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English

Revision B1

FIRMWARE REVISIONS
This manual applies directly to instruments that have the firmware **Rev. A8**

[AT851 Battery Aging Tester]

User's Guide

Safety Summary

Warning Dangerous :

When you notice any of the unusual conditions listed below, immediately terminate operation and disconnect the power cable.
Please Contact Applent Instruments Incorporation sales representative for repair of the instrument. If you continue to operate without repairing the instrument, there is a potential fire or shock hazard for operators.

Instrument operates abnormally.
Instrument emits abnormal noise, smell, smoke, or a spark-like light during the operation.
Instrument generates high temperature or electrical shock during operation.
Power cable, plug, or receptacle on instrument is damaged.
Foreign substance or liquid has fallen into the instrument.

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Disclaimer	Applent Instruments assumes no liability for the customer's failure to comply with these requirements.
Ground The Instrument	To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.
DO NOT Operate In An Explosive Atmosphere	Do not operate the instrument in the presence of inflammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
Keep Away From Live Circuits	Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.
DO NOT Service Or Adjust Alone	Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
DO NOT Substitute Parts Or Modify Instrument	Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to an Applent Instruments Sales and Service Office for service and repair to ensure that safety features are maintained.

CERTIFICATION, LIMITED WARRANTY, & LIMITATION OF LIABILITY

Applent Instruments, Inc. （shortened form **Applent**）certifies that this product met its published specifications at the time of shipment from the factory. Applent further certifies that its calibration measurements are traceable to the People's Republic of China National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility or by the calibration facilities of other International Standards Organization members.

This Applent instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its component products. **The warranty period is 1 years and begins on the date of shipment.** During the warranty period, Applent will, at its option, either repair or replace products that prove to be defective. This warranty extends only to the original buyer or end-user customer of a Applent authorized reseller, and does not apply to fuses, disposable batteries or to any product which, in Applent's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation or handling.

For warranty service or repair, this product must be returned to a service facility designated by Applent. The buyer shall prepay shipping charges to Applent and Applent shall pay shipping charges to return the product to the Buyer. However, the Buyer shall pay all shipping charges, duties, and taxes for products returned to Applent from another country.

Applent warrants that its software and firmware designated by Applent for use with an instrument will execute its programming instruction when properly installed on that instrument. Applent does not warrant that the operation of the instrument, or software, or firmware, will be uninterrupted or error free.

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. APPLENT SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT, RELIANCE OR ANY OTHER THEORY.

Applent Instruments, Inc.
Changzhou,
Jiangsu,
China,
Rev.A2 January, 2005
Rev.B0 January, 2008

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1. Unpacking and Preparation

!

This chapter describes how to set up and start the AT851.

- Incoming Inspection
- Power Requirements
- Setting up the Fuse
- How to Remove the Handle
- Environmental Requirements
- Cleaning

1.1 Incoming Inspection

After you have received the instrument, carry out inspection during unpacking according to the following procedures.

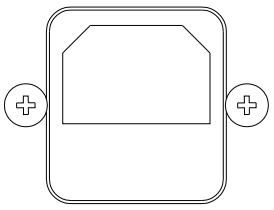
WARNING

If the external face of the instrument (such as the cover, front/rear panel, VFD screen, power switch, and port connectors) appears damaged during transport, do not turn on the power switch, in case that get an electrical shock.

Check whether the packing box or shock-absorbing material used packaging the instrument has been damaged.
Referring to <Packing List> in the packing box, check whether all packaged items supplied together with the meter have been provided as per the specified optioned.

1.2 Setting up Fuse

Figure 1-1
Fuse Holder



~Line: 110VAC/220V AC
20VA MAX
Fuse: 250V 1A
Slow Blow

Please use the following fuse type.

UL/CSA type, Slow-Blow, 5×20-mm miniature fuse, 1A, 250 V

To verify and replace the fuse, remove the power cable and pull out the fuse holder.
Two fuses in Fuse Holder.

1.3 Environmental Requirements

Set up the AT851 according to following environmental requirements.

Operating Environments
Ensure the operating environment meets the following requirements.
Temperature: 0°C to 55°C
Temperature range at calibration: 23°C±5°C (<1°C deviation from the temperature when performing calibration)
Humidity: 15% to 85% at wet bulb temperature ≤ 40°C (non-condensation)
Altitude: 0 to 2,000m
Vibration: Max. 0.5 G, 5 Hz to 500 Hz

1.4 Cleaning

To prevent electrical shock, disconnect the AT851 power cable from the receptacle before cleaning.
Use dry cloths or cloths slightly dipped in water to clean the case.
Do not attempt to clean the internal of the AT851.

WARNING: Don't Use Organic Solvents (such as alcohol or gasoline) to clean the Instrument.

1.5 How to Remove the Handle

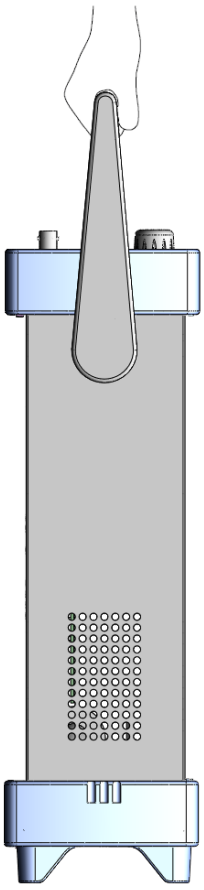
A handle kit is attached to the AT851:

1 Retracted

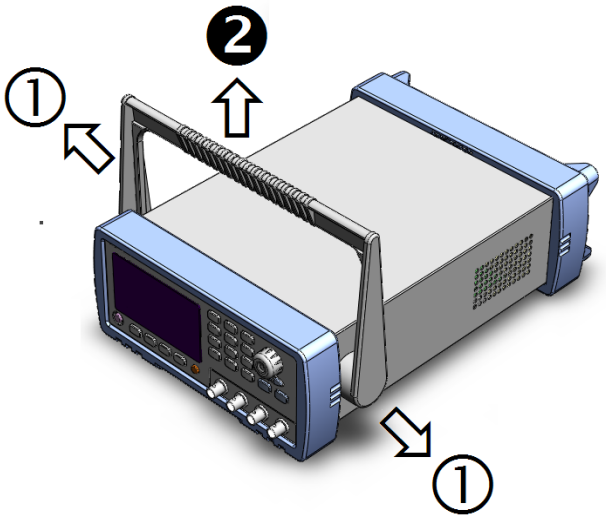
⇩

2 Extended

⇨



3 Carrying Position



Remove Handle（*Lift the handle perpendicular to the unit while pulling it in the direction of 1.*）

2. Overview

This chapter contains general information about Z9500 .The information is organized as follows

- Introduction
- Main Specifications
- Feature overview

2.1 Main Specification

- DC INPUT RATE: AT8511:150W/120V/30A，8512：300W/120V/30A
- CONSTANT CURRENT: 0~30A
  Accuracy:0.2%
- CONSTANCE VOLTAGE: 0~120V
  Accuracy: 0.1%
- CONSTANCE POWER: 0~150W(AT8511), 0~300W(AT8512)
  Accuracy:1%
- CONSTANCE RESISTANCE： 0~4000Ω
  Accuracy: 1%
- Battery Aging Test: Discharge – Charge – Rest
- Battery Aging Charge and Rest Timer: 9999 minutes
- Battery Capacity: 999.99AH
- Battery Discharge Timer: 999H
- Maximum Loop Times: 999 times

2.2 Features

- VFD Display
- Operation Mode:
  NORMAL (CC/CV/CP/CR) , TRANSIENT (TRN), SEQUENCE LIST (SEQ), AUTOMATIC TESTING FUNCTION (ATF), BATTERY TESTING FUNCTION and SHORT CIRCUIT TEST (SHT).
- Protections:
  Over Voltage (OV), Over Current (OC), Over Power (OP) and Over Heat (OH) protection.

3. Start up

This chapter describes names and functions of the front panel, rear panel, and screen display and provides the basic procedures for operating AT851.

- Front panel summary
- Rear panel summary
- Power-up
- How to connect with AT851

3.1 Front panel

Figure 3-1 Front panel

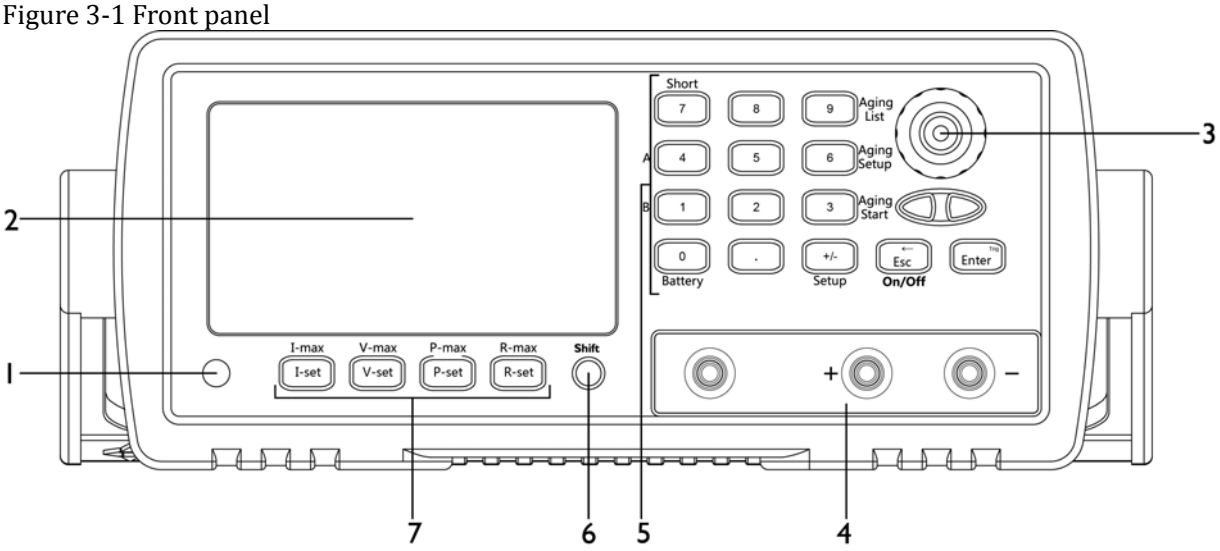


Table 3-1 Front panel description

No.	Name and Description
1	POWER SWITCH. Push down: ON, Push up: OFF
2	VFD. Displaying measurement results, instrument status and user's interface menus.
3	Knob. To choose menu item and input number
4	Terminals.
5	Keypad II, Multi-function keys: Numeric and 2nd Function.
6	Shift. Pressing this key before using 2nd Function.
7	Keypad I, Dual-Function keys: 1st Function and 2nd Function.

3.2 VFD

Figure 3-2 VFD

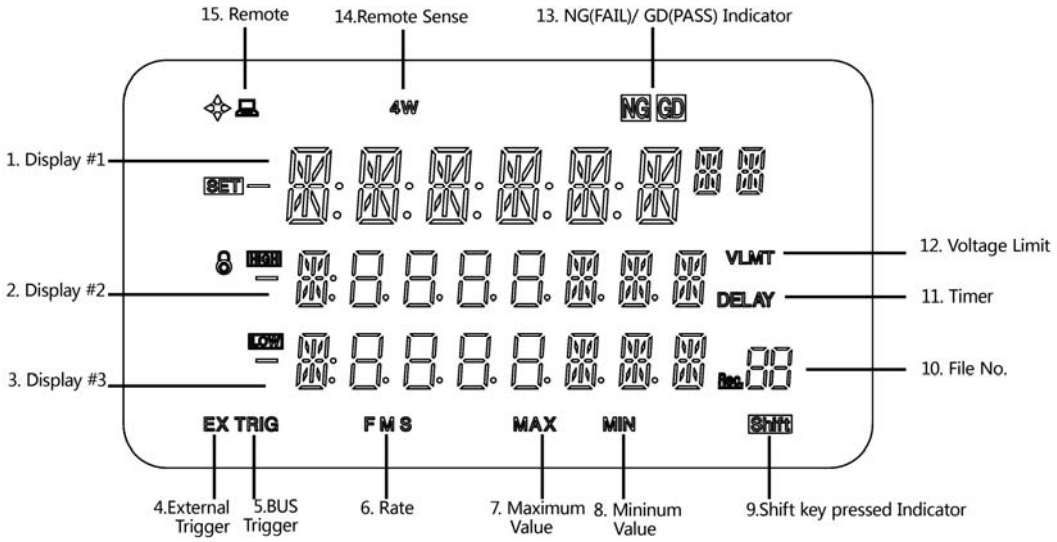


Table 3-1 VFD Description

ID	Name	Description
1	Display #1	The No.1 Display Line. Display voltage measurement.
2	Display #2	The No.2 Display Line. Display current, power or resistance measurement
3	Display #3	The No.3 Display Line. Display the Operation Mode and Input ON/OFF status. Normal Operation Mode: CC/CV/CP/CR Transient Operation Mode: TRN Sequence List Operation Mode: SEQ Automatic Testing Function: ATF Battery Testing Function: BAT Short Circuit Operation: SHT
4，5	EX TRIG	TRIG: BUS Trigger Indicator EX TRIG: External Trigger Indicator (See also: Trigger)
6	FMS	Rate Indicator. F: Fast, M: Medium, S: Slow
7	MAX	Maximum Value.
8	MIN	Minimum Value.
9	Shift	Lit when Shift key pressed.
10		File No.
11	DELAY	Load on Timer Function start working.
12	VLMT	Display when Von/Voff Operation start working
13	NG GD	Display the comparator result in ATF mode.
14	4W	Remote sense function is ON.
15	💻	Remote operation function is ON

3.3 Keypad

Figure 3-3 Keypad I

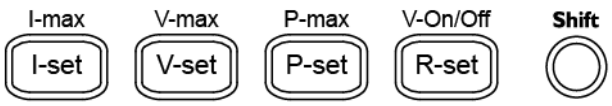


Figure 3-4 Keypad II

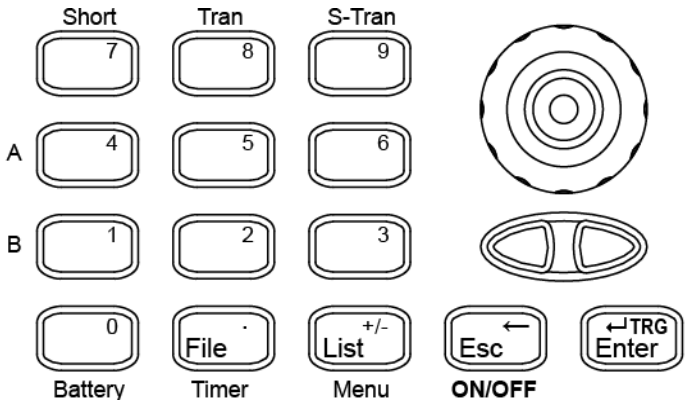
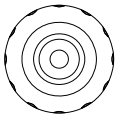
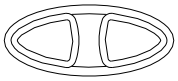
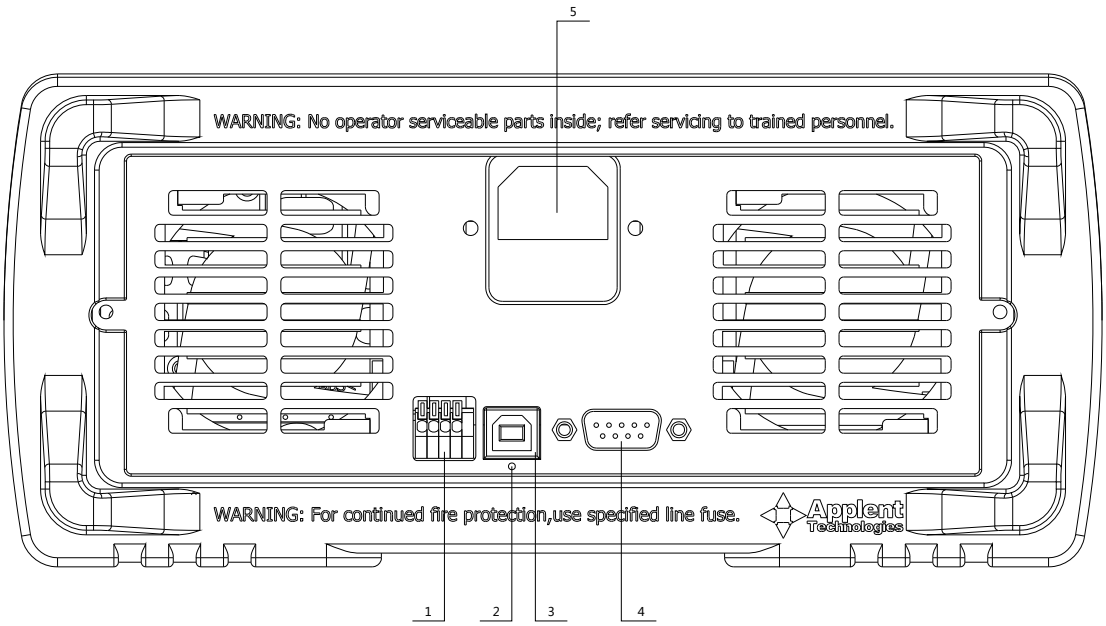


Table 3-2 Keypad description

Key	Description
I-Set	Set up a constant current from 0 to Max current. “CC” will be shown on Display #3.
Shift+I-max	Set up Max current value. The I-Max setup page will be displayed.
V-Set	Set up a constant voltage from 0 to Max voltage. “CV” will be showed on Display #3
Shift+V-max	Set up Max voltage value. The V-MAX setup page will be displayed.
P-Set	Set up a constant power from 0 to Max Power. “CP” will be showed on Display #3.
Shift+P-max	Set up Max power value. The P-Max setup page will be displayed.
R-Set	Set up a constant resistance from 0 to 4000Ω. “CR” will be showed on Display #4
Shift+V-On/Off	Set up Von value and Voff value for Von/Off operation. “VLMT” indicator will be showed on VFD.
File	File Save/Read/Erase Operation. The FILE setup page will be displayed.
List	Sequence List Operation. The LIST setup page will be displayed.
	Rotary knob to adjust the value in Test and Setup mode. Rotary knob to choose menu in menu mode.
	Choose menu item.
Esc	Escape
Enter	Enter.
Shift+Battery	Battery Testing Mode. The “BAT” will be showed on Display #3.
Shift+Short	Short circuit Operation Mode. The “SHT” will be showed on Display #3.
Shift+Tran	Enter Transition Operation Mode. The “TRN” will be showed on Display #3
Shift+ S-Tran	Set up the transition parameter.
Shift+Timer	Load on Timer Operation Mode. The “DELAY” indicator will be showed.
Shift+Menu	Menu List Page.

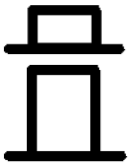
3.4 Real panel

Figure 3-5 Real panel



1. Handler Interface. (Include External Trigger Input and Remote Sense)
2. NC
3. NC
4. RS232C Interface.
5. Power Inlet (Built-In fuse type)

3.5 Power On/Off



Power On

Power Off

3.5.1 Warm-up Time

AT851 is ready to be used as soon as the power-up sequence has completed. However, to achieve the accuracy rating, warm up the instrument for 30 minutes is necessary.

3.6 Application Connections

3.6.1 Wiring Considerations

WARNING
FIRE HAZARD

To satisfy safety requirements, load wires must be heavy enough to not overheated while carrying the short-circuit output current of the device connects to AT851.

Input connections are made to the + and - binding posts on the front panel. A major consideration in making input connections is the wire size.
The minimum wire size required to prevent overheating may not be large enough to maintain good regulation. Stranded, copper wires are recommended to use. The wires should be large enough to limit the voltage drop no more than 0.5 V per lead.

3.6.2 Local Sense Connections

Figure 3-6 Local Sensing

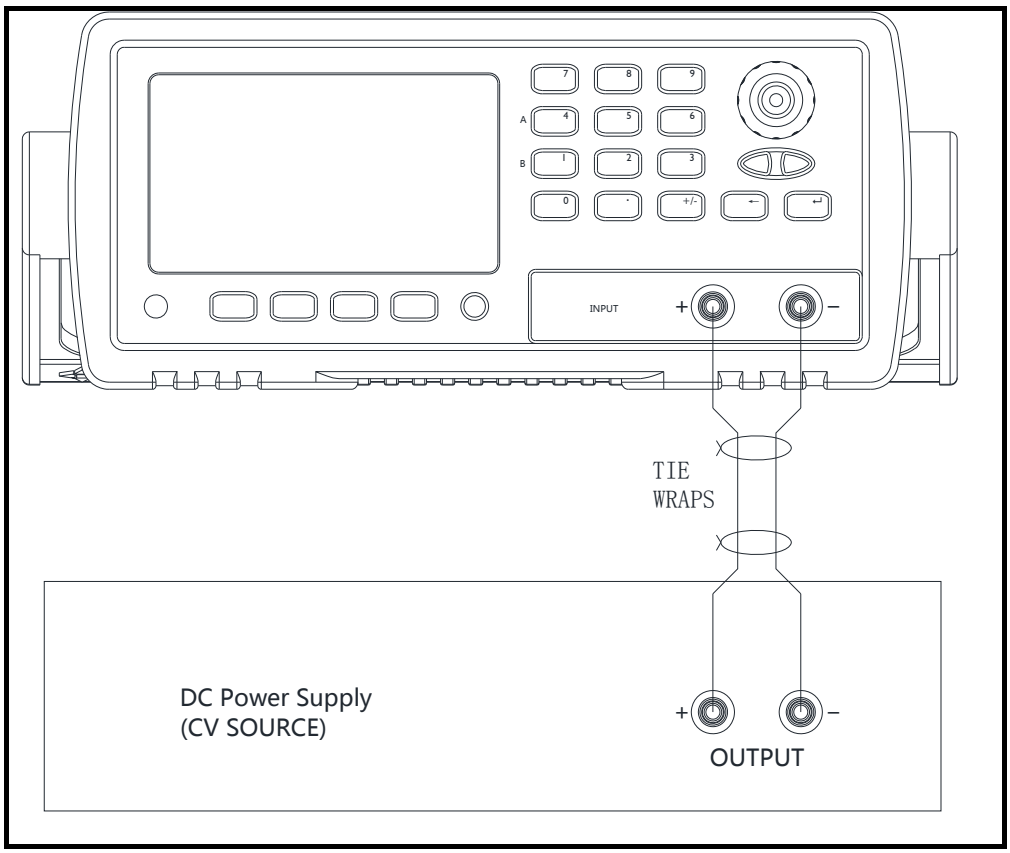


Figure 3-7 The remote sensing interface on real panel.

3.6.3 Remote Sensing Connections

The remote sense terminals of AT851 are connected to the output of the power supply. Remote sensing compensates for the voltage drop in applications require long lead lengths.

Before using remote sensing connections, you must set the MENU-SENSE to ON state. A “4W” indicator will be displayed on VFD.

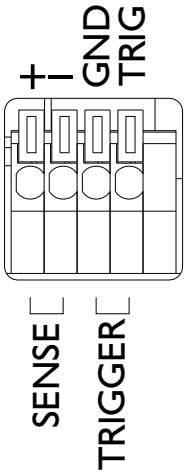
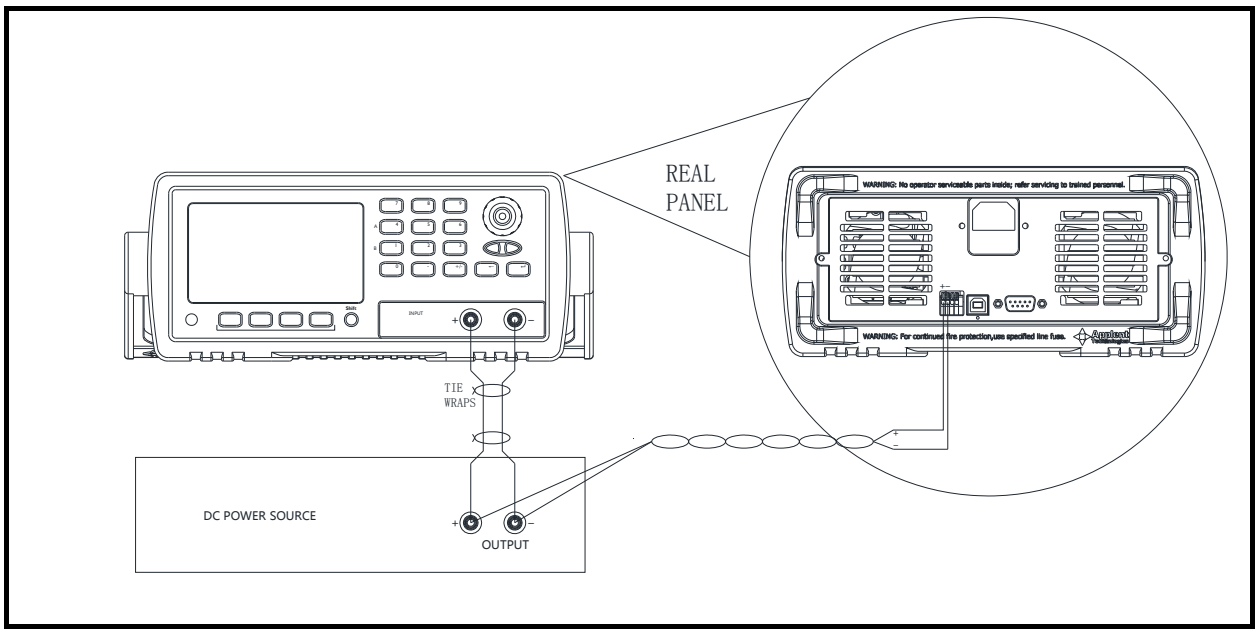
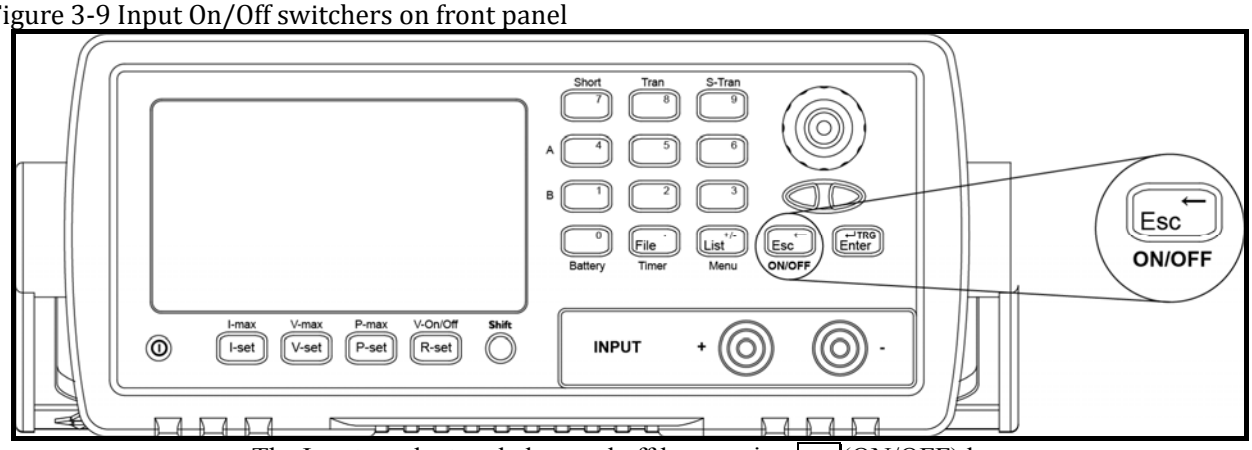


Figure 3-8 Remote Sensing



3.7 Turning the Input On/off

Figure 3-9 Input On/Off switchers on front panel

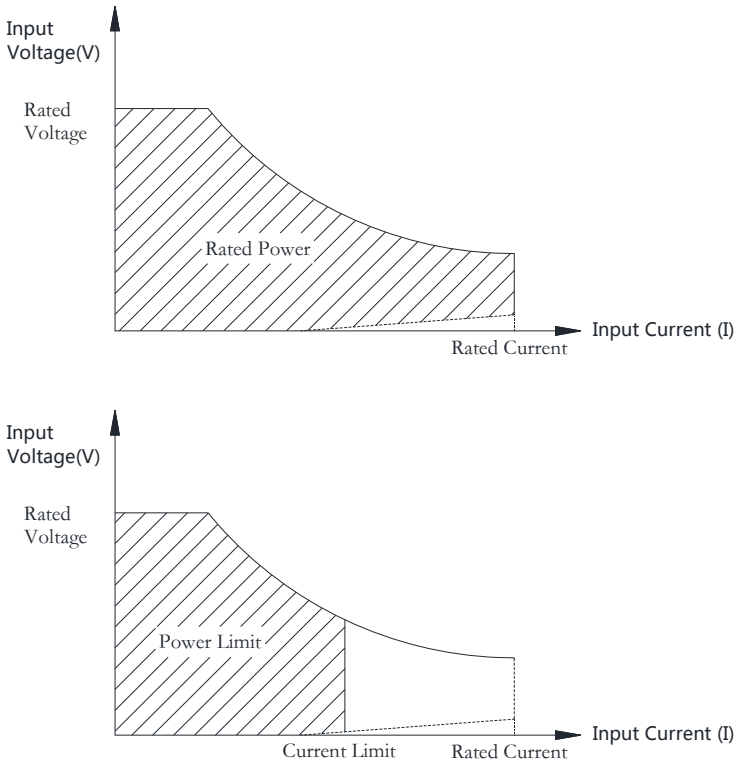


The Input can be toggled on and off by pressing ESC(ON/OFF) key.
The Input state “ON” or “OFF” will be displayed on display #3.

Figure 3-9
The Input State

3.8 Operation Range

Figure 3-10 Rate power and Power Limit



3.9 Protection Features

AT851 includes five protection features.

3.9.1 Over Voltage [-OV-]

Load input will be turned OFF immediately if input voltage exceeds the 105%*V-MAX. The buzzer beeps, "-OV-" is displayed on display #3 and indicator flashes.

3.9.2 Over Current [-OC-]

When work in the CR or CC and CP mode, input current is ascending continuously and the load current will be limited to I-MAX value. Load will work in the OC protection state and -OC- will be displayed on display #3.
In the CV mode, transition mode and list mode, the buzzer beeps and -OC- will been displayed once input current exceeds the 102%*I-MAX.

3.9.3 Over Power [-OP-]

CV mode:
If the input power exceeds the power limit (101%*P-MAX), load will work in the over power protection state. The buzzer beeps, current value will be flashed and -OP- will be displayed.
If the input power exceeds the power limit (102%*P-MAX), load will be turned off.
CC, CP and CR mode:
If the input power exceeds the power limit (102%*P-MAX), load will work in the over power protection state. Voltage and current value will be flashed and -OP- will be displayed. But the buzzer is silent.

3.9.4 Reverse Voltage [-RV-]

This feature protects the load module in case of the input DC voltage lines are connected with wrong polarity.
Once a reverse voltage condition detected, Buzzer beeps and -RV- will be displayed, and input will turn off immediately.

3.9.5 Over Heat [-OH-]

Once the load internal power devices' temperature exceeds the safe limits (80°C), load input will turn off, -OH- will be displayed on VFD, and buzzer beeps.

4. Basic Operation

This section includes the following information:

- CC/CV/CP/CR Operation Mode
- Setup the Maximum Value
- Von/off Operation
- Load ON Timer Function
- File Operation
- Menu Operation

4.1 Modes of Operation

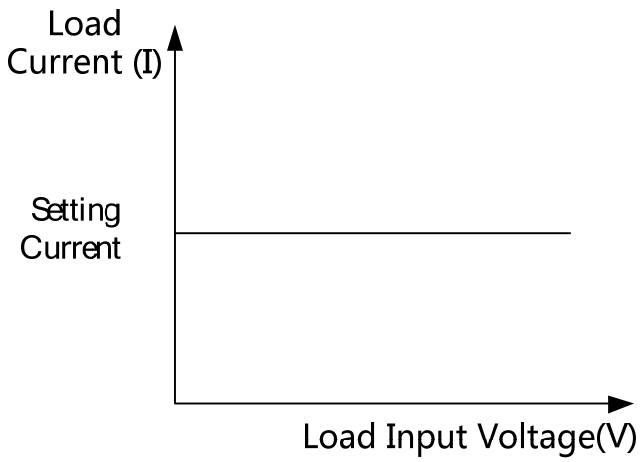
The four modes of operation are:

- Constant Current (CC)
- Constant Voltage (CV)
- Constant Power (CP)
- Constant Resistance (CR)

4.1.1 Constant Current Mode [CC]

In CC mode, the load will sink a current in accordance with the programmed value regardless of the input voltage. (See following figure)

Figure 4-1 Constant Current Mode



AT851 provides two methods to set the current value by using the numeric keypad and the knob.

Method 1: Setup the current value by using the numeric keypad

Table 4-1 Setup input current (I-Set) by using numeric keypad

Procedure	Operation details	Display
Step 1	Press I-Set If the mode is not the CC mode Press I-Set again	
Step 2	Enter a new value using numeric keypad or rotary the knob to adjust the value.	

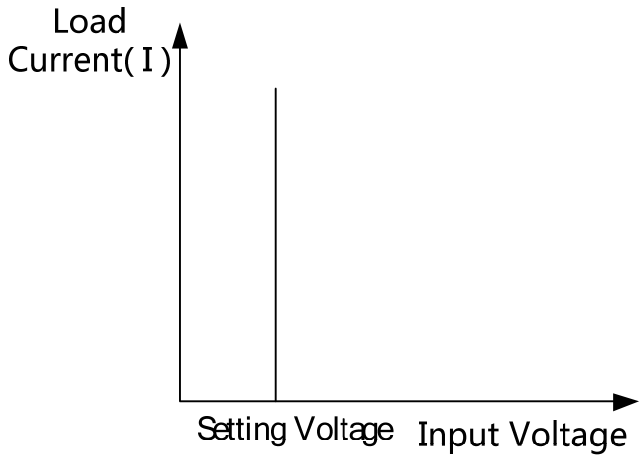
	Example: press key 1 . 2
Step 3	Press Enter to confirm this input

Method 2: Setup the current value by using knob.
The value can be continually changed from the previews value according the knob rotation.
The knob rotation magnification can be set in Menu-Knob item.

4.1.2 Constant Voltage Mode (CV)

In CV mode, AT851 will sink enough current to control the source voltage to the programmed value.
AT851 acts as a shunt voltage regulator when operating in the CV mode.

Figure 4-2
Constant Voltage Mode



AT851 provides two methods to set the voltage value by using the numeric keypad and the knob.

Method 1: Setup the voltage value by using the numeric keypad

Table 4-2 Setup voltage (V-Set) by using numeric keypad

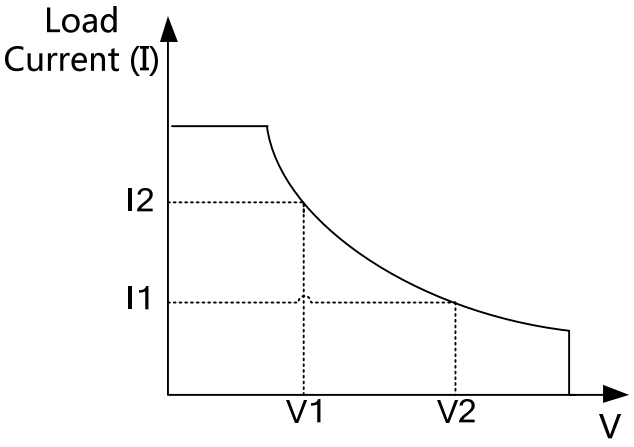
Procedure	Operation details
Step 1	Press V-Set If the mode is not the CV mode, press V-Set again.
Step 2	Enter a new value using numeric keypad or rotary the knob to adjust the value. Example: press key 1 0 . 5
Step 3	Press Enter to confirm this input

Method 2: Setup the voltage value by using knob.
The value can be continually changed from the previews value according the knob rotation.
The knob rotation magnification can be set in Menu-Knob item.

4.1.3 Constant Power Mode (CP)

In CP mode, AT851 will consumption power accordance with the programmed value regardless of the input voltage.
According to the formula P=U*I, if input voltage (U) increases, the current (I) must be decreased to satisfy the constant power value.

Figure 4-3
Constant power Mode



AT851 provides two methods to set the power value by using the numeric keypad and the knob.

Method 1: Setup the power value by using the numeric keypad

Table 4-3 Setup power value(P-Set) by using numeric keypad

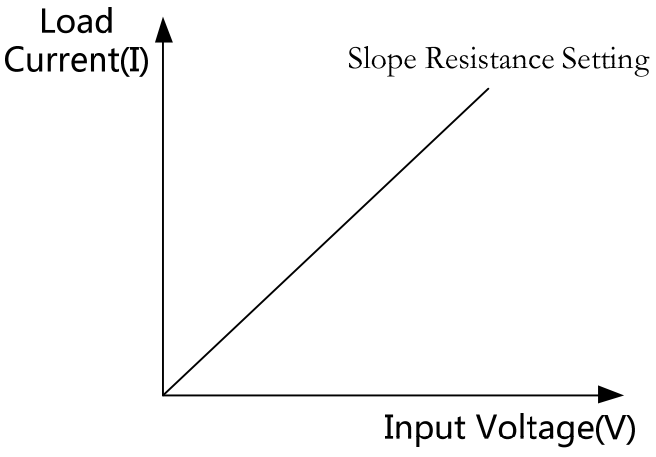
Procedure	Operation details
Step 1	Press P-Set If the mode is not the CP mode, press P-Set again.
Step 2	Enter a new value using numeric keypad or rotary the knob to adjust the value. Example: press key 1 0 . 5
Step 3	Press Enter to confirm this input

Method 2: Setup the power value by using knob.
The value can be continually changed from the previews value according the knob rotation.
The knob rotation magnification can be set in Menu-Knob item.

4.1.4 Constant Resistance Mode (CR)

In CR mode, AT851 will sink a current linearly proportional to the input voltage in accordance with the programmed resistance.
According to the formula R=U/I, if input voltage (U) increases, the current (I) must be decreased to satisfy the constant resistance value.

Figure 4-4
Constant Resistance Mode



AT851 provides two methods to set the resistance value by using the numeric keypad and the knob.

Method 1: Setup the power value by using the numeric keypad

Table 4-4 Setup resistance value(R-Set) by using numeric keypad

Procedure	Operation details
Step 1	Press R-Set If the mode is not the CR mode, press R-Set again.
Step 2	Enter a new value using numeric keypad or rotary the knob to adjust the value. Example: press key 1 0 . 5
Step 3	Press Enter to confirm this input

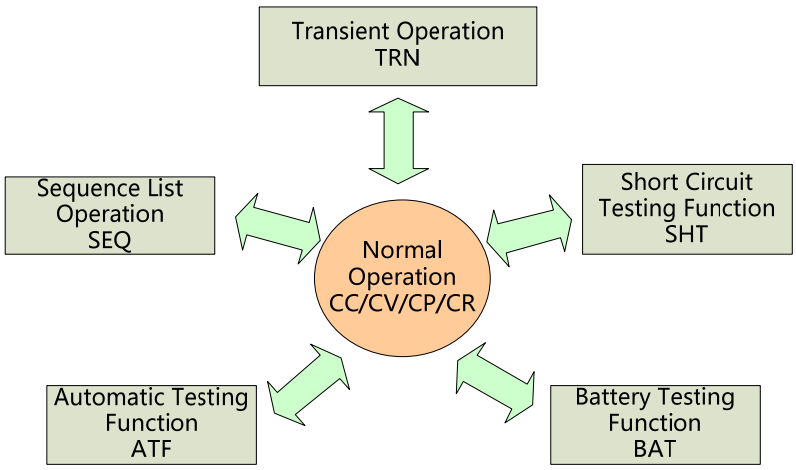
Method 2: Setup the resistance value by using knob.
The value can be continually changed from the previews value according to the knob rotation.
The knob rotation magnification can be set in Menu-Knob item.

4.2 Functions of Operation

AT851 includes six functions of operation.

1. Normal Operation [CC/CV/CP/CR]
2. Transient Operation [TRN]
3. Sequence List Operation [SEQ]
4. Automatic Testing Function [ATF]
5. Battery Testing Function [BAT]
6. Short Circuit Testing Function [SHT]

Figure 4-5 Functions of Operation



4.3 Setup the Maximum Current [I-max]

Press Shift+I-max to enter I-MAX setup page：

Figure 4-6 I-max Setup Page

Two methods are used to input the I-max value:
1st: The value can be continually changed from the previews value according to the knob rotation. The knob rotation magnification can be set in Menu-Knob item.
2nd: Using numeric keypad to input value.

4.4 Setup the Maximum Voltage [V-max]

Press Shift+ V-max to enter V-MAX setup page.
Two methods are used to input the V-max value:
1st: The value can be continually changed from the previews value according to the knob rotation. The knob rotation magnification can be set in Menu-Knob item.
2nd: Using numeric keypad to input value.

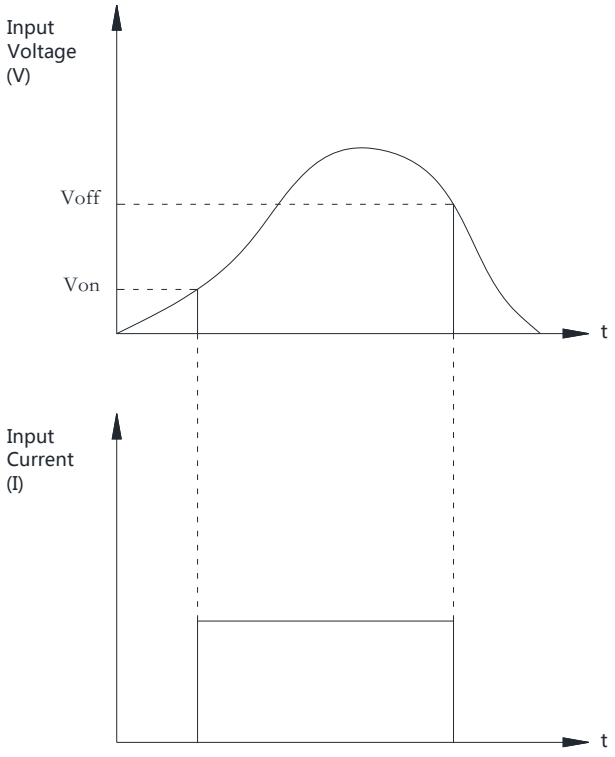
4.5 Setup the Maximum Power [P-max]

Press Shift+ P-max to enter P-MAX setup page.
Two methods are used to input the P-max value:
1st: The value can be continually changed from the previews value according the knob rotation. The knob rotation magnification can be set in Menu-Knob item.
2nd: Using numeric keypad to input value.

4.6 Von/off Operation

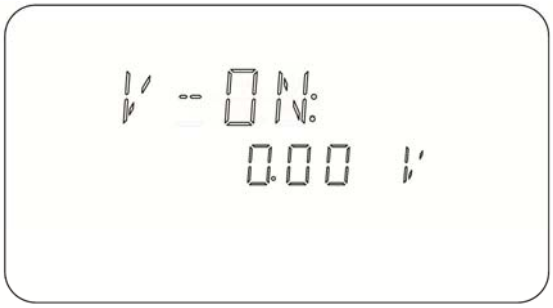
You can set voltage value Von/off to control the input state on/off for electronic load. When the input voltage reaches the Von value, the load's input state is on. When the input voltage reaches the Voff value, the load's input state is off.

Figure 4-7
Von/off Operation



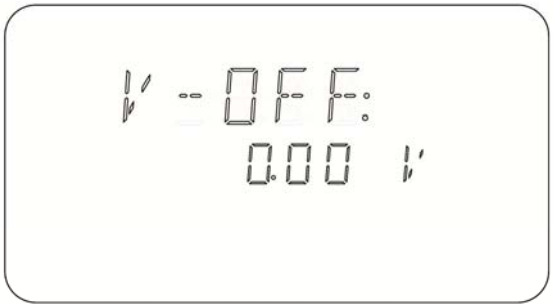
Von/off Setup Procedures:
Step 1: Press Shift+Von/off, The V-ON Setup Page displayed.

Figure 4-8
V-ON Setup Page



Step 2: Enter the V-ON Value by using numeric keypad or knob. Enter "0" can disable V-ON function.
Step 3: Press Enter to confirm input and the V-OFF Setup Page displayed.

Figure 4-9
V-OFF Setup Page

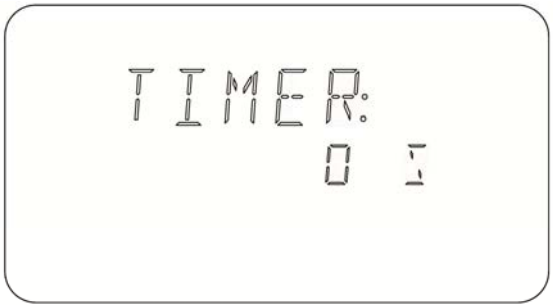


Step 4: Enter the V-OFF Value by using numeric keypad or knob. Enter "0" can disable V-OFF function.
Step 5: The VLMT indicator will be showed on VFD once Von or/and Voff value was/were set.

4.7 Load ON Timer Function

When the "Load ON Timer" enabled and timer value reach the setup time, AT851 will turn off the input automatically.
"Load ON Timer" Setup Procedure:
Press Shift+ Timer to enter "Load ON Timer" setup Page.

Figure 4-10
Load ON Timer Setup Page



Enter the timer Value by using numeric keypad or knob.
Enter "0" can disable "Load ON Timer" function.
The unit is "second" and maximum time is 60000s。

4.8 File Operation (Saving/Loading/Erasing Settings)

You can save these following values into internal non-volatile memory:

- I-set value and I-max value
- V-set value and V-max value
- P-set value and P-max value
- R-set value and R-max value
- Transient setting value

AT851 provides 20 files (file No. from 0 to 19). You must save setting load parameters into files manually.
If the Menu-RECALL Item set to "ON", the saving setting file will be load into system

automatically at next power up.

To save/load/erase file:

Press File key at normal operation state, File operation page appeared:

Figure 4-11
File Operation Page

Table 4-5 File Operation

FILE	
SAVE	Save
LOAD	Load
ErASE	Erase

Procedures for saving setting into selected file number

Step 1. To choose a file by knob, such as File No.19.
If selected file is empty, "NULL" displayed on display #3.

Step 2. To select item "SAVE" by < or >

Step 3. Press Enter key to save settings into selected file.

4.9 Display Power or Resistance Measurement Result

After the load input turned ON, the display #3's measurement result can be switched by< or > key:

- Current Meas. Value [I]
- Power Meas. Value [P]
- Resistance Meas. Value [R]
- Battery Meas. Capacity [B]. (Availability in Battery Testing Function)
- Battery discharge time [T]. (Availability in Battery Testing Function)

4.10 Menu

The menu settings will be saved into internal non-volatile memory automatically. These Settings will be loaded at next power up.

Table 4-6 Menu operation

[Menu]	[Press Shift + Menu]
RECALL	Power-On File Recall
OFF	
ON	The last saving file will be loaded at next power up.
KNOB	Setup rotary knob state
OFF	Knob cannot be used
1	Step 0.001
10	Step 0.01
100	Step 0.1
SHRT.CT	Fast load file0~9 by using numeric key 0 thru 9
OFF	
ON	
SENSE	Remote Sense. Setup voltage measurement mode.

	OFF	
	ON	The voltage will be measure from remote sense interface.
RATE		ADC Sample Rate
	SLOW	Slow rate. “S” indicator will be showed on VFD.
	FAST	Fast rate. “F” indicator will be showed on VFD
TRIG		Trigger Source
	INT	Internal Trigger.
	BUS	BUS Trigger.
	EXT	External Trigger. Trigger signal inputs from handler interface on the real panel.
COMM		Communication
	232	RS-232C
	485	RS-485 (Optional)
BAUD		Baud Rate Select
	4800	
	9600	
	19200	
	38400	
	57600	
	115.2k	
ADDR		RS-485 Address (Optional)
	0-254	
INIT		Return to factory default value
	OFF	
	ON	

5. Advanced Testing Function

This section includes the following 3 advanced testing functions：

- Short Circuit On/Off (SHT)
- Battery Testing Function (BAT)
- Battery Life Testing Function (BLT)

5.1 Short Circuit On/Off (SHT)

AT851 can simulate a short circuit at its input by turning the load on with full-scale current (3.2A@Low Range and 32A @ High Range).
The actual value of the electronic short is dependent on the mode and range that are active when the short is turned on. In CV mode, it is equivalent to programming zero volts. In CC/CP/CR mode, it is equivalent to programming full-scale current for the present CC range.

Turn Short On/Off：

Step 1: In normal operation mode (CV/CC/CP/CR) and the load input is turned off, choose an operation mode (CV, CC, CP or CR).
Step 2: press shift + Short to enter Short Circuit Testing Function.

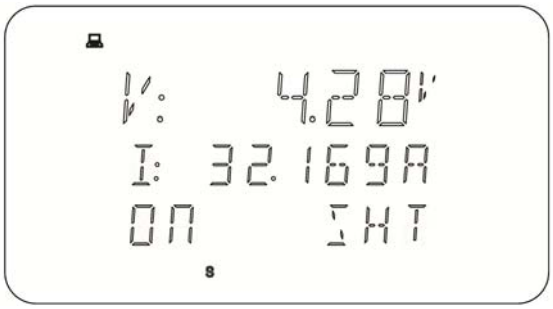


Figure 5-1 Short-Circuit Testing Page

Step 3: Turn on load input by ON/OFF.
Step 4: You can press < or > key to watch Current (I), Power(P) or Resistance (R) measurement value.
Step 5: Turn off load input by pressing ON/OFF key.
Step 6: Press shift + Short to return normal operation mode.

5.2 Battery Testing Function (BAT)

Capability Test
Electronic load uses CC mode to do the capability test. Battery testing cannot work in CV, CR or CP mode.
The discharge curve can be displayed in PC analysis software if you connect AT851 to PC.

5.2.1 Set up battery testing parameter

Step 1: In normal operation mode (CC), turn off the load input and connect with a tested battery.
Step 2: Press shift+Battery, the battery discharge current (BAT-I) setup page appears.

Figure 5-2
Set up Discharge Current

Step 3: Press Numeric keys or rotary Knob to input discharge current (such as 0.508Enter).
Step 4: Press Enter key, battery cut-off voltage setup page appears:

Figure 5-3
Set up cut-off voltage

Step 5: Press Numeric keys or rotary Knob to input voltage (such as 1.5Enter)
Step 6: Press Enter key to enter battery Testing Function Page (BAT) and battery testing starts. (The load input will be turned on automatically)

Figure 5-4
Battery Testing Function Page

During the testing, press < > to watch current (I), power (P), battery capacity (B) or discharge time (T). The discharge time format is HHH-MM (hour-minute)
When the battery voltage drops below the setting value, load input turns off.

Step 7: Press shift+Battery to return normal operation mode.

5.3 Battery Aging Testing Function

5.3.1 Set up the parameters

Step.1 Turn on
Step.2 Press Shift +6 (Aging Set) to enter Battery Life Testing page

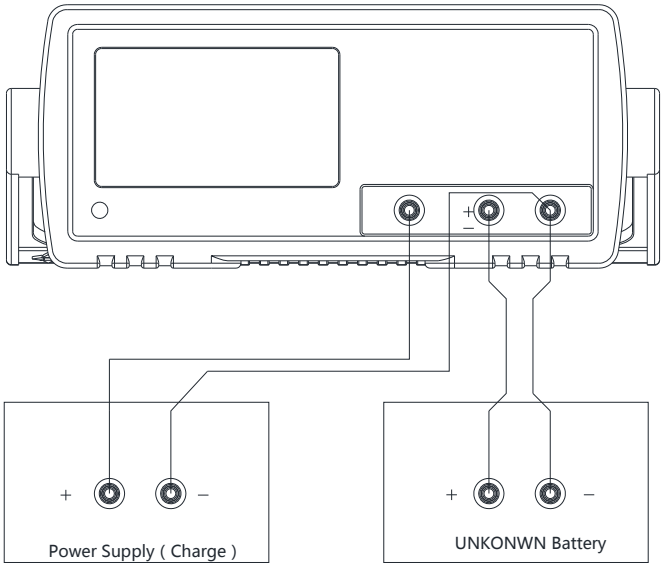
【Battery Life Testing 】Page [Press Shift + 6]	
DICH-I	Discharge Current 0~30A
CUT-V	Cut-off Voltage 0~120V
REST-T	Rest Time(in minutes) 0~999 minutes
CHAR-V	Charging Cut-off Voltage 0~120V
CHAR-t	Charging Time(in minutes) 0~9999 minutes
LOOP	Number of Loops 0~999

RESET	Reset test data, test from a new beginning, the previously saved data will be cleared. Select YES, and the test data will be cleared.

Step.3 Press Enter to save data and exit the set page. Return to default test page.
Press Cancel to return to default test page, the data set will not be saved.

5.3.2 Start the test

Step.1 Turn on
Step.2 Connect the battery and an external charging power supply, as shown below:
(Left: Charging Power Supply Right: Unknown Battery)



Step.3 Press shift+ 3 to enter Battery Aging Test Function. The lower right corner displays the current number of loops. As shown below:

DICH	Discharging
CHAr	Charging
REST	Rest

Tips

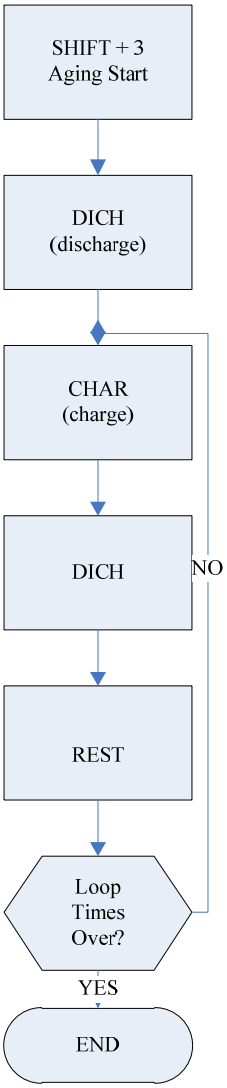
During the test you can press Shift + 3 to suspend the test, the data will be saved in the system.
Press Shift + 3 to continue.

5.3.3 List of test data

Step.1 Turn on
Step.2 Press Shift + 9 to enter List of test data.
Step.3 Spin the Knob to view all test data. The first row displays the sequence number of the loop.

Battery Aging Test: Discharge – Charge – Rest
Battery Aging Charge and Rest Timer: 9999 minutes
Battery Capacity: 999.99AH
Battery Discharge Timer: 999H
Maximum Loop Times: 999 times

5.3.4 Testing Process



6. Specification

This chapter describes the specification and supplemental performance characteristics of the AT851:

- Specifications
- Dimension

6.1 Specification

Accuracy is defined as meeting all of the following conditions.

Temperature: 23℃±5℃

Humidity: ≤65% R.H.

Warm up time is 30 min or more.

Rate: Slow

A 1-year calibration cycle

Sampling rate：Fast：10 times/s

Slow：3 times/s

Constant Current CC	Range	0-3A	0-30A
	Resolution	0.0001A	0.001A
	Accuracy	0.1%+0.1%FS	0.2%+0.1%FS
Constant Voltage CV	Range	0-18V	0-120V
	Resolution	0.001V	0.01V
	Accuracy	0.05%+0.02%FS	0.05%+0.025%FS
Constant Power CP	Range	0-100W	100-300W
	Resolution	0.001W	0.01W
	Accuracy	1%+0.1%FS	1%+0.1%FS
Constant Resistance CR	Range	0.1-99Ω	100-4KΩ
	Resolution	0.01Ω	1Ω
	Accuracy	1%+0.3%FS	1%+0.8%FS
Voltage Measurements	Range	0-18V	0-500V
	Resolution	0.001V	10mV
	Accuracy	0.05% + 0.02%FS	0.05% + 0.025%FS
Current Measurement	Range	0-3A	0-30A
	Resolution	0.0001A	0.001A
	Accuracy	0.1% + 0.1%FS	0.2% + 0.3%FS
Short Circuit (SHT)	Current	≈30A	
	Resistance	≈40mΩ	
Battery Testing Function (BAT)	Capacity	999.99AH	
	Timer	999H	

6.2 General Specification

Display: Vacuum-Fluorescent-Display (4-Colors VFD) Size: 98x55mm
Rating Power: 330W
Rating Voltage: 0V~120V
Rating Current: 0A~30A
Display Parameter: Voltage, Current, Power, Resistance, Battery Capacity and Battery Discharge Time.
Battery Aging Test: Discharge – Charge – Rest
Battery Aging Charge and Rest Timer: 9999 minutes
Battery Capacity: 999.99AH

Battery Discharge Timer: 999H
Maximum Loop Times: 999 times

Environment：

Temperature and humidity range：18℃~28℃, 80% RH or less

Operating temperature and humidity range：10℃~40℃,10~90% RH

Storage temperature and humidity range: 0℃~50℃,10~90% RH

Power Supply： 110V/220V AC, 48.5Hz ~ 52.5Hz

Fuse: 1A Slow-Blow

Maximum rated power：15VA

Weight： 6kg, net

6.3 Dimensions