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ET5410A+ / ET5411A+

Programovatelná jednokanálová DC Elektronická zátěž

Uživatelský manuál

East Tester®

ET5410A+ /ET5411A+
Programmable Single-Channel
DC Electronic Load User Manual

CE

Hangzhou Zhongchuang Electron Co., Ltd

Hangzhou Zhongchuang Electron Co., Ltd

Obsah

Základní funkce přístroje

Programovatelná DC elektronická zátěž ET54XXA+ poskytuje vysoké rozlišení 1 mV/10 mV a 1 mA/10 mA s výbornými výkonovými parametry. Je vybavena 12 provozními režimy a komplexními testovacími funkcemi, díky čemuž ji lze široce využít při testování nabíječek, spínaných zdrojů, lineárních zdrojů, baterií a výrobních linek.

Uživatelsky přívětivý design:

- 2,8" TFT LCD displej s bohatým zobrazením informací
- Přehledné grafické rozhraní, snadné ovládání
- Funkce zámku tlačítek pro prevenci náhodné operace

Výkonná zátěž:

- Základní režimy: CC, CV, CR, CP, CC+CV, CR+CV
- Profesionální test baterií
- Profesionální test LED
- Dynamický test výstupního výkonu zdroje
- Skenovací test kontinuity výstupu zdroje v zadaném rozsahu
- Sekvenční (list) test – simulace různých stavů zátěže
- Test zkratu – simulace zkratu na zátěži
- Podpora externího spouštění (rozhraní DB9)
- Vestavěný bzučák
- Udržení nastavení po výpadku napájení
- Vzdálené ovládání přes USB, RS-232 nebo RS-485 (volitelně)
- Rozhraní PS2 – podpora externí klávesnice

Vícenásobná bezpečnostní ochrana:

- Ochrana před nadproudem, přepětím, přetížením a přehřátím
- Nastavitelné parametry přepěťové a nadproudové ochrany
- Inteligentní regulace otáček ventilátoru – snižuje hluk
- Upozornění na záměnu polarity

Standardní příslušenství:

- Třížilový napájecí kabel × 1
- Pojistka napájení × 2
- Uživatelský manuál × 1

Kapitola 1 Rychlý start

1.1 LCD přední panel

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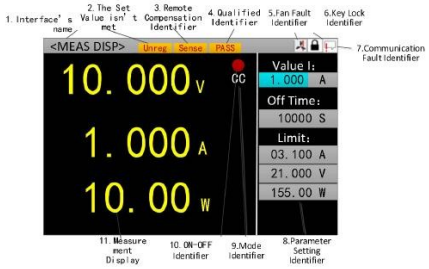
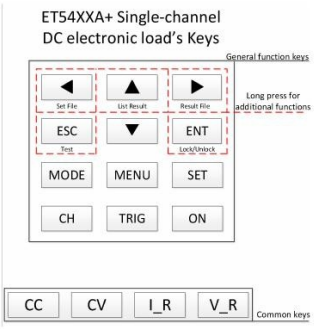
Chapter 1 Quick Start

1.1 LCD Front Panel



1. Interface name 2. An identification that does not meet the set value 3. Remote identification 4. Qualified identification 5. Fan fault identification 6. Button lock identification 7. Communication failure identification 8. Parameter set display 9. Mode identification 10. Switch identification 11. Main measurement display

1.2 Front Panel Buttons



ET54XXA Single-Channel DC Electronic Load Button
Regular function button/ Commonly used button/ Additional lon-press fuction button

1.3 Button Instruction

There are 9 regular function buttons on the right side of the display screen, including 5 additional long-press function buttons, and there are 4 commonly used buttons on the bottom of the display screen. See the following table for specific operation.

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Popis prvků displeje:

- 1. Název rozhraní
- 2. Indikátor neplnění nastavené hodnoty
- 3. Indikátor vzdáleného ovládání (Remote)
- 4. Indikátor kvalifikace (Qualified)
- 5. Indikátor poruchy ventilátoru
- 6. Indikátor zámku tlačítek
- 7. Indikátor chyby komunikace
- 8. Zobrazení nastavených parametrů
- 9. Indikátor režimu
- 10. Indikátor spínání (ON/OFF)
- 11. Hlavní měřicí displej

1.2 Tlačítka předního panelu

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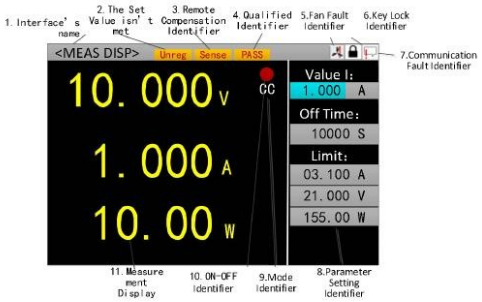
Chapter 1 Quick Start

1.1 LCD Front Panel



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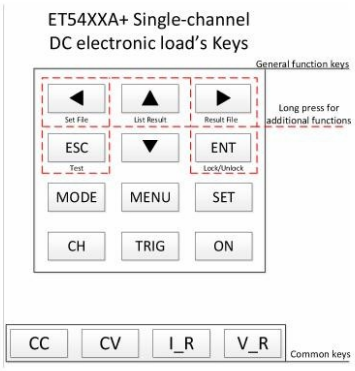
1.2 Front Panel Buttons



ET54XXA Single-Channel DC Electronic Load Button
Regular function button/ Commonly used button/ Additional lon-press fuction button

1.3 Button Instruction

There are 9 regular function buttons on the right side of the display screen, including 5 additional long-press function buttons, and there are 4 commonly used buttons on the bottom of the display screen. See the following table for specific operation.

3

1.3 Popis tlačítek

Na pravé straně displeje je 9 standardních funkčních tlačítek (z nichž 5 má funkci dlouhého stisku) a 4 rychlá tlačítka v dolní části.

Tlačítko	Standardní funkce	Funkce dlouhého stisku
◀	Posun kurzoru vlevo	Vstup do uložení souboru – nastavovací parametry
▶	Posun kurzoru vpravo	Vstup do uložení souboru – výsledky
▲	Posun nahoru / zvýšení hodnoty	Vstup do rozhraní výsledků sekvenčního testu
▼	Posun dolů / snížení hodnoty	—
ESC	Únik z menu	Rychlý návrat na měřicí rozhraní
ENT	Potvrdit	Přepnutí zámku tlačítek / přepnutí místní↔vzdálené
MODE	Výběr režimu	—
MENU	Vstup do systémového menu	—
SET	Nastavení parametrů	—
CH	—	—
TRIG	Spouštěcí tlačítko (trigger)	—
ON	Zapnutí/vypnutí kanálu	—
CC	Rychlé přepnutí do režimu CC	—
CV	Rychlé přepnutí do režimu CV	—
I_R	Přepnutí proudového rozsahu	—
V_R	Přepnutí napěťového rozsahu	—

Poznámka: V sekvenčním (list) režimu jsou neplatná všechna rozhraní kromě testovacího a 4 rychlých tlačítek.

Kapitola 2 Provoz funkcí

Pro bezpečný provoz připojujte zátěž ke zdroji správnou polaritou (červená = +, černá = −). Nejprve zapněte výstup zdroje, poté zapněte zátěž.

2.1 Přepínání vzdálený/místní provoz

V režimu vzdáleného ovládání se zobrazí ikona v horní části rozhraní a rozhraní je zamčeno. Zpět na místní provoz přepnete dlouhým stiskem [ESC].

2.2 Nastavení systému

Tlačítko [MENU] → systémové menu. Navigace: šipky + [ENT] pro vstup do podmenu, [ESC] pro návrat.

1. Nastavení zátěže: Rozsah, limitní hodnoty, zpoždění vypnutí, kompenzace napětí.
2. Nastavení systému: Výchozí/poslední hodnoty po startu; jazyk; tóny tlačítek a výstrah; obnovení továrního nastavení.
3. Nastavení komunikace: Místní adresa a přenosová rychlost.
4. Nastavení kvalifikace: Zapnutí/vypnutí kvalifikačního testu a podmínky (horní/dolní limity U, I, P). Výsledek PASS nebo FAIL.
5. Informace o systému: Model, sériové číslo, verze HW a SW.
6. Test vlivu zátěže: Regulace zátěže, vnitřní odpor zdroje a ΔV.
7. Vzdálená kompenzace: Kompenzace úbytku napětí na propojovacím kabelu.

set interface, you can complete the operations of language, factory data reset, startup, etc., and system set interface is shown in Chart 2.2.2. The following is a brief introduction to each interface of system menu:

1. Load set: Complete related settings about load range, limit value, off delay, and whether voltage compensation is on or not.

2. System set: Set load default value or last set value after the load starts up; set the language of the load to Chinese or English, turn on or off of button tone, turn on or off of warning tone, and whether to restore factory.

3. Communication set: Set local address and baud rate of load communication.

4. Qualified set: Set whether qualified test of the load is on, and qualified test conditions, including upper and lower limits of voltage, current and power. With qualified test being on, if voltage, current and power values of the channel are within qualified test range after the load channel starts to run, the PASS mark of corresponding channel will be displayed, otherwise the FAIL mark of corresponding channel will be displayed.

5. System information: Display product model and serial number of the load, as well as hardware and software version numbers.

6. Load effect test: Measure the load regulation, internal resistance of source and ΔV of corresponding channel of the load.

7. Remote compensation: Measure the value of voltage drop generated by corresponding channel current on connection line. Only when this interface of corresponding channel is running, the voltage compensation for this channel is meaningful.

8.System menu interface operation instructions: 1. Press [MENU] button to enter system menu interface; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. Press [ENT] button to enter submenu interface or switch operation item; 4. Press [ESC] button to return to previous interface.

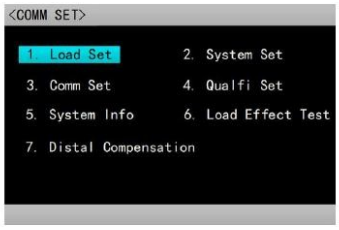


Chart 2.2.1 System Menu Interface

Chart 2.2.2 System Set Interface

2.3 Load Set Operation

You can enter load set interface through system menu, as shown in Chart 2.3. In this interface, you can complete related settings such as load range, limit value and off delay. The following is a description of setting options:

1. Trigger source: External/software/manual. External trigger: input trigger signal from external interface; software trigger: send SCPI commands through remote control from external controller; manual trigger: manually press "THIR" button on the keyboard.

2.3 Nastavení zátěže

1. Zdroj spouště: Externí / softwarový / ruční (tlačítko [TRIG]).
2. Kompenzace napětí: Zapnuto/vypnuto. Kompenzuje ztráty napětí na kabelu. Platí jen při aktivní vzdálené kompenzaci.
3. Proudový rozsah: Nízký/vysoký. Rychlé přepnutí: [I_R].
4. Napěťový rozsah: Nízký/vysoký. Rychlé přepnutí: [V_R].
5. Maximální výkon: Max. povolený výkon za provozu.
6. Zpoždění vypnutí: Délka běhu základního provozního režimu.
7. Spouštěcí napětí: Kanál se spustí, pokud vstupní napětí překročí tuto hodnotu.
8. Vypínací napětí: Kanál se uzavře, pokud vstupní napětí klesne pod tuto hodnotu.

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2. Voltage compensation: On/off. Choose to compensate or not to compensate for voltage loss between the source and load, which is reflected in voltage value displayed in measurement display interface. Note: Voltage compensation is meaningful only when remote compensation interface in system menu is running.

3. Current range: Low/high. Set maximum current allowed during load run.

4. Voltage range: Low/high. Set maximum allowable voltage during load run.

5. Maximum power: Set maximum power allowed during load run.

6. Off delay: Set runtime of basic running mode.

7. Starting voltage: Set starting voltage of the channel. If input voltage of the channel is higher than starting voltage, the channel will run.

8. Turn-off voltage: Set turn-off voltage of the channel. If input voltage of the channel is lower than turn-off voltage, the channel will be closed.

Load set interface operation instructions: 1. Select "load set" in system menu interface to enter load set interface; 2. Select operation item with【▲ ▼◂ ▸ 】 arrow buttons ; 3. For non-numeric parameters, press [ENT] button to switch settings; 4. For numeric parameters, press [ENT] button to enter edit mode. Then, select corresponding digits through【◂ ▸ 】 arrow buttons and adjust value through【▲ ▼】arrow buttons. Press [ENT] or [ESC] button to confirm input; 5. The current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 6. Press [ESC] to return to previous interface;

Chart 2.3 Load Set Interface

2.4Load Effect Test Operation

Through system menu, you can enter load effect test interface, as shown in Chart 2.4. The load will run under 3 different loads and continue for a preset time respectively, and then voltage value under different loads will be recorded. This interface can measure and calculate load regulation rate, ΔV and internal resistance of source.

Operation instructions: 1. The high/low current range and high/low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Select operation item with 【▲ ▾◂ ▸ 】 arrow buttons; 3. Press [Enter] button to enter edit Mode. Then, select corresponding digits through 【◂ ▸ 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 4. Press [ON] button to start or close the mode of selected channel;

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2.4 Test vlivu zátěže

Zátěž pracuje pod 3 různými hodnotami zátěže po přednastavený čas a zaznamenává napěťové hodnoty. Vypočítá regulaci zátěže, ΔV a vnitřní odpor zdroje.

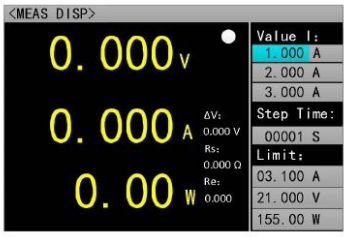

Chart 2.4 Load Effect Test Interface

2.5 Remote Compensation Operation

Through system menu, you can enter load effect test interface, as shown in Chart 2.5. The load will run under 2 different loads, and then voltage value under different loads will be recorded, so as to compensate line loss.

Operation instructions: 1. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through the [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 4. Press [ON] button to start or close the mode of selected channel;

Chart 2.5 Remote Compensation Interface

2.6 Basic Mode Operation

The electronic load can work in the following basic measurement modes: constant current mode (CC), constant voltage mode (CV), constant resistance mode (CR), constant power mode (CP), constant current-constant voltage mode (CC + CV), constant resistance-constant voltage mode (CC + CR). The parameter settings of the above six modes can be set in measurement interface. Hereinto, press [MODE] button in any mode measurement interface to enter mode selection interface, as shown in Chart 2.6.

Note: 1. The setting value of basic mode operation can also be changed when the load is running.

2. The limit value of basic mode operation can also be changed when the load is running.

3. The off-delay value of basic mode operation cannot be changed when the load is running.

Operation instructions: 1. Press [MODE] button; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. Press [Enter] button to confirm selected mode and jump to measurement interface of the selected mode; 4. If there is no selected mode, press [ESC] button to return to previous interface; 5. CC mode or CV mode can be quickly selected by pressing [CC] or [CV] two commonly used buttons;

2.5 Vzdálená kompenzace

Zátěž pracuje pod 2 různými hodnotami zátěže, zaznamenává napěťové hodnoty a kompenzuje ztráty na propojovacím kabelu.

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Chart 2.4 Load Effect Test Interface

2.5 Remote Compensation Operation

Through system menu, you can enter load effect test interface, as shown in Chart 2.5. The load will run under 2 different loads, and then voltage value under different loads will be recorded, so as to compensate line loss.

Operation instructions: 1. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Select operation item with 【▲ ▼◄ ► 】 arrow buttons; 3. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through the [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 4. Press [ON] button to start or close the mode of selected channel;

Chart 2.5 Remote Compensation Interface

2.6Basic Mode Operation

The electronic load can work in the following basic measurement modes: constant current mode (CC), constant voltage mode (CV), constant resistance mode (CR), constant power mode (CP), constant current-constant voltage mode (CC + CV), constant resistance-constant voltage mode (CC + CR). The parameter settings of the above six modes can be set in measurement interface. Hereinto, press [MODE] button in any mode measurement interface to enter mode selection interface, as shown in Chart 2.6.

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3. The off-delay value of basic mode operation cannot be changed when the load is running.

Operation instructions: 1. Press [MODE] button; 2. Select operation item with 【▲ ▼◄ ► 】 arrow buttons; 3. Press [Enter] button to confirm selected mode and jump to measurement interface of the selected mode; 4. If there is no selected mode, press [ESC] button to return to previous interface; 5. CC mode or CV mode can be quickly selected by pressing [CC] or [CV] two commonly used buttons;

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2.6 Základní režimy měření

Elektronická zátěž může pracovat v těchto základních režimech: CC, CV, CR, CP, CC+CV, CR+CV. Parametry lze nastavit přímo v měřicím rozhraní.

Nastavovací a limitní hodnoty lze měnit i za chodu. Zpoždění vypnutí nelze měnit za chodu.

Výběr režimu: [MODE] → šipky → [ENT]; nebo rychlá tlačítka [CC] / [CV].

Chart 2.6 Mode Selection Interface

2.6.1 Constant Current Measurement Mode

In constant current mode, electronic load consumes a constant current regardless of whether input voltage changes.

Operating instructions: 1. Press [CC] button to enter measurement interface of CC mode; 2. The high/ low current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.1 Constant Current Measurement Mode

2.6.2 Constant Voltage Measurement Mode

In constant voltage mode, electronic load will consume enough current to maintain input voltage at setting voltage value.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CV mode; 2. The high/ low current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

2.6.1 Konstantní proud (CC)

Zátěž odebírá konstantní proud bez ohledu na změny vstupního napětí.
Ovládání: [CC] → [I_R]/[V_R] pro rozsahy → šipky → [ENT] pro editaci → [ON] pro spuštění.

Chart 2.6 Mode Selection Interface

2.6.1Constant Current Measurement Mode

In constant current mode, electronic load consumes a constant current regardless of whether input voltage changes.

Operating instructions: 1. Press [CC] button to enter measurement interface of CC mode; 2. The high/ low current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through【◄ ► 】arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.1 Constant Current Measurement Mode

2.6.2Constant Voltage Measurement Mode

In constant voltage mode, electronic load will consume enough current to maintain input voltage at setting voltage value.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CV mode; 2. The high/ low current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through【◄ ► 】arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

2.6.2 Konstantní napětí (CV)

Zátěž odebírá dostatečný proud, aby udržela vstupní napětí na nastavené hodnotě.
Ovládání: [MODE] → CV → [ENT] → stejné jako CC.

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Chart 2.6.2 Constant Voltage Measurement Mode

2.6.3 Constant Resistance Measurement Mode

In constant resistance mode, the load is equivalent to a constant resistance, and the load will consume current that changes with changes of input voltage.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CR mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.3 Constant Resistance Measurement Mode

2.6.4 Constant Power Measurement Mode

In constant power mode, the load consumes a constant power. When input voltage changes, the load will adjust corresponding current to maintain consumed power at setting power value.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CP mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

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2.6.3 Konstantní odpor (CR)

Zátěž je ekvivalentní konstantnímu odporu – proud se mění úměrně vstupnímu napětí.
Ovládání: [MODE] → CR → [ENT] → stejné jako CC.

Chart 2.6.2 Constant Voltage Measurement Mode

2.6.3 Constant Resistance Measurement Mode

In constant resistance mode, the load is equivalent to a constant resistance, and the load will consume current that changes with changes of input voltage.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CR mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.3 Constant Resistance Measurement Mode

2.6.4 Constant Power Measurement Mode

In constant power mode, the load consumes a constant power. When input voltage changes, the load will adjust corresponding current to maintain consumed power at setting power value.

Operating instructions: 1. Press [MODE] button to enter measurement interface of CP mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

2.6.4 Konstantní výkon (CP)

Zátěž odebírá konstantní výkon – při změně vstupního napětí upravuje proud, aby výkon zůstal na nastavené hodnotě.
Ovládání: [MODE] → CP → [ENT] → stejné jako CC.

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Chart 2.6.4 Constant Power Measurement Mode

2.6.5 Constant Current-Constant Voltage Measurement Mode

The constant current-constant voltage measurement mode aims to prevent tested source from being damaged due to overcurrent discharge. In this mode, when the source to be tested cannot output current value set by the load, the load will automatically switch from constant current mode to constant voltage mode.

Operating instructions: 1. Press [MODE] button to enter the measurement interface of the CC + CV mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.5 Constant Current-Constant Voltage Measurement Mode

2.6.6 Constant Resistance-Constant Voltage Measurement Mode

The constant resistance-constant voltage measurement mode aims to prevent measured source from being damaged due to overcurrent discharge. In this mode, when the source to be tested cannot output enough current to maintain setting resistance, the load will automatically switch from constant resistance mode to constant voltage mode.

Operating instructions: 1. Press [MODE] button to enter the measurement interface of the CR + CV mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

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2.6.5 CC+CV – Konstantní proud / Konstantní napětí

Chrání testovaný zdroj před nadproudem. Pokud zdroj nemůže dodat nastavený proud, zátěž se automaticky přepne z CC do CV.
Ovládání: [MODE] → CC+CV → [ENT] → stejné jako CC.

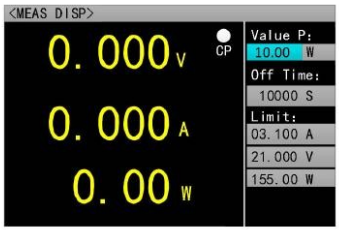


Chart 2.6.4 Constant Power Measurement Mode

2.6.5 Constant Current-Constant Voltage Measurement Mode

The constant current-constant voltage measurement mode aims to prevent tested source from being damaged due to overcurrent discharge. In this mode, when the source to be tested cannot output current value set by the load, the load will automatically switch from constant current mode to constant voltage mode.

Operating instructions: 1. Press [MODE] button to enter the measurement interface of the CC + CV mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Chart 2.6.5 Constant Current-Constant Voltage Measurement Mode

2.6.6 Constant Resistance-Constant Voltage Measurement Mode

The constant resistance-constant voltage measurement mode aims to prevent measured source from being damaged due to overcurrent discharge. In this mode, when the source to be tested cannot output enough current to maintain setting resistance, the load will automatically switch from constant resistance mode to constant voltage mode.

Operating instructions: 1. Press [MODE] button to enter the measurement interface of the CR + CV mode; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. Press [Enter] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

2.6.6 CR+CV – Konstantní odpor / Konstantní napětí

Chrání testovaný zdroj před nadproudem. Pokud zdroj nemůže udržet nastavený odpor, zátěž se přepne z CR do CV.
Ovládání: [MODE] → CR+CV → [ENT] → stejné jako CC.

Chart 2.6.5 Constant Resistance-Constant Voltage Measurement Mode

2.7Dynamic Test Operation

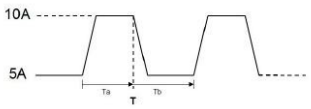
The dynamic test operation can repeatedly switch set current or voltage of two kinds of load. This function can be used to test dynamic characteristics of the source. Before starting dynamic test, relevant parameters of dynamic test need to be set. Specific parameters include dynamic load state, value A, value A pulse-width time, value B, value B pulse- width time and dynamic test mode. The dynamic load state is divided into constant current and constant voltage. The set interface and test interface are shown in Chart 2.5.1 and Chart 2.5.2 respectively.

Parameter set interface operation instructions: 1. Press [SET] button to enter parameter set interface of dynamic test after entering measurement interface of dynamic test by pressing [MODE] button; 2. The high/ low current range and high/ voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】arrow buttons; 4. For non-numeric parameters, press [ENT] button to switch settings; 5. For numeric parameters, press [ENT] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 6. Press [ESC] to return to previous interface;

Test interface operation instructions: 1. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Press [ON] button to start or close the mode of selected channel;

Hereinto, dynamic test mode can be divided into three types, including continuous mode, pulse mode and trigger mode. The instructions are as follows:

◆ Continuous mode: In this mode, the load can continuously switch between value A and value B after starting the test.



Continuous mode of operation

◆ Pulse mode: In this mode, the load will switch from value A to value B every time it receives a trigger signal after starting the test, and then switch to value A again after maintaining the pulse-width time of value B.

2.7 Dynamický test

Opakovaně přepíná nastavenou hodnotu proudu nebo napětí mezi dvěma úrovněmi A a B. Testuje dynamické vlastnosti zdroje.

Kontinuální (Continuous): Nepřetržité přepínání mezi hodnotou A a B.
Impulzní (Pulse): Po každém spouštěcím signálu: A → B (po dobu šířky impulzu B) → A.
Spouštěcí (Trigger): Po každém spouštěcím signálu přepne mezi A a B. Šířka impulzu se nepoužívá.

Nastavení: [MODE] → TRAN → [SET] → šipky → [ENT]. Test: [ON] pro spuštění/zastavení.

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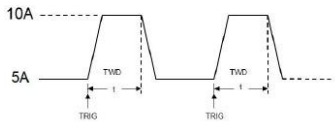

Pulses Per Second Operation Mode

- Trigger mode: In this mode, the load will switch between value A and value B every time it receives a trigger signal after starting the test. It will not work to set the pulse-width.

Trigger Operation Mode

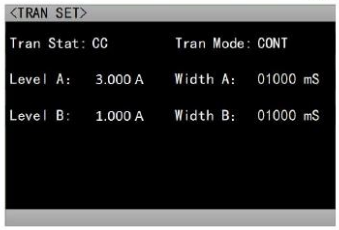

Chart 2.7.1 Dynamic Set Interface

Chart 2.7.1 Dynamic Test Interface

2.8 List Test Operation

The list test function can conveniently test running of the source to be tested under different load conditions, which is conducive to automatic test of production line. By presetting list test steps, you can edit test steps and test parameters of the source to be tested into a list and complete a series of tests in order. Specific parameters include step number set, stepping mode, cycling switch, load mode of each step, load size, delay time, comparison switch, upper limit value and lower limit value. Set interface and test interface are shown in Chart 2.6.1 and Chart 2.6.2 respectively. Test result interface after the test is shown in Chart 2.6.3, and save interface of file list setting parameter is shown in Chart 2.6.4. Save interface of file list result is shown in Chart 2.6.5, and file rename interface is shown in Chart 2.6.7.

The instructions for list test set are as follows:

1. Test step: Set the number of test items.
2. Stepping mode: Continuous/trigger. Set stepping method of test items.
3. Cycling switch: Turn on/off. Set whether the whole test process is cyclic.
4. Load mode: CC/CV/CP/CR/open circuit /short circuit.
5. Load size: Corresponding to test set value of test items.

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2.8 Sekvenční (list) test

Testuje zdroj v nastaveném pořadí kroků za různých podmínek zátěže. Vhodné pro automatizované testy výrobní linky.

Parametry:

- Počet kroků testu
- Režim kroku: Kontinuální / spouštěcí
- Cyklické opakování: Zapnuto / vypnuto
- Režim zátěže: CC / CV / CP / CR / otevřený obvod / zkrat
- Hodnota zátěže pro každý krok
- Horní a dolní limit – po zapnutí porovnání (U / I / P / R)
- Zpoždění: délka běhu každého kroku

Nastavení: [MODE] → LIST → [SET] → šipky → [ENT]. [CC]/[CV] = stránkování, [I_R] = uložit, [V_R] = spustit test.

6. Upper limit value: Set maximum value allowed in the test process after [Compare] is turned on.

7. Lower limit value: Set minimum value allowed in the test process after [Compare] is turned on.

8. Comparison: Whether to compare the value of the channel with preset upper limit value and lower limit value after starting the test. The comparable values are divided into voltage/current/power/resistance.

9. Delay: Set runtime of test items.

List test set interface operation instructions: 1. Press [SET] button to enter parameter set interface of list test after entering test interface of list test by pressing [MODE] button; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. For non-numeric parameters, press [ENT] button to switch settings; 4. For numeric parameters, press [ENT] button to enter the edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through the【▲▼】 arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 6. Press the button under "Save", i.e. [I_R] button, to enter save interface of file list setting parameter; 7. Press the button under "Test", i.e. [V_R] button, to enter test interface of list test; 8. Press [ESC] to return to previous interface;

Test interface operation instructions: 1. Press [CH] button to select channel; 2. The high/low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Press [ON] button to start or close the mode of selected channel;

Chart 2.8.1 List Test Interface

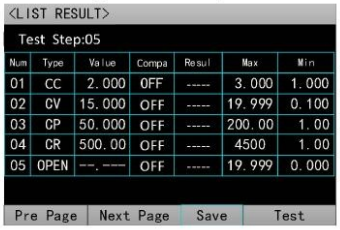
Test Step: 05 StepMode: Auto Repeat: OFF

Num	Type	Value	Delay	Compar	Max	Min
01	CC	2.000	0005	OFF	3.000	1.000
02	CV	15.000	0005	OFF	19.999	0.100
03	CP	50.000	0005	OFF	200.00	1.00
04	CR	500.00	0005	OFF	4500	1.00
05	OPEN	--.---	0005	OFF	19.999	0.000

Pre Page | Next Page | Save | Test

Chart 2.8.2 List Set Interface

List test result interface operation instructions: 1. Long press [▲] button to enter list test result interface when the mode is closed; 2. Press the buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 3. Press the button under "Save", i.e. [I_R] button, to enter save interface of file list setting parameter; 4. Press the button under "Test", i.e. [V_R] button, to enter the test interface of list test; 5. Press [ESC] button to return to previous interface;



Test Step:05

Num	Type	Value	Compa	Resul	Max	Min
01	CC	2.000	OFF	-----	3.000	1.000
02	CV	15.000	OFF	-----	19.999	0.100
03	CP	50.000	OFF	-----	200.00	1.00
04	CR	500.00	OFF	-----	4500	1.00
05	OPEN	--.---	OFF	-----	19.999	0.000

Pre Page | Next Page | Save | Test

Chart 2.8.3 List Result Interface

Save interface of file list setting parameter operation instructions: 1. In list set interface, select "Save" function to enter save interface of file list setting parameter, or long press【◄ 】button to

Výsledky: Dlouhý stisk [▲] → přehled výsledků.

enter save interface of file list setting parameter when the mode is closed; 2. Select operation item with 【▲▼◄ ► 】arrow buttons; 3. Press [ENT] button to enter edit mode, and select "Store", "Recall" and "Delete" of the file with [▲ ▼] arrow buttons; 4. Press [ENT] button to enter file rename interface when "Store" is selected; 5. Press [ENT] button to enter list set interface when "Recall" is selected, and the setting parameters displayed on interface are parameter data stored in recall file; 6. Press [ENT] button to clear stored data and file name of selected file when "Delete" is selected; 7. Press the buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 8. Press [ESC] to return to previous interface;

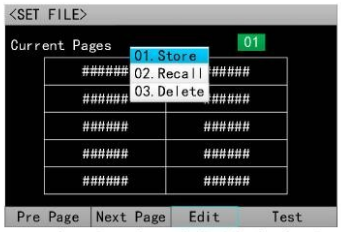


Chart 2.8.4 Save Interface of File List Setting Parameter

Save interface of file list result operation instructions: 1. In list result interface, select "Save" function to enter save interface of file list result, or long press【► 】button to enter save interface of file list result when the mode is closed; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. Press [ENT] button to enter edit mode, and select "Store", "Recall" and "Delete" of the file with [▲ ▼] arrow buttons; 4. Press [ENT] button to enter file rename interface when "Store" is selected; 5. Press [ENT] button to enter list result interface when "Recall" is selected, and the result displayed on interface is result data stored in recall file; 6. Press [ENT] button to clear stored data and file name of selected file when "Delete" is selected; 7. Press the buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 8. Press [ESC] to return to previous interface;

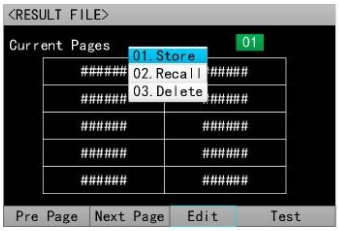


Chart 2.8.5 Save Interface of File List Result

File rename interface operation instructions: 1. Select a character with【▲▼◄ ► 】arrow buttons, and press [ENT] button to input character; 2. Press [ESC] button to clear the character if output character needs to be cleared. Press [ESC] button to return to previous interface after all characters are cleared; 3. Press the button under "Save", namely [I_R] button to return to previous interface (save interface of setting parameter or save interface of result) after inputting file name;

Uložení souboru nastavení: V nastavení → „Uložit" nebo dlouhý stisk [◀]. Operace: Store / Recall / Delete.

enter save interface of file list setting parameter when the mode is closed; 2. Select operation item with 【▲▼◄ ► 】arrow buttons; 3. Press [ENT] button to enter edit mode, and select "Store", "Recall" and "Delete" of the file with [▲ ▼] arrow buttons; 4. Press [ENT] button to enter file rename interface when "Store" is selected; 5. Press [ENT] button to enter list set interface when "Recall" is selected, and the setting parameters displayed on interface are parameter data stored in recall file; 6. Press [ENT] button to clear stored data and file name of selected file when "Delete" is selected; 7. Press the buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 8. Press [ESC] to return to previous interface;

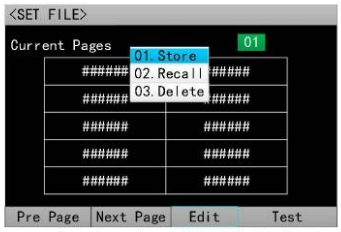


Chart 2.8.4 Save Interface of File List Setting Parameter

Save interface of file list result operation instructions: 1. In list result interface, select "Save" function to enter save interface of file list result, or long press【► 】button to enter save interface of file list result when the mode is closed; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. Press [ENT] button to enter edit mode, and select "Store", "Recall" and "Delete" of the file with [▲ ▼] arrow buttons; 4. Press [ENT] button to enter file rename interface when "Store" is selected; 5. Press [ENT] button to enter list result interface when "Recall" is selected, and the result displayed on interface is result data stored in recall file; 6. Press [ENT] button to clear stored data and file name of selected file when "Delete" is selected; 7. Press the buttons under "Pre Page" or "Next Page", i.e. [CC] and [CV] buttons, to turn the page; 8. Press [ESC] to return to previous interface;

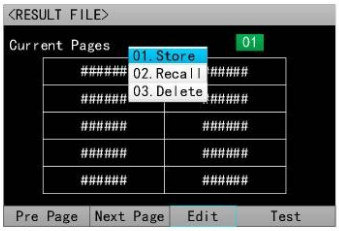


Chart 2.8.5 Save Interface of File List Result

File rename interface operation instructions: 1. Select a character with【▲▼◄ ► 】arrow buttons, and press [ENT] button to input character; 2. Press [ESC] button to clear the character if output character needs to be cleared. Press [ESC] button to return to previous interface after all characters are cleared; 3. Press the button under "Save", namely [I_R] button to return to previous interface (save interface of setting parameter or save interface of result) after inputting file name;

Přejmenování souboru: Šipky pro výběr znaku → [ENT] vložit → [ESC] smazat → [I_R] uložit název.

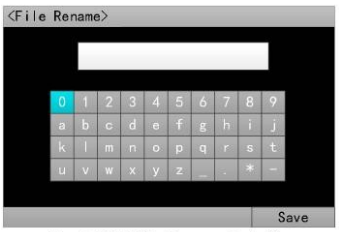


Chart 2.8.7 File Rename Interface

2.9Scan Test Operation

Scan test can be used to detect continuous run of the source to be tested within a certain range, and can easily capture various critical parameters of the source to be tested, such as protection current and break-over voltage. The user can set scan starting point, ending point, stepping amount, stepping delay, threshold type, comparison type and other related parameters. After scan test, it will display whether the test result is qualified or not, and OCP capture value will be displayed on measurement display interface.

The instructions of scan test set are as follows:

1. Scan type: Constant current / constant voltage / constant power. Set continuous running type of the source to be tested within a certain range.

2. Stepping amount: Set stepping value added at each step between scan starting point and ending point.

3. Stepping delay: Set runtime of each step between scan starting point and ending point.

4. Threshold type: Minimum voltage / voltage breakover / sag. Minimum voltage: when voltage of the load during operation is lower than threshold setting value of minimum voltage, voltage, current and power values of the load at this time will be captured and displayed on measurement display interface; voltage breakover: when the amplitude of voltage breakover during operation is higher than threshold setting value, voltage, current and power values of the load at this time will be captured and displayed on measurement display interface; voltage sag: when voltage suddenly drops sharply close to 0 during operation, voltage, current and power values of the load at this time will be captured and displayed on measurement display interface.

5. Comparison type: By voltage/ by current/ by power/off. Select whether scan test process is compared. If so, select comparison type. For example, after comparison type is set as by voltage, if voltage in the whole test process is within set value range from set lower limit voltage to upper limit voltage, scan result will be reflected in measurement display interface. The same is true for other comparison types.

6. Upper limit: Upper limit of comparison corresponding to comparison type.

7. Lower limit: Lower limit of comparison corresponding to comparison type.

Parameter set interface operation instructions: 1. Press [SET] button to enter parameter set interface of scan test after entering measurement interface of scan test by pressing [MODE] button; 2. The current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. For non-numeric parameters, press [ENT] button to switch settings; 5. For numeric parameters, press [ENT] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through 【▲▼】 arrow buttons. Press [ENT] or [ESC] button to exit editing; 6. Press [ESC] to return to previous interface;

Test interface operation instructions: 1. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Press [ON] button to start or close the mode of selected channel;

2.9 Skenovací test

Detekuje kontinuální provoz zdroje v zadaném rozsahu. Zachycuje kritické parametry: ochranný proud (OCP), průrazové napětí, propad napětí.

1. **Typ skenování:** Konstantní proud / napětí / výkon.
2. **Krok:** Přírůstek při každém kroku.
3. **Zpoždění kroku:** Délka běhu každého kroku.
4. **Typ prahu:** Minimální napětí / průraz napětí / propad napětí (sag).
5. **Typ porovnání:** Napětím / proudem / výkonem / vypnuto.
6. **Horní limit:** Horní limit pro porovnání.
7. **Dolní limit:** Dolní limit pro porovnání.

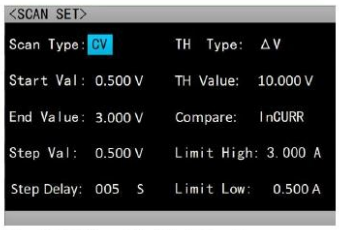


Chart 2.9.1 Scan Test Set Interface

Chart 2.9.2 Scan Test Interface

2.10Battery Test Operation

Battery test function is commonly used to detect battery discharge performance. The electronic load can run in mode of constant current or constant resistance. The cut-off conditions of load run include voltage, runtime, discharge capacity and discharge energy. After the load is started, battery discharge capacity and discharge energy can be automatically measured and are reflected in the measurement display interface.

The instructions of battery test set are as follows:

1. Discharge mode: Constant current / constant resistance. Set operating mode of the battery.
2. Discharge current 1 / 2 / 3: Set value of electronic load running in constant current mode.
3. Discharge resistance: Set value of electronic load running in constant resistance mode.
4. Cut-off condition: Voltage / time / energy / capacity. Set cut-off condition type for battery operation.
5. Cut-off voltage 1 / 2 / 3: Set cut-off voltage corresponding to discharge current when cut-off condition is voltage.
6. Cut-off time: Set cut-off value when cut-off condition is time.
7. Cut off energy: Set cut-off value when cut-off condition is energy.
8. Cut off capacity: Set cut-off value when cut-off condition is capacity.

Parameter set interface operation instructions: 1. Press [SET] button to enter parameter set interface of battery test after entering measurement interface of battery test by pressing [MODE] button; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with 【▲▼◄ ► 】 arrow buttons; 4. For non-numeric parameters, press [ENT] button to switch settings; 5. For numeric parameters, press [ENT] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 6. Press [ESC] to return to previous interface;

Test interface operation instructions: 1. The current range and voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Press [ON] button to start or close the mode of selected channel;

2.10 Test baterií

Měří výbojový výkon baterie v režimu CC nebo CR. Po spuštění automaticky měří vybitou kapacitu a energii.

1. **Výbojový režim:** CC / CR.
2. **Výbojový proud 1/2/3:** Hodnota zátěže v režimu CC.
3. **Výbojový odpor:** Hodnota zátěže v režimu CR.
4. **Podmínka ukončení:** Napětí / čas / energie / kapacita.
5. **Ukončovací napětí 1/2/3:** Odpovídá výbojovému proudu.
6. **Ukončovací čas:** Limit při podmínce čas.
7. **Ukončovací energie:** Limit při podmínce energie.
8. **Ukončovací kapacita:** Limit při podmínce kapacita.

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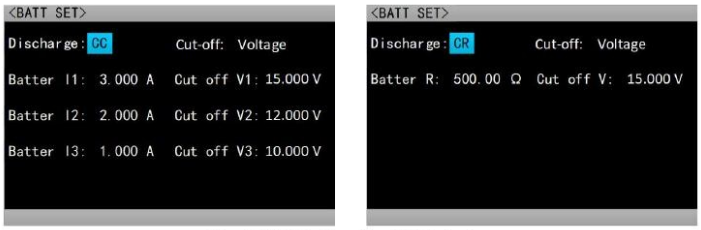

Chart 2.10.1 Battery Test Set Interface

Chart 2.10.2 Battery Test Interface

2.11 LED Test Operation

CR-LED test can simulate characteristics of real LED lamps. By increasing turn-on voltage of diodes in traditional CR mode, the load starts to run when load input voltage exceeds turn-on voltage of diodes, which can truly reflect load capacity of LED driving source.

Operation instructions: 1. Press [MODE] button to enter LED test interface; 2. The high/low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with【▲▼◄ ► 】arrow buttons; 4. Press [ENT] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through [▲ ▼] arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

Option Instructions:

Item	Content	Instruction
LED Vo:	0---Vmax	Stable working voltage of LED constant current source when carrying LED lamp
LED Io:	0---Imax	LED constant current source output current
LED Coeff:	0.01—1	Proportion of voltage on RD in the circuit to the total voltage

From the above parameters, turn-on voltage of LED and impedance of LED can be obtained according to the following equations (1) (2). VF is defined as turn-on voltage of diode, and RD is defined as LED impedance value.

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2.11 Test LED

CR-LED test simuluje charakteristiky skutečných LED svítidel. Zátěž se spustí až po překročení prahového napětí diody – věrně simuluje LED budič.

Parametr	Rozsah	Popis
LED Vo	0 – Vmax	Stabilní pracovní napětí LED zdroje při provozu s LED svítidlem
LED Io	0 – Imax	Výstupní proud LED konstantního zdroje
LED Coeff	0,01 – 1	Podíl napětí na RD vůči celkovému napětí

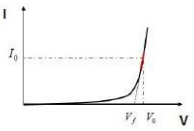
Výpočet parametrů LED:

Rd = (Vo / Io) × Coeff [impedance LED]

Vf = Vo × (1 − Coeff) [prahové napětí diody]

Rd = (Vo / Io) * Coeff (1)

Vf = Vo * (1 - Coeff) (2)



LED Characteristic curve

Chart 2.11 LED Test Interface

2.12 Short Circuit Test Operation

The load can simulate a short circuit at input end. In short circuit test, actual current consumed by the load short circuit depends on maximum output of the source.

Operation instructions: 1. Press [MODE] button to enter short circuit test interface; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with【▲▼◄ ► 】 arrow buttons; 4. Press [ENT] button to enter edit mode. Then, select corresponding digits through【◄ ► 】 arrow buttons and adjust value through 【▲▼】 arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

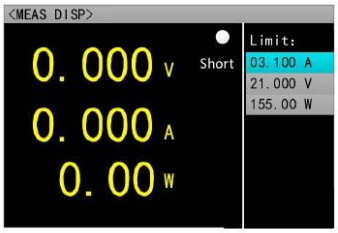


Chart 2.12 Short Circuit Test Interface

2.13Protection Function

The load provides prompts of overcurrent, overvoltage, overpower, overtemperature and polarity reverse connection (the prompt information shall be subject to the actual picture). When the load is in protection state, other button functions are invalid before exiting protection state by pressing [ENT] button.

2.12 Test zkratu

Simuluje zkrat na vstupním konci. Skutečný zkratový proud závisí na maximálním výstupu zdroje. Ovládání: [MODE] → SHORT → [ON] pro spuštění/zastavení.

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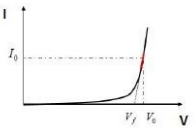
Rd = (Vo / Io) * Coeff (1)

Vf = Vo * (1 - Coeff) (2)



LED Characteristic curve

Chart 2.11 LED Test Interface

2.12 Short Circuit Test Operation

The load can simulate a short circuit at input end. In short circuit test, actual current consumed by the load short circuit depends on maximum output of the source.

Operation instructions: 1. Press [MODE] button to enter short circuit test interface; 2. The high/ low current range and high/ low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 3. Select operation item with【▲▼◄ ► 】arrow buttons; 4. Press [ENT] button to enter edit mode. Then, select corresponding digits through【◄ ► 】arrow buttons and adjust value through 【▲▼】 arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ON] button to start or close the mode of selected channel;

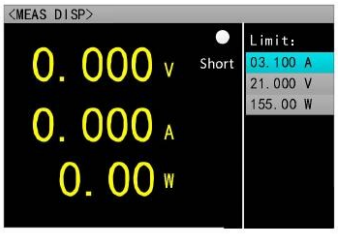


Chart 2.12 Short Circuit Test Interface

2.13Protection Function

The load provides prompts of overcurrent, overvoltage, overpower, overtemperature and polarity reverse connection (the prompt information shall be subject to the actual picture). When the load is in protection state, other button functions are invalid before exiting protection state by pressing [ENT] button.

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2.13 Ochranné funkce

Ochrana před nadproudem, přepětím, přetížením, přehřátím a záměnou polarity. V ochranném stavu stiskněte [ENT] pro reset.

Typ	Popis	Podmínka aktivace
OC	Ochrana před nadproudem	Vstupní proud > limit proudu
OV	Ochrana před přepětím	Vstupní napětí > limit napětí
OP	Ochrana před přetížením	Vstupní výkon > limit výkonu
OT	Ochrana před přehřátím	Teplota chladiče > 85 °C
RV	Záměna polarity	Vstupní polarita je obrácená

Equipment protection instructions:

Protection type	Type description	Protection reason
OC	Overcurrent protection	Input current is higher than the current limit value
OV	Overvoltage protection	Input voltage is higher than the voltage limit value
OP	Overpower protection	Input power is higher than the power limit value
OT	Overtemperatur protection	Radiator temperature is higher than 85°C
RV	polarity reverse connection prompt	Input polarity is opposite

Chart 2.13 Overcurrent Protection Prompt

2.14Trigger Function

The load has a trigger function, which is mainly applied in dynamic and list tests to start next conversion. The load supports three triggering methods: 1. Manual trigger (triggered by [TRIG] button on the front panel) 2. External trigger (triggered through the trigger port on rear panel). 3. Bus trigger (triggered by program control commands of RS-232 or 485 bus interface).

2.15Qualified Test Operation

Qualified test is an additional function of basic measurement mode CC/CV/CR/CP. After qualified test is started, main interface of basic measurement mode can detect whether current test is within set limit in real time, and Pass/Fail will be displayed.

Parameter set interface operation instructions: 1. The high/low current range and high/low voltage range can be quickly switched by pressing [I_R] [V_R] commonly used buttons; 2. Select operation item with 【▲▼◄ ► 】 arrow buttons; 3. For non-numeric parameters, press [ENT] button to switch settings; 4. For numeric parameters, press [ENT] button to enter edit mode. Then, select corresponding digits through 【◄ ► 】 arrow buttons and adjust value through 【▲▼】 arrow buttons. Press [ENT] or [ESC] button to exit editing; 5. Press [ESC] to return to previous interface;

2.14 Funkce spouště (Trigger)

Spoušť se uplatňuje v dynamickém a sekvenčním testu. Tři metody:

- Ruční – tlačítko [TRIG] na předním panelu
- Externí – signál přes spouštěcí port na zadním panelu
- Sběrnicová – příkazy přes RS-232 nebo RS-485

2.15 Kvalifikační test

Doplňková funkce režimů CC/CV/CR/CP. Průběžně porovnává naměřené hodnoty s nastvenými limity a zobrazuje PASS nebo FAIL.

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Chart 2.14.1 Qualified Test Set Interface

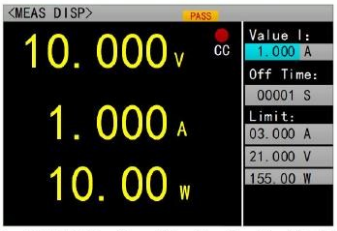

Chart 2.14.2 Interface After Starting Qualified Test

2.16Other System Set

2.16.1 Button Lock Function

In order to prevent users from misoperation, the load also has a lock function. The lock identification will be displayed in title bar. In locked state, except for long-press function of [ESC] button, [ON] and [ENT] buttons, all the other buttons including the knob are locked. In addition, in locked state, a locked icon will appear in icon bar, and the icon will disappear when unlocked. Long press【ENT】 button for 3s to switch between locked and unlocked states.

2.16.2 Communication Port and External Interface Function

The ET54XXA+ series are equipped with RS232 (optional) or 485 (optional) and USB multiple communication ports. Users can choose any port to complete communication with computer. The external interfaces are status output and trigger input, which are described as follows:

Extended interface output	R1	LIST list test is in progress, low effective
	P1	List list test result is qualified, low effective
	G	GND
Extended interface input	N1	External trigger input
RS485/232 communication port	B/R	RS485 B pin / RS232 receiving pin
	A/T	RS485 A pin / RS232 transmitting pin
	⏚	Reference place of communication

Extended port output is OC gate output. The user needs to connect pull-up resistor and pull-up electronic level. The range of pull-up electronic level is 0-50V, and that of sinking current is 0-100ma. The equipment interface will be damaged after exceeding the above electrical range.

The extended port input is an external trigger input terminal, and falling edge is effective. The interval between two falling edges shall be greater than 100ms.

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2.16 Ostatní nastavení systému

2.16.1 Funkce zámku tlačítek

Zátěž lze uzamknout pro prevenci náhodné operace. Zamčený stav je indikován ikonou. V zamčeném stavu jsou neaktivní všechna tlačítka a knoflík, s výjimkou dlouhého stisku [ESC], [ON] a [ENT]. Přepnutí: dlouhý stisk [ENT] po dobu 3 s.

2.16.2 Komunikační porty a externí rozhraní

Série ET54XXA+ je vybavena porty RS-232 (volitelně), RS-485 (volitelně) a USB.

Rozhraní	Pin	Funkce
Výstup ext. rozhraní	R1	Probíhá LIST test, aktivní v nízké úrovni
	P1	Výsledek LIST testu je kvalifikovaný, aktivní v nízké úrovni
	G	GND
Vstup ext. rozhraní	N1	Vstup externího spouštěče
RS-485/232 port	B/R	RS-485 pin B / RS-232 přijímací pin
	A/T	RS-485 pin A / RS-232 vysílací pin
	⏚	Referenční zem

Výstup ext. portu: OC výstup. Připojte pull-up rezistor a napájení 0–50 V (max. 100 mA). Překročení poškodí rozhraní.

Vstup ext. portu: Reaguje na sestupnou hranu. Interval mezi dvěma hranami > 100 ms.

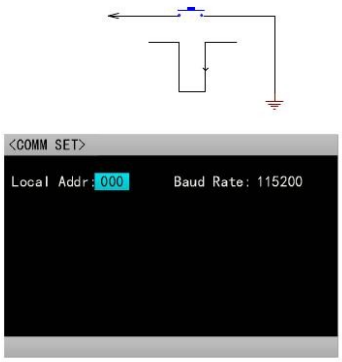

Chart 2.15.2 Communication Set Interface

Technické specifikace

Parametr	ET5410A+	ET5411A+
Jmenovitý výkon	400 W	400 W
Vstupní napětí (rozsah)	0 – 150 V	0 – 500 V
Vstupní proud (max.)	0 – 40 A	0 – 15 A
CV – rozsah	0,1–19,999 V / 0,1–150 V	0,1–19,999 V / 0,1–500 V
CV – rozlišení	1 mV / 10 mV	1 mV / 10 mV
CV – přesnost	±(0,05 % + 0,02 % FS)	±(0,05 % + 0,02 % FS)
CC – rozsah	0–3 A / 0–40 A	0–3 A / 0–15 A
CC – rozlišení	1 mA / 10 mA	1 mA / 10 mA
CC – přesnost	±(0,05 % + 0,05 % FS)	±(0,05 % + 0,05 % FS)
CR – rozsah	0,05 Ω–1 kΩ / 1 kΩ–4,5 kΩ	0,05 Ω–1 kΩ / 1 kΩ–4,5 kΩ
CR – rozlišení	10 mΩ / 100 mΩ	10 mΩ / 100 mΩ
CR – přesnost	±(0,1 % + 0,5 % FS)	±(0,1 % + 0,5 % FS)
CP – rozsah	0–400 W	0–400 W
CP – rozlišení	10 mW	10 mW
Dyn. test – T1/T2	50 ms – 60 s	50 ms – 60 s
Test baterií – max. kapacita	9 999 Ah	9 999 Ah
Zpětné čtení U – přesnost	±(0,05 % + 0,1 % FS)	±(0,05 % + 0,1 % FS)
Zpětné čtení I – přesnost	±(0,05 % + 0,1 % FS)	±(0,05 % + 0,1 % FS)
Ochrana OV	> 21 V nebo > 155 V	> 21 V nebo > 510 V
Ochrana OC	> 3,1 A nebo > 42 A	> 3,1 A nebo > 16 A
Ochrana OP	410 W	410 W
Ochrana OT	85 °C	85 °C

Obecný parametr	Hodnota
Napájecí napětí	100–240 V AC ±10 %, 50/60 Hz
Displej	2,8" TFT LCD, 320×240
Provozní teplota	0 °C – 40 °C
Skladovací teplota	-10 °C – 70 °C
Relativní vlhkost	< 80 %
Komunikace	USB (standard), RS-232 nebo RS-485 (volitelně)
Rozměry (š × v × h)	90 × 190 × 300 mm

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