300VDC or AC RMS

⚠ **Note:**
It is normal that if the small value of capacitance does not return zero, deduct the readings during measurement for getting the accurate value.

AC CURRENT (BY CLAMP PROBE)

Range	Resolution	ACA
600A	0.1A	±(2.5%+5d)

- Overload protection: 600A RMS
- Frequency: 40Hz – 60Hz

OPERATION INSTRUCTION

AC/DC VOLTAGE, FREQUENCY, DUTY CYCLE MEASUREMENT

1. According to voltage measurement requirements, select the suitable range 
2. Set the rotary switch to the desired range based on the demands of the voltage under test.
3. Insert the black test lead into COM jack, for measuring voltage value less than 1000V, insert the red test lead jack into  ; for measuring voltage value over 1000V, insert the red test lead into 2000V jack.
4. Touch the black test probe tip to the negative side of the circuit; touch the red test probe tip to the positive side of circuit.
5. Press  to shift mode among AC voltage, DC voltage, frequency, duty cycle.

⚠**NOTE：**

- In small range testing, even without input or connection of test leads, the meter may display the value that is normal and not affect the accuracy of the measurement.
- To avoid electrical shock and/or damage to the instrument, do not attempt to take any voltage measurement that might exceed 1000VDC/VAC RMS.

AC/DC CURRENT, FREQUNECY, DUTY CYCLE MEASUREMENT

1. According to current measurement requirements, select suitable range and press  to  select  DC current, AC current, Frequency, Duty Cycle mode.
2. Set the rotary switch to desired range based on the demands of the current under test.
3. Inert the black test lead into COM jack, red test lead into μA mA jack.
4. Remove the power from the circuit under the test and discharge the capacitors of the circuit.
5. Connect the black test lead to the lower voltage end of the circuit under test, and connect the red test lead to the higher voltage end of the circuit under test. (In series with the circuit to be tested)
6. Read the value in the LCD display.

⚠**NOTE：**

- According to current range and demands of insert jack to select the measuring ranges, max. current is less than 600mA in μA mA jack.
- Never attempt to input the current more than input jack requirements to avoid damage meter

AC HIGH-CURRENT MEASUREMENT

1. According to current measurement requirements, set the rotary switch to 
2. Insert the black plug of the current clamp into COM jack, and red plug of current clamp  into jack.
3. Put the conductor under test in the middle of the current clamp, and only one conductor can be tested at one time.
4. Read the value in the LCD display.

⚠**NOTE:**

- Never attempt to input the current more than max. rating value of current clamp.

TEMPERATURE MEASUREMENT

1. Set the rotary switch to  and press  to select ℃/℉ mode.
2. LCD displays values of environmental temperature.
3. To Insert the K-type temperature probe, Plug In Red plug into the input
4. jack, insert black plug of thermocouple probe into COM jack, making sure to observe the correct polarity.
5. Read the temperature value in the LCD.

⚠**NOTE:**

- Since cold-junction compensating circuit installed inside the meter, it takes long time to reach the thermal balance with the measuring environment, the meter needs to be placed in the measuring environments for a longer time to get the more accurate readings.

RESISTANCE, DIODE, CONTINUITY MEASUREMENT

1. Set the rotary switch to  and press  to select resistance, diode, continuity mode.
2. Insert the black test lead into COM jack and red test lead into 
3. Place the red test lead on the anode of diode and black test lead on the cathode of diode, the meter will show values in the LCD display.
4. Touch the test probe tips to the circuit or wire you wish to check, the max. value of resistance under check will be shown in display, if the resistance is less than 50Ω, the audible signal will be sounded.
5. Read the values in LCD display. (diode unit is “V”; continuity, resistance unit is “Ω”)

⚠**NOTE:**

- Disconnect power to the unit under test and discharge all capacitors before taking test.
- To avoid damaging the meter, do not input any voltage.

CAPACITANCE MEASUREMENT

1. Set the rotary switch to and press FUNC RANGE to select capacitance mode.
2. Insert the black test lead into COM jack and red test lead into
3. Discharge all capacitors under testing.
4. Touch the test leads to the capacitor to be tested, black test lead connect to the negative and red test lead connect to the positive of capacitor.
5. Read the value in LCD display.
6. When measuring the small value capacitors, the meter may not return to zero due to interference, press REL MAX/MIN to clear 0 first, and then to proceed with the capacitance measurement.

⚠ **NOTE:**

- Disconnect power to the unit under test and discharge all capacitors before test.
- To avoid damaging the meter, do not input any voltage.

FREQUENCY/DUTY CYCLE MEASUREMENT

1. Set the rotary switch to range.
2. Insert the black test lead into COM jack and red test lead into Jack.
3. Touch the test lead tips to the circuit under test.
4. Read the frequency value in the LCD display.

⚠ **NOTE：**

- Slightly press FUNC RANGE to select “Hz” or “%” mode.
- To avoid electric shock, do not apply more than 300VAC before taking measurements.

NON-CONTACT VOLTAGE (NCV) DETECTION

1. Set the rotary switch and the LCD display “EF”
2. Approach the top part of meter with the circuit under test, the audible alert signal will be sounded and LED blinked, the LCD shows “----” icon once voltage detected.
3. The LCD shows voltage intensity, a greater number of grids appears means voltage is strong.

⚠ **NOTE:**

- The detection result is for reference; do not determine the voltage by NCV detection ONLY.
- Detection may interfere with socket design, insulation thickness and other variable conditions.
- External interference sources, such as flashlights, motor, etc., may cause the wrong detection.
- Do not measure voltage under NCV range.

BATTREY INSTALLATION

To avoid the false readings, replace the battery as soon as the battery indicator  appears.

1. Turn power off and disconnect the test leads from the meter.
2. Open the rear battery cover by using a screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery cover back in place, secure with the screws.

REPLACING THE FUSE

1. Turn power off and disconnect the test leads from the meter.
2. Remove the battery cover and the battery.
3. Remove the screws by securing the rear cover.
4. Gently remove the old fuse and install the new fuse into the fuse holder.
5. Replace and secure the rear cover, battery and battery cover.

BEETECH WARRANTY POLICY

BEETECH Instruments are free from defects in workmanship and functioning, under normal and appropriate use and conditions, for a period of one 1 year from the original invoice date.

During the Warranty period of one year the original purchaser is warranted against the instruments purchased. During this period BEETECH will repair or replace (at its decision) the defective unit subject to verification of the defect or the malfunction (If a manufacturing defect) at Free of Cost (except shipping charges - to & from, handling charges, packing charges, insurance charges, etc., which must be incurred by the customer).

This warranty does not cover disposable batteries, or any damage caused due to abuse, neglect, accident, unauthorized opening or repair, alteration, contamination, or any other abnormal conditions of operation or handling.

Such repairs or replacements are primarily subject to verification of manufacturing defects or malfunction and proof of purchase as confirmed by inspecting the product and the original, dated, purchase invoice. Buyers are to retain purchase invoices for a minimum of one year for warranty

To summarize, warranty does not include:

1) Any condition resulting from other than ordinary and usual use for which the product was not intended.
2) Any condition resulting from incorrect or inadequate usage, application, maintenance, or care.
3) Damage resulting from misuse, incorrect application, abuse, negligence, accidents or shipping damage
4) Normal wear and tear or damage in transportation or in transit.
5) If the device has been opened, inspected, or modified by the user the warranty is void and cannot be claimed.
6) Batteries, Testing leads, and functional accessories are out of warranty policy.
7) Any defect which is not a manufacturing defect.

CALIBRATION CERTIFICATE

This Certificate guarantees that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which is calibrated to standards traceable to International and National standard.

(This instrument does not require further calibration until the period of one year from date of use)