ETSYSTEM®

**AC/DC Last ELP/ACP**
***AC/DC Load ELP/ACP***
***1875W - 3750W***

# Manual ELP/ACP
## 1875VA to 3750VA


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**SAFETY SUMMARY**

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 violates safety standards of design, manufacture, and intended use of the instrument. ET System electronic GmbH assumes no liability for the *customer's failure to comply with these requirements.*

**GENERAL**

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

**ENVIRONMENTAL CONDITIONS**

This instrument is intended for indoor use in an installation category I, pollution degree 2 environments. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

**BEFORE APPLYING POWER**

Verify that the product is set to match the available line voltage and the correct fuse is installed.

**GROUND THE INSTRUMENT**

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument must be connected to the ac power supply mains through a three conductor power cable, with the third wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

**FUSES**

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired
Fuses or short circuited fuse holder. To do so could cause a shock or fire hazard.

**DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.**

Do not operate the instrument in the presence of flammable gases or fumes.

**KEEP AWAY FROM LIVE CIRCUITS.**

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

**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 EXCEED INPUT RATINGS.**

This instrument may be equipped with a line filter to reduce electromagnetic interference and must be connected to a properly grounded receptacle to minimize electric shock hazard. Operation at line voltages or frequencies in excess of those stated on the data plate may cause leakage currents in excess of 5.0 mA peak.

**DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.**

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a ET System electronic GmbH Sales and Service Office for service and repair to ensure that safety features
are maintained.

*Instruments which appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.*

# EC DECLARATION OF CONFORMITY

We **ET System electronic GmbH** declares under our own responsibility that the product

AC/DC Electronic Loads

(Model No.:

ELP/ACP Serie: 3750; 2800; 1875; 3750HV; 2800HV satisfies all the technical relations application to the product within the scope of council:

**Directive: 2014/30/EU; 2014/35/EU; 2015/863/EU; 2012/19/EU**

The above product is in conformity with the following standards or other normative documents

**Harmonized Standard：**

EN 61010-1: 2010+A1:2019

EN IEC 61010-2-030:2021+A11:2021

EN 61326-1:2013

EN 61326-2-1:2013

**Reference Basic Standards：**

**Emission:**

EN 55011: 2016+A1: 2020 Class A

EN 55032: 2015+A1:2020

EN 61000-3-2: 2014

EN 61000-3-3: 2013

**Immunity:**

EN 61000-4-2: 2009

EN 61000-4-3: 2006+A2:2010

EN 61000-4-4: 2012

EN 61000-4-5: 2014+A1:2017

EN 61000-4-6: 2014

EN 61000-4-8: 2010

EN 61000-4-11: 2020

# UK Declaration of Conformity

We **ET System electronic GmbH** declares under our own responsibility that the product

AC/DC Electronic Loads

(Model No.:

ELP/ACP Serie: 3500; 2800; 1875; 3750HV; 2800HV satisfies all the technical relations application to the product within the scope of council:

Directive: **Electromagnetic Compatibility Regulations 2016; Electrical Equipment (Safety) Regulations 2016; the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**

The above product is in conformity with the following standards or other normative documents

**Harmonized Standard：**

BS EN 61010-1:2010+A1:2019 ;BS EN IEC 61010-2-030:2021+A11:2021

BS EN 61326-1: 2013 ; BS EN 61326-2-1: 2013

**Reference Basic Standards：**

**Emission:**

BS EN 55011: 2016+A1: 2020 Class A

BS EN 55032: 2015+A1:2020

BS EN 61000-3-2: 2014

BS EN 61000-3-3: 2013

**Immunity:**

BS EN 61000-4-2: 2009

BS EN 61000-4-3: 2006+A2:2010

BS EN 61000-4-4: 2012

BS EN 61000-4-5: 2014+A1:2017

BS EN 61000-4-6: 2014

BS EN 61000-4-8: 2010

BS EN 61000-4-11: 2020

**SAFETY SYMBOLS**

 **Direct current (DC)**

 **Alternating current (AC)**

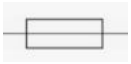
 **Both direct and alternating**

 **Three-phase alternating current**

 **Protective earth (ground)**

 **On (Supply)**

 **Off (Supply)**

 **Fuse**

 **Caution ! Refer to this manual before using the meter.**

 **Caution, risk of electric shock**

**CAT IV** – Is for measurements performed at the source of the low-voltage installation.

**CAT III** – Is for measurements performed in the building installation.

**CAT II** – Is for measurements performed on circuits directly connected to the low-voltage installation.

**CAT I** – Is for measurements performed on circuits not directly connected to Mains.

# ELP/ACP series AC/DC load operation manual
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Tables

# Chapter 1 Introduction

## 1-1. General description

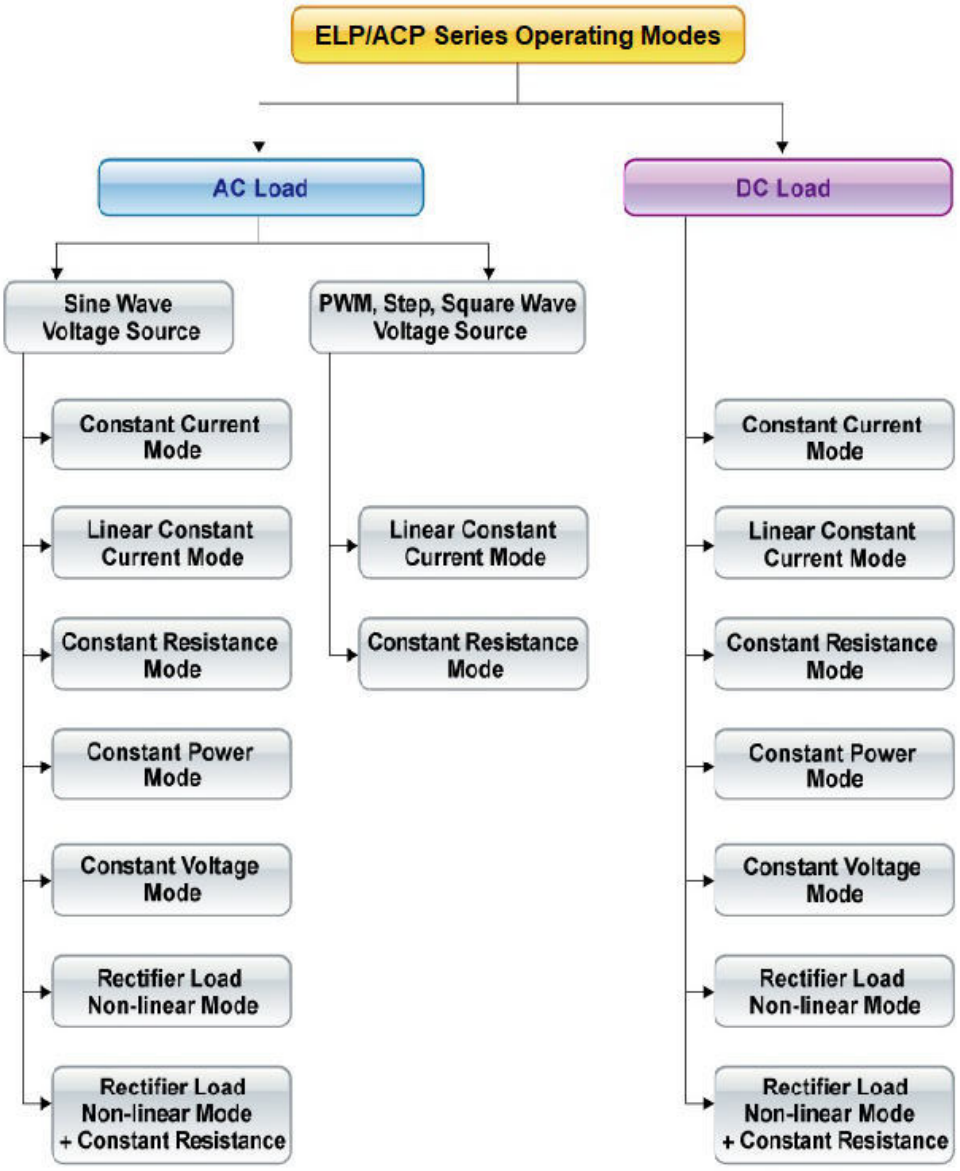
5 digit V/A/W Meter，display the Voltage（Vrms, Vpeak, Vmax., Vmin）、Current （Irms, Ipeak, Imax, Imin.）,Watt, Voltampere （VA）, Frequency Crest Factor、 Power Factor,Total Harmonic Distortion of Voltage（VTHD）, Voltage Harmonic(VH）、Total Harmonic Distortion of Current（ITHD）, Current Harmonic（IH）


| MODEL | ELP/ACP 3750 | ELP/ACP 2800 | ELP/ACP 1875 | ELP/ACP 3750 | ELP/ACP 2800 |
|---|---|---|---|---|---|
| Power (W) | 3750 W | 2800W | 1875 W | 3750 W | 2800W |
| Current(Ampere) | 37.5 Arms / 112.5Apeak | 28 Arms / 84Apeak | 18.75 Arms / 56.25Apeak | 28 Arms / 84Apeak | 18.75 Arms / 56.25Apeak |
| Voltage(Volt) | 50~350Vrms / 500Vdc | | | 50~480Vrms / 700Vdc | |
| FREQUENCY Range | DC,40~440Hz (CC,CP Mode) , DC~440Hz (LIN,CR,CV Mode) | | | DC,40~70Hz (CC,CP Mode) , DC~70Hz (LIN,CR,CV Mode) | |

When Turbo ON, power and current increase 2 times

ELP/ACP Series is suitable for the step, square and sine wave of the AC Power device test, Especially For the uninterruptible power supply UPS, Inverter, fuses, circuit breakers, power Regulator AVR, Battery, AC / DC power supply / components ... and so on, absolutely is the Best test solution in the market.

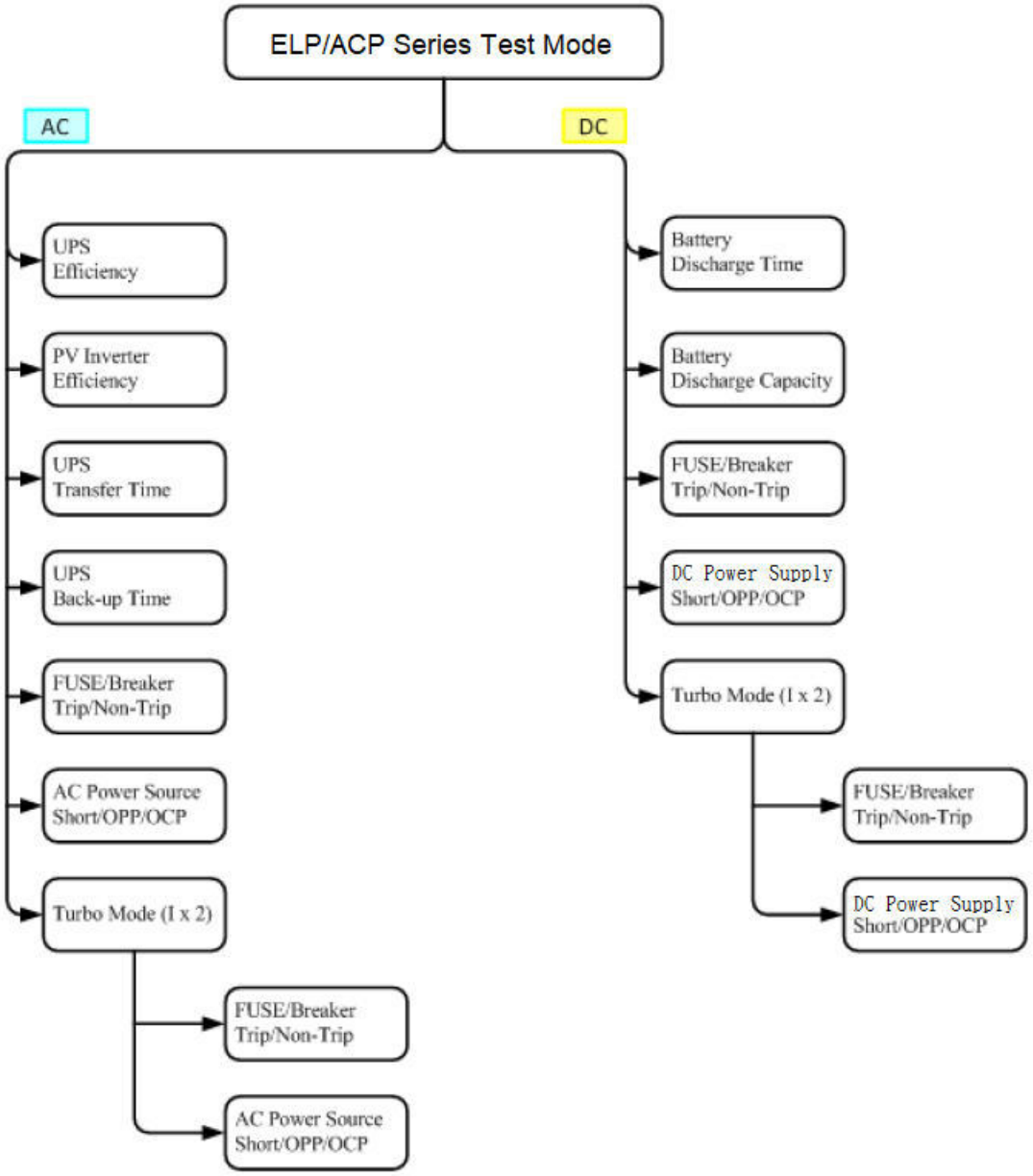
- ELP/ACP LOAD Operating mode



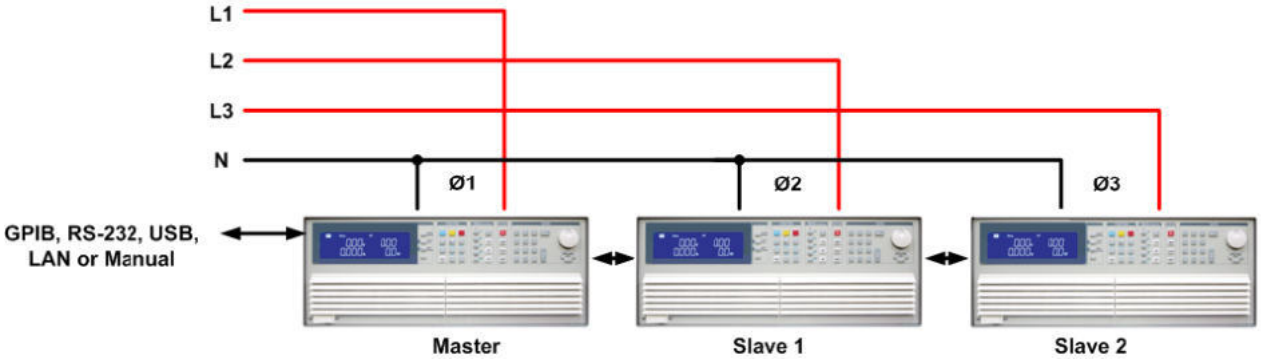
**The most complete measurement function**

ELP/ACP series AC / DC electronic load has built-in 16-bit precision measurement circuit, providing accurate measurement values, measuring items include voltage rms (Vrms), current rms (Arms), watts (Watt), voltampere (VA), crest factor (CF), power factor (PF), voltage total harmonic distortion (VTHD), voltage harmonics (VH), current total harmonic distortion (ITHD), current Harmonics (IH), peak current (Ipeak), maximum ampere (Amax), minimum ampere (Amin), maximum voltage (Vmax), and minimum voltage (Vmin).
In addition to these measurement functions, it also provides time measurement, such as UPS back up time, fuses and circuit breakers' trip or blow time and Off-line UPS transfer time.

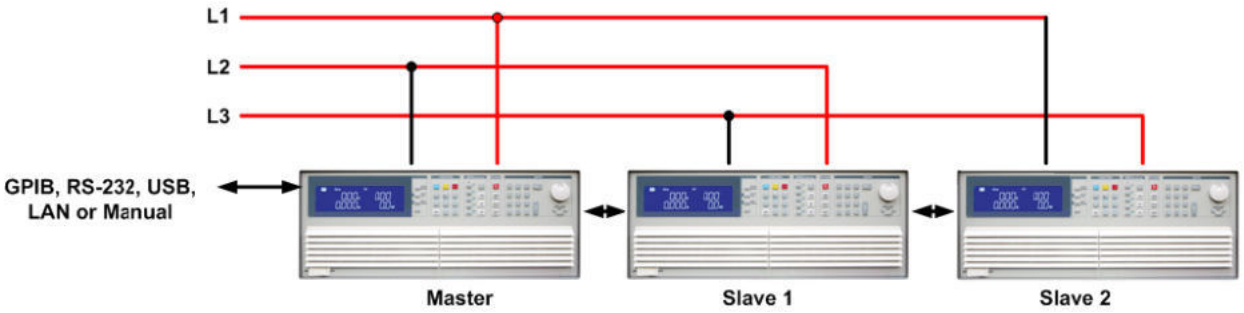
Note*1: ms= milli - siemens = 1/kΩ
Note*2: The operating temperature range is 0 ~ 40°C,accuracy of this specification is 25°C ± 5 °C



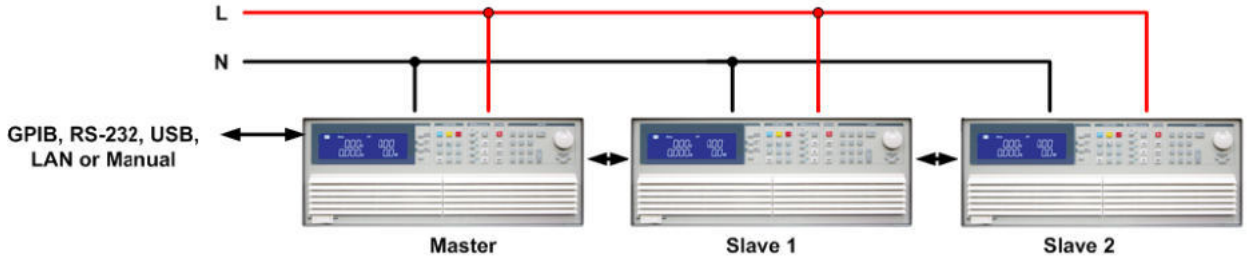
- Parallel and three-phase control




3 phase Y connection




3 phase △ connection



ELP/ACP Series AC/DC electronic load can be used to work with GPIB, RS232, USB or LAN interface and panel manual operation can be made available. The work area of ELP/ACP 3750W is as shown in Fig.1-1. The work scope of its voltage and current is 0-350Vrms and 0-37.5Arms respectively.
The electronic load operating environment temperature is 0 ° C ~ 40 °C, full power operation for a period of time may produce OTP.

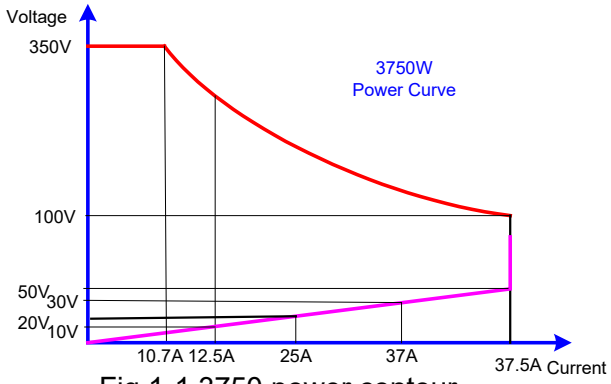


Fig 1-1 3750 power contour

The work area of ELP/ACP 2800 2800W is as shown in Fig.1-2.
The work scope of its voltage and current is 0-350Vrms and 0-28Arms respectively.

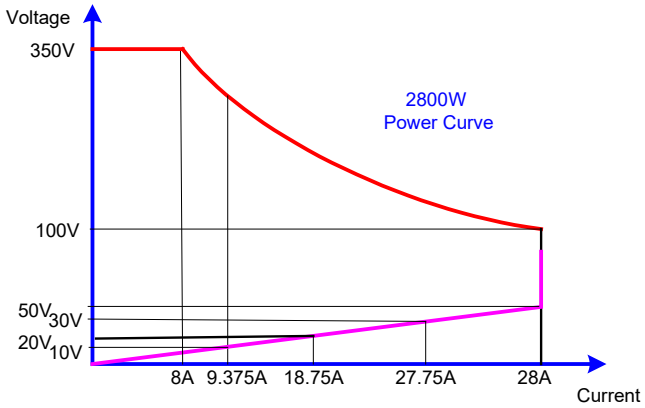


Fig 1-2 2800 power contour

The work area of ELP/ACP 1875 1875W is as shown in Fig.1-3.
The work scope of its voltage and current is 0-350Vrms and 0-28Arms respectively.

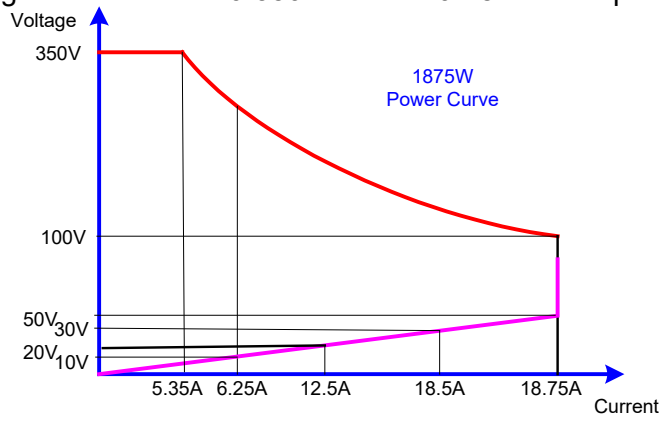


Fig 1-3 1875 power contour

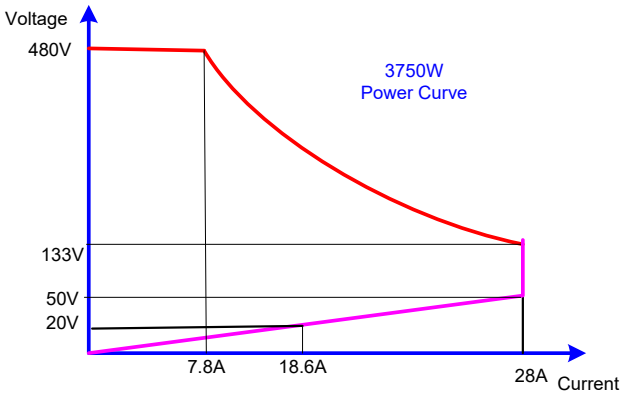



Fig 1-4 3750 power contour

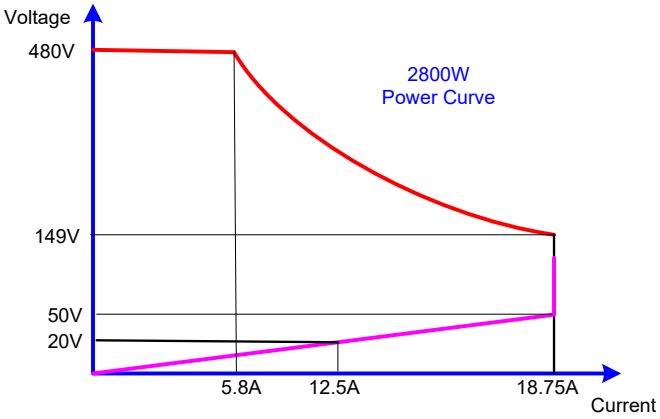



Fig 1-5 2800 power contour

**Complete AC and DC load modes**

- **AC load mode**

### 1.1.1. CC Mode

With the operating mode of Constant Current, the ELP/ACP series electronic load will sink a current in accordance with the programmed value regardless of the input voltage (see Fig.1-6).

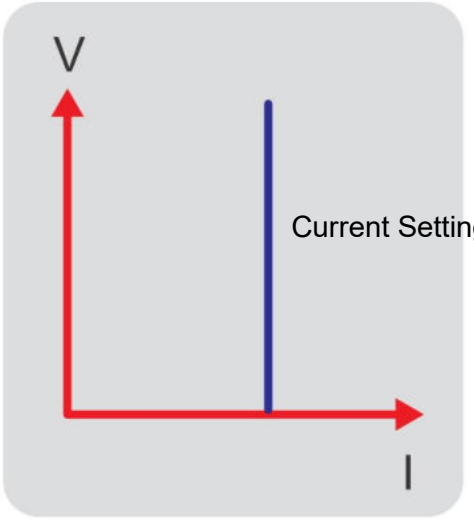



Fig 1-6 Constant Current mode

### 1.1.2. Linear C.C. Mode

During Linear C.C. mode, the load current input into ELP/ACP Series High Power Electronic Load depends on the current setting regardless of the input voltage, e.g., the current setting remains unchanged. Please refer to Fig.1-7. The load input current signal will follow input voltage signal, That is useful for step wave-form and square wave-form device.

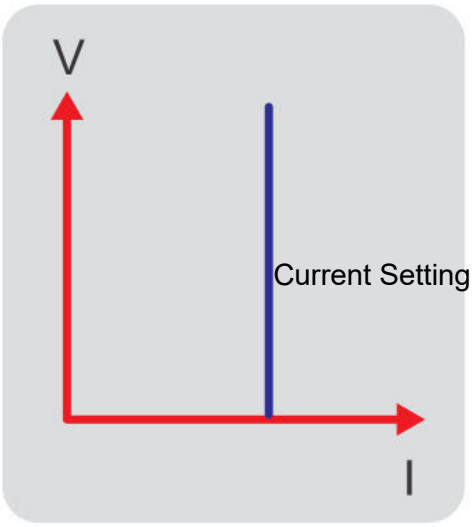



Fig 1-7 Constant Current mode

### 1.1.3. CR Mode:

At Constant Resistance mode, the ELP/ACP series Electronic Load will sink a current linearly proportional to the load input voltage in accordance with the programmed resistance setting (see Fig 1-8).

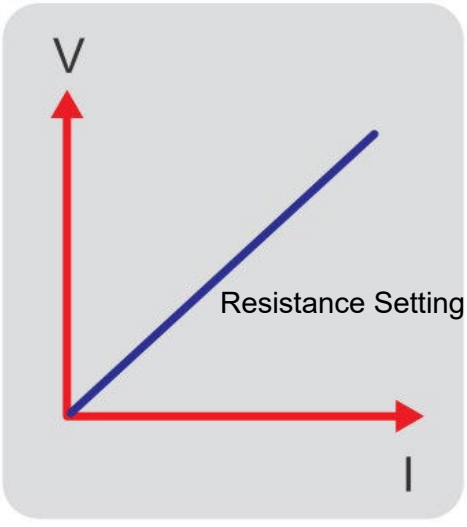



Fig 1-8 Constant Resistance mode

### 1.1.4. CV Mode:

At Constant Voltage mode, the ELP/ACP series Electronic Load will attempt to sink enough current until the load input voltage reaches the programmed value (see Fig 1-9).

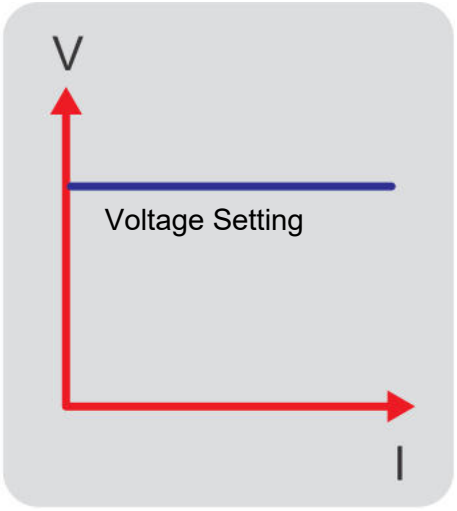



Fig 1-9 Constant Voltage mode

### 1.1.5. CP Mode:

At Constant Power mode, the ELP/ACP series Electronic Load will attempt to sink load power (load voltage * load current) in accordance with the programmed power. (See Fig 1-10).

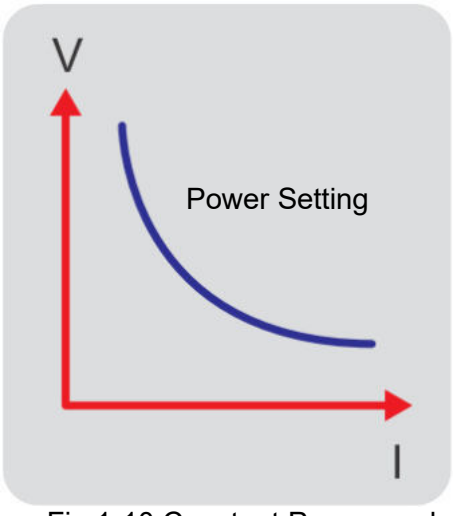



Fig 1-10 Constant Power mode

- **DC load mode**

### 1.1.6. CC Mode

With the operating mode of Constant Current, the ELP/ACP series electronic load will sink a current in accordance with the programmed value regardless of the input voltage (see Fig.1-11).

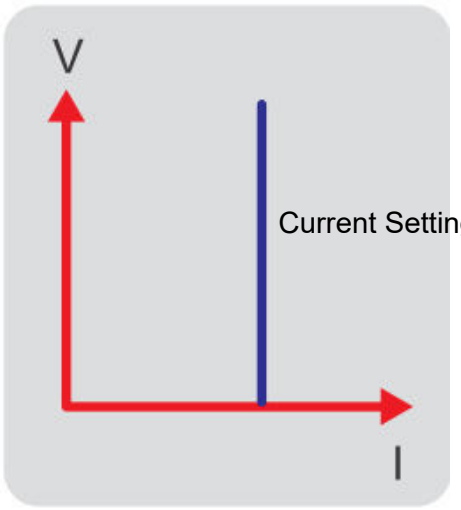



Fig 1-11 Constant Current mode

### 1.1.7. CR Mode

At Constant Resistance mode, the ELP/ACP series Electronic Load will sink a current linearly proportional to the load input voltage in accordance with the programmed resistance setting (see Fig 1-12).

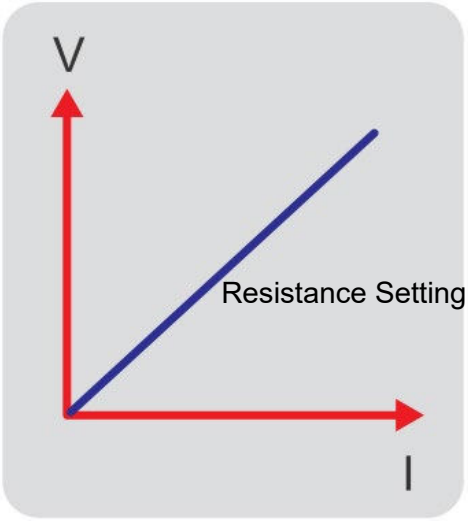



Fig 1-12 Constant Resistance mode

### 1.1.8. CP Mode:

At Constant Power mode, the ELP/ACP series Electronic Load will attempt to sink load power (load voltage * load current) in accordance with the programmed power. (See Fig 1-13).

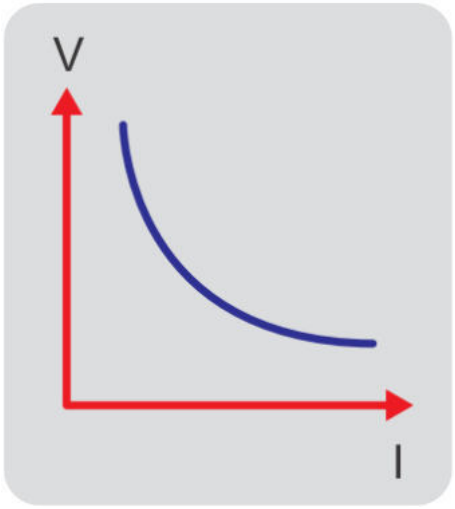



Fig 1-13 Constant Power mode

### 1.1.9. CV Mode:

At Constant Voltage mode, the ELP/ACP series Electronic Load will attempt to sink enough current until the load input voltage reaches the programmed value (see Fig 1-14).

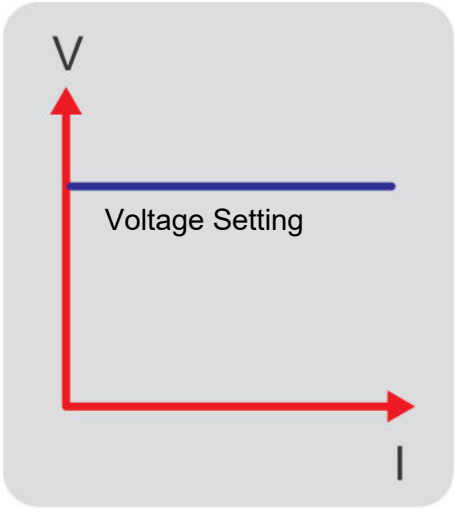



Fig 1-14 Constant Voltage mode

## 1-2. Features

The main features of the ELP/ACP series of load are highlighted below.

1.2.1. Four meters can be displayed V/A/W Meter, display the Voltage (Vrms, Vpeak, Vmax., Vmin), Current (Irms, I Peak, Imax. Imin.) Watt, Voltampere (VA), Frequency, Crest Factor, Power Factor, Total Harmonic Distortion of Voltage (VTHD), Voltage Harmonic (VH), Total Harmonic Distortion of Current (ITHD), Current Harmonic (IH) Remote Control via a choice of Computer interfaces.
1.2.2. AC / DC load with CC, Linear CC, CR, CV, CP and Rectifier Load mode
1.2.3. Frequency Range : DC, 40~440Hz
1.2.4. Crest factor adjustable range : 1.414~5.0
1.2.5. Power factor (PF) adjustable range: 0~1 lead or（-1~0）lag
1.2.6. Built-in test modes include UPS Efficiency, PV Inverter Efficiency, UPS Back-up time, Battery Discharge time, UPS transfer time, Fuse / Breaker Trip / Non-Trip, short circuit Simulation, OCP, OPP, etc.
1.2.7. Turbo mode, which can withstand up to twice the current (75A) and power (7.5KW) Electronic load in a short time, the most suitable for Fuse / Breaker and AC power short Circuit, OCP, OPP test.
1.2.8. Eight units parallel up to 540KW and three-phase △ or Y load connection can be Synchronized control by one master unit
1.2.9. Can be controlled by external voltage for CC, Linear CC, CR, CP, CV mode (Option)
1.2.10. Measure the fuse and circuit breaker trip or blow time
1.2.11. Measure the UPS OFF-Line transfer time(Transfer time)
1.2.12. Perform short circuit simulation(can set the short circuit time), OCP, OPP test
1.2.13. Over voltage warning, over current, over power, over temperature protection.
1.2.14. Optional interface: GPIB, RS232, USB, LAN.
1.2.15. 150 set Store/Recall memory.
1.2.16. Support on-load boot; at first set Load ON to support on-load boot, inverter or Uninterruptible power supply is turned on directly with the set load current, used to verify Whether the starter is stable when the Inverter is connected.
1.2.17. Supports the loading and unloading angle control; the loading and unloading angle Control, the full range of 0-359 degrees can be set to verify whether the Inverter output Voltage transient response is stable when the actual electrical plugging and unplugging, And whether Overshoot/Undershoot is within the allowable range.
1.2.18. Support positive half-cycle or negative half-cycle loading; used to verify whether the Inverter output voltage remains stable when the actual appliance has only positive half-Cycle or negative half-cycle load current.
1.2.19. Supports SCR/TRIAC current phase modulation waveforms, 90 degree Trailing edge And leading Edge.

1.2.20. Supports the Inrush Current of the power supply at startup and the Surge Current test When the load is suddenly plugged in (Hot Plug-in).

## 1-3. Standard Accessories

a ELP/ACP Series operation manual.....1PCs
b Round terminal RVL1-4.....2PCs
c Round terminal RNYBS8-4.....2PCs
d Terminal PTV1-12.....8PCs
e HD-DSUB 15pin MALE to MALE 150cm……1 PCs
f Power Cord.....1PCs

## 1-4. Option

1.4.1. GPIB+RS232 interface
1.4.2. RS232 interface
1.4.3. GPIB interface
1.4.4. USB interface + USB DRIVER CD
1.4.5. LAN interface + LAN DRIVER CD
1.4.6. GPIB cable 1 M
1.4.7. GPIB cable 2 M
1.4.8. USB TYPE A TO TYPE B cable 1.8 M.

## 1-5. Specifications 1

| | | |
|---|---|---|
| AC INPUT | LINE | 100Vac~230Vac ± 10% |
| | FREQUENCY | 50/60 Hz ±3Hz |
| | PROTECT FUSE | 2A/250V (5*20mm) |
| | MAX.POWER CONSUMPTION | 150VA |

| Model | Power | Voltage | Current | Dimension(HxWxD) | WEIGHT |
|---|---|---|---|---|---|
| ELP/ACP 3750 | 3750W | 350V | 37.5A | 177 mm x 440 mm x 558 mm | 33.5 Kg |
| ELP/ACP 2800 | 2800W | 350V | 28A | 177 mm x 440 mm x 558 mm | 27.5 Kg |
| ELP/ACP 1875 | 1875W | 350V | 18.75A | 177 mm x 440 mm x 558 mm | 21.5 Kg |
| ELP/ACP 3750HV | 3750W | 480V | 28A | 177 mm x 440 mm x 558 mm | 33.5 Kg |
| ELP/ACP 2800HV | 2800W | 480V | 18.75A | 177 mm x 440 mm x 558 mm | 27.5 Kg |

Table 1-1 ELP/ACP Series Specifications

# 1-6. Specifications 2

| MODEL | ELP/ACP 3750 | ELP/ACP 2800 | ELP/ACP 1875 | ELP/ACP 3750HV | ELP/ACP 2800HV |
|---|---|---|---|---|---|
| Power (W) | 3750 W | 2800W | 1875 W | 3750 W | 2800W |
| Current(Ampere) | 37.5 Arms / 112.5Apeak | 28 Arms / 84Apeak | 18.75 Arms / 56.25Apeak | 28 Arms / 84Apeak | 18.75 Arms / 56.25Apeak |
| Voltage(Volt) | 50~350Vrms / 500Vdc | | | 50~480Vrms / 700Vdc | |
| FREQUENCY Range | DC,40~440Hz(CC,CP Mode) , DC~440Hz(LIN,CR,CV Mode) | | | DC,40~70Hz(CC,CP Mode) , DC~70Hz(LIN,CR,CV Mode) | |
| **PROTECTIONS** | | | | | |
| Over Power Protection | ≒ 3937.5Wrms or Programmable | ≒2940Wrms or Programmable | ≒ 1968.75Wrms or Programmable | ≒ 3937.5Wrms or Programmable | ≒2940Wrms or Programmable |
| Over Current Protection | ≒ 39.375 Arms, or Programmable | ≒ 29.4 Arms or Programmable | ≒ 19.687 Arms or Programmable | ≒ 29.4 Arms or Programmable | ≒ 19.687 Arms or Programmable |
| Over Vlotage Protection | ≒ 367.5 Vrms / 525Vdc | | | ≒ 504Vrms / 735Vdc | |
| Over Temp. Protection | Yes | | | | |
| **OPERATION MODE** | | | | | |
| **Constant Current Mode for Sine-Wave** | | | | | |
| Range | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| Resolution | 0.625mA/16bits | 0.5mA/16bits | 0.3125mA/16bits | 0.5mA/16bits | 0.3125mA/16bits |
| Accuracy | ± ( 0.1% of setting + 0.2% of range ) @ 50/60Hz , ± 0.5% of ( setting + range ) | | | | |
| **Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave** | | | | | |
| Range | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| Resolution | 0.625mA/16bits | 0.5mA/16bits | 0.3125mA/16bits | 0.5mA/16bits | 0.3125mA/16bits |
| Accuracy | ± ( 0.1% of setting + 0.2% of range ) @ 50/60Hz , ± 0.5% of ( setting + range ) | | | | |
| **Constant Resistance Mode** | | | | | |
| Range | 1.6 ohm～32K ohm | 2.0 ohm～40K ohm | 3.2 ohm～64K ohm | 2.5 ohm～50K ohm | 4 ohm～80K ohm |
| Resolution*1 | 0.010416mS/16bits | 0.0083333mS/16bits | 0.0052083mS/16bits | 0.006666mS/16bits | 0.004166mS/16bits |
| Accuracy | ±0.2% of （setting + range）@ 50/60Hz , ± ( 0.5% of setting + 2% of range ) | | | | |
| **Constant Voltage Mode** | | | | | |
| Range | 50~350Vrms / 500Vdc | | | 50~480Vrms / 700Vdc | |
| Resolution | 0.01V | | | 0.0125V | |
| Accuracy | ±(0.1% of setting + 0.1% of range) | | | | |
| **Constant Power Mode** | | | | | |
| Range | 3750W | 2800W | 1875W | 3750W | 2800W |
| Resolution | 0.1W | 0.1W | 0.1W | 0.1W | 0.1W |
| Accuracy | ±(0.1% of setting + 0.1% of range) | | | | |
| **CREST FACTOR (CC & CP MODE ONLY)** | | | | | |
| Range | √2~5 | | | | |
| Resolution | 0.1 | | | | |
| Accuracy | (0.5% / Irms) + 1%F.S. | | | | |
| **POWER FACTOR (CC & CP MODE ONLY)** | | | | | |
| Range | 0~1 Lag or Lead | | | | |
| Resolution | 0.01 | | | | |
| Accuracy | 1%F.S. | | | | |
| **TEST MODE** | | | | | |
| **UPS Efficient Measurement** | Non-Linear Mode | | | | |
| Operating Frequency | Auto ; 40~440Hz | | | Auto ; 40~70Hz | |
| Current Range | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| PF Range | 0~1 | | | | |
| **MEASURING EFFICIENCY FOR PV SYSTEMS, POWER CONDITIONERS for THD 80%** | Resistive + Non-Linear Mode | | | | |
| Operating Frequency | Auto ; 40~440Hz | | | Auto ; 40~70Hz | |
| Current Range | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| Resistive Range | 1.6 ohm～32K ohm | 2.0 ohm～40K ohm | 3.2 ohm～64K ohm | 2.5 ohm～50K ohm | 4 ohm～80K ohm |
| **UPS Back-Up function(CC,LIN,CR,CP)** | | | | | |
| UVP (VTH) | 50~350Vrms / 500Vdc | | | 50~480Vrms / 700Vdc | |
| UPS Back-Up Time | 1~99999 Sec. (>27H) | | | | |
| **Battery Discharge function(CC,LIN,CR,CP)** | | | | | |
| UVP (VTH) | 50~350Vrms / 500Vdc | | | 50~480Vrms / 700Vdc | |
| Battery Discharge Time | 1~99999 Sec. (>27H) | | | | |
| **UPS Transfer Time** | | | | | |
| Current Range | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| UVP (VTH) | 2.5V | | | | |
| Time range | 0.15mS~999.99mS | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Fuse Test mode** | | | | | | |
| Max. Current | Turbo OFF | 37.5Arms | 28.0Arms | 18.75Arms | 28.0Arms | 18.75Arms |
| | Turbo ON | 75.0Arms (x2) *3 | 56.0Arms (x2) *3 | 37.5Arms (x2) *3 | 56.0Arms (x2) *3 | 37.5Arms (x2) *3 |
| Trip & Non-Trip Time | Turbo OFF | 0.1~9999.9sec. | | | | |
| | Turbo ON | 0.1~1.0sec. | | | | |
| Meas. Accuracy | | ±0.003 Sec. | | | | |
| Repeat Cycle | | 0~255 | | | | |
| **Short/OPP/OCP Test Function** | | | | | | |
| Short Time | Turbo OFF | 0.1S ~ 10Sec. Or Cont. | | | | |
| | Turbo ON | 0.1S ~ 1Sec | | | | |
| OPP/OCP Step Time | Turbo OFF | 100ms | | | | |
| | Turbo ON | 100ms, up to 10 Steps | | | | |
| OCP Istop | Turbo OFF | 37.5Arms | 28.0Arms | 18.75Arms | 28.0Arms | 18.75Arms |
| | Turbo ON | 75.0Arms | 56.0Arms | 37.5Arms | 56.0Arms | 37.5Arms |
| OPP Pstop | Turbo OFF | 3750W | 2800W | 1875W | 3750W | 2800W |
| | Turbo ON | 7500W | 5600W | 3750W | 7500W | 5600W |
| **Programmable Inrush current simulation: Istart - Istop / Tsep** | | | | | | |
| Istart, Inrush Start Current | | 0~75A | 0~56A | 0~37.5A | 0~56A | 0~37.5A |
| Inrush Step time | | 0.1mS~100mS | | | | |
| Istop, Inrush stop current | | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| **Programmable Surge current simulation: S1/T1 - S2/T2 - S3/T3** | | | | | | |
| S1 and S2 Current | | 0~75A | 0~56A | 0~37.5A | 0~56A | 0~37.5A |
| T1 and T2 Time | | 0.01S~0.5Sec. | | | | |
| S3 Current | | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| T3 Time | | 0.01S ~ 9.99Sec. Or Cont. | | | | |
| **MEASUREMENTS** | | | | | | |
| **VOLTAGE READBACK V METER** | | | | | | |
| Range | | 500V | | | 700V | |
| Resolution | | 0.01V | | | 0.0125V | |
| Accuracy | | ±0.05% of (reading +range) | | | | |
| Parameter | | Vrms,V Max/Min,+/-Vpk | | | | |
| **CURRENT READBACK A METER** | | | | | | |
| Range | | 18.75Arms/37.5Arms | 14Arms/28Arms | 9.375Arms/18.75Arms | 14Arms/28Arms | 9.375Arms/18.75Arms |
| Resolution | | 0.4mA/0.8mA | 0.3mA/0.6mA | 0.2mA/0.4mA | 0.3mA/0.6mA | 0.2mA/0.4mA |
| Accuracy | | ±0.05% of （ reading ＋ range）@ 50/60Hz ， ±0.2% of （ reading ＋ range） | | | | |
| Parameter | | Irms,I Max/Min,+/-Ipk | | | | |
| **WATT READBACK W METER** | | | | | | |
| Range | | 3750W | 2800W | 1875W | 3750W | 2800W |
| Resolution | | 0.0625W | 0.05W | 0.03125W | 0.0625W | 0.05W |
| Accuracy | | ±0.1% of （reading ＋ range） | | | | |
| VA METER | | Vrms×Arms Correspond To Vrms and Arms | | | | |
| **Power Factor METER** | | | | | | |
| Range | | +/- 0.000~1.000 | | | | |
| Accuracy | | ±(0.002±(0.001/PF)*F) | | | | |
| **METER Frequency (V)** | | | | | | |
| Range | | DC,40~440Hz | | | DC,40~70Hz | |
| Accuracy | | 0.1% | | | | |
| **Other Parameter METER** | | | | | | |
| VA, VAR, CF I, Ipeak, Imax., Imin. Vmax., Vmin., IHD, VHD, ITHD, VTHD | | | | | | |
| **OTHERS** | | | | | | |
| Start up loading | | Yes , Power on loading during Inverter / UPS start up | | | | |
| Load ON / OFF Angle | | 0 ~ 359 degree can be programmed for the angle of load ON and load OFF loading | | | | |
| Half cycle and SCR/TRIAC loading | | Postive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed | | | | |
| Master/Slave( 3 phase or Parallel application) | | Yes, 1 master and upto 7 slave units | | | | |
| External programming input | | F.S / 10Vdc, Resulotion 0.1V | | | | |
| External SYNC input | | TTL | | | | |
| Vmonitor （Isolated） | | ±500V / ±10V | | | ±700V / ±10V | |
| Imonitor （Isolated） | | ±112.5Apk / ±10Vpk | ±84Apk / ±10Vpk | ±56.25Apk / ±10Vpk | ±84Apk / ±10Vpk | ±56.25Apk / ±10Vpk |
| Interface (OPTION) | | GPIB ; RS-232 ; LAN ; USB | | | | |
| MAX. Power consumption | | 150VA | | | | |
| Operation Temperature *2 | | 0 ~ 40 ℃ | | | | |
| Current of input impedance(mA) @ 50/60Hz ; @400Hz | | ~V*0.6 ; ~V*4.4 | ~V*0.45 ; ~V*3.3 | ~V*0.3 ; ~V*2.2 | ~V*0.4 ; ~V*2.95 | ~V*0.3 ; ~V*2.2 |
| Dimension( H x W x D ) | | 177 x 440 x 558 mm | 177 x 440 x 558mm | 177 x 440 x 558 mm | 177 x 440 x 558 mm | 177 x 440 x 558 mm |
| Weight | | 33.5Kg | 27.5Kg | 21.5Kg | 33.5Kg | 27.5Kg |

Table 1-1A ELP/ACP Series Specification

# Chapter 2 Installation

## 2-1 Inspection

The ELP/ACP Series high power AC/DC load was carefully inspected before shipment. If instrument damage has occurred during transport, please inform ET System electronic GmbH 's sales and service office or representative.

Your ELP/ACP Series high power AC/DC load was shipped with a power cord for the type of Terminal blocks used at your location. If the appropriated cord was not included, please contact your nearest ET System electronic GmbH sales office to obtain the correct cord. Refer to “check line voltage “to check the line voltage is 100V~230Vac.

## 2-2 Check line voltage

The ELP/ACP Series high power AC/DC load can operation with 100 Vac ~230Vac input as indicated on the label on the rear panel.

Make sure that the factory check mark corresponds to your nominal line voltage. Skip this procedure if the label is corrected marked.

2.2.1. With the ELP/ACP Series AC/DC load power OFF, disconnect the power cord.

2.2.2. Refer the drawing on the rear panel of ELP/ACP Series high power load in Fig 2-1.

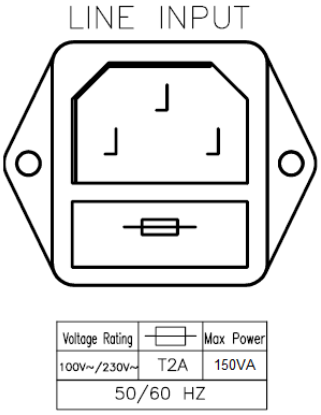



Fig 2-1 ELP/ACP Series AC Input Connection

## 2-3 Fuse Exchange

This product has the power fuse, and exchanges it according to the following procedure.


Never fail to turn off the power of this product, and disconnect the plug of the AC Power cable.


To avoid the fire or electronic shock, the Fuse that will be used in the product should have the safety standard in the area of the region you use. Any use of improper Fuse or shorting the Fuse holder would be extremely dangerous and would be strictly prohibited.

- Before exchanging the Fuse, if there are abnormal odor or abnormal noise,
- Please stop using immediately and ask for the repair.

2.3.1. Check the rating of the line fuse and replace it with the correct fuse if necessary. 100V~230V use T2A/250V (5*20mm).

2.3.2. The AC line fuse is located below the AC line receptacle see Fig 2-2. Use a small Screwdriver to extract the fuse holder, to change a new one. Change an appropriate Specifications fuse which indicated in Table 1-1.

2.3.3. Reinstall fuse holder and connect the power cord.

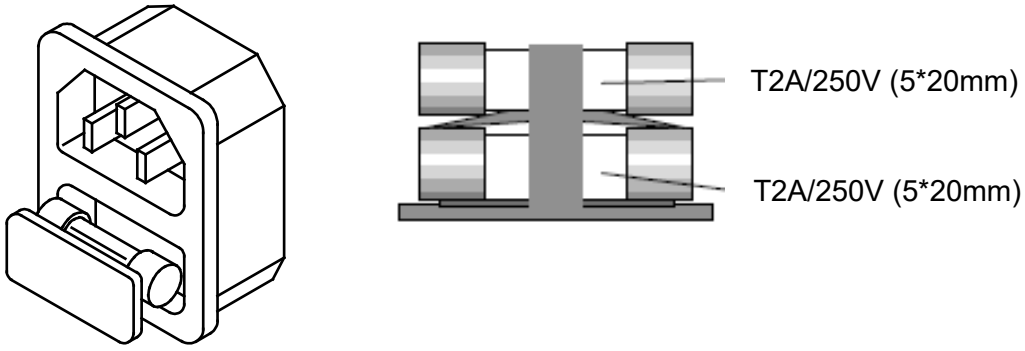



Fig 2-2 ELP/ACP Series fuse holder

## 2-4 Grounding requirements


**SHOCK HAZARD**

1. It is requested to use the 3Pin plug connector only for ELP/ACP Series mainframe to out of danger when electric leakage. And the complete and proper grounded is necessary.

2. The ELP/ACP Series high power AC/DC load is equipped with three conductor cable which plugs in an appropriate receptacle to ground the instrument's cover.

## 2-5 Environmental requirements

- Indoor use.
- Measurement Category I.
- Pollution Degree 2.
- Relative Humidity 80% Max.
- Ambient Temperature 0 to +40°C
- Altitude up to 2000m.
- The equipment is not for measurements performed for CAT II, III and IV.
- Transient Overvoltage on the mains supply can be 2500V.

## 2-6 Repair

If the instrument is damaged, please attach a tag to the instrument to identify the owner and indicated the require service or repairing. And inform the ET System electronic GmbH sales and service office or representative.

## 2-7 Cleaning

Use a soft or slightly damp cloth to clean this product.


BEFORE you clean the unit, switch the mains power off and disconnect the input lead.

- Please do NOT use any organic solvent capable of changing the nature of the plastic such as benzene or acetone.
- Please ensure that no liquid is allowed to penetrate this product.

## 2-8 Power Up

The following procedure should be followed before applying mains power:

2.8.1. Turn off (O) the POWER switch
2.8.2. Check that the power cord is corrected.
2.8.3. Check that nothing is connected to the DC INPUT on the rear panels.
2.8.4. Turn on POWER switch.

## 2-9 Connection to the load Input Terminal on the Rear Panel

**Connection procedure of the load input terminal on the rear panel**

2.9.1. Turn off POWER switch.

2.9.2. Check that the output of the equipment under test is off.

2.9.3. Connect the load wire to the load input terminal on the rear panel.

2.9.4. Check the polarity of the connection and connect the load wire to the output Terminal of the equipment under test.

Note: Avoid equipment damaged, don't input the DC voltage standard output to the DC Load input terminal, if calibration voltage meter required, please input the DC voltage standard to the Vsense input.

## 2-10 GPIB & RS232 interface option

2.10.1. GPIB + RS232 interface is on the rear panel of ELP/ACP Series Mainframe for application GPIB or RS232.

2.10.2. GPIB and RS232 interface can only be used at the same time, to Change the interface must reboot unit.

2.10.3. GPIB connection with three important limitations as Described below:

2.10.3.1 The maximum number of devices including the controller is no More than 15.

2.10.3.2 The maximum length of all cable is no more than 2 meters times The Number of devices connected together, up to 20 meters Maximum.

2.10.3.3 RS232 Female Block connections on the back panel, the Connecting Device and the computer RS232 port to one-way Connection.
(Note: Not 2-wire connection, the detail as 4-2).

2.10.4. Fig 2-2 shows the RS232 connector (Female) on the rear panel Connects ELP/ACP Series Mainframe to RS232 port of computer in one By one Configuration .The RS232 BAUD-RATE can be set in the front Panel, it Will be lit the GPIB Address when press the "SYSTEM" button. Press it again, it will be lit the BAUD-RATE.


Fig 2-3 ELP/ACP Series GPIB & RS232 interface

## 2-11 RS232 interface option

Fig 2-3 shows the RS232 connector (Female) on the rear panel connects ELP/ACP Series mainframe to RS232 port of computer in one by one configuration. The RS232 BAUD-RATE can be set in the front panel, it will be lit the GPIB address when press the "SYSTEM" button. Press it again, it will be lit the BAUD-RATE.


Fig 2-4 ELP/ACP Series RS232 interface

## 2-12 GPIB interface option

2.12.1 The maximum number of devices including the controller is no more than 15.

2.12.2 The maximum length of all cable is no more than 2 meters times the number Of devices connected together, up to 20 meters maximum.


Fig 2-5 ELP/ACP Series GPIB interface

## 2-13 USB interface option

Fig 2-6 shows the USB interface in the rear panel of ELP/ACP Series mainframe. Please Refer Appendix B.


Fig 2-6 ELP/ACP Series USB interface

## 2-14 LAN interface option

Fig 2-7 shows the LAN interface in the rear panel of ELP/ACP Series mainframe. Please Refer Appendix C.


Fig 2-7 ELP/ACP Series LAN interface

## 2-15 I/O connection

ELP/ACP series I/O Interface with I monitor, V-monitor, Analog Programming Input, SYNC Input, Instructions please refer to Chapter 3.3.28~3.3.30.

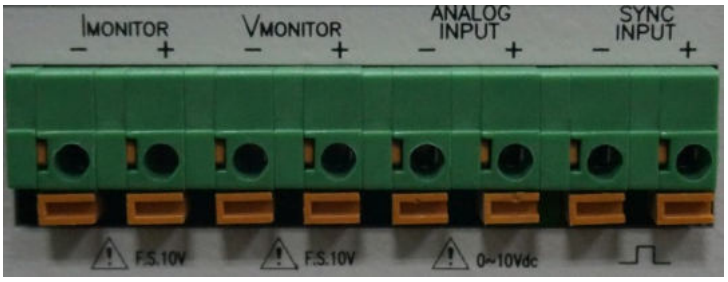
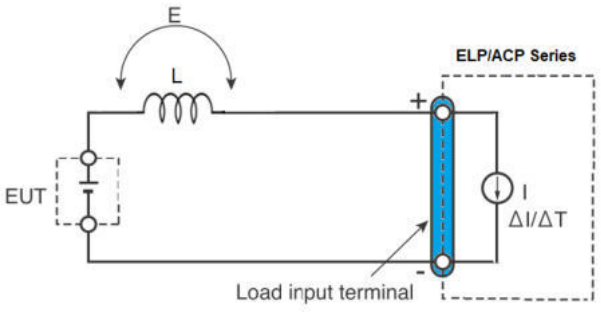



Fig 2-8 ELP/ACP Series I/O Connection

## 2-16 Load wire inductance

The load wiring has an inductance (L). When the current (I) varies in short time period, It generates a large voltage at both ends of the wiring cable. This voltage applies to all of the load input terminals of the ELP/ACP series when the impedance of the EUT is relatively small. The voltage generated by the load wire inductance (L) and the current variation (I) is expressed using the following equation.




$$E = L \times (\Delta I / \Delta T)$$

E: Voltage generated by the wire inductance
L: Load wire inductance
ΔI: Amount of Current variation
ΔT: Variation period of current

In general, the wire inductance can be measured approximately 1 μH per 1 meter. If the 10 meters of Load wires is connected between the EUT and the electronic load (ELP/ACP Series) with the current Variation of 2 A/μs, the voltage generated by the wire inductance Will be 20 V.

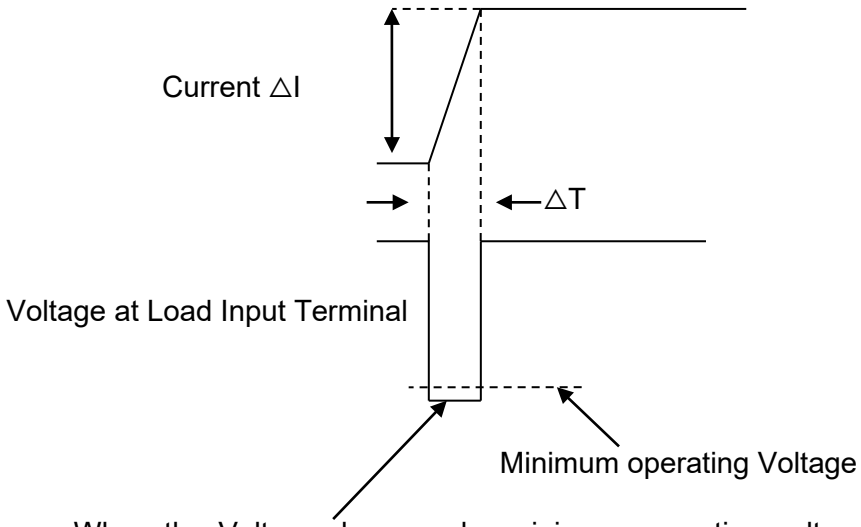
The negative polarity of the load input terminal is the reference potential of the external Control signal, Therefore, the device connected to the external control terminal may get malfunctioned.

When operating under the constant voltage (CV) mode or constant resistance (CR) mode or constant power (CP), the load current is varied by the voltage at the load input terminal, so the operation can be affected easily by the generated voltage.

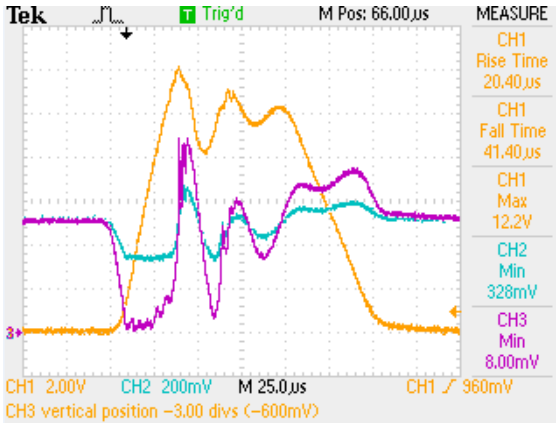
The wiring to the EUT should be twisted and the shortest as possible.
If the load wire is long or has a large loop, the wire inductance is increased. Consequently, the Current variation that results when switching occurs will cause a large voltage drop.

When the value of instantaneous voltage drops under the minimum operating voltage depends on the generated voltage at the load input terminal, the response of recovery will be extensively delayed.

In such event, the electronic load (ELP/ACP) may generate unstable oscillation.
In such condition, the input voltage may exceed the maximum input voltage and Cause damage to the ELP/ACP Series.




When the Voltage drops under minimum operating voltage, the electronic load may generate unstable oscillation




CH1=Imonitor
CH2=Power Supply output Voltage (x10)
CH3= LOAD Input Voltage (x10)

Fig 2-9 Waveform example: Generate unstable oscillation

To prevent problems, connect the ELP/ACP series and the equipment under test using the shortest Twisted Wire possible to keep the voltage caused by inductance between the minimum operating Voltage and the maximum input voltage range.

In such settings, the value of DI /DT will be decreased, accordingly the generated voltage Will be reduced even the inductance of load wiring can not be reduced.

In the case of DC operation also, the phase delay of the current may cause instability in the ELP/ACP Series Control inducing oscillation. In this case also, connect the ELP/ACP Series and the equipment under test using the shortest twisted wire possible.

If only DC operation is required, a capacitor may be connected to the load Input Terminal as shown in Fig. 2-10 to alleviate oscillation. In this case, use the capacitor within its Allowable ripple current.

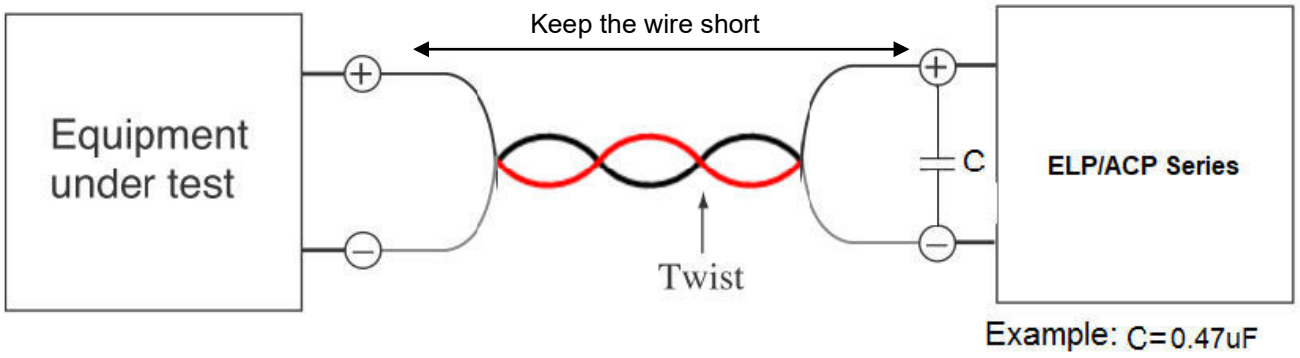



Fig 2-10 Length of wiring

# Chapter 3 Operation

This chapter describes the front panel function and operation of each ELP/ACP Series load, The Communication Interface is described in Chapter 4.

## 3-1. ELP/ACP Series dimension description

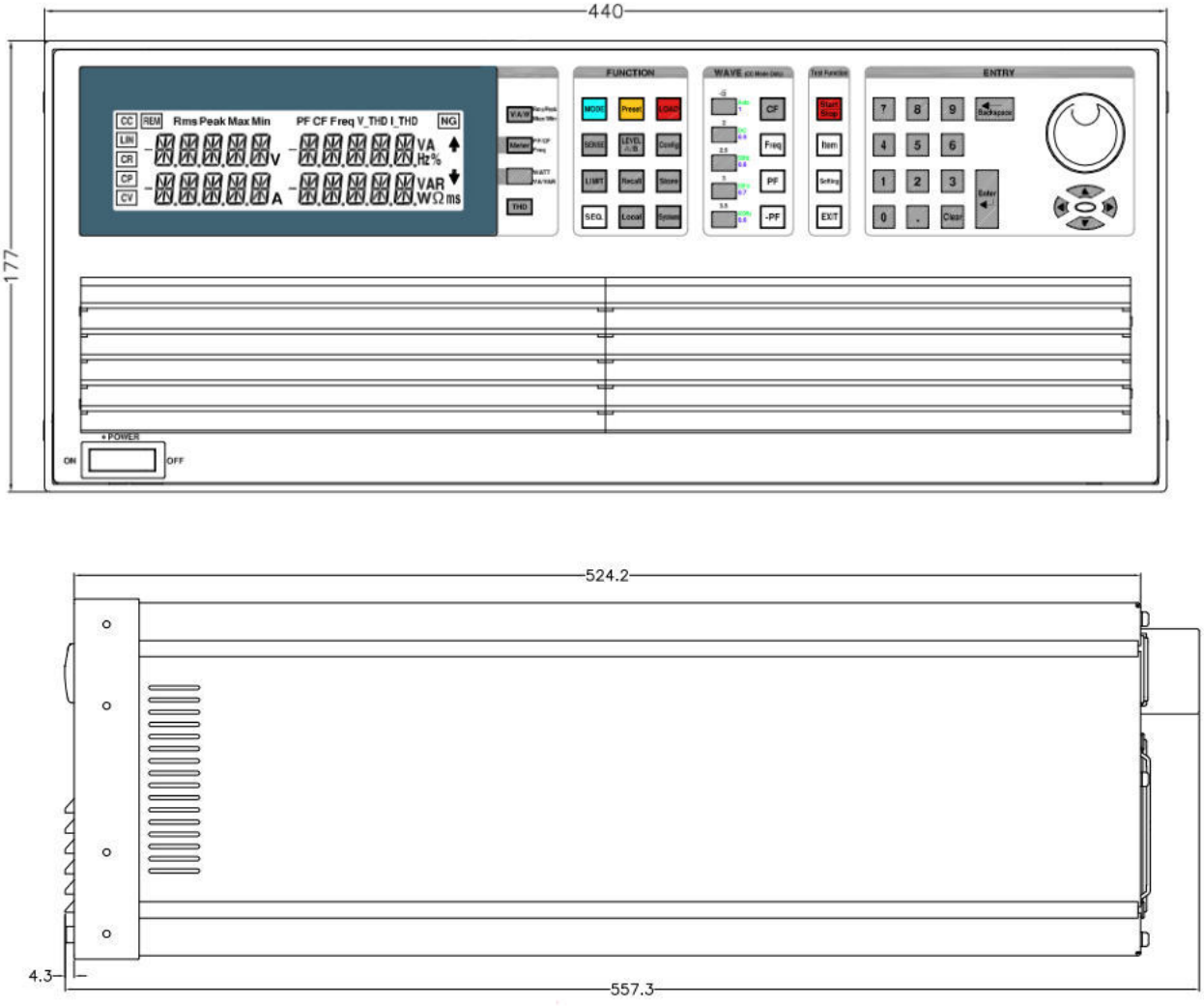



Fig 3-1 ELP/ACP Series SIZE description

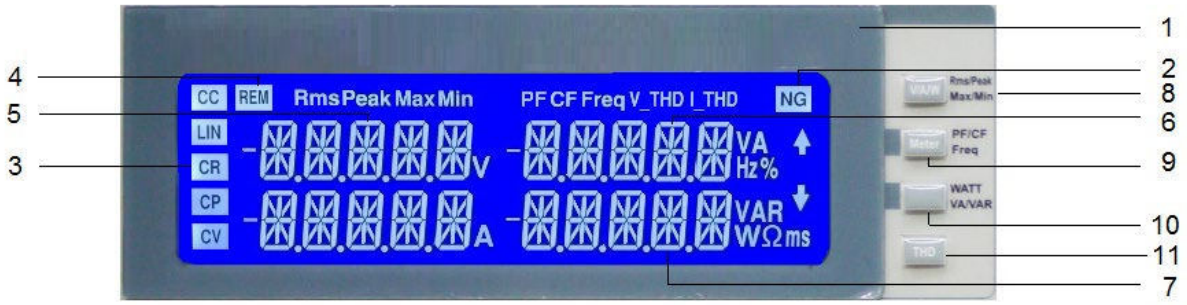
## 3-2. ELP/ACP series panel diagram


| | | | |
|---|---|---|---|
| 1 | LCD Multi-function display<br>Four meters can display the voltage value at the same time the Voltage（Vrms, Vpeak, Vmax., Vmin）、Current（Irms, Ipeak, Imax., Imin.）、Watt, Voltampere（VA）、Frequency、Crest Factor、Power Factor、Total Harmonic Distortion of Voltage（VTHD）、Voltage Harmonic（VH）、Total Harmonic Distortion of Current（ITHD）、Current Harmonic（IH） | 3 | Operate function keys<br>Mode、Preset ON/OFF、Load ON/OFF、Sense ON/OFF、Level A/B、Config、Limit、Recall、Store、SEQ、Local、System operate function keys |
| | | 4 | Waveform library keys<br>Can be quickly set CF √2 / 2 / 2.5 / 3 / 3.5、+/- PF0.6 / 0.7 / 0.8 / 0.9 / 1.0、FREQ Auto / 50Hz/ 60Hz / 400Hz。 |
| | | 5 | Test function keys<br>Can select Short / OPP / OCP /Non-L / NL-CR /Fuse / Batt (Battery Discharge) / Trans (UPS transfer time) test functions. |
| 2 | Meter switch button<br>V/A/W keys can set the display Rms/Peak/Max/Min、Meter key can select PF/CF/FREQ、switchable display WATT/VA/VAR keys、THD key choose to display THD | 6 | Numeric keypad |
| | | 7 | Knob setting |
| | | 8 | Switch |
| | | 9 | Cursor and button setting |


| | | | |
|---|---|---|---|
| 10 | AC power input connector | 13 | Master-slave control connector<br>Master : Connect the top or bottom to the next unit<br>Slave : The top connects to the previous unit and the bottom connects to the next unit |
| 11 | Vmonitor、Imonitor、Analog input、SYNC input Input terminal | | |
| 12 | Vload, Vsense Input terminal | 14 | Communication interface (GPIB、RS-232、USB、LAN) |

Fig 3-2 ELP/ACP Series Rear Panel

## 3-3. LCD Display description:




3.3.1. Model number and sink ranges

Refers to model number, voltage, current and power specification of ELP/ACP Series High Power AC/DC Electronic Load.

3.3.2. NG Indicator

The user can adjust upper and lower limits for voltage, current and power within the CONFIG menu and turn the NG Indicator ON. If a Voltmeter, Ammeter or Wattmeter measurement is outside these set limits then the NG indicator will illuminate.

3.3.3. MODE and CC, LIN, CR, CP, CV mode, LCD

On the ELP/ACP Series AC/DC Electronic Load, there are 5 working modes which can be selected by MODE KEY with the sequence of Constant Current, Linear Constant Current, Constant Resistance, Constant Power and Constant Voltage. Then switching can be made in such a sequence. However, LED indicator of CC, LIN, CR, CP and CV will display the working mode selected.

3.3.4. REM LCD Indicator

When ELP/ACP Series AC/DC Electronic Load is connected with computer program for control and operation, REM LED Indicator will come on. In such a case, panel manual operation will become null and void.
When REM LED indicator comes off, panel manual operation will resume.

3.3.5. Left 5 digit LCD display

The 5 digit LCD display is a multi-function display. The function of the display changes depending whether the user is in NORMAL mode or in a SHORT, OPP, Non-L, NL+CR, FUSE, BATT ,TRANS INRUSH , SURGE test modes:

Normal mode:
The left 5 digit display displays the voltage present at the load's input terminals.
The value displayed will include the automatic voltage compensation if the sense Terminals are also connected to the device under test (DUT) .

If V-sense is set to 'ON' and the sense terminals are connected to the DUT the Load will check and compensate for all voltage drops.

Test Mode:
If the Item buttons are pressed the left display will show a text Message that correlates with the selected test function.

SHORT test selected: left display will show "Short".
OPP test selected: left display will show "OPP".
OCP test selected: left display will show "OCP".
Non-L test selected: left display will show "Non-L".
NL+CR test selected: left display will show "NL+CR".
FUSE test selected: left display will show "FUSE".
BATT test selected: left display will show "BATT".
TRANS test selected: left display will show "TRANS".
INRUSH test selected: left display will show "INRUSH".
SURGE test selected: left display will show "SURGE".

During the test the left display will show the load Input voltage.

3.3.6. Right upper 5 digit LCD display
The right upper 5 digit displays also changes function depending if the user is in Normal mode or has entered a setting menu

Normal mode:
In normal mode the middle LCD display functions as a 5 digit ammeter. The 5 digit DAM shows the load current flowing into the DC load when the Load is ON.

Setting Mode:
If CONFIG, LIMIT, buttons are pressed the middle LCD show a text message according to the setting function it is in. Each subsequent press of the button moves the display to the next available function. The sequence of each setting menu is detailed below

- **CONFIG**: Sequence is “EXTIN OFF” →SYNC OFF →“LD ON” → “LDOFF” → “BW” →AVG→CPRSP→CYCLE→SNUB.
- **LIMIT**: Sequence is ”V_Hi” → “V_Lo” → “I_Hi” → “I_Lo” → “W_Hi” → “W_Lo” →“VA_Hi” → “VA_Lo” → “OPL”→“OCL” → “NG”.

3.3.7. Right lower 5 digit LCD display

The right 5 digit displays also changes function depending if the unit is in normal Mode or one of the setting menus has been activated.

Normal mode:
In normal mode the right 5 digit displays shows the power consumption in Watts (W).

Setting Mode:
The right display together with the rotary adjustment knob is used to set values. The value changes according to the setting function that is active. The middle LCD provides a text message to tell the user which part of the setting menu is active.

3.3.7.1. **PRESET** mode. The value of the setting entered on the right display Changes depending on the operating MODE that has been selected

- If CC mode is selected the right display provides setting in amps "A".
- If LIN mode is selected the right display provides setting in amps "A"
- If CR mode is selected the right display provides setting in ohms “Ω”
- If CP mode is selected the right display provides setting in watts “W”.
- If CV mode is selected the right display provides setting in volts “V”.

3.3.7.2. **LIMIT.** Each press of the LIMIT button changes the middle LCD text. The Sequence and the corresponding setting value shown on the bottom Display is as follows:

➔ V_Hi (left limit voltage) displays the set value in volts “V”
➔ V_Lo (right limit voltage) displays the set value in volts “V”
➔ I_Hi (left limit current) displays the set value in amps “A”
➔ I_Lo (right limit current) displays the set value in amps “A”
➔ W_Hi (left limit power) displays the set value in watts “W”
➔ W_Lo (right limit power) displays the set value in watts “W”
➔ VA_Hi (left limit power) displays the set value in VA “VA”
➔ VA_Lo (right limit power) displays the set value in VA “VA”
➔ OPL (right limit power) displays the set value in watts “W”
➔ OCL (right limit power) displays the set value in amps “A”
➔ NG displays whether the NG flag is set to "ON" or "OFF".

3.3.7.3. CONFIG. Each press of the CONFIG button changes the right upper LCD Text.
The sequence and the corresponding setting value shown on the bottom Displays are as follows:

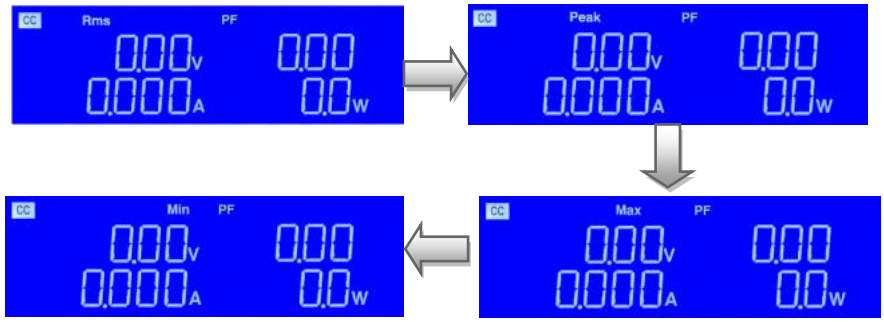
➔ EXTIN can be set to「OFF」or 「ON」
➔ SYNC can be set to「OFF」or 「ON」
➔ LD ON
➔ LDOFF
➔ BW can be set to 1~15.

➔ AVG can be set to 1, 2, 4,8,16.
➔ CPRSP can be set to 0~7.
➔ CYCLE can be set to 1~16.
➔ SNUB can be set to「AUTO」or 「ON」or 「OFF」.

3.3.8. V/A/W Key

There are four operating modes. These can be selected in turn by pressing the "V/A/W" key on the ELP/ACP series AC/DC Electronic Load. The sequence is:

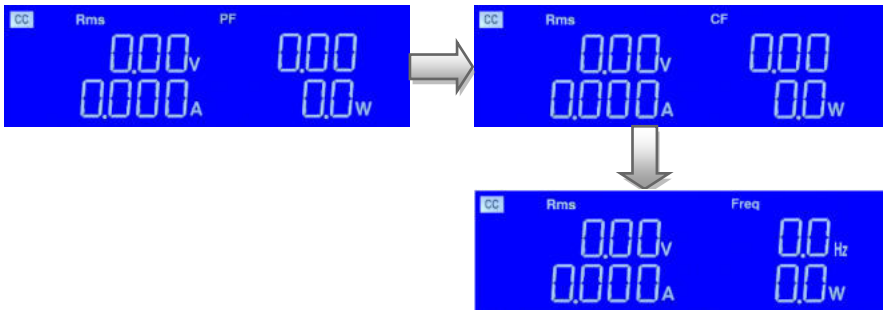
➔ Rms
➔ Peak
➔ Max
➔ Min




3.3.9. Meter key

There are three operating modes. These can be selected in turn by pressing the " Meter" key on the ELP/ACP series AC/DC Electronic Load. The sequence is:

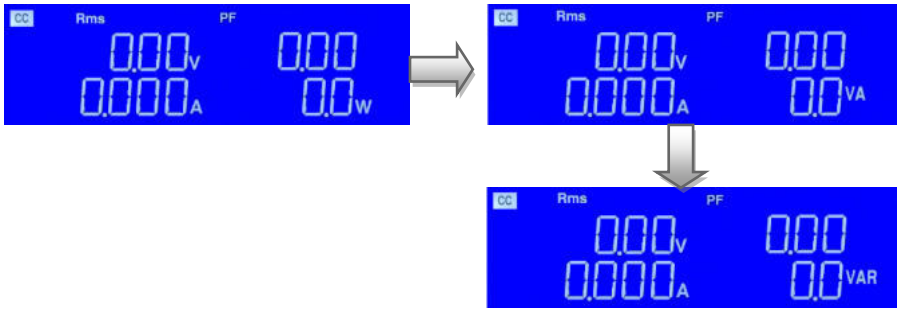
➔ PF
➔ CF
➔ Freq




3.3.10. WATT/VA/VAR Key

There are three operating modes. These can be selected in turn by pressing the "WATT/VA/VAR" key on the ELP/ACP series AC/DC Electronic Load. The sequence is:

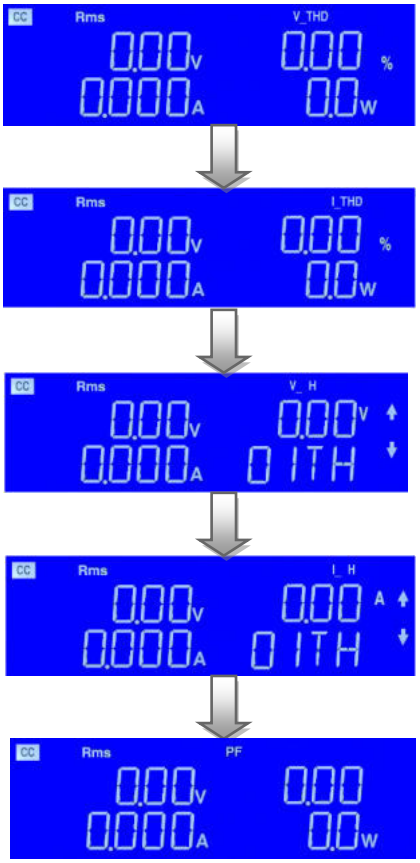
➔ W
➔ VA
➔ VAR



3.3.11 THD Key

There are four operating modes. These can be selected in turn by pressing the “THD” key on the ELP/ACP series AC/DC Electronic Load. The sequence is:

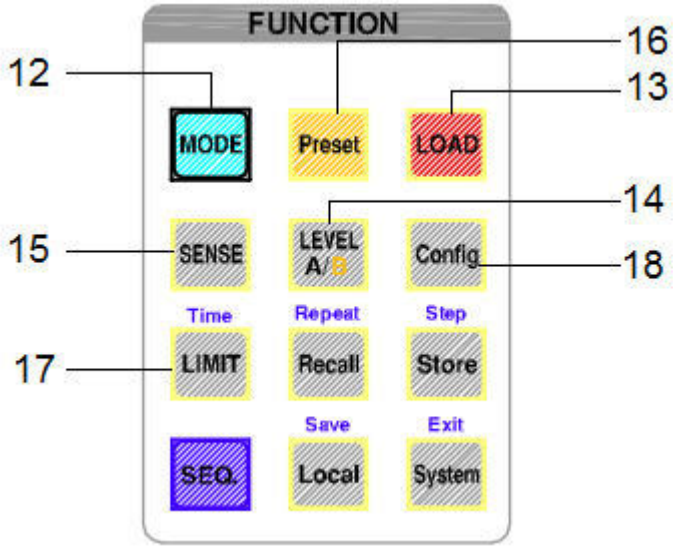
- ➔ V_THD
- ➔ I_THD
- ➔ V_H
- ➔ I_H
- ➔ PF




- In V_H operating modes, these can be selected in turn by pressing the “PF/CF/FREQ” key and WATT/VA/VAR Key to adjust, the setting range is 01TH ~ 50TH.

- In I_H operating modes, these can be selected in turn by pressing the “PF/CF/FREQ” key and WATT/VA/VAR Key to adjust, the setting range is 01TH ~ 50TH.


- Function key description:




3.3.12. MODE and CC, LIN, CR, CP, CV Indicator

There are five operating modes. These can be selected in turn by pressing the "MODE" key on the ELP/ACP series AC/DC Electronic Load module. The sequence is:

➔ (CC) Constant Current
➔ (LIN) Linear Constant Current
➔ (CR) Constant Resistance
➔ (CP) Constant Power
➔ (CV) Constant Voltage

The appropriate LCD will illuminate according to the operating mode is selected.

3.3.13. 

Key and LED

The input to the ELP/ACP series AC/DC Electronic Load can be switched ON/OFF by Using the “LOAD” button. Indication of the ON/OFF state is provided by illumination Of the Button.

| | | |
|---|---|---|
| LOAD button lit | = LOAD ON | (load sinks according to the preset values) |
| LOAD button unlit | = LOAD OFF | (the load does not sink current) |

Turning the LOAD OFF does not affect the preset values. When the LOAD ON state Is enabled the unit will revert to sinking according to the preset values.

3.3.13.1. LD ON and LDOFF are set the open and close loading angle Control, the Full range of 0-359 degree.
Please refer to table 1 for adjustment ranges.

3.3.14. 

Key and LED

Pressing Level Key will be B, press again will be A, further pressing will be B again And so on. B means Level B (LED ON), e.g., to move out Level A, then move in Level B. A means Level A (LED OFF), e.g., to move out Level B, then move in Level A.

Under the condition of setting Memory A or B, this key is mainly for setting the Values of groups A/B for rapid switching load current or resistance.

3.3.15. 

Key and LED

The voltmeter and internal trigger circuit of ELP/ACP Series AC/DC electronic load can Be controlled by this Key thus determining whether or not the input to the voltmeter. Is made from the AC input terminal (OFF) or Vsense terminal (ON). Upon Vsense ON, LED indicator will be ON and the 5 digit voltmeter can display The voltage read from Vsense. Upon Vsense OFF, the 5 digit voltmeter can Display the voltage read from AC input terminal.

3.3.16. 

Key and LED

If the PRESET key is pressed the button will become lit indicating that the PRESET mode has been accessed. The lowest 5 digit display will change from showing the power consumption in watts to displaying the value to be preset. The value that can be programmed changes according to the operating mode that has been selected.

3.3.16.1. Constant Current (CC) mode:
The A and B levels of load current can be preset at right lower 5 digit LCD. the "A" LED will be lit indicating the setting value is amps.

3.3.16.2. Linear Constant Current (LIN) mode:
The A and B levels of load current can be preset at right lower 5 digit LCD. the "A" LED will be lit indicating the setting value is amps.

3.3.16.3. Constant Resistance (CR) mode:
The A and B levels of load resistance can be preset on the right lower 5 Digit LCD. The "Ω" LED will be lit indicating the setting value is ohms.

3.3.16.4. Constant Voltage (CV) mode:
The A and B levels of load voltage can be preset on the right lower 5 Digit LCD. The “V" LED will be lit indicating the setting value is volts.

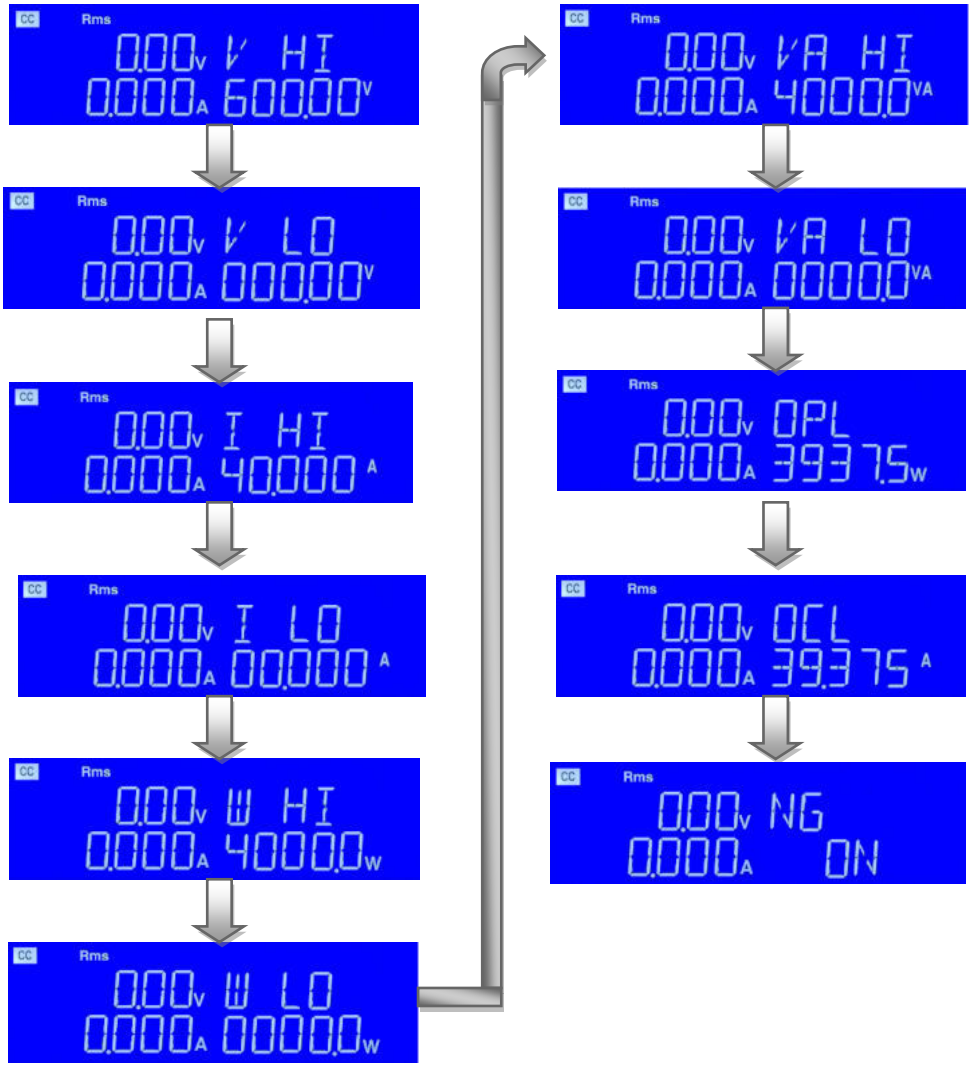
3.3.16.5. Constant Power (CP) mode:
The A and B levels of load power can be preset on the right lower 5 digit LCD. The "W" LED will be lit indicating the setting value is watts.

3.3.17. Limit key

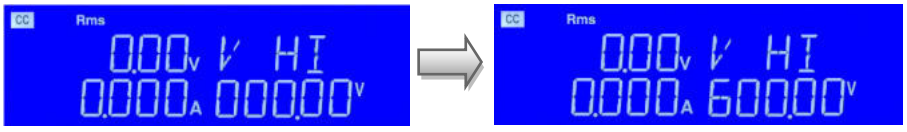
The LIMIT button allows the user to set left and right thresholds for voltage, current Or power. These threshold settings are used in conjunction with the NG function to Flag when the load is operating outside the desired limits

Each press of the LIMIT key enables a different value to be entered. On first press Of the LIMIT key the button will illuminate and V-Hi will be displayed on the right LCD. The setting is made with the rotary knob and can be read from the right LCD during setting. The setting sequence is shown below:

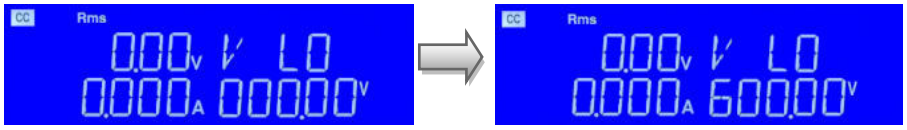
V_Hi (DVM upper limit) →
V_Lo (DVM lower limit) →
I_Hi (DAM upper limit) →
I_Lo (DAM lower limit) →
W_Hi (DWM upper limit) →
W_Lo (DWM lower limit) →
VA Hi →
VA Lo →
OPL →
OCL →
NG OFF/ON (No Good Flag) →
LIMIT setting function OFF



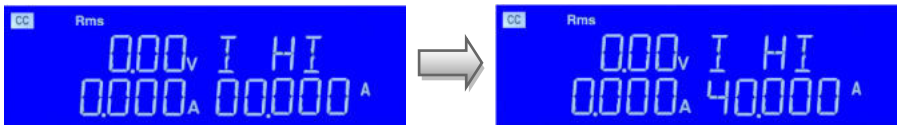

- Setting upper limit voltage VH , the right upper 5 digit monitor display the ”V-Hi” and right lower monitor display upper limit of the voltmeter with the unit as "V" ,The V-Hi set range from 0.00 V to 600.00V step 0.01V by rotating the Setting knob.



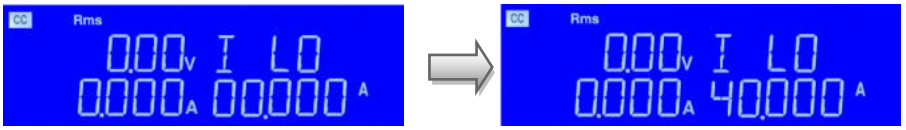

- Setting lower limit voltage VL, the right upper 5 digit monitor display ”V-Lo” and right lower monitor display lower limit of the voltmeter with the unit as "V" ,The V-Lo set range from 0.00 V to 600.00V step 0.01V by rotating the Setting knob.



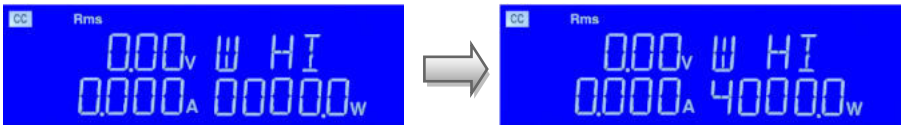
- Setting Upper limit current IH , the right upper 5 digit monitor display ”I-Hi” and right lower monitor display upper limit of the voltmeter with the unit as "A", The I-Hi set range from 0.000 A to 40.000A step 0.001A by rotating the Setting knob.



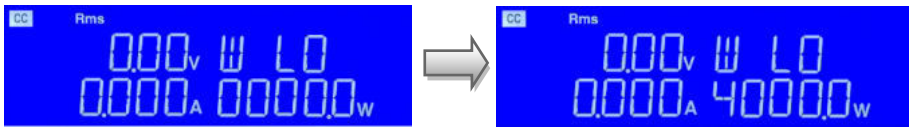

- Setting lower limit current IL , the right upper 5 digit monitor display ”I-Lo” and right lower monitor display lower limit of the voltmeter with the unit as "A" ,The I-Lo set range from 0.000 A to 40.000A step 0.001A by rotating the Setting knob.



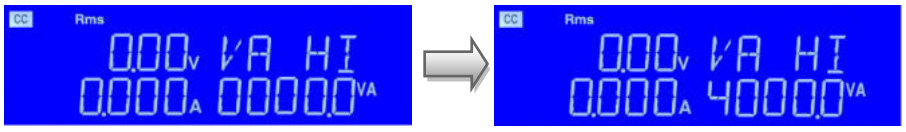

- Setting Upper limit power WH, the right upper 5 digit monitor display ”W-Hi” and right lower monitor display upper limit of the voltmeter with the unit as "W", The W-Hi set range from 0 W to 4000.0W step 1W by rotating the Setting knob.



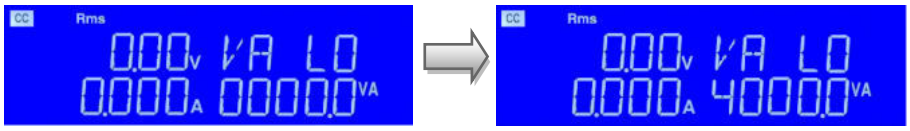

- Setting lower limit power WL, the right upper 5 digit monitor display ”W-Lo” and right lower monitor display lower limit of the voltmeter with the unit as "W", The W-Lo set range from 0.0 W to 4000.0W step 0.1W by rotating the Setting knob.



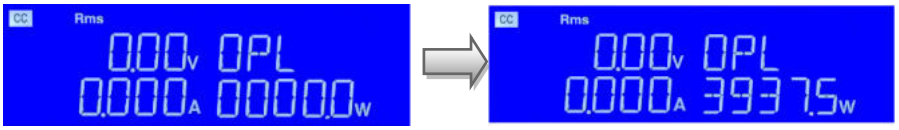

- Setting Upper limit power VAH, the right upper 5 digit monitor display ”VA-Hi” and right lower monitor display upper limit of the voltmeter with the unit as "VA", The VA-Hi set range from 0 VA to 4000.0VA step 0.1VA by rotating the Setting knob.



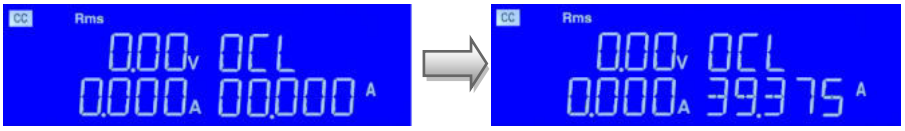

- Setting lower limit power VAL, the right upper 5 digit monitor display ”VA-Lo” and right lower monitor display lower limit of the voltmeter with the unit as "W", The VA-Lo set range from 0.0 VA to 4000.0VA step 0.1VA by rotating the Setting knob.



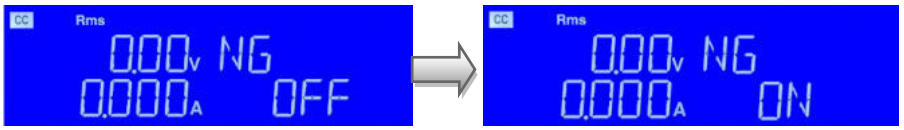
- Setting OPL, the right upper 5 digit monitor display ”OPL” and right lower monitor display upper limit of the voltmeter with the unit as "W", The OPL set range from 0.1W to 3937.5W step 0.1W by rotating the Setting knob.



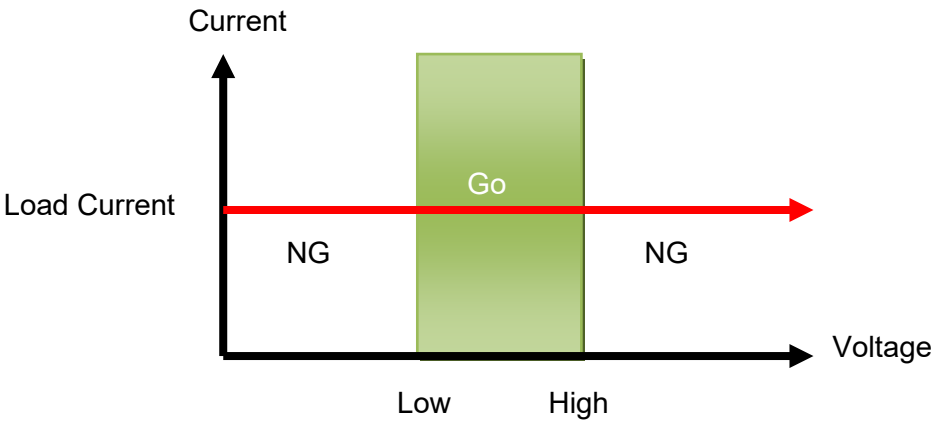

- Setting OCL, the right upper 5 digit monitor display ”OCL” and right lower monitor display upper limit of the voltmeter with the unit as "A", The OCL set range from 0.001 A to 39.375A step 0.001A by rotating the Setting knob.



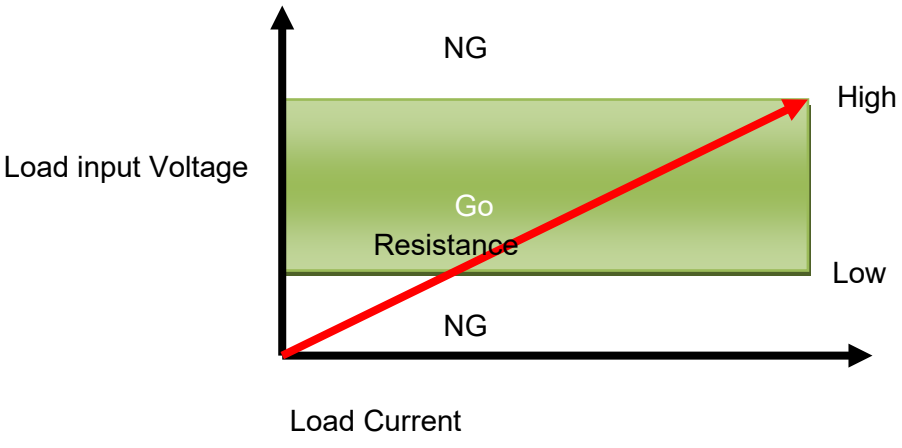

- Setting NG ON/OFF, When exceed VH, VL, IH, IL, WH, WL, VAH, VAL One of these Whether NG on LCD display.



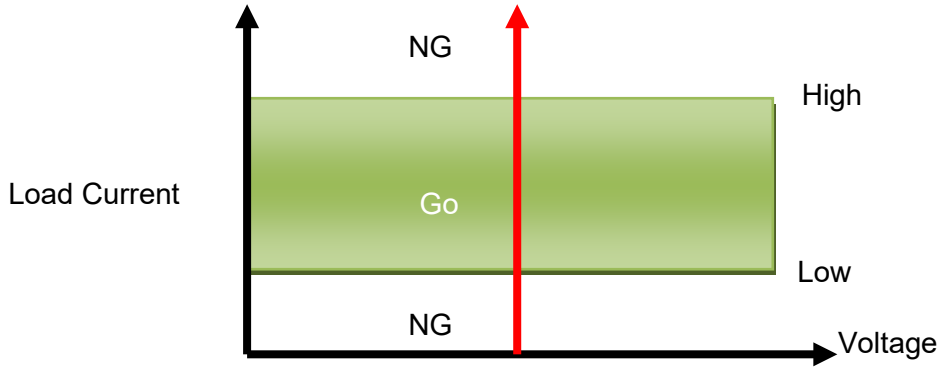

- CC mode, press limits key to set the V-Hi and V-Lo voltage upper and lower limits of the GO / NG.




- CR mode, press limits key to set the V-Hi and V-Lo voltage upper and lower limits of the GO / NG.

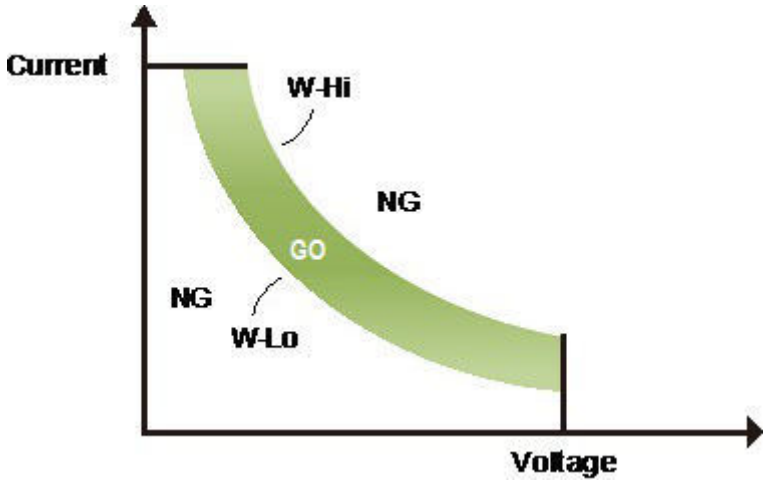


- CV mode, press limits key to set the I-Hi and I-Lo Current upper and lower limits of the GO / NG.




Load input Voltage

- CP mode, press limits key to set the W-Hi and W-Lo power upper and lower limits of the GO / NG.

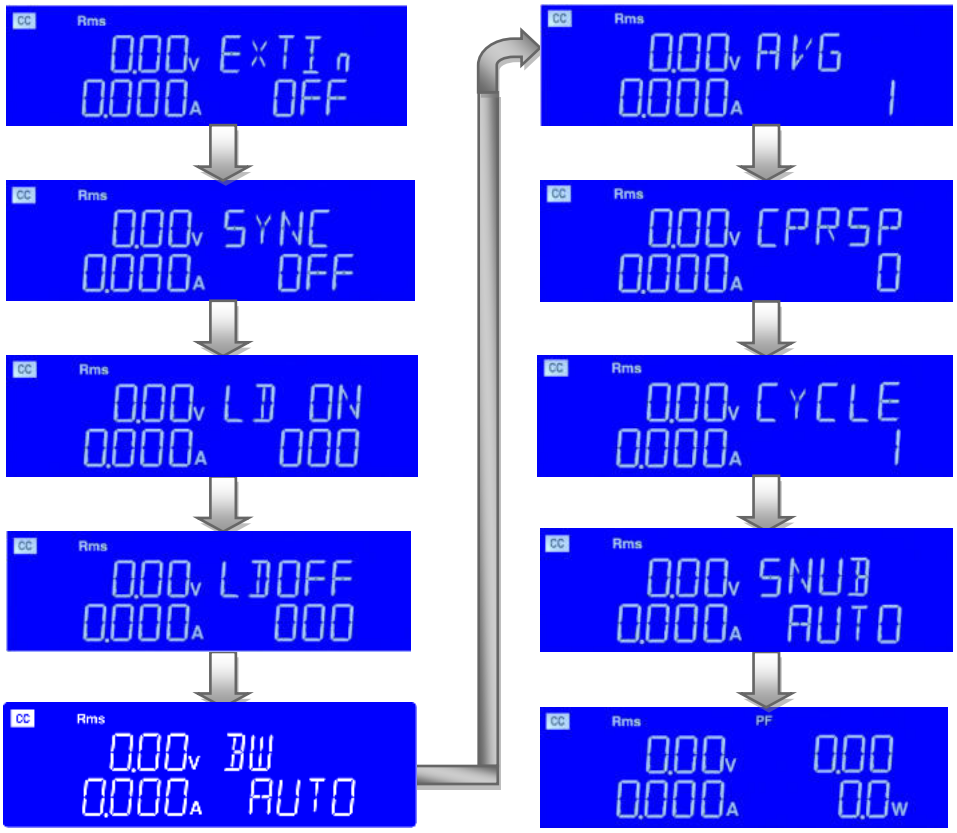


3.3.18. Config key

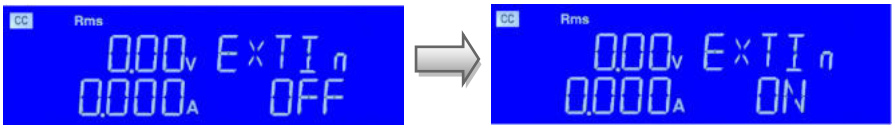
The CONFIG key allows the sense function to engage automatically or switched ON. The CONFIG key also enables the LOAD to automatically turn ON/OFF When a voltage level is reached.

Each press of the CONFIG key moves the menu on one step. On first press of the CONFIG key the button will illuminate and EXTIN will be displayed on the Right upper LCD. The value is adjusted with the rotary knob and can be read from the right LCD during setting. The setting sequence is shown below:

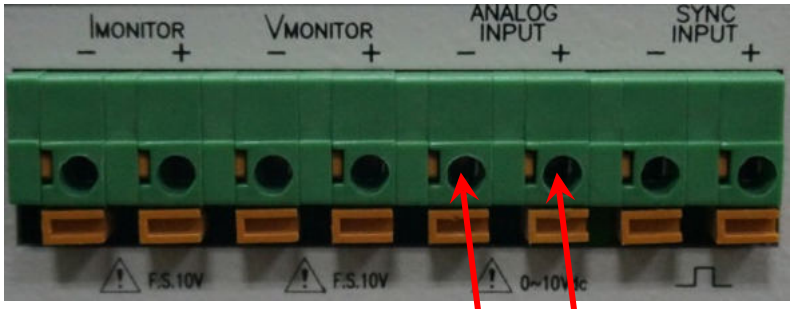
EXTIN OFF →
SYNC OFF →
LD ON →
LD OFF →
BW →
AVG →
CPRSP →
CYCLE →
SNUB →
Exit CONFIG options



- The right upper 5 digit monitor display the EXTIN and right lower monitor display OFF or ON for external input disable or enable, Default is OFF




There is an analog signal setting input connector on the back panel of the ELP/ACP series chassis to control the magnitude of the load current, that is, the load current is proportional to the magnitude of the analog signal. In the fixed current mode, if you want to directly control the load by the voltage, you can use this analog signal input.
The input voltage range is 0Vdc~10Vdc.




Setting specifications F.S / 10Vdc, Resulotion 0.1V In constant current mode, 0V to 10V analog input signal can set load current From 0A to full scale. Take ELP/ACP 350Vrms/37.5A/3750W electronic load as An example, 10V analog input signal can generate 37.5A load current.

In constant power mode, 0V to 10V analog input signal can set load power. From 0W to full scale. Take ELP/ACP 350Vrms/37.5A/3750W electronic load as An example, 10V analog input signal can generate 3750W load power.

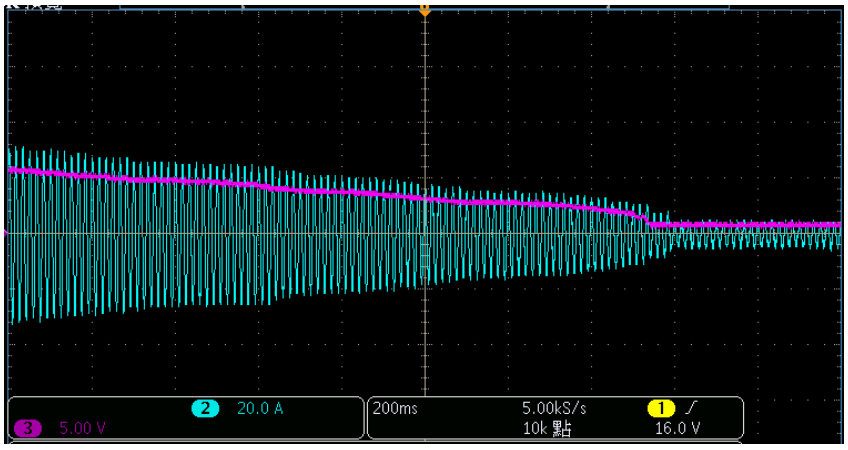
Note: The above operation must be LOAD ON

The measured analog input is 5Vdc (CH3), and the electronic load is set to Constant current mode.

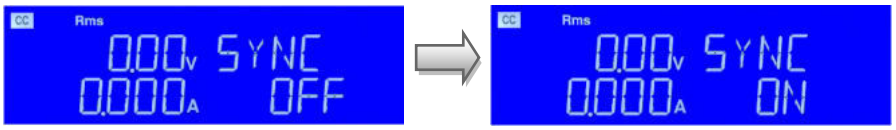

CH1=voltage (100V); CH2 current (18.75A)


1. Measured Analog input 10Vdc (CH3), the electronic load is set to constant current mode. CH1=voltage (100V); CH2 current (37.5A)

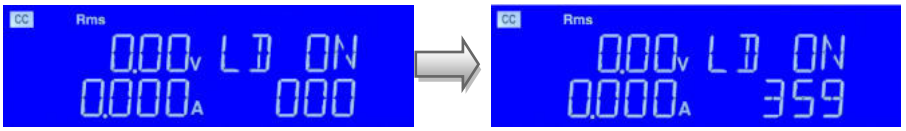
2. Measured analog input, input voltage 10Vdc downward adjustment (CH3), the electronic load is set to constant current mode.



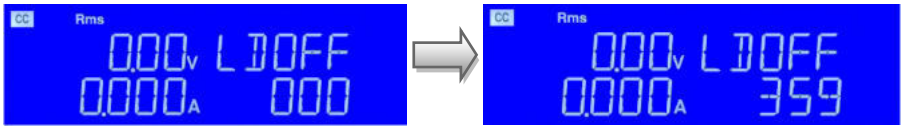

- The right upper 5 digit monitor display the SYNC and right lower monitor display OFF or ON for synchrous from external source disable or enable of rear panel I/O input terminal,Default is OFF.
  SYNC operating range: TTL 5V Signal, TTL Hi level > 2.0V, TTL Low level < 0.8V



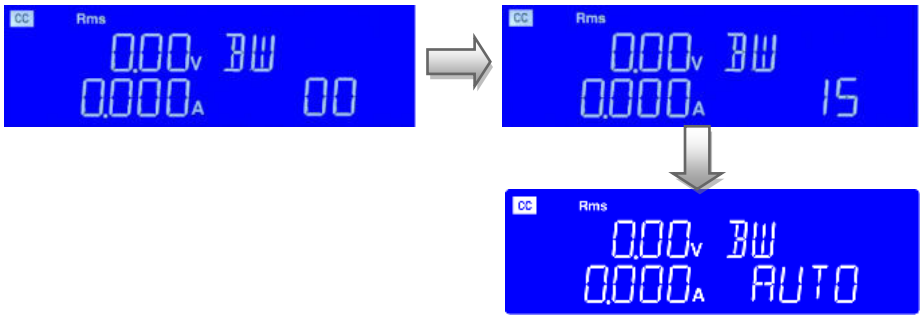

- The right upper 5 digit monitor display the LDON and right lower monitor display load on angle setting with the unit as “degree”. The range is 0 to 359 degree, Default is 0.
  LD ON/LD OFF is to set the angle of overloading and unloading.
  You can specify any angle of the sine wave to start loading and unloading.



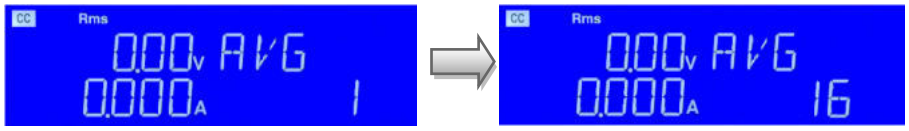
- The right upper 5 digit monitor display the LDOFF and right lower monitor display load off angle setting with the unit as “degree”. The range is 0 to 359 degree, Default is 0.




- The right upper 5 digit monitor display the BW and right lower monitor display the setting value for different bandwidth. The range is 00~15 and AUTO, Default is AUTO.
  When the UUT reacts slowly, there will be oscillation. Please adjust the BW appropriately to meet the UUT reaction time. In BW AUTO, set the load current to be 14 when the load current is less than 1/3 of the specification, and automatically set to 13 when it’s greater than 1/3 of the specification.

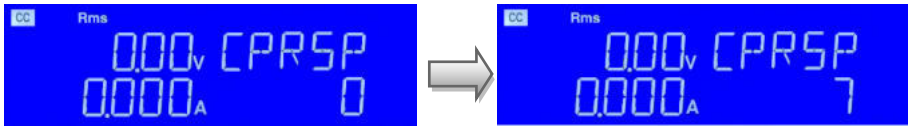



- The right upper 5 digit monitor display the AVG and right lower monitor display 1 for average value. The range is 1, 2, 4,8,16, Default is 1.

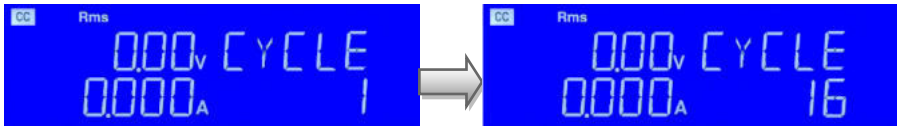



- The right upper 5 digit monitor display the CPRSP and right lower monitor Display 0 for CPRSP value. The range is 0~7, Default is 0.

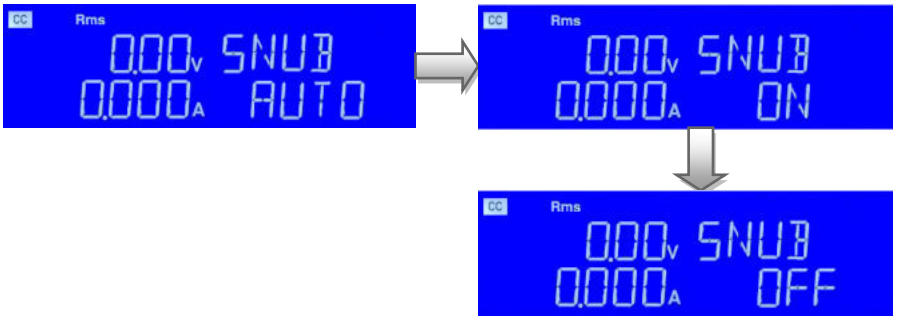
  CPRSP is set to the constant power response speed 0~3 for linear current constant power load, 0 is the fastest to adjust the load power response, 3 is the slowest. 4~7 is the standard current constant power load 4 to adjust the load power The response is the fastest, and the slowest default is 0.



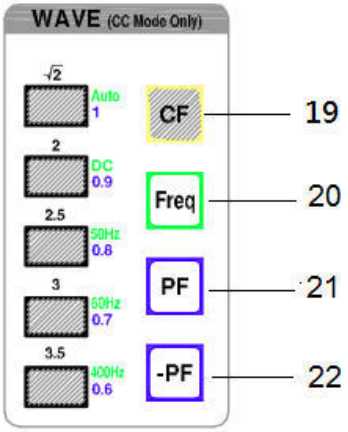

- The right upper 5 digit monitor display the CYCLE and right lower monitor display 1 for CYCLE value. The range is 1~16, Default is 1.
  CYCLE means the updated cycle of the meter. For example: Setting is 8 means that it will be updated after reading eight datas.
  The update cycle can be increased when the meter jumps severely.
  The difference with AVG is that it does not do multiple data averaging calculations.



- The right upper 5 digit monitor display the SNUB and right lower monitor display “AUTO” ,use the knob and the key to switch AUTO or ON or OFF.
  SUNB is a Snubber circuit, which is used for frequency compensation.
  When it is set to AUTO, if the LOAD setting load current or power is greater than 1/3 of the specification, the Snubber circuit will be start up automatically. It can also be set to ON or OFF.
  When this circuit is started up, an extra small current will be generated. Please refer to the specification table “Current of input impedance”. (ELP/ACP)



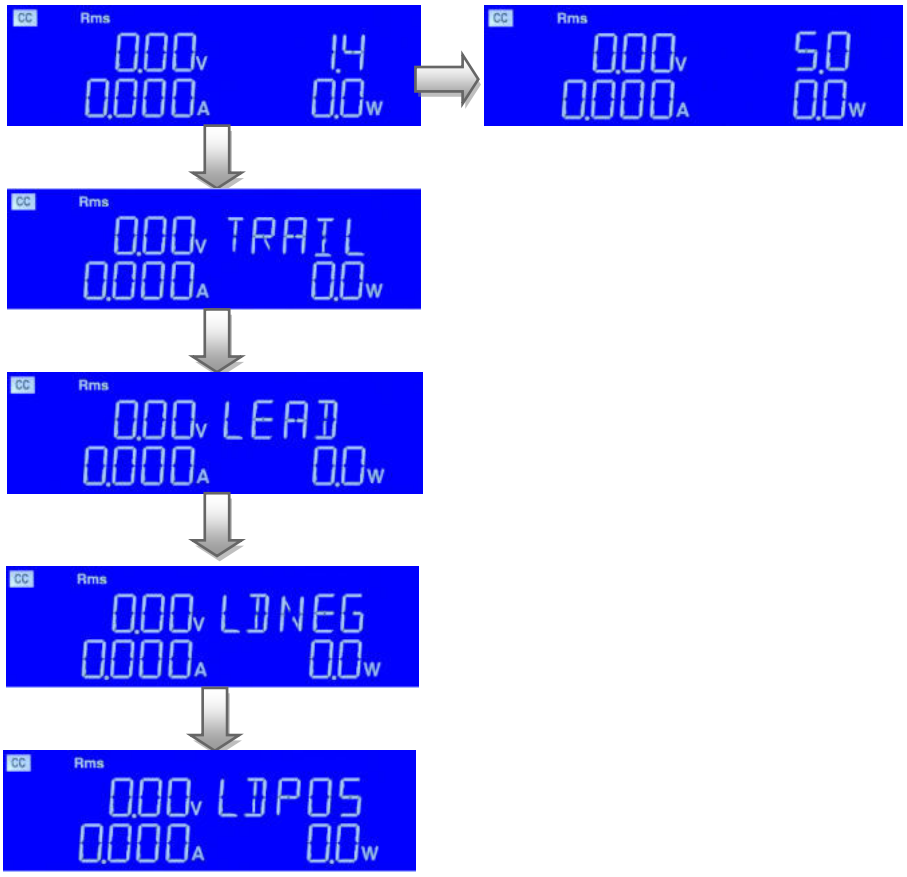

.



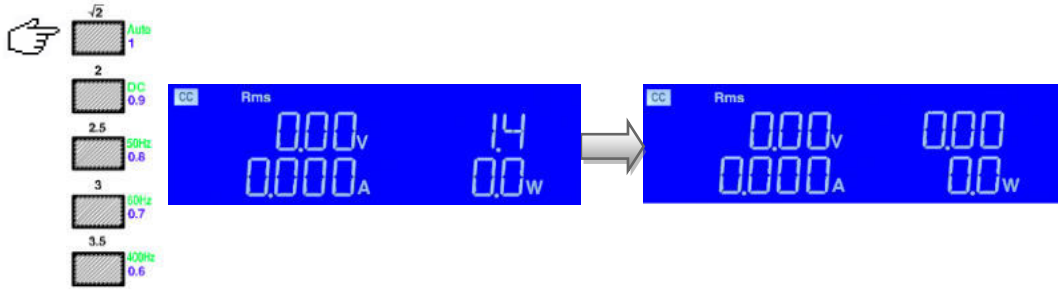

3.3.19. CF Key and √2, 2, 2.5, 3, 3.5 key

CF key only functions upon C.C. and C.P. mode and all LED off upon Linear C.C., C.R. and C.V. mode. √2, 2, 2.5, 3, 3.5 keys are used to quick change the current C.F. (Crest Factor) of C.C. mode. However, adjust the CF by number key or Up, Down or rotary switch to setting the C.F. values.
The CF key can be set to the range of 1.0, 1.1, 1.2, 1.3, 1.4 to 5.0, and the CF 1.0 To 1.3 are the SCR/TRIAC current phase modulation waveforms and the half-wave Load simulation. The waveforms of the first cycle and the last cycle may differ Depending on the angle setting of LD ON and LDOFF. The setting sequence is as Follows:

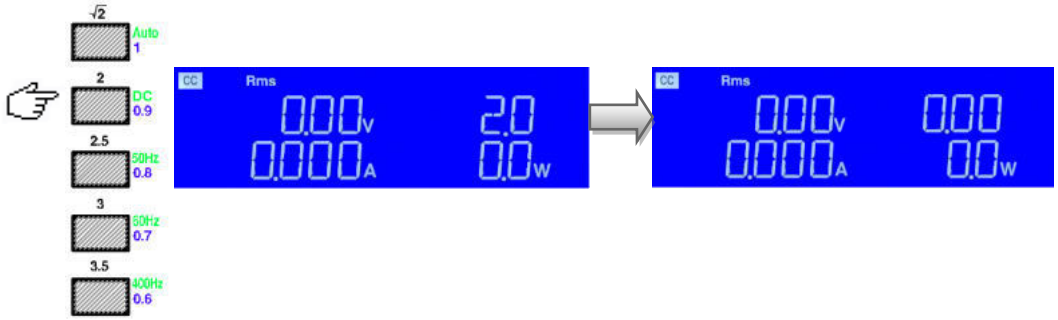
1.4 ~5.0 →
(1.3)TRAIL: Trailing edg →
(1.2)LEAD: Leading edge →
(1.1)LDNEG: negative half-cycle loading →
(1.0) LDPOS: positive half-cycle loading →



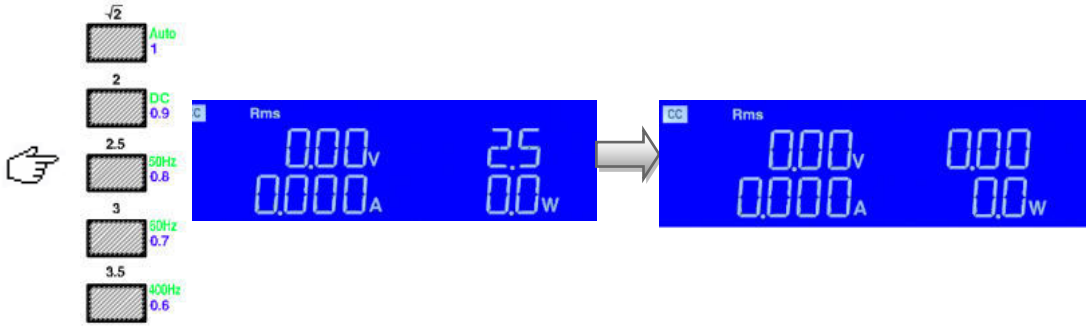

- Press the CF key, and √2 key settings will be automatically saved and exit.



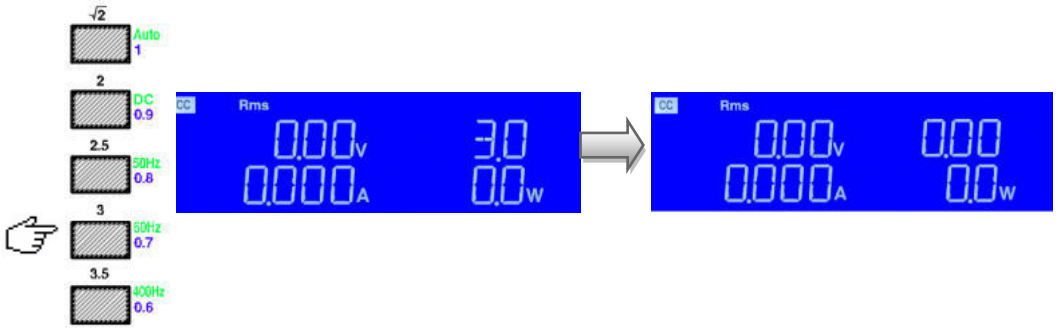

- Press the CF key, and 2 key settings will be automatically saved and exit.



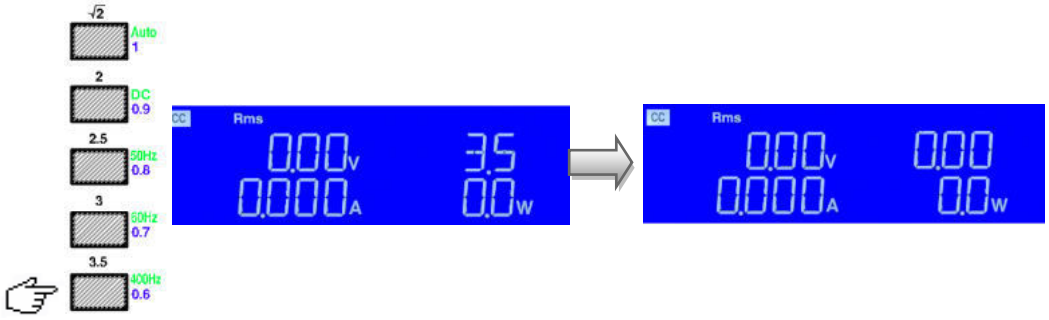
- Press the CF key, and 2.5 key settings will be automatically saved and exit.



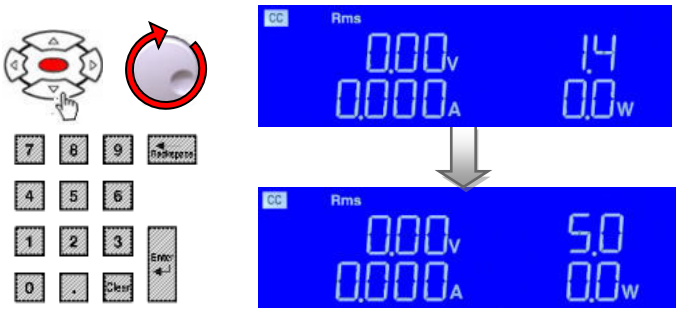

- Press the CF key, and 3.0 key settings will be automatically saved and exit.




- Press the CF key, and 3.5 key settings will be automatically saved and exit.



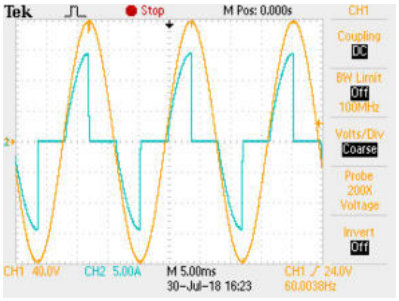

- Press the CF key, setting range from 1.4 to 5.0, step 0.1 by rotating the Setting Knob, press the ENTER key after the completion of the setting will be automatically Stored.



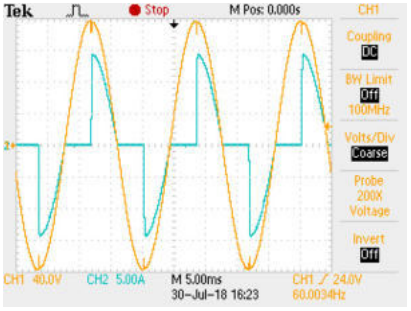
Note:
The limitation is the peak current of specification, ELP/ACP Series current specification is 37.5Arms/112.5Apeak, so when you setting the CF of 5.0 the rms current setting should be limited to 22.5A
Ex:

| | | |
|---|---|---|
| ELP/ACP 3750 | nominal = 37.5A. | CF 5.0 limit = 22.5A |
| ELP/ACP 2800 | nominal = 28A. | CF 5.0 limit = 16.8A |
| ELP/ACP 1875 | nominal = 18.75A. | CF 5.0 limit = 11.25A. |
| ELP/ACP 3750HV | nominal = 28A. | CF 5.0 limit = 16.8A |
| ELP/ACP 2800HV | nominal = 18.75A. | CF 5.0 limit = 11.25A. |

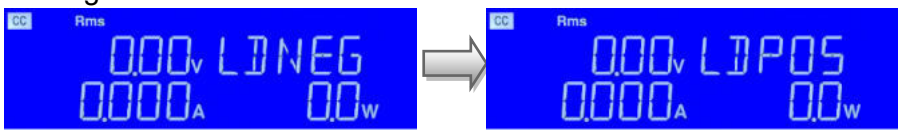
- Current phase modulation waveform load
  90 degree SCR Trailing edge current waveform

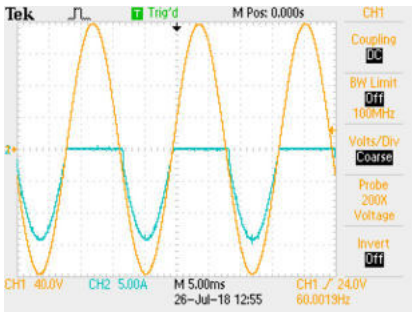



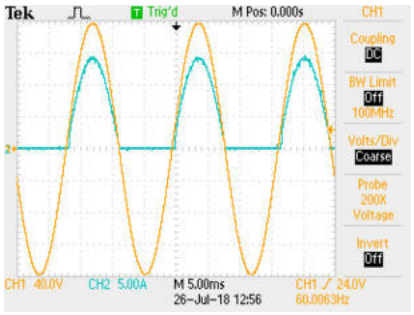

90 degree SCR Leading edge current waveform


- positive half-cycle or negative half-cycle load setting
  Use the knob and key to adjust the CF value, or press the CF key, the Keypad key enters 1.1 (LDNEG), the monitor displays “LDNEG “is negative half-cycle loading, the Keypad key enters 1.0 (LDPOS),”LDPOS” for positive half-cycle loading.



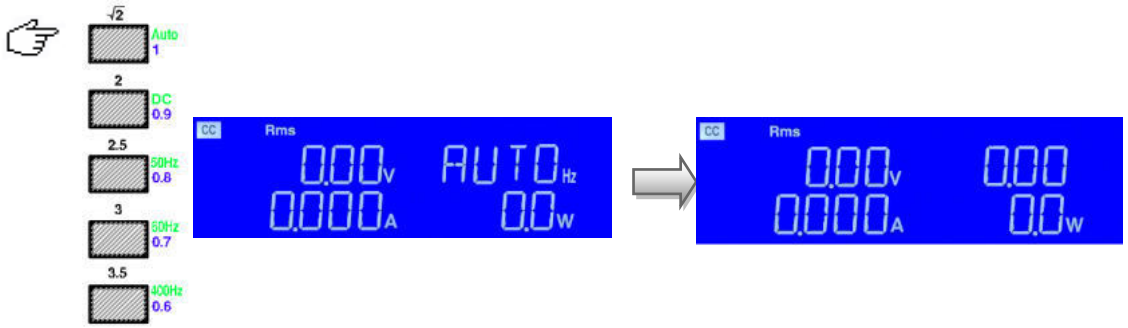



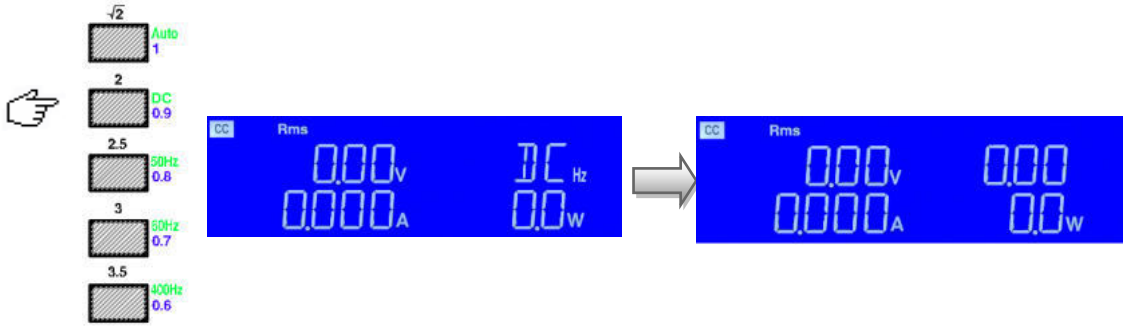
3.3.20. FREQ Key and Auto, DC, 50Hz, 60Hz and 400Hz key

Freq key only functions upon C.C. and C.P. mode and all LED off upon Linear C.C., C.R. and C.V. mode. Auto, DC, 50Hz, 60Hz and 400Hz keys are used to quick change the frequency of C.C.and C.P. mode. However, adjust the frequency by number key or Up, Down or rotary switch to setting the frequency values. The range is 40~440Hz.

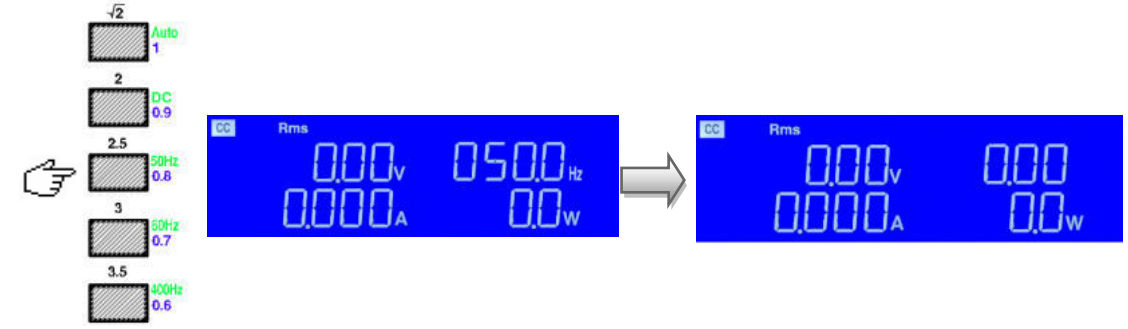
- Press the FREQ key, and **Auto** key settings will be automatically saved and exit.



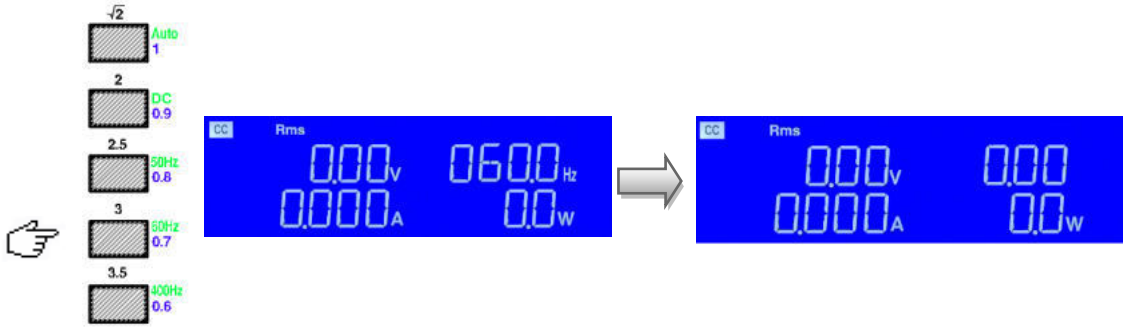

- Press the FREQ key, and **DC** key settings will be automatically saved and exit.



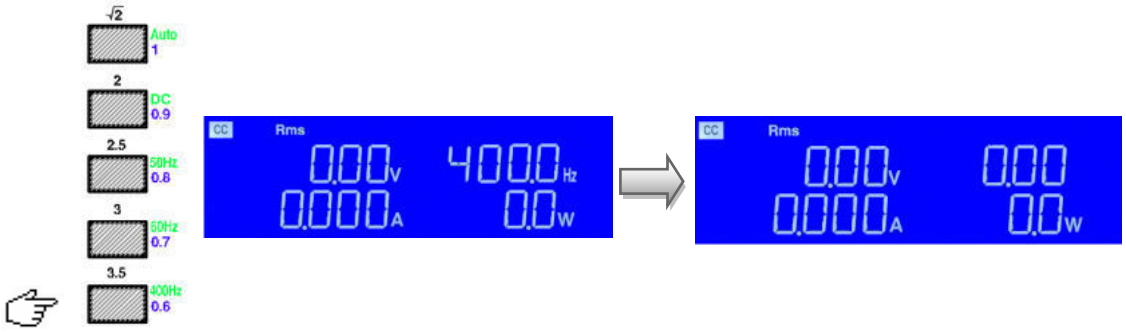

- Press the FREQ key and **50Hz** key settings will be automatically saved and exit.



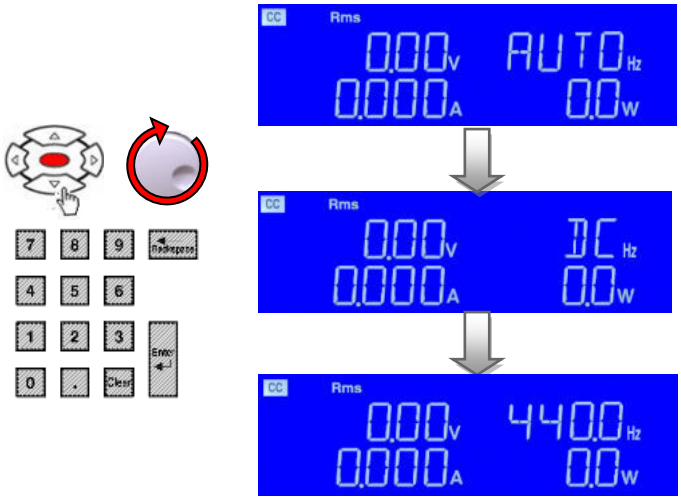

- Press the FREQ key and 60Hz key settings will be automatically saved and exit.



- Press the FREQ key and 400Hz key settings will be automatically saved and exit.
  *ELP/ACP 3750HV, ELP/ACP 2800HV Without this setting



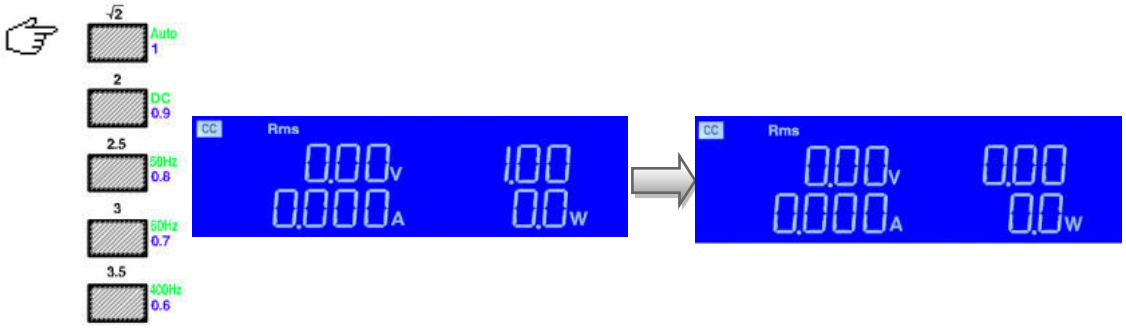

- Press the FREQ key, setting range from AUTO to 440Hz, step 0.1 by rotating the Setting knob, press the ENTER key after the completion of the setting will be automatically stored.



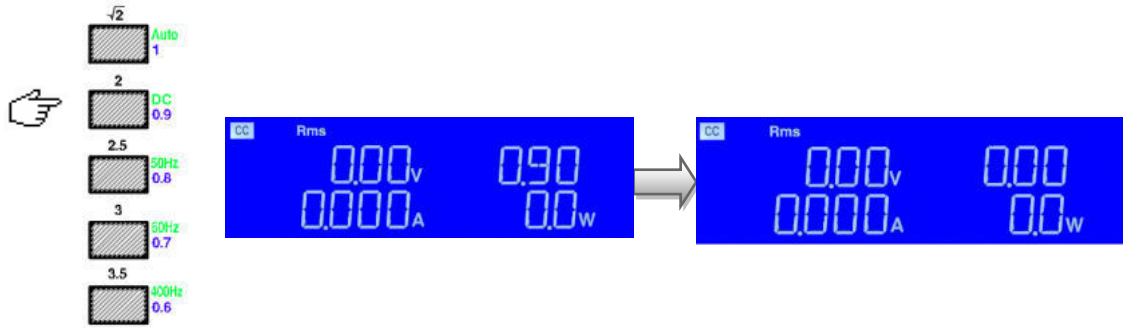

3.3.21. PF Key and 1, 0.9, 0.8, 0.7 and 0.6 key

PF(lead) key only functions upon C.C. and C.P. mode and all LED off upon Linear C.C., C.R. and C.V. mode.
1, 0.9, 0.8, 0.7 and 0.6 keys are used to quick change the P.F.(Crest Factor) of C.C. and C.P. mode.
However, adjust the PF by number key or Up, Down or rotary switch to setting the P.F. values. The range is 0 ~ 1.

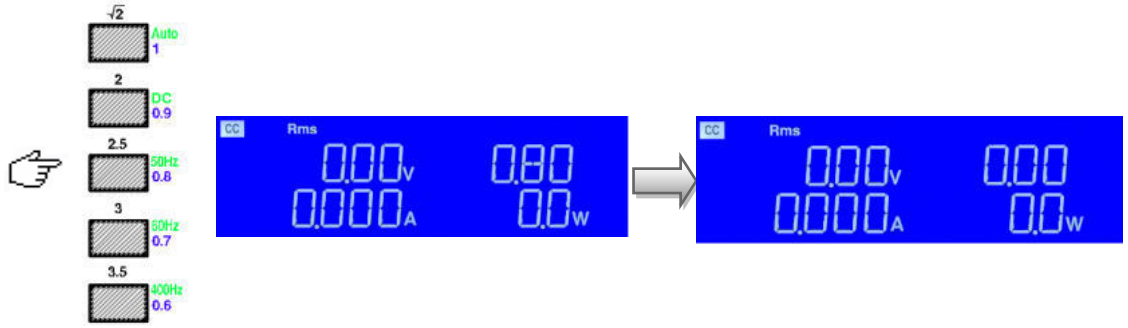
- Press the PF key, and 1 key settings will be automatically saved and exit.



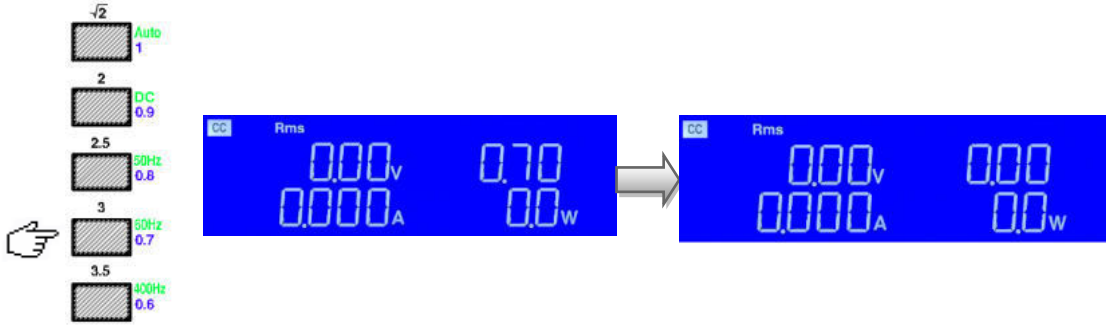
- Press the PF key, and 0.9 key settings will be automatically saved and exit.



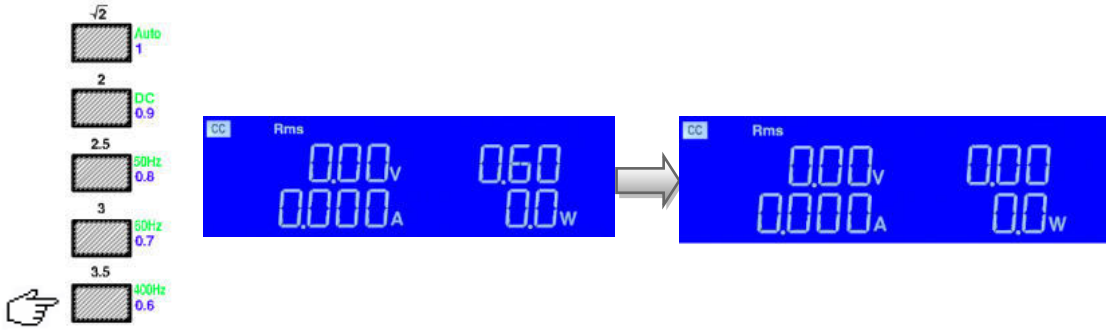

- Press the PF key, and 0.8 key settings will be automatically saved and exit.



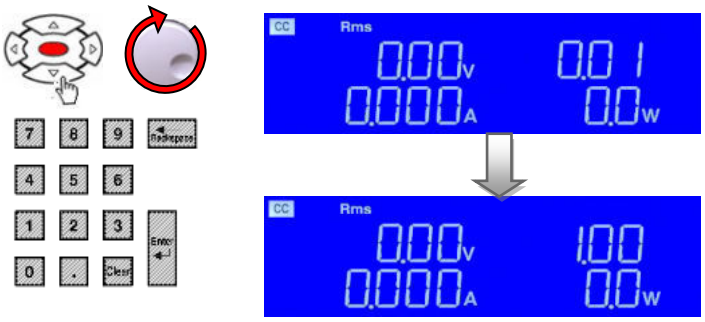

- Press the PF key, and 0.7 key settings will be automatically saved and exit.



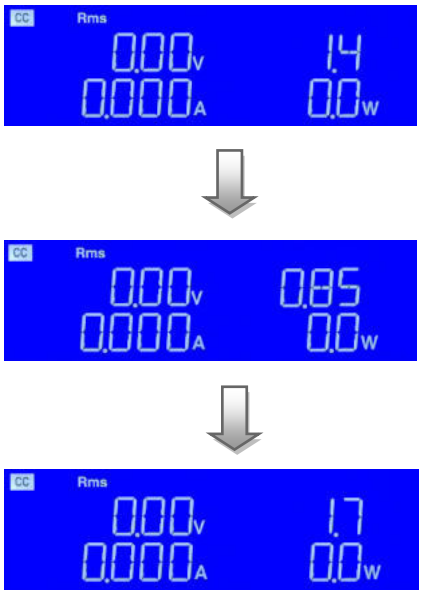

- Press the PF key, and 0.6 key settings will be automatically saved and exit.



- Press the PF key, setting range from 0.01 to 1.00, step 0.01 by rotating the Setting knob, press the ENTER key after the completion of the setting will be automatically stored.




- Adjustment of PF
  The adjustable range of PF will be different due to CF. Therefore, it is necessary to select the appropriate CF to make the PF setting value within the adjustable range （refer to the PF vs CF graph on page 61）. When the PF setting value is not within the adjustable range under this CF setting value, the system will automatically adjust the CF setting value so that the PF setting value is as required by the user.




（CF is 1.4）

（PF changed to 0.85）

（PF is outside of the adjustable range, reset CF to 1.7 and adjustable range of PF is 0.84~0.93）

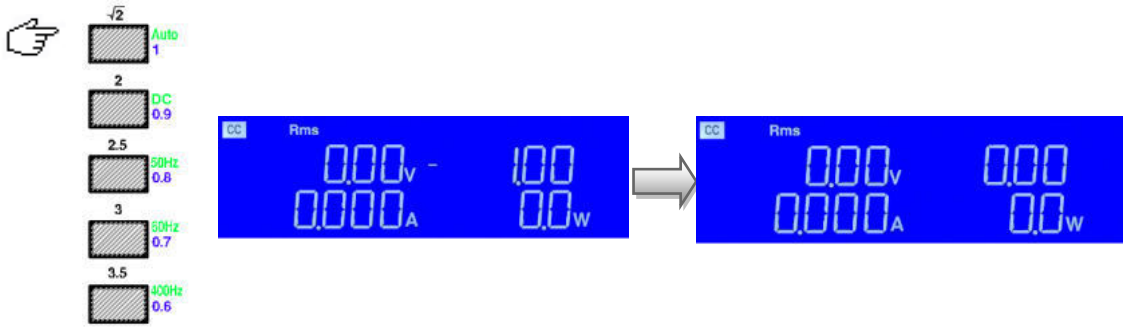
3.3.22. - PF Key and 1, 0.9, 0.8, 0.7 and 0.6 key

PF(lag) key only functions upon C.C. and C.P. mode and all LED off upon Linear C.C., C.R. and C.V. mode.

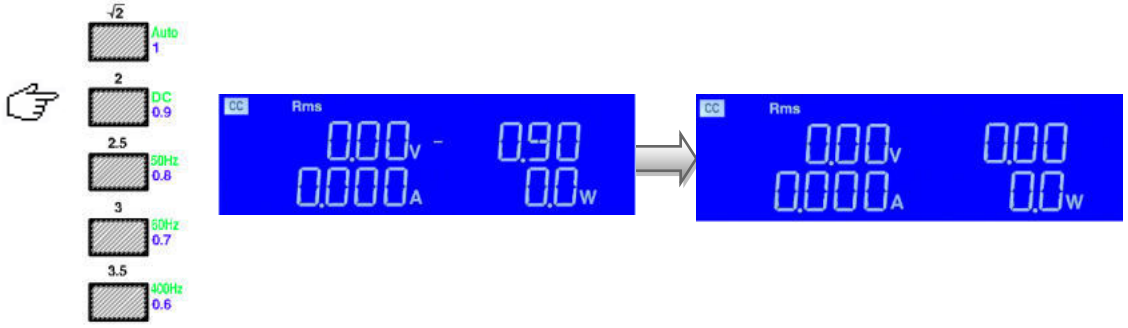
1, 0.9, 0.8, 0.7 and 0.6 keys are used to quick change the P.F.(Crest Factor) of C.C. and C.P. mode.

However, adjust the PF by number key or Up, Down or rotary switch to setting the P.F. values. The range is 0 ~ -1.

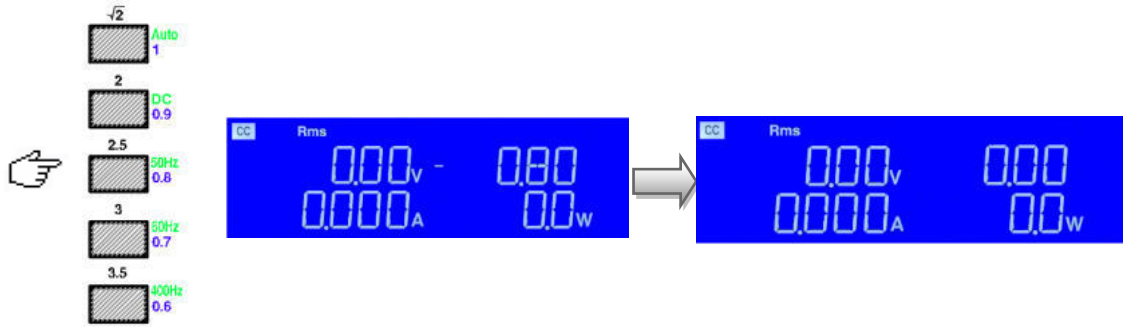
- Press the -PF key, and 1 key settings will be automatically saved and exit.



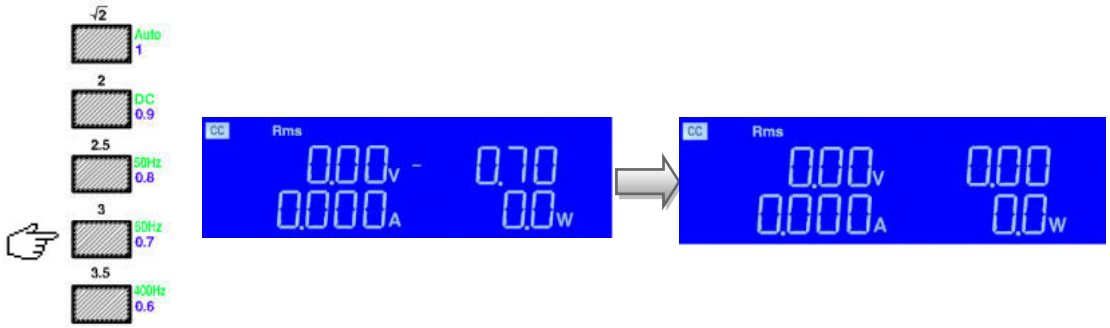

- Press the -PF key, and 0.9 key settings will be automatically saved and exit.



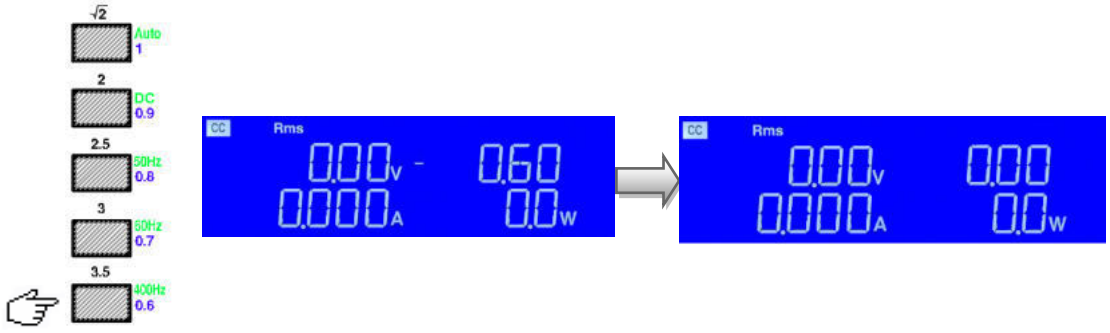

- Press the -PF key, and 0.8 key settings will be automatically saved and exit.



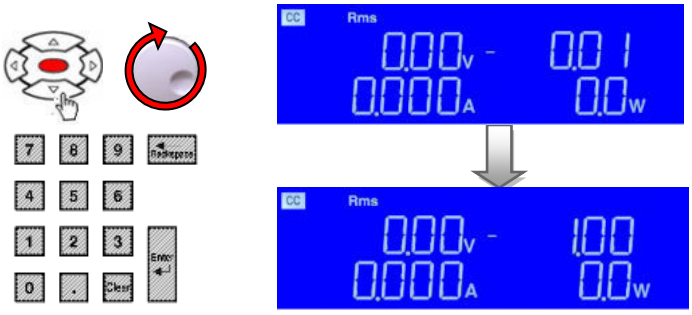
- Press the -PF key, and 0.7 key settings will be automatically saved and exit.



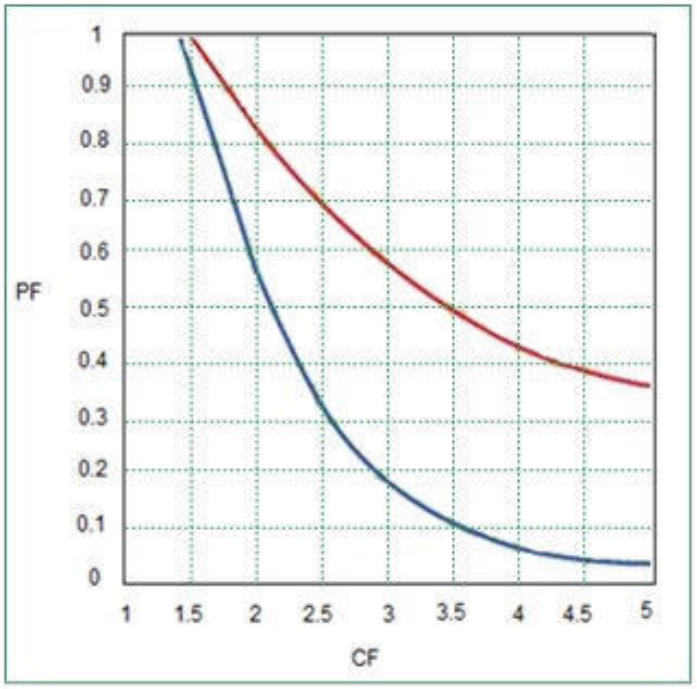

- Press the -PF key, and 0.6 key settings will be automatically saved and exit.




- Press the PF key, setting range from- 0.01 to -1.00, step 0.01 by rotating the Setting knob, press the ENTER key after the completion of the setting will be Automatically stored.

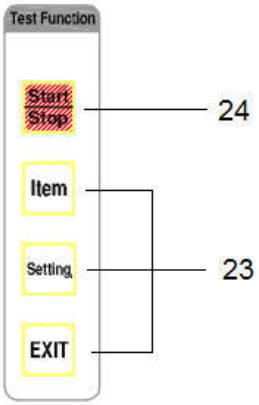


PF setting range, when CF is set to 2, the PF setting range is 0.55~0.8.




PF vs CF curve graph

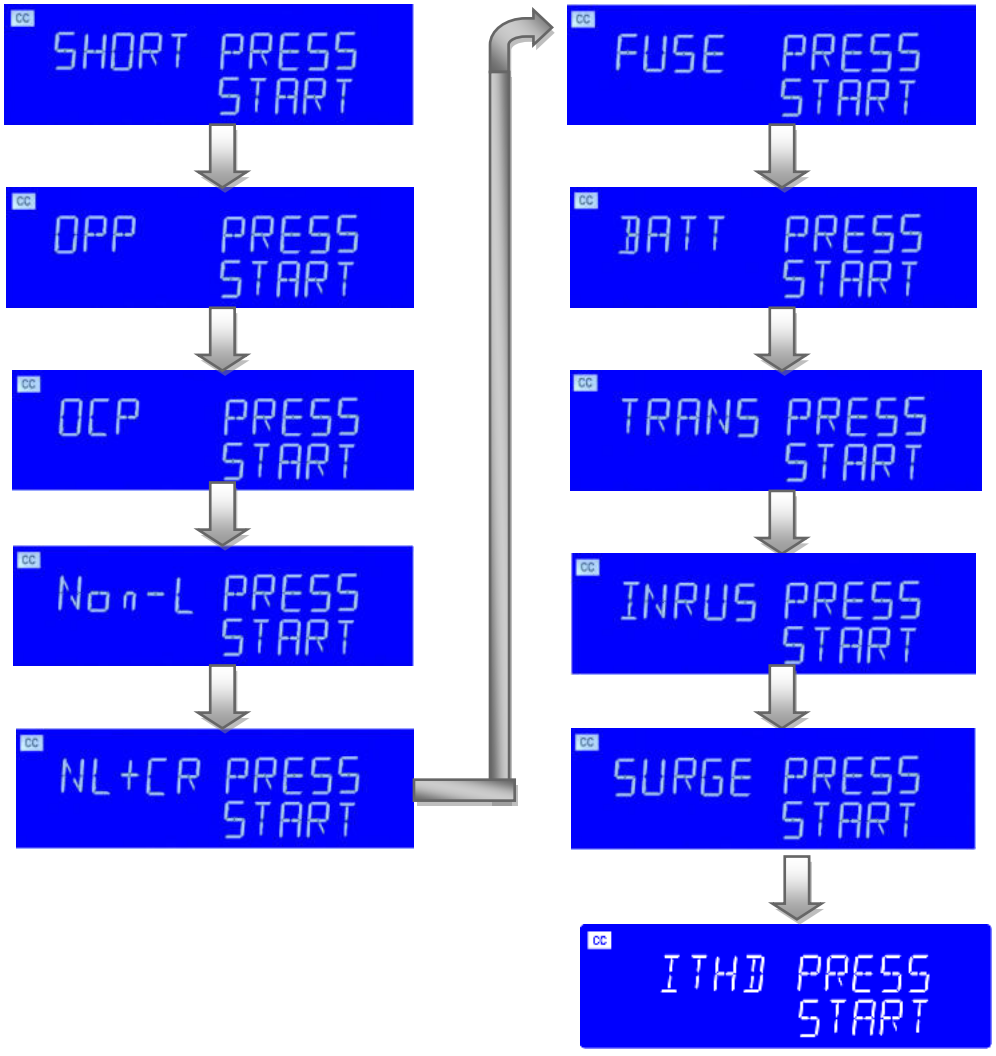
**Test Function key description:**



3.3.23. Item , Setting and Exit key for Test Item

Item, Setting and Exit key for Test Item Test item as following There are eight Operating modes. These can be selected in turn by pressing the “Item “key on The ELP/ACP series AC/DC Electronic Load module. The sequence is:

SHORT →
OPP →
OCP →
Non-L →
NL+CR →
FUSE →
BATT →
TRANS →
INRUSH →
SURGE →
ITHD →



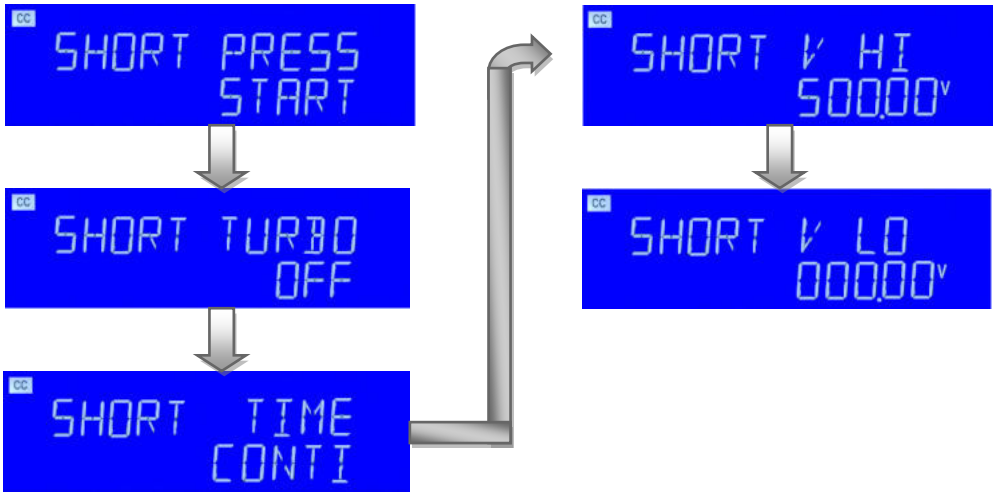
The SHORT parameters setting: The SHORT test will attempt to sink high current up to the ELP/ACP series AC/DC load Maximum current in order to check the power source's protection and behavior. The test time can be adjusted and threshold values for the High and low voltage Limits set.

Pressing the Item key once will cause the button to illuminate. The Message "SHORT PRESS START" will be shown across the displays.

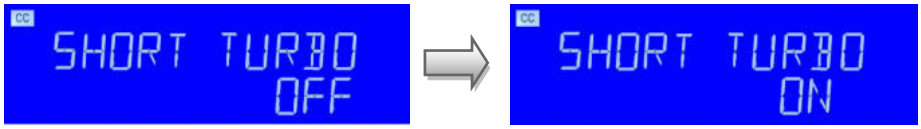
Each press of the Setting key moves the menu on one step. The left and right LCDs show the currently selected test parameter as text. The value is adjusted by the Rotary knob and can be read from the right display during Setting.

The setting sequence is shown below:

SHORT PRESS START →
SHORT TURBO →
SHORT Time CONTI →
SHORT V HI →
SHORT V Lo →




- The right upper 5 digit monitor display the Turbo and right lower monitor display "OFF" ,use the knob and the key to switch ON or OFF.

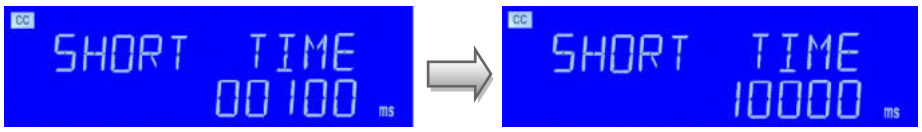



- The setting short test time, right upper 5 digit monitor display the TIME and right lower monitor display "CONTI", the setting range is "CONTI" means continue.

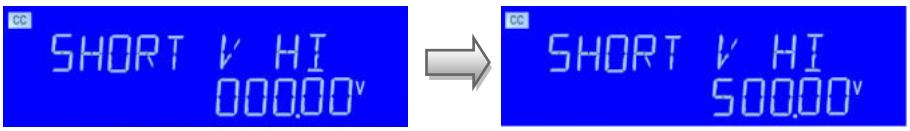

- SHORT TIME: setting the Short test time, the left 5 digit monitor display the "SHORT" ,the right upper 5 digit monitor display the TIME and right lower monitor display "100ms" , the range is 100ms to 10000ms.

- The short test will be no time limitation when setting to CONTI until press

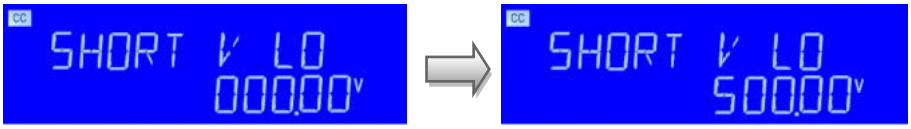
“START/STOP” key to stop the short test.
Note: TURBO ON state, the test time up to 1000ms.




- V-Hi: Short test voltage check upper limitation setting, the Left 5 digit monitor display the “SHORT” ,the right upper 5 digit monitor display the “V-HI” and right lower monitor display setting value, the unit is "V". The range is 0.01V to 500.00V.




- V-Lo : Short test voltage check lower limitation setting, the Left 5 digit monitor display the “SHORT” ,the right upper 5 digit monitor display the “V-Lo” and right lower monitor display setting value, the unit is "V". The range is 0.01V to 500.00V.




Once the test parameters have been entered the test is started by pressing The red START/STOP button while the SHORT PRESS START text is displayed. During the test the bottom LCD will show run and the actual short Current will be displayed on the right upper LCD.

Note 1: The message PASS END will be displayed if the measured voltage levels stays within the V_Hi and V_Lo threshold levels during the test

Note 2: The message FAIL END will be displayed if the measured voltage levels falls outside the V_Hi and V_Lo threshold levels during the test. The NG flag will also illuminate.

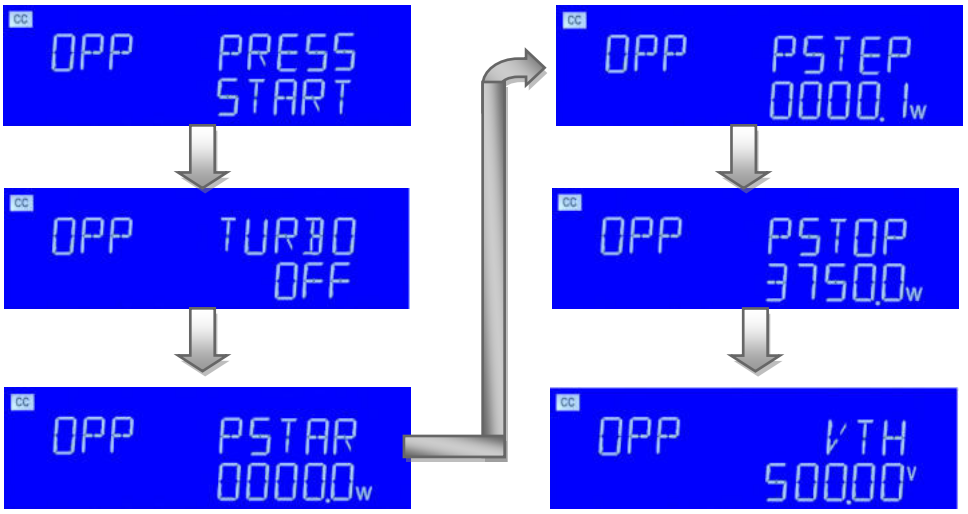
Note 3: If continuous short time is selected the test is ended by pressing the red START/STOP button.

- The OPP parameters setting:
  The OPP allows the parameters of an Over Power Protection test to be entered. The OPP test will ramp up the load power in steps to validate the Device under Test’s (DUT) protection and behavior. A voltage threshold level can be set. If the Voltage measured during the test is lower than the set Threshold voltage then the Test will fail and the display will signal OPP ERROR. Similarly a power threshold (P STOP) can be set. If the measured power reaches the P STOP threshold the test Will be discontinued and the OPP ERROR message will be displayed.

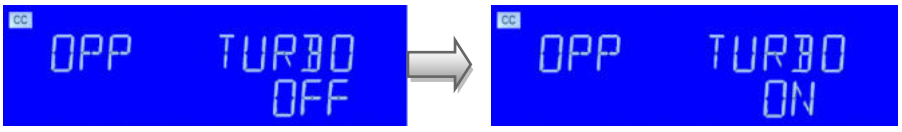
  Pressing the Item key once will cause the button to illuminate. The message “OPP PRESS START” will be shown across the displays.

  Each press of the Setting button moves the menu on one step. The Left and Middle LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

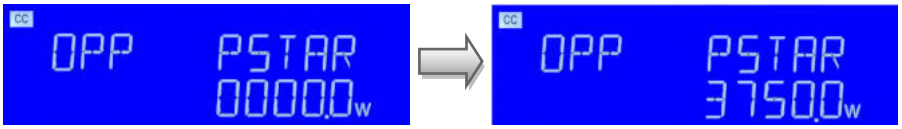
OPP PRESS START →
OPP TURBO →
OPP PSTAR →
OPP PSTEP →
OPP PSTOP →
OPP VTH →



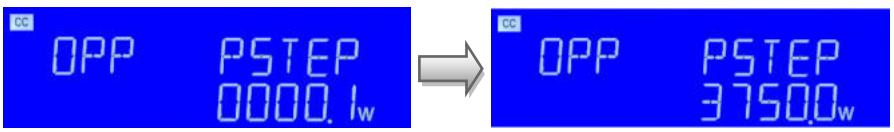

- The right upper 5 digit monitor display the Turbo and right lower monitor display “OFF” ,use the knob and the key to switch ON or OFF.




- PSTAR: setting the start power, the Left 5 digit monitor display the “OPP” ,the right upper 5 digit monitor display the “PSTAR”, and right lower monitor display setting value, the unit is "W". The range is 0.1W to the full scale of the CP mode specification.

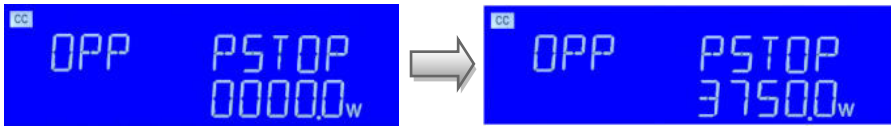



- PSTEP: setting the increment step power, the Left 5 digit monitor display the “OPP” ,the right upper 5 digit monitor display the “PSTEP”, and right lower monitor display setting value, the unit is "W". The range is 0.1W to the full scale of the CP mode specification.

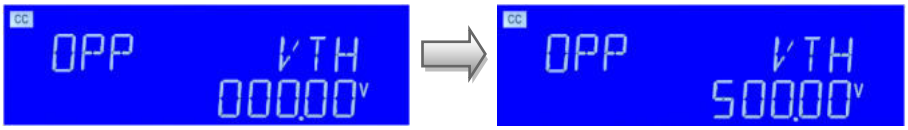



- PSTOP: setting the stop power, the Left 5 digit monitor display the “OPP” ,the right

upper 5 digit monitor display the “PSTOP”, and right lower monitor display setting value, the unit is "W". The range is 0.1W to the full scale of the CP mode specification.
NOTE: The maximum settable stop power in TURBO ON state is the "PSTAR + 10 X PSTEP" power.




- Vth : Setting threshold voltage; the Left 5 digit monitor display the “OPP” ,the right upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.



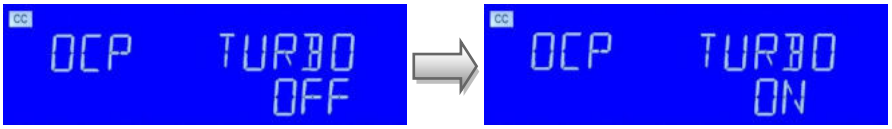

- The OCP parameters setting:
  The OCP allows the parameters of an Over Current Protection test to be entered. The OCP test will ramp up the load current in steps to validate the Device Under Test’s (DUT) protection and behavior. A voltage threshold level can be set. If the Voltage measured during the test is lower than the set Threshold voltage then the Test will fail and the display will signal OCP ERROR. Similarly a current Threshold (I STOP) can be set. If the measured Current reaches the I STOP Threshold the Test will be discontinued and the OCP ERROR message will be displayed.

  Pressing the Item key once will cause the button to illuminate. The message “OCP PRESS START” will be shown across the displays.

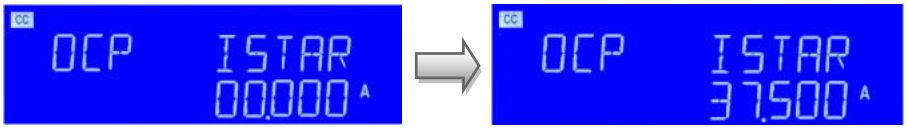
Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
The setting sequence is shown below:

OCP PRESS START →
OCP TURBO →
OCP ISTAR →
OCP ISTEP →
OCP ISTOP →
OCP VTH →

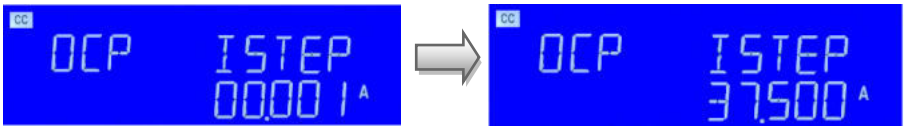

- The right upper 5 digit monitor display the Turbo and right lower monitor display “OFF” ,use the knob and the key to switch ON or OFF.



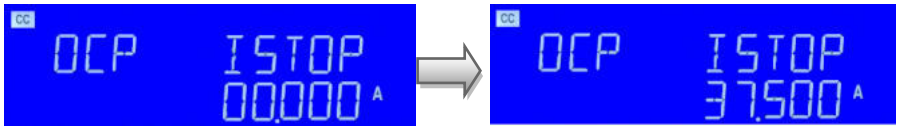

- ISTAR: setting the start current point, the Left 5 digit monitor display the “OCP” ,the right upper 5 digit monitor display the “ISTAR”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.




- ISTEP: setting the increment step current point, the Left 5 digit monitor display the “OCP” ,the right upper 5 digit monitor display the “ISTEP”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.

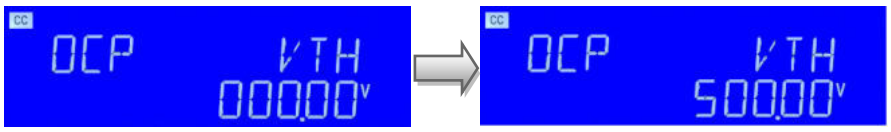



- ISTOP: setting the stop current point, the Left 5 digit monitor display the “OCP” ,the right upper 5 digit monitor display the “ISTOP”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.
  TURBO ON state, the maximum stop current that can be set is "ISTAR + 10X ISTEP current value.




- Vth: Setting threshold voltage; the Left 5 digit monitor display the “OCP” ,the right

upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.




Once the test parameters have been entered the test is started by pressing the red START/STOP button while the OCP PRESS START text is displayed. During the Test the middle LCD will show run and the actual current being Taken will be displayed on the Right LCD

Note 1: The message OCP ERROR will be displayed if the DUT fails the test. The reasons for failure are due to one of the following conditions:

(a) the voltage level of the DUT falls below the set voltage threshold (OCP Vth) during the test
(b) The current taken from the DUT reaches the OCP I STOP setting.

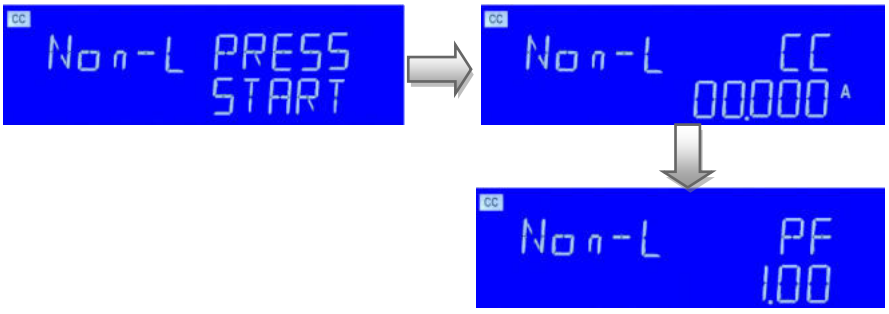
Note 2: The message PASS will be displayed if the DUTs voltage stays above The set threshold. Also to PASS the OCP test the current taken from the DUT cannot equal the I STOP setting.

Note 3: If the DUT passes the OCP test the maximum current taken during the Test is displayed on the right LCD.

Upon PASS or OCP ERROR the test will automatically stop. The red START/STOP button can be used during the test to immediately cease operation.

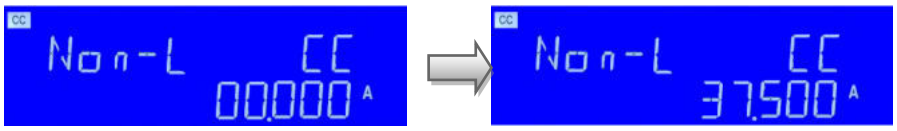
- Non-L Nonlinear test key function parameter setting:
  Pressing the Item key once will cause the button to illuminate. The message “Non-L PRESS START” will be shown across the displays.
- Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

Non-L PRESS START →
Non-L CC →
Non-L PF →

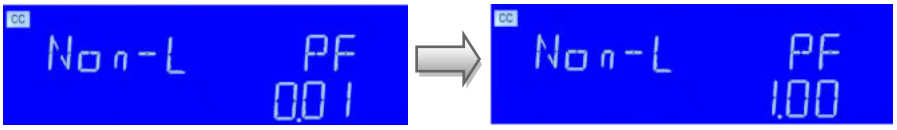



- Non-L CC: setting the Non-L current point, the Left 5 digit monitor display the

“Non-L” ,the right upper 5 digit monitor display the “CC”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.

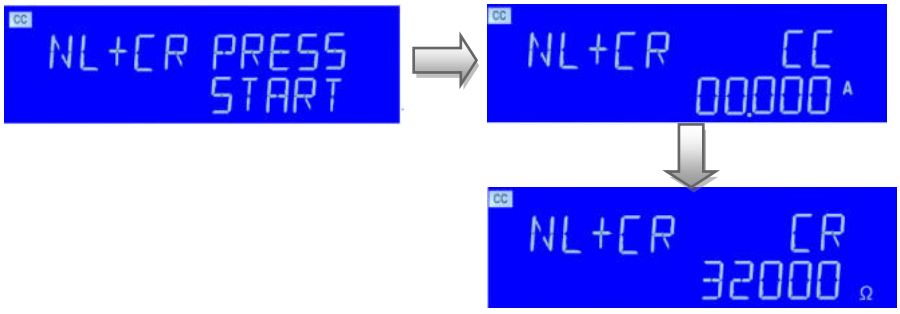



- Non-L PF: setting the PF, the Left 5 digit monitor display the “Non-L” ,the right upper 5 digit monitor display the “PF”, and right lower monitor display setting value, The range is 0.01 ~ 1.00.

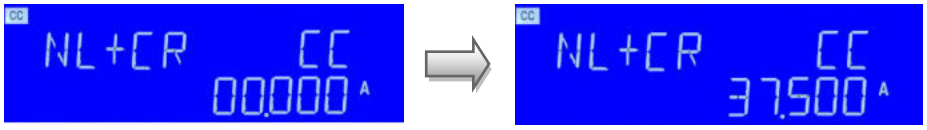



- NL+CR Nonlinear plus CR test key function parameter setting:
  Pressing the Item key once will cause the button to illuminate. The message “NL+CR PRESS START” will be shown across the displays.
  Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

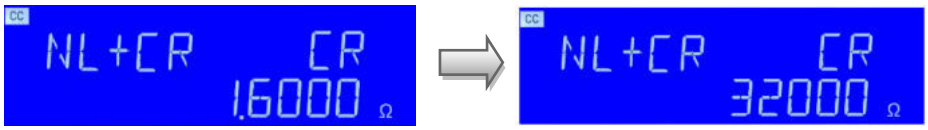
NL+CR PRESS START →
NL+CR CC →
NL+CR CR →




- NL+CR CC: setting the NL+CR CC current point, the Left 5 digit monitor display the “NL+CR”, the right upper 5 digit monitor display the “CC”, and right lower monitor display setting value, the unit is "A”, use the knob and button to set the Nonlinear CC current value, the range from 0.000A to full scale current of the CC mode specification.



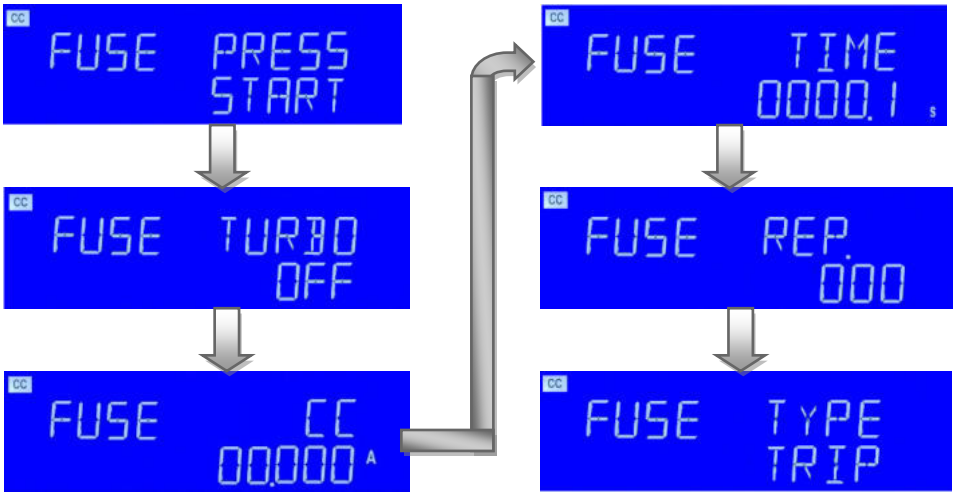
- NL+CR CR: setting the NL+CR CR resistance point, the Left 5 digit monitor display the “NL+CR” ,the right upper 5 digit monitor display the “CR”, and right lower monitor display setting value, the unit is "Ω" , use the knob and button to set the CR value from 1.6000Ω to the full scale of the CR mode specification.



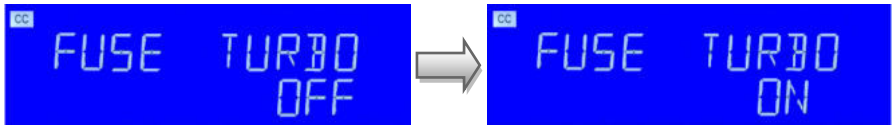

The FUSE parameters setting:

- Pressing the Item key once will cause the button to illuminate. The message “FUSE PRESS START” will be shown across the displays.
- Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

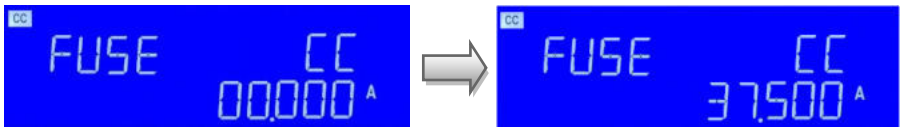
FUSE PRESS START →
FUSE TURBO OFF →
FUSE CC →
FUSE TIME →
FUSE REP. →
FUSE TYPE TRIP →




- Setting the fuse TURBO, The Left 5 digit monitor display the “FUSE”, the Right Upper 5 Digit monitor display the “TURBO”, and right lower monitor Display OFF; Use the knob and the key to ON or OFF.

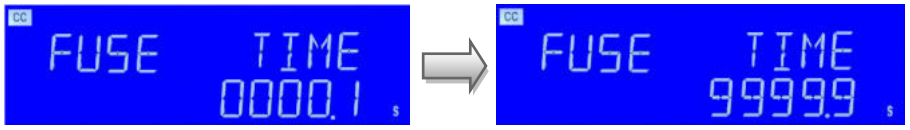


- FUSE CC : setting the fuse current point, the Left 5 digit monitor display the “FUSE” ,the right upper 5 digit monitor display the “CC”, and right lower monitor display setting value, the unit is "A", Use the knob and button to set the FUSE CC current value the range from 0.000A to full scale current of the CC mode specification.

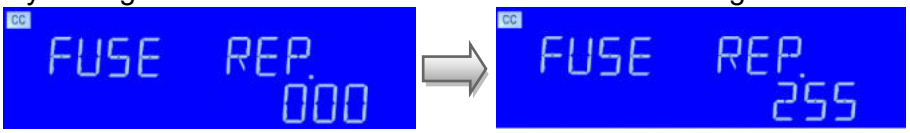



- FUSE TIME: setting the fuse test time, the Left 5 digit monitor display the “FUSE” ,the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "S". Use the knob and button to set the range from 0.1S ~9999.9S.

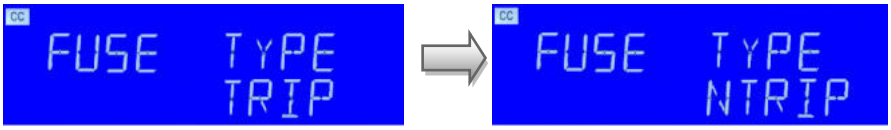
  Note: If the TURBO is ON, the maximum settable time is one second.




- FUSE REP: setting the fuse test times, the Left 5 digit monitor display the “FUSE” ,the right upper 5 digit monitor display the “REP.”, and right lower monitor display setting value. Use the knob and button to set the range from 0 to 255.

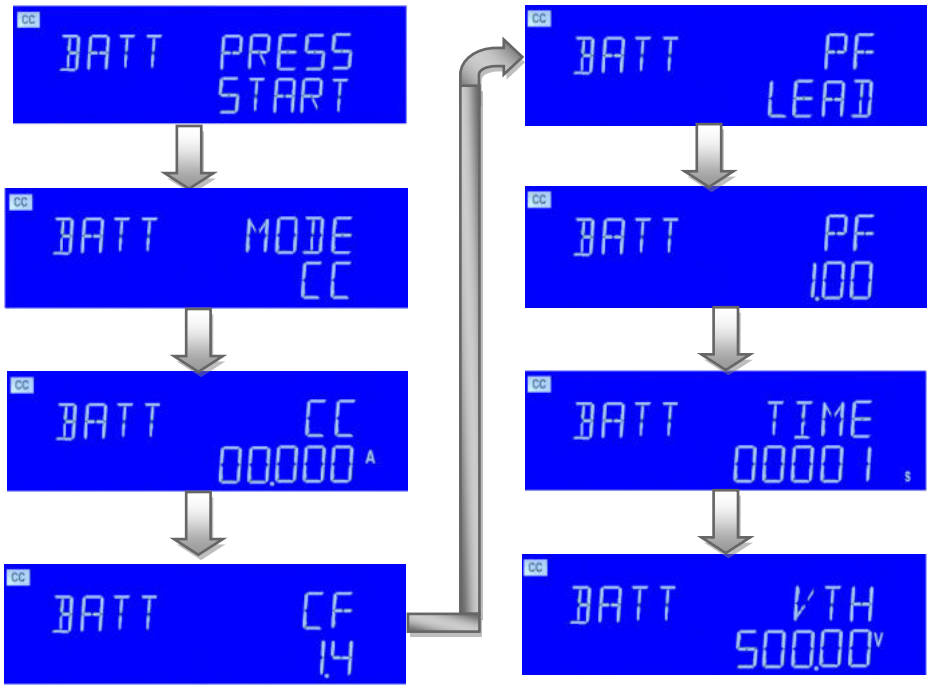



- The right upper 5 digit monitor display the TYPE and right lower monitor display “TRIP” ,use the knob and the key to TRIP or NTRIP.

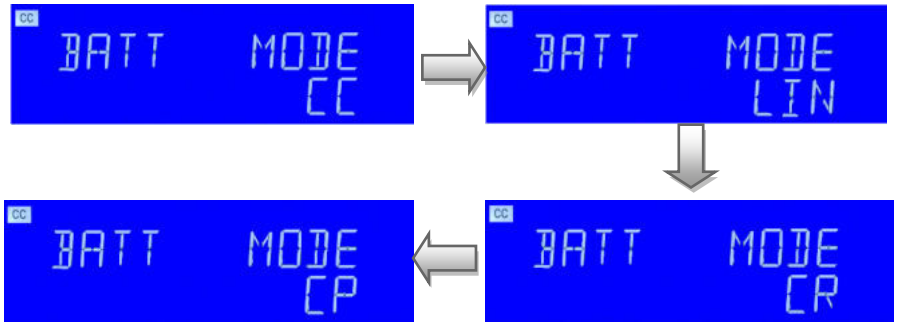


- The BATT parameters setting:
  In the battery test mode, the test will be terminated when the set conditions are Reached.
  For example, the voltage drops to UVP or the load time reaches the set time, so as to Achieve the three battery test modes.
  Pressing the Item key once will cause the button to illuminate. The message “BATT PRESS START” will be shown across the displays.
  Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

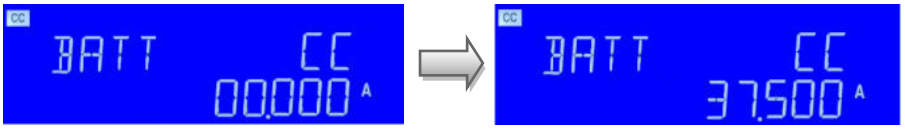
  BATT PRESS START →
  BATT MODE CC →
  BATT CC →
  BATT CF →
  BATT PF LEAD →
  BATT PF →
  BATT TIME →
  BATT VTH →



- The Left 5 digit monitor display the “BATT”, the right upper 5 digit monitor Display the “MODE”, and right lower monitor display the “CC”, use the knob and the key to switch CC, LIN, CR or CP.

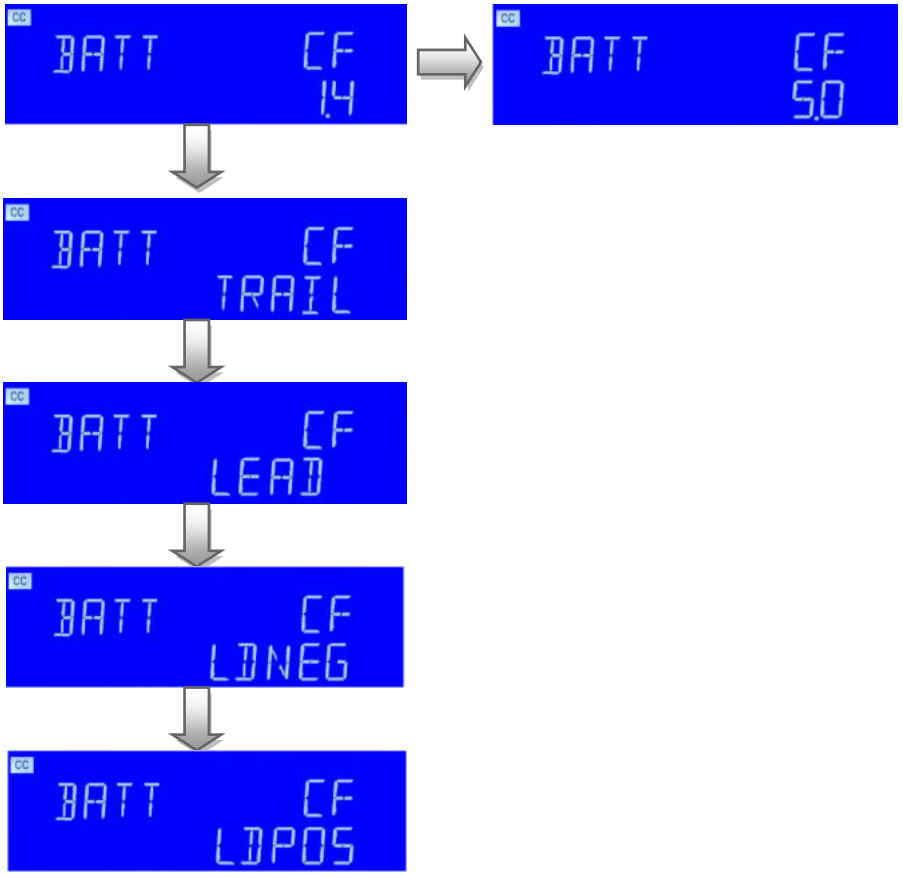



- BATT CC : setting the Battery current point, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “CC”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.

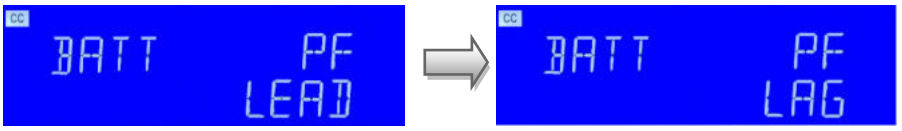



- BATT CF: setting the CF, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “CF”, and right lower monitor display setting value. The range is 1.0、1.1、1.2、1.3、1.4 ~5.0,the setting sequence is shown below:

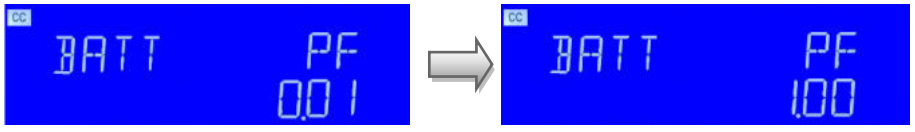
BATT CF 1.4 ~5.0 →
(1.3) BATT CF TRAIL: Trailing edg →
(1.2) BATT CF LEAD: Leading edge →
(1.1) BATT CF LDNEG: negative half-cycle loading →
(1.0) BATT CF LDPOS: positive half-cycle loading →



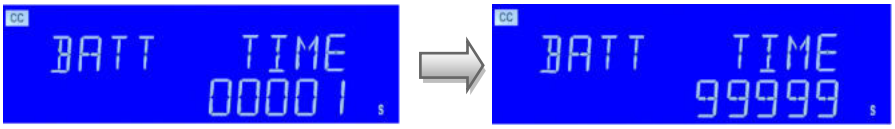

- The Left 5 digit monitor display the “BATT”,the right upper 5 digit monitor Display the “PF”, and right lower monitor display the”LEAD”,use the knob and the key to LEAD or LAG.



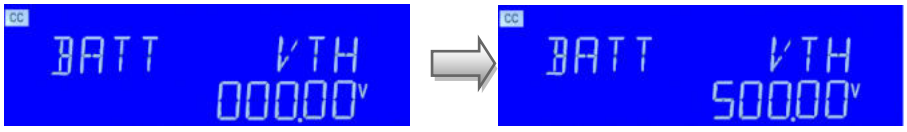

- BATT CF: setting the PF, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “PF”, and right lower monitor display setting value. The range is 0.01 ~1.00.



- BATT TIME: setting the Battery test time, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "S". The range is 1S ~99999S.

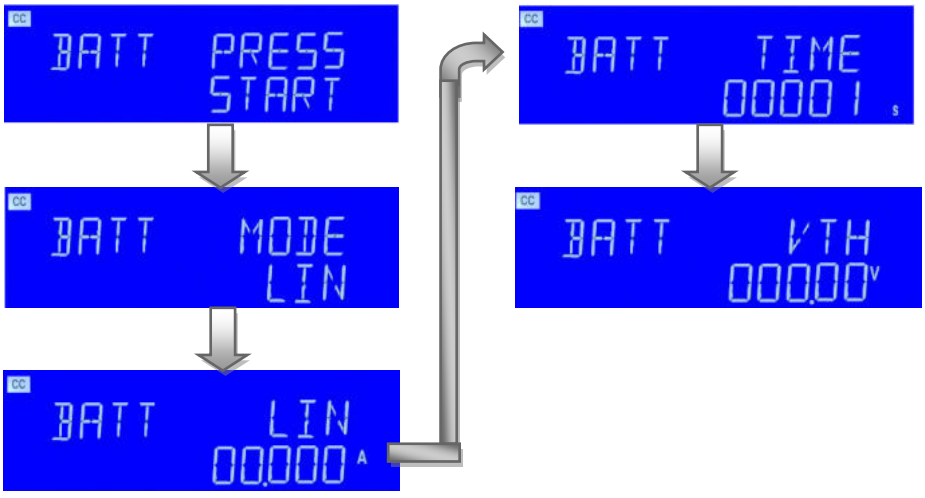



- BATT VTH: the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.

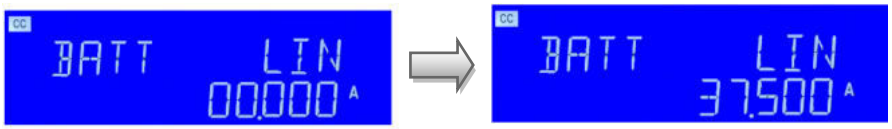



- Press the Item key to enter the Item setting mode BATT PRESS START, the LED indicator is ON, and then press the setting key. The LED indicator is ON. To exit the setting, press the EXIT key and select LIN MODE. The setting sequence is as follows:

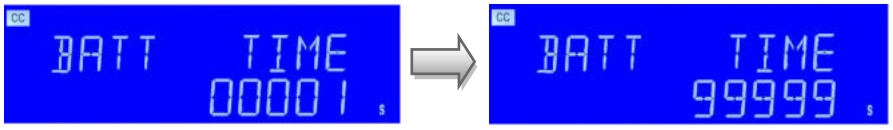
BATT PRESS START →
BATT MODE LIN →
BATT LIN →
BATT TIME →
BATT VTH →



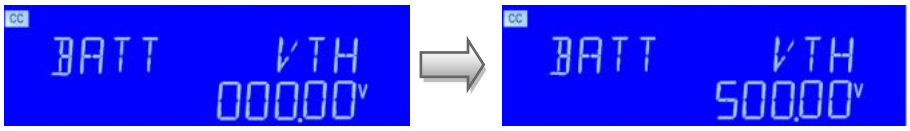

- BATT LIN : setting the BATT LIN, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “LIN”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.



- BATT TIME: setting the BATT TIME, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "S". The range is 1s to the 99999s.

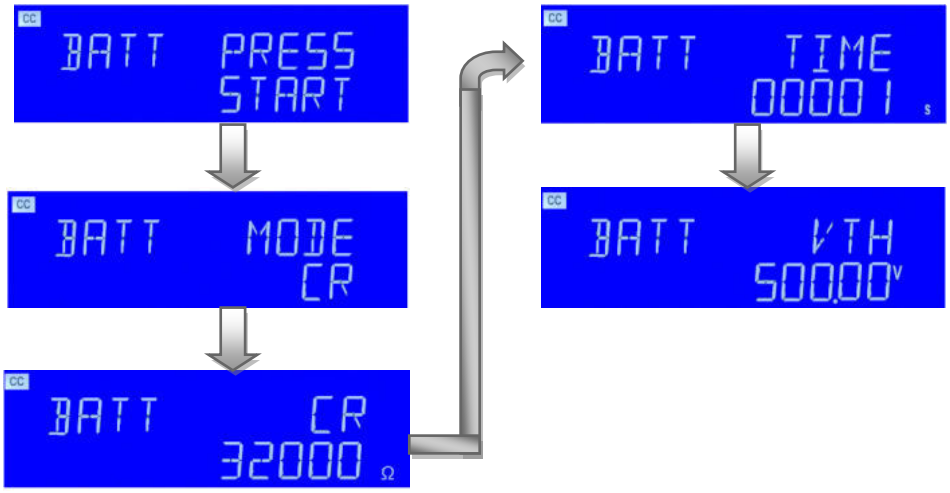



- BATT Vth: Setting BATT threshold voltage; the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.

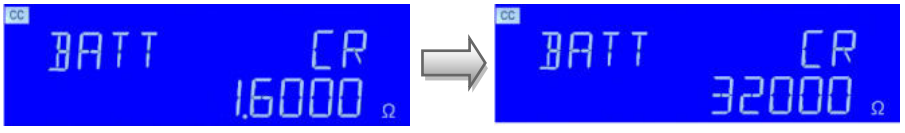



- Press the Item key to enter the Item setting mode BATT PRESS START, the LED Indicators is ON, and then press the setting key. The LED indicator is ON. To exit the setting, press the EXIT key and select CR MODE. The setting sequence is as follows:

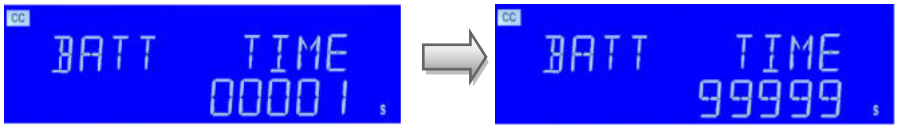
BATT PRESS START →
BATT MODE CR →
BATT LIN →
BATT TIME →
BATT VTH →



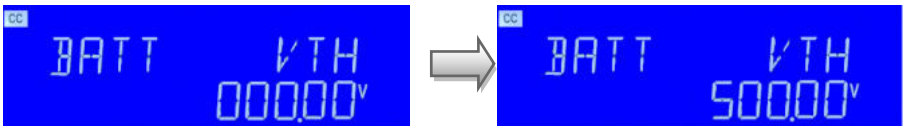

- BATT CR : setting the BATT CR, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “CR”, and right lower monitor display setting value, the unit is "Ω". The range is 1.6Ω to the full scale of the CR mode specification.



- BATT TIME: setting the BATT TIME, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "S". The range is 1s to the 99999s.

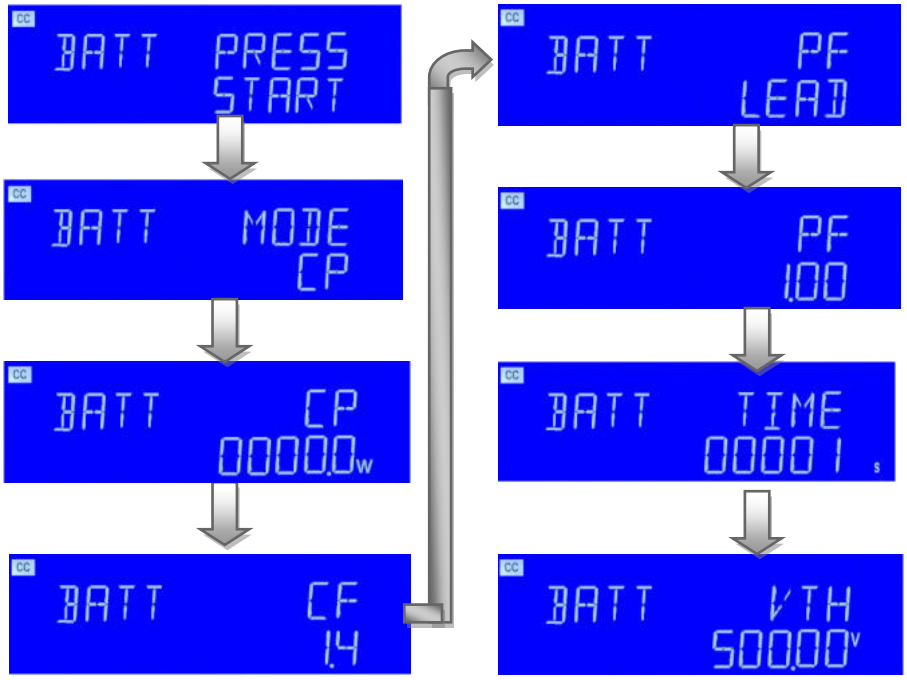



- BATT Vth: Setting BATT threshold voltage; the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.

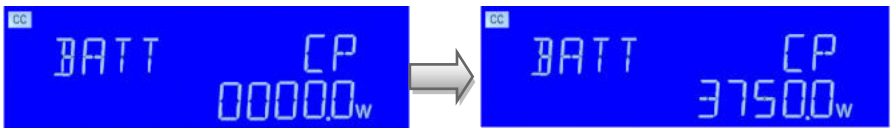



- Press the Item key to enter the Item setting mode BATT PRESS START, the LED Indicators is ON, and then press the setting key. The LED indicator is ON. To exit the setting, press the EXIT key and select CP MODE. The setting sequence is as follows:

BATT PRESS START →
BATT MODE CP →
BATT CP →
BATT CF →
BATT PF LEAD →
BATT PF →
BATT TIME →
BATT VTH →

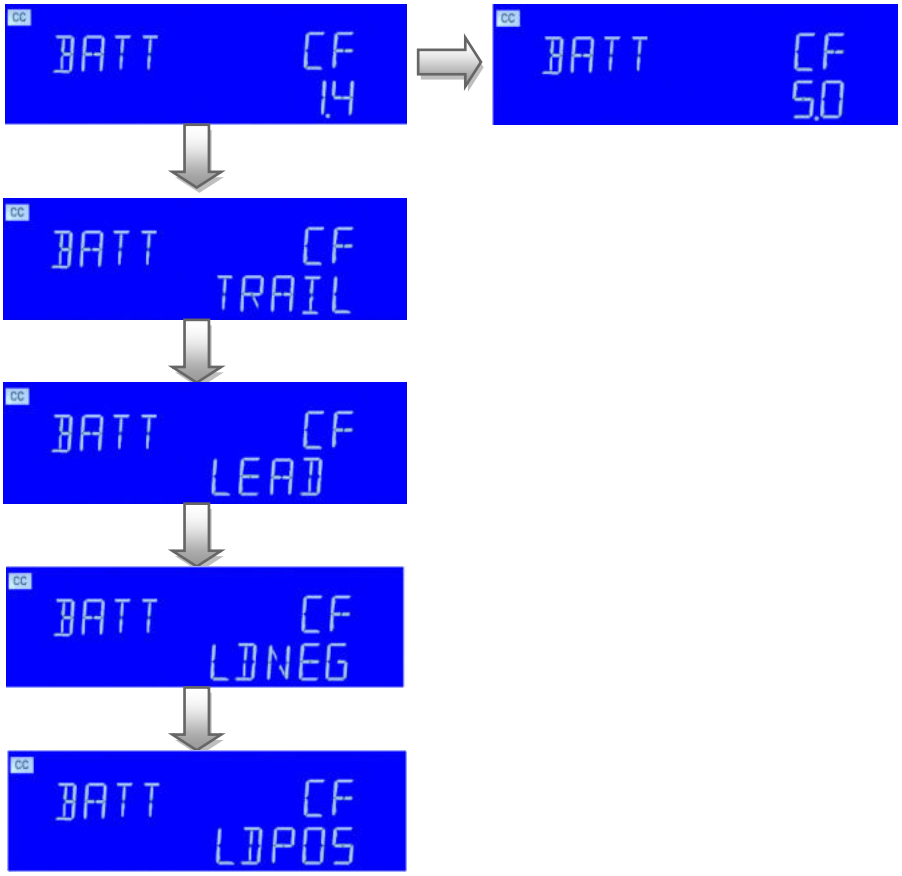


- BATT CP : setting the BATT CP, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “CP”, and right lower monitor display setting value, the unit is "W". The range is 0.1W to the full scale of the CP mode specification.

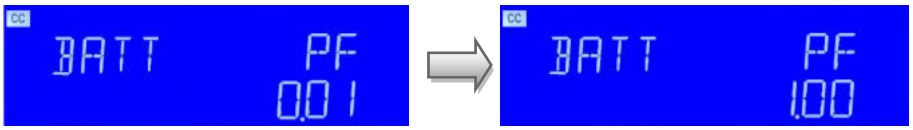



- BATT CF: setting the CF, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “CF”, and right lower monitor display setting value. The range is 1.0、1.1、1.2、1.3、1.4 ~5.0,the setting sequence is shown below:

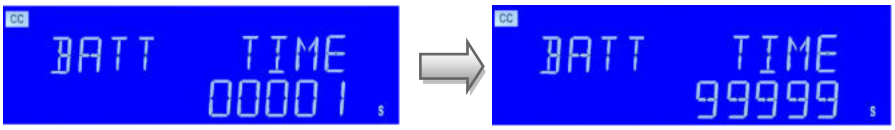
BATT CF 1.4 ~5.0 →
(1.3) BATT CF TRAIL: Trailing edg →
(1.2) BATT CF LEAD: Leading edge →
(1.1) BATT CF LDNEG: negative half-cycle loading →
(1.0) BATT CF LDPOS: positive half-cycle loading →



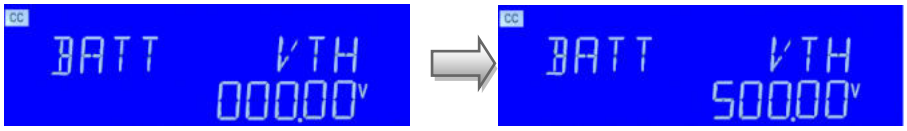
- BATT CF: setting the PF, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “PF”, and right lower monitor display setting value. The range is 0.01 ~1.00.




- BATT TIME: setting the Battery test time, the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "S". The range is 1S ~99999S.

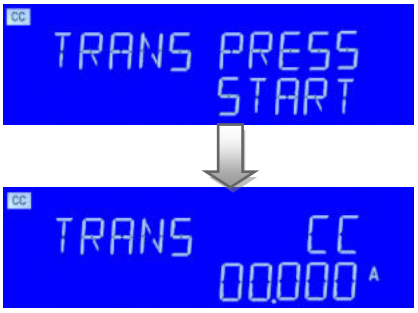



- BATT VTH: the Left 5 digit monitor display the “BATT” ,the right upper 5 digit monitor display the “VTH”, and right lower monitor display setting value, the unit is "V". The range is 0.01V to the full scale of the Voltage specification.

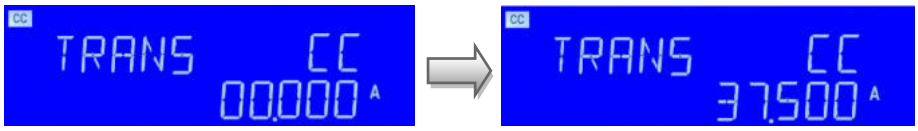



- The TRANS parameters setting:
  TRANS is used to test the time when the UPS is switched to battery power after the Electricity power is cut off.
  Pressing the Item key once will cause the button to illuminate. The message “TRANS PRESS START” will be shown across the displays.
  Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

  TRANS PRESS START →
  TRANS CC →

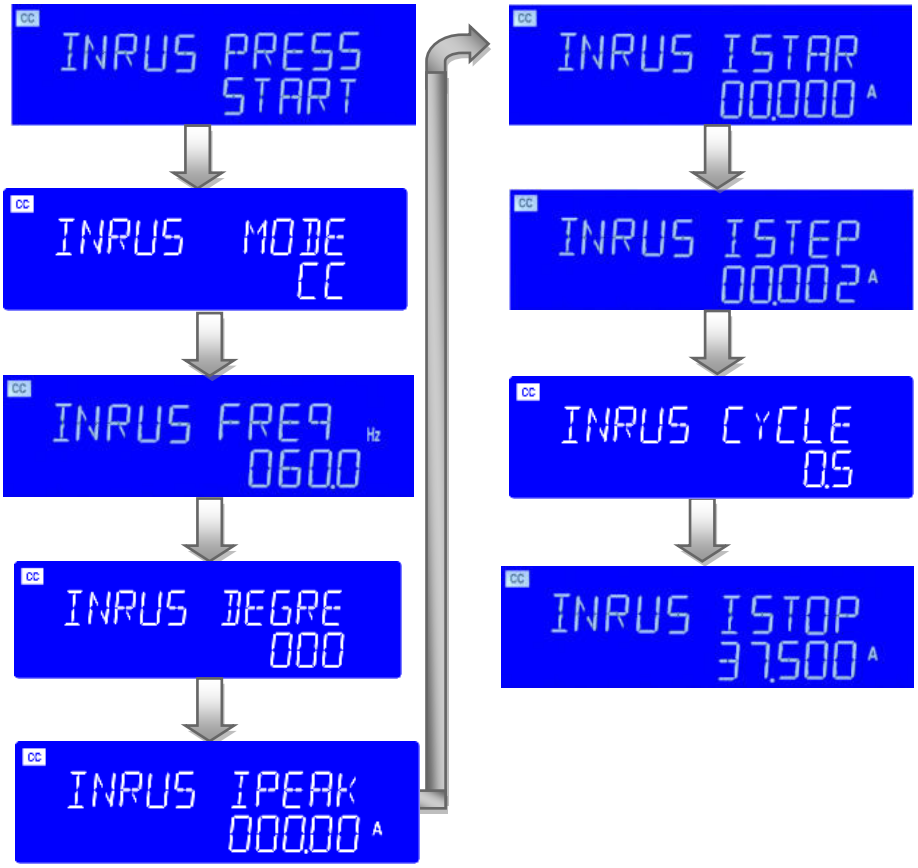


- TRANS CC : setting the Battery current point, the Left 5 digit monitor display the “TRANS” ,the right upper 5 digit monitor display the “CC”, and right lower monitor display setting value, the unit is "A". The range is 0.001A to the full scale of the CC mode specification.



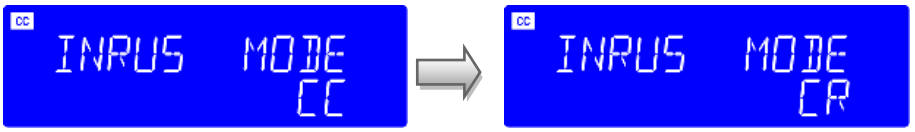

- The INRUS parameters setting:
  Pressing the Item key once will cause the button to illuminate. The message “INRUS PRESS START” will be shown across the displays.
  Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  When MODE is selected “CC”, its setting sequence is as follows:

  INRUS PRESS START →
  INRUS MODE →
  INRUS FREQ →
  INRUS DEGRE →
  INRUS IPEAK →
  INRUS ISTAR →
  INRUS ISTEP →
  INRUS CYCLE or INRUS TIME →
  INRUS ISTOP →

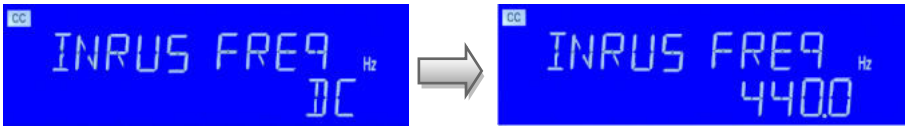



- INRUS MODE: Setting the INRUS MODE, the left 5-digit monitor display the

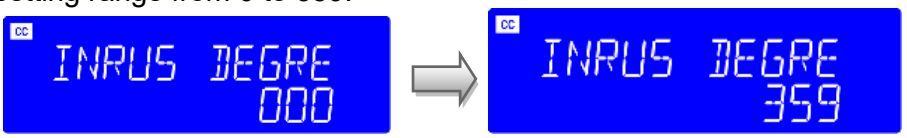
"INRUS", the right 5-digit monitor display the "MODE", and the lower 5-digit monitor display setting value, use the knob and button to set CC or CR.



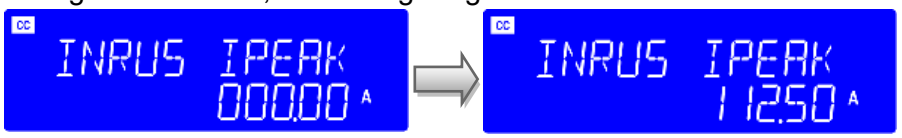

- INRUS FREQ: setting the INRUS FREQ, the Left 5 digit monitor display the “INRUS”, the right upper 5 digit monitor display the “FREQ”, and Right lower monitor display setting value, the unit is "Hz”, use the knob and button to set the Range from DC and 40~ 440Hz.



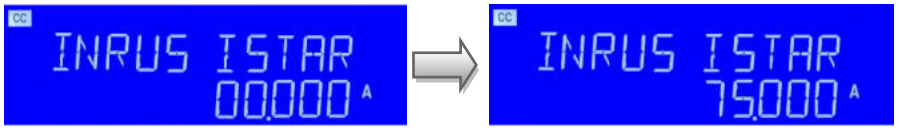

- INRUS DEGRE: Setting the INRUS DEGRE, the left 5-digit monitor display the "INRUS", the right 5-digit monitor display the "DEGRE", and the lower 5-digit monitor display setting value, use the knob and button to set the angle value, the setting range from 0 to 359.



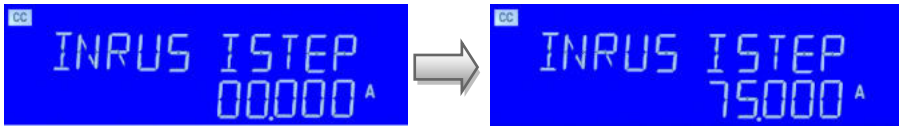

- INRUS IPEAK: setting the INRUS IPEAK, the left 5-digit monitor display the “INRUS”, the right 5-digit monitor display the “IPEAK”, and the lower 5-digit monitor display setting value, the unit is "A". Use the knob and button to set the starting current value, the setting range from 0.000 A to 112.50A.




- INRUS ISTAR : setting the INRUS ISTAR, the Left 5 digit monitor display the “INRUS” ,the right upper 5 digit monitor display the “ISTAR”, and right lower monitor display setting value, the unit is "A". Use the knob and button to set the starting current value, the setting range from 0.000 A to 75.000A.

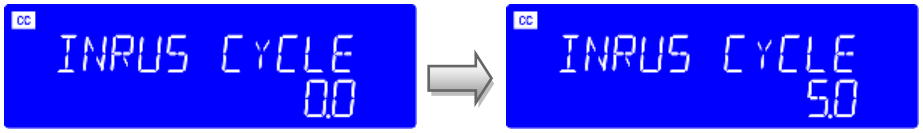



- INRUS ISTEP : setting the INRUS ISTEP, the Left 5 digit monitor display the “INRUS” ,the right upper 5 digit monitor display the “ISTEP”, and right lower monitor display setting value, the unit is "A". Use the knob and button to set the ISTEP current value, the setting range from 0.000 A to 75.000A.

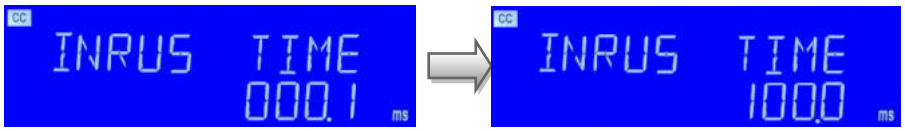



- At Frequency 40-440Hz (AC), setting the INRUS CYCLE, the left 5-digit monitor

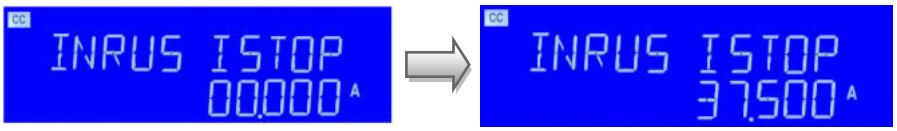
display the "INRUS", the right 5-digit monitor display the "CYCLE", and the lower 5-digit monitor display setting value, use the knob and button to set the range from 0 to 5.0.




- At Frequency 0 Hz (DC), set the INRUS TIME, the left 5-digit monitor display "INRUS", the right 5-digit monitor display "TIME", and the lower 5-digit monitor display setting value, the unit is "ms". Use the knob and button to set the time, the setting range from 0.1ms to 100.0ms.

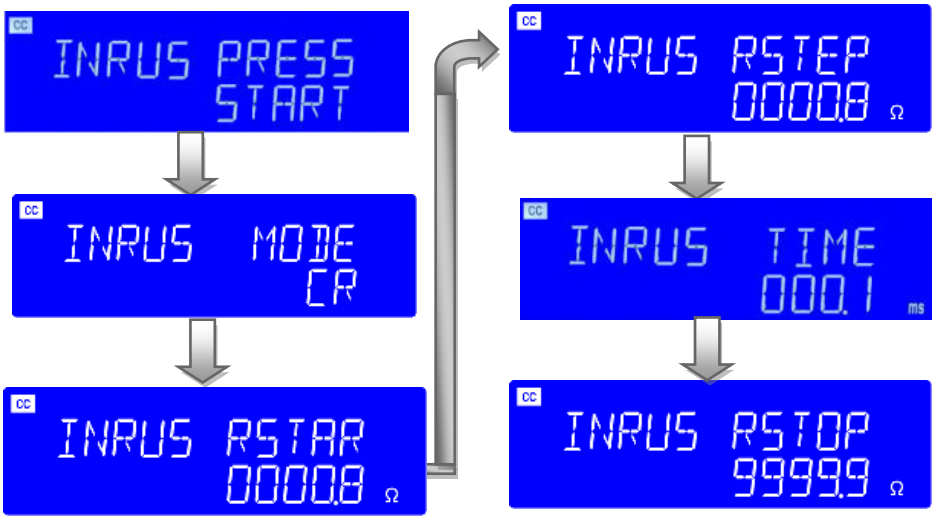



- INRUS ISTOP : setting the INRUS ISTOP, the Left 5 digit monitor display the “INRUS” ,the right upper 5 digit monitor display the “ISTOP”, and right lower monitor display setting value, the unit is "A". Use the knob and button to set the ISTOP current value, the setting range from 0.000 A to 37.500A.

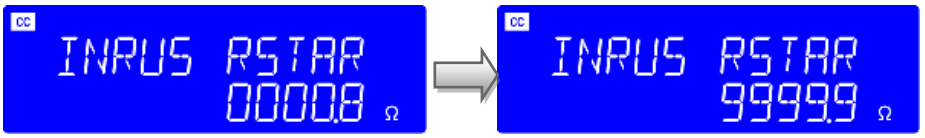



Press the Item key to enter the Item setting” INRUS PRESS START”, the LED indicator will illuminate. Next, press the setting key, the LED indicator will illuminate. Press EXIT key to leave the setting. When the MODE is selected “CR”, the setting sequence is as follows:

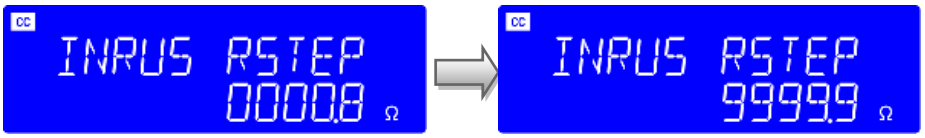
INRUS PRESS START →
INRUS MODE →
INRUS RSTAR →
INRUS RSTEP →
INRUS TIME →
INRUS RSTOP →



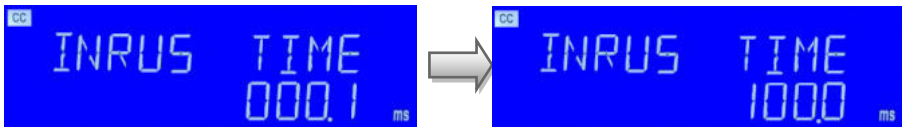
- INRUS RSTAR: Setting the INRUS RSTAR, the left 5-digit monitor display the "INRUS", the right 5-digit monitor display the "RSTAR", and the lower 5-digit monitor display setting value, the unit is "Ω". Use the knob and button to set the resistance value, range from 0.8Ω to 9999.9 Ω.




- INRUS RSTEP: Setting the INRUS RSTEP, the left 5-digit monitor display the "INRUS", the right 5-digit monitor display the "RSTEP", and the lower 5-digit monitor display setting value, the unit is "Ω". Use the knob and button to set the resistance value, range from 0.8Ω to 9999.9 Ω.

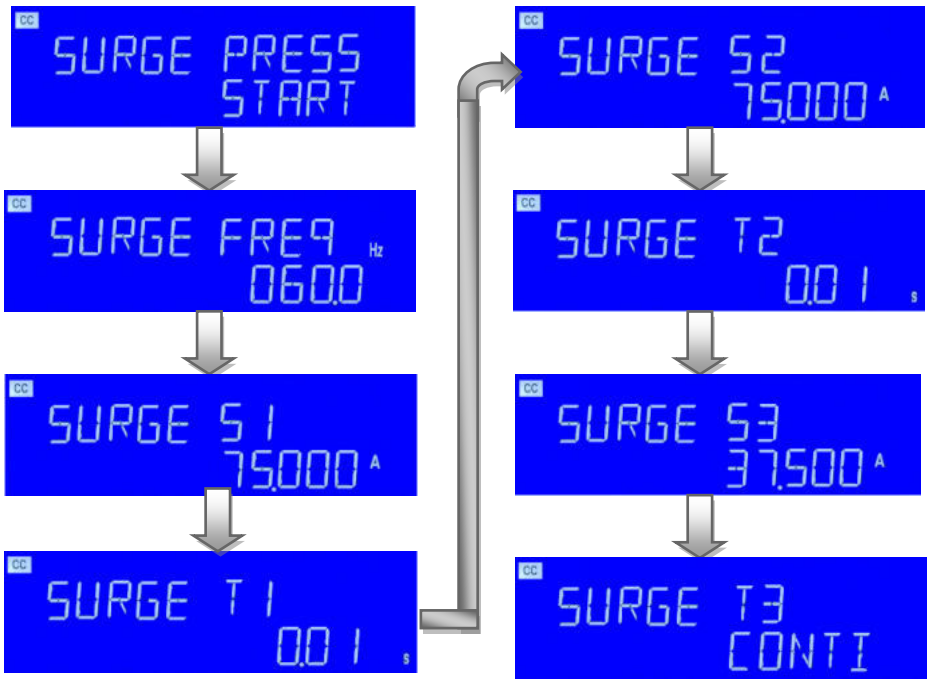



- INRUS TIME: setting the INRUS TIME, the Left 5 digit monitor display the “INRUS”, the right upper 5 digit monitor display the “TIME”, and right lower monitor display setting value, the unit is "ms". Use the knob and button to set the time, the setting range from 0.1ms to the 100.0ms.

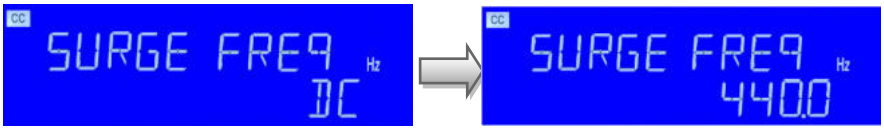



- The SURGE parameters setting:
  Pressing the Item key once will cause the button to illuminate. The message “SURGE PRESS START” will be shown across the displays.
  Each press of the setting button moves the menu on one step. The Left and right LCDs show the currently selected test parameter as text. The value is adjusted by The rotary knob and can be read from the Right display during Setting.
  The setting sequence is shown below:

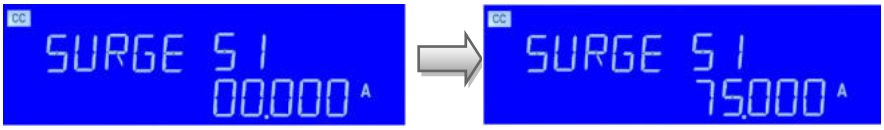
SURGE PRESS START →
SURGE FREQ →
SURGE S1 →
SURGE T1 →
SURGE S2 →
SURGE T2 →
SURGE S3 →
SURGE T3 →



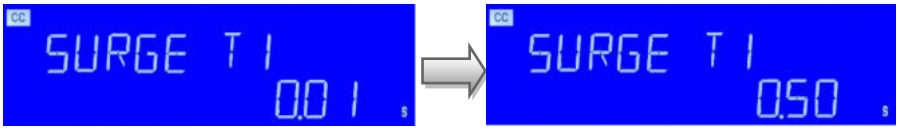

- SURGE FREQ: setting the SURGE FREQ, the Left 5 digit monitor display the “SURGE”, the right upper 5 digit monitor display the “FREQ”, and Right lower monitor display setting value, the unit is "Hz”, use the knob and button to set the Frequency value, the setting range from DC and 40~ 440Hz.



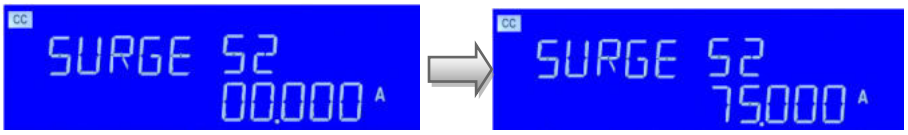

- SURGE S1 :setting the SURGE S1, the Left 5 digit monitor display the “SURGE” ,the right upper 5 digit monitor display the “S1”, and right lower monitor display setting value, the unit is "A”, use the knob and button to set the first surge current value, the setting range from 0.000A to the 75.000A.



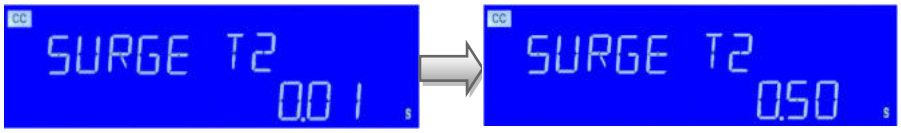

- SURGE T1: setting the SURGE T1, the Left 5 digit monitor display the “SURGE” ,the right upper 5 digit monitor display the “T1”, and right lower monitor display setting value, the unit is "S", use the knob and button to set the first surge current time value, the setting range from 0.01s to the 0.50s.



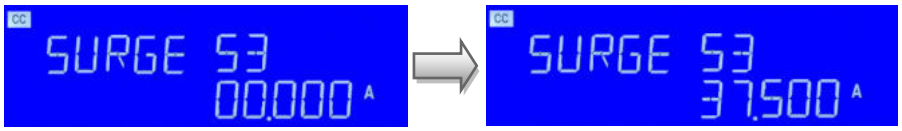
- SURGE S2 : setting the SURGE S2, the Left 5 digit monitor display the “SURGE” ,the right upper 5 digit monitor display the “S2”, and right lower monitor display setting value, the unit is "A”, use the knob and button to set the second surge current value, the setting range from 0.000A to the 75.000A.



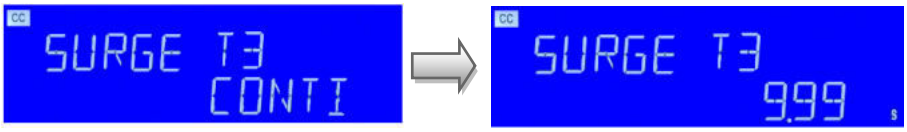

- SURGE T2 : setting the SURGE T2, the Left 5 digit monitor display the “SURGE” ,the right upper 5 digit monitor display the “T2”, and right lower monitor display setting value, the unit is "S", use the knob and button to set the second surge current time value, the setting range from 0.01s to the 0.50s.



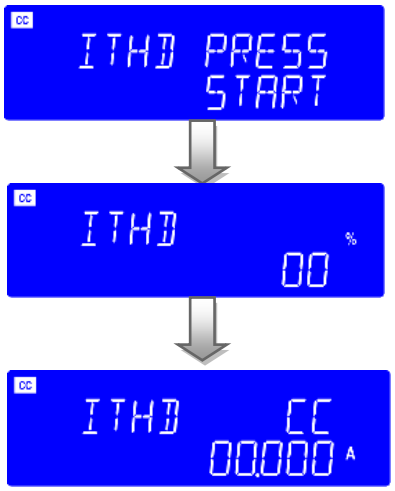

- SURGE S3 : setting the SURGE S3, the Left 5 digit monitor display the “SURGE” ,the right upper 5 digit monitor display the “S3”, and right lower monitor display setting value, the unit is "A", use the knob and button to set the Third surge current value, the setting range from 0.000A to the 37.500A.



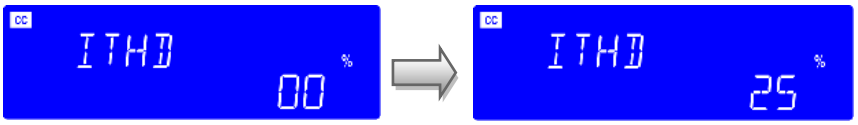

- SURGE T3 : setting the SURGE T3, the Left 5 digit monitor display the “SURGE” , the right upper 5 digit monitor display the “T3”, and right lower monitor display setting value, the unit is "S", use the knob and button to set the third surge current time value, the setting range from CONTI to the 9.99s.



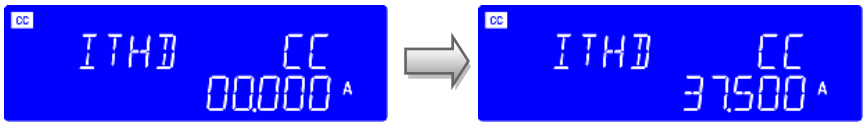
- Press the Item key to enter the setting mode "ITHD PRESS START", the LED indicator will illuminate. Next, press the setting key, the LED indicator will illuminate. Press EXIT key to leave the setting. The sequence is as follows:
  ITHD PRESS START →
  ITHD 00% →
  ITHD CC →




  - ITHD percentage: The Left 5 digit monitor display the "ITHD", the right 5 digit monitor display the "%", and right lower monitor display setting value, adjusted by the rotary knob and arrow key. The setting range is from 00% to 25%



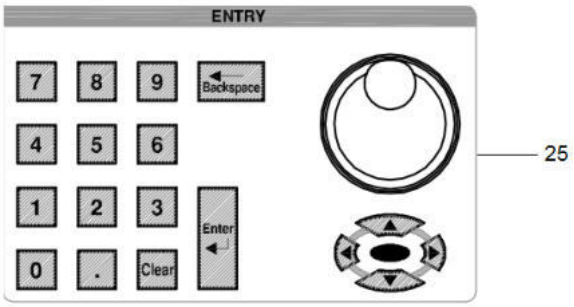

  - ITHD CC Mode: The Left 5 digit monitor display the "ITHD", the right 5 digit monitor display the "CC", and the lower monitor display setting value, adjusted by the rotary knob and arrow key. The setting range is from 00.000A to 37.500A.



3.3.24. 

key

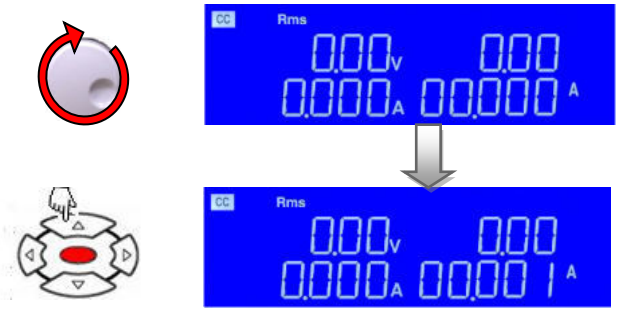
The red START/STOP key is used in conjunction with the SHORT, OCP, OPP, Non-L, NL+CR, FUSE, BATT, TRANS test functions. It is used to START a test according to the set parameters or to STOP a test before PASS or FAIL is signaled. Please refer to the preceding sections for more information on the SHORT, OCP, OPP, Non-L, NL+CR, FUSE, BATT, TRANS INRUS, SURGE tests.



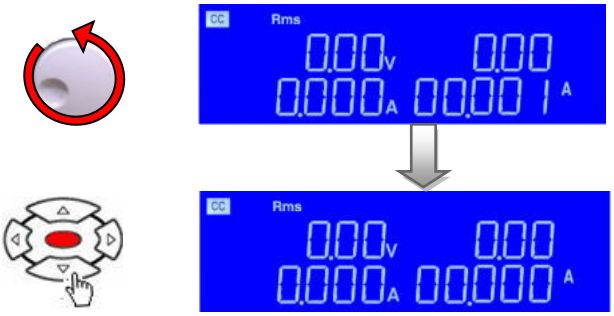

3.3.25. ROTARY Knob and ARROW Keys

The ROTARY knob and ARROW keys are used to increase or decrease the set values.

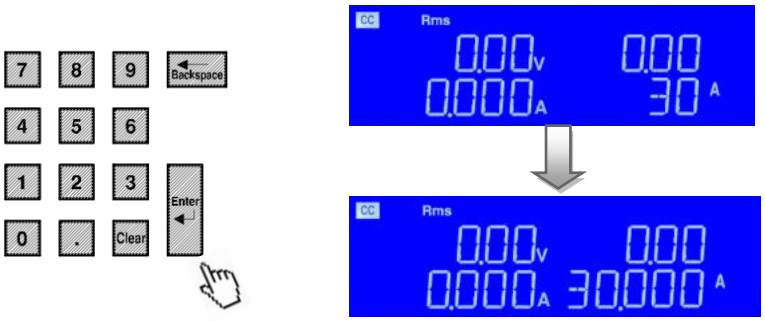
- Clockwise the rotary switch and UP arrow key to increase the setting values.



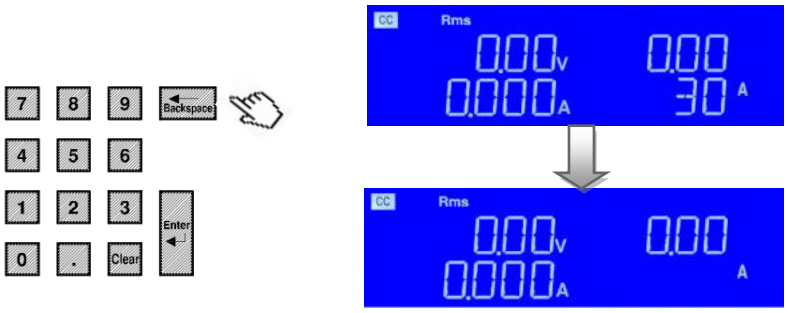

- Anti-clockwise the rotary switch and DOWN arrow key to decrease the setting values..



- Keypad KEY：When using the Keypad, please enter the number, press the Enter key.




- Backspace KEY:Setting, press the Clear key to clear the input value.




Note: In CR mode, increase setting value define for current value, so clockwise the Rotary switch and press UP key will decrease the resistance value to increase The current value. anti-clockwise the rotary switch and press DOWN key will increase the resistance value to decrease the current value.

3.3.26. DC INPUT Terminal.

When Load Input Connector is used, be sure that the rated specification of the Voltage and current of the ELP/ACP Series AC/DC Electronic Load shall not be Exceeded.

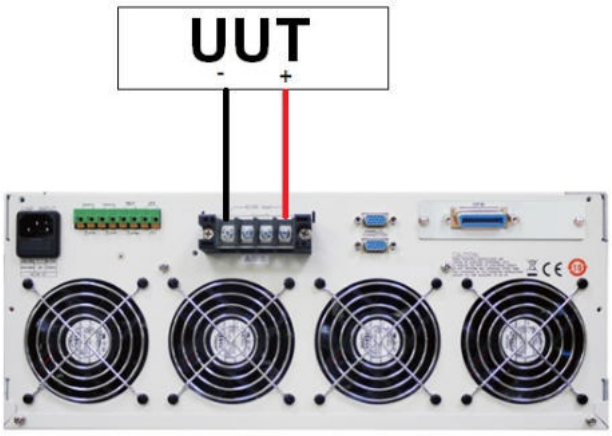



Fig 3-3 typical connection of ELP/ACP series load module

3.3.27. V-sense input terminal

In order to solve the voltage drop of the conductor under the condition of big load Current, Vsense-CLIP cable can be used to connect with the specific point to be Measured thus obtaining the specific voltage value.

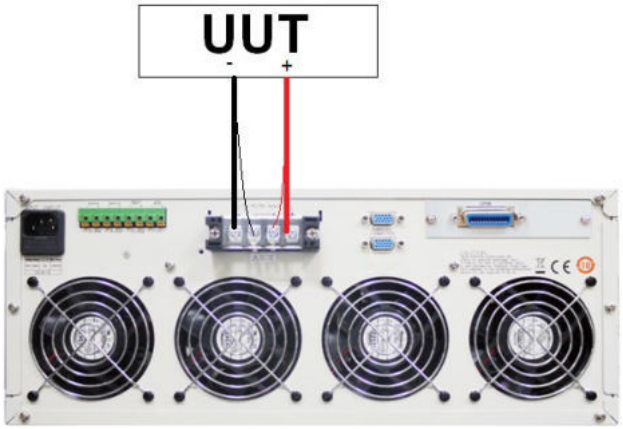



Fig 3-4 typical connection of ELP/ACP series load module

3.3.28. I-monitor (CT isolated)

The I-monitor is provided as a socket. It is designed to enable the user to Monitor the Electronic Load's input current or short current. The I-monitor's signal Is 0V to 10V. This signal is proportional to the full scale current that the particular Electronic Load is capable of.

For example. ELP/ACP 3750: Imax = 37.5A therefore I-monitor 10V = 37.5A so 1V = 3.75A

Please refer to the specification Fig 1-1 to Fig1-5 for the maximum current that each ELP/ACP series Load is capable of.

3.3.29. V-monitor (IC isolated)

V-monitor output signal is mainly designed connection to the oscilloscope, observe UUT Voltage waveform, The V-monitor's signal is 0V to 10V. Please refer to Table 1-1, this signal is Proportional to the full scale current that the particular electronic Load.

3.3.30. Analog programming input

The Electronic Load has an analog programming input on the rear panel of the mainframe. The analogue programming input enables the load module to track and load according to an external 0-10V signal.

The analog programming input is configured as a terminal on the mainframe's rear panel.

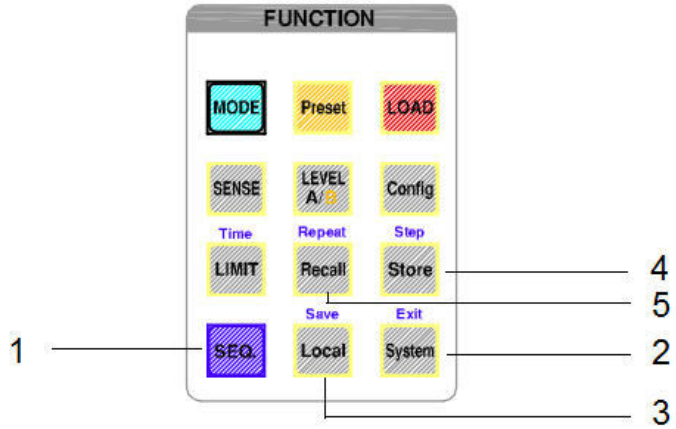
The ELP/ACP series Load will attempt to load proportionally according to the signal and the load module's maximum current or power range. For example: ELP/ACP 3750: Imax = 37.5A and Pmax =3750W
So in CC mode if analogue programming input is 5V = 18.75A load setting
Or in CP mode if analogue programming input is 1V = 37.5W load setting

In the Constant Current mode, 0V to 10V analog input signal can be set to 0A to full scale of the load current to ELP/ACP 3750 350V / 37.5A / 3750W electronic load , 10V analog input signal can produce 37.5A load current.

In the Constant power mode, 0V to 10V analog input signal can be set to 0W to full scale of the load power to ELP/ACP 3750  350V / 37.5A / 3750W electronic load, 10V analog input signal can produce 3750W load Power.
Note: The above operation must be LOAD ON

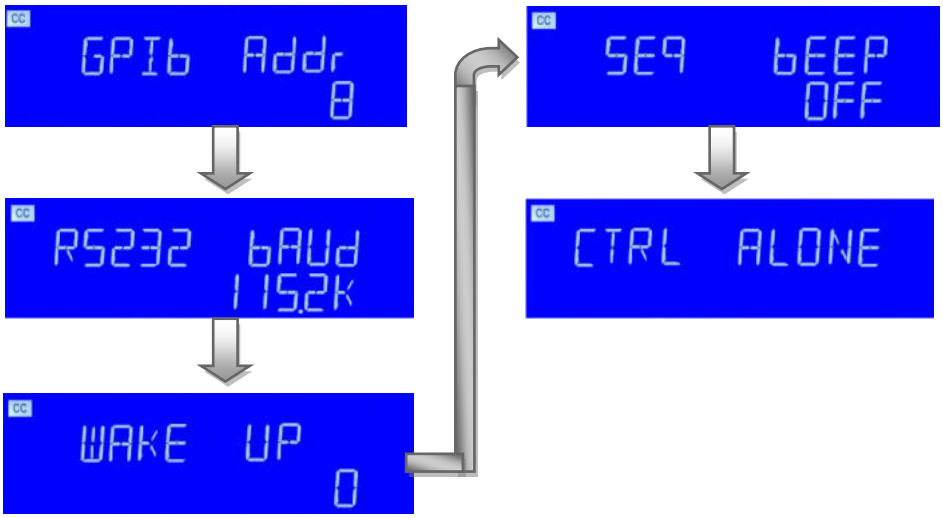
## 3-4. ELP/ACP Series Operating Instructions (1)

ELP/ACP series of LCD displays status, details are as follows:




KEYPAD KEY: AUTO SEQUENCE edits the settings, test and RECALL / STORE key.

3.4.1. SYSTEM:Press SYSTEM to set the argument ,GPIB address,RS232 BAUD- RATE, WAKE UP and buzzer Alarm power ON/OFF and Master/Slave control.




3.4.2. Press LOCAL to exit REMOTE mode.

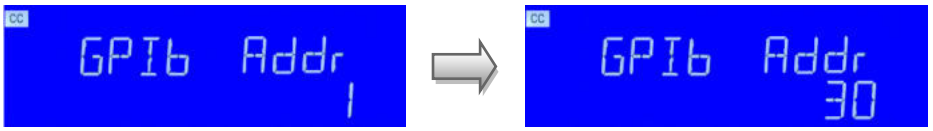
3.4.3. Recall / Store：Recall / Store LOAD state settings.

## 3-5. ELP/ACP Series System Operating Instructions (3)

### 3.5.1. Setting system parameters

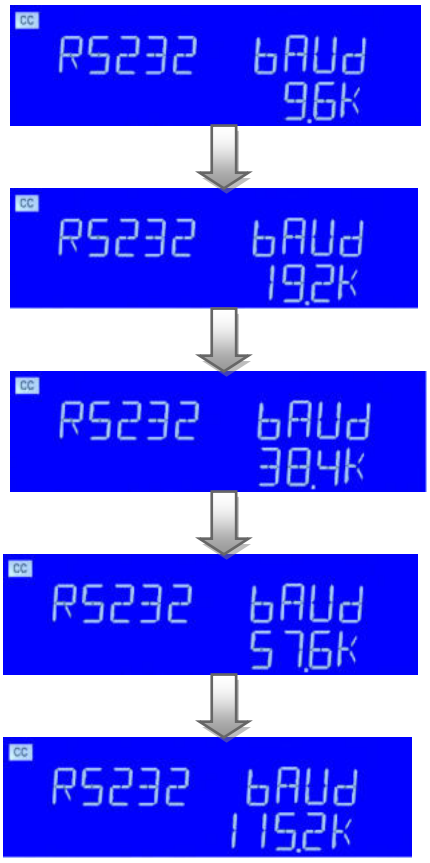
Set GPIB address, RS232 BAUD RATE, WAKE UP, Buzzer ON/OFF and Master/Slave Control.

3.5.1.1. Set GPIB address：First Press SYSTEM key, the Left 5 digit monitor display the “GPIb”, the right upper 5 digit monitor display "Addr", the right lower 5 digit monitor display setting GPIB address of the representative, Press UP, DOWN buttons to adjust the GPIB address 1~30, Key and then press ENTER, ELP/ACP series GPIB Address value is saved, Press system key four times to leave the GPIB address configuration State.




3.5.1.2. Set RS232 BAUD RATE：

SYSTEM key first by the second, the Left 5 digit monitor display the “RS232”, the right upper 5 digit monitor display the ”baud” and right lower monitor display setting BAUD-RATE value, Press UP, DOWN buttons to adjust the value of BAUD RATE, Key and then press ENTER, ELP/ACP series is saved setting BAUD RATE, press system key three times to leave the BAUD-RATE setting state.

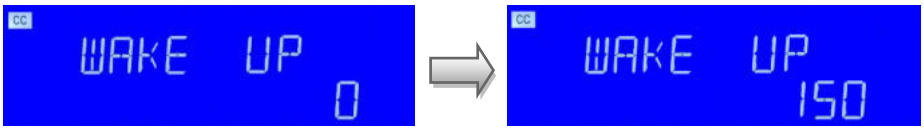


3.5.1.3. WAKE-UP function:

This function is designed for auto setting the load status and load level in turning on The ELP/ACP series every time. SYSTEM key first by the three.

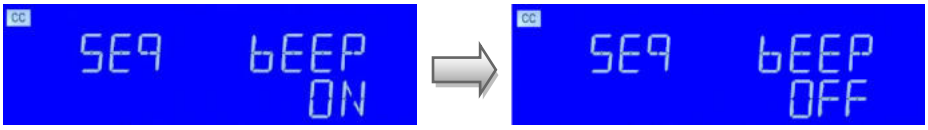
The Left 5 digit monitor display the “WAKE”, the right upper 5 digit monitor display the ”UP”, and right lower monitor display setting value, Press UP, DOWN buttons to adjust the 0~150.

Press ENTER key to be stored, press system key two times to leave the WAKE-UP setting state, If set to "0" means do not call.




3.5.1.4. Beeperr ON / OFF setting :

This is audio indicated the test result for automatically sequency (AUTO SEQUENCE)test function. When the test result is PASS that beeper will make a sound.When the test result is FAIL that beeper will make 2 sounds.
Setting method :
Press SYSTEM key 4 times, it will display following screen and then press UP or DOWN key to select bEEP ON or bEEP OFF.




Note:setting system parameters, if the input is required to use the KEYPAD ENTER button to confirm, otherwise ELP/ACP series will not save the changes the settings.

Note:Pass: Automatic test mode, no NG state, is the PASS.
Fail: Automatic test mode, any test if the NG then is the FAIL.

3.5.1.5. ELP/ACP Series Master/Slave Instructions

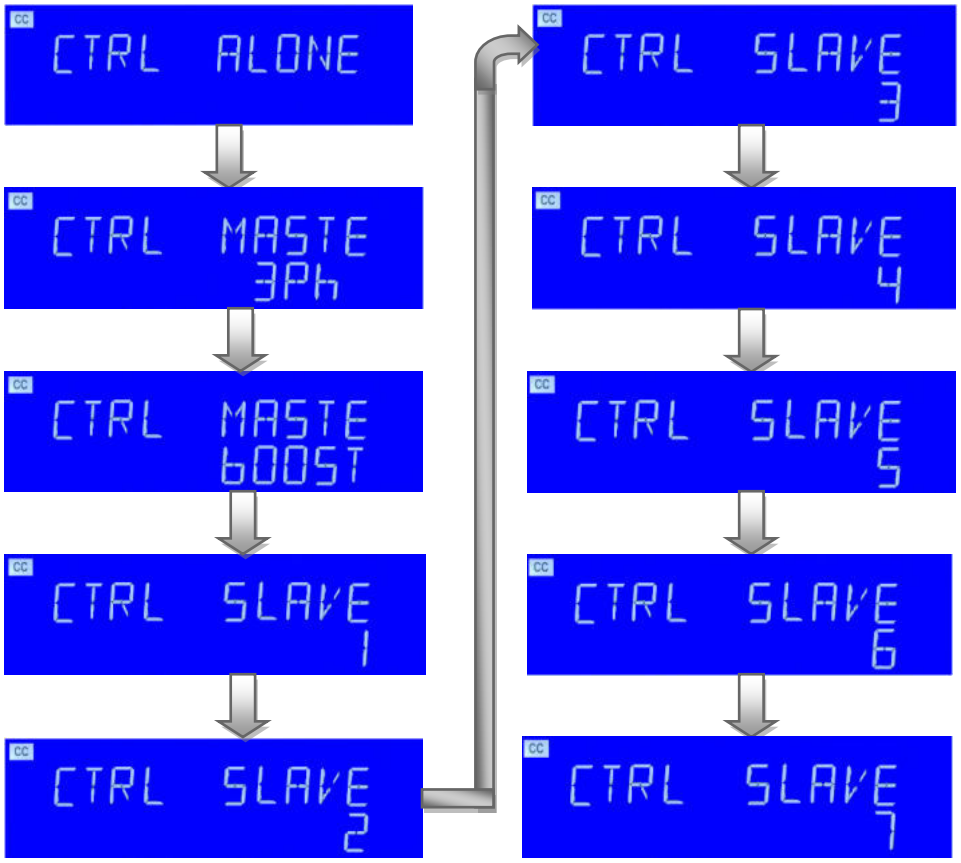
ELP/ACP Series “MASTER / SLAVE “Parallel function, 1 Master, 7 SLAVE, Setting Method Press the System key to set the CONTROL MODE to select ALONE, MASTER or SLAVE1 ~ 7, Press the ENTER key to set, when Power off Data will Not be lost, this parameter is saved.Master will automatically detect whether there Is Slave machine, if there is no Slave Machine will run “ALONE Mode”, if the Slave Machine will run “MASTER Mode”.

Master machine measuring current and power meter is to show the total current and Total power (Master + Slave), the voltage meter is displayed by the Master Machine, The Slave machine voltage meter position will display "SL1" ~ "SL7”.

Note:
1. Master/Slave operation in parallel cannot be performed on different models.
2. When Master / Slave is operated in parallel, the left and right keys are invalid.
3. Master/Slave operation in parallel, When Limit is set OPL or OCL functions, Slave will not display the setting value.

CTRL ALONE →

CTRL MASTE 3PH →
CTRL MASTE bOOST →
CTRL SLAVE 1 →
CTRL SLAVE 2 →
CTRL SLAVE 3 →
CTRL SLAVE 4 →
CTRL SLAVE 5 →
CTRL SLAVE 6 →
CTRL SLAVE 7 →




3.5.1.6. Master / Slave has 2 operating modes

1. 3PH mode is for 3 phase application, three ELP/ACP series can be connected for Three phase Δ or Y connection, the setting current value (single-phase current Value) will be sent to each Slave unit automatically, the user does not have to set Each unit.

2. Boost mode is for master / slave parallel application, the setting current will be actively shared to each load, Master ammeter will show the total current that is the sum of all ammeters, Slave voltmeter will show SL1 ~ SL2, the others are unchanged.

3.5.1.7. The following procedure should be followed before applying power on

Master/Slave mains:
Step1. Turn on (O) the Slave POWER switch.
Step2. Turn on (O) the Master POWER switch.

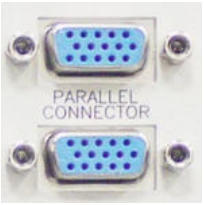
3.5.1.8. The following procedure should be followed before applying power off

Master/Slave mains:
Step1. Turn off (I) the Master POWER switch.
Step2. Turn off (I) the Slave POWER switch.

3.5.1.9. Parallel method:

Use HD-DSUB 15pin 1:1 Cable to connect the MASTER and SLAVE Rear Panel, HD-DSUB 15pin connector (connect the upper and lower Connectors),

**Caution:** Do not use VGA Cable, because of internal pin4 ~ 8, 11 and Chassis short circuit.




3.5.1.10. Master 3ph Manual operation：

(ELP/ACP MASTER 3ph/SLAVE model the following is example)
PRESET setting： CC/LIN/CR/CV/CP Mode as Figure, CC setting 30A=Master 30A + Slave 1 30A+ Slave 2 30A, LIN setting 30A=Master 30A + Slave 1 30A+ Slave 2 30A, CR: 3.666Ω=Master=Slave 1=3.666Ω=Slave2=3.666Ω, CP: 3300W=Master 3300W = Slave 1 3300W=Slave 2 3300W, CV: 100V=Master 110V= Slave 1=110V =Slave 2=110V.

Master 3ph Display


Slave1 Display


Slave2 Display


Figure CC Set 30A

Master 3ph Display


Slave1 Display


Slave2 Display


Figure LIN Set 30A

Master 3ph Display

Figure CR Set 3.6666Ω

Master 3ph Display


Slave1 Display


Slave2 Display


Figure CP Set 3300W

Master 3ph Display


Slave1 Display


Slave2 Display


Figure CV Set 110V

3.5.1.11. Master boost Manual operation：

(ELP/ACP MASTER boost/SLAVE model the following is example)
PRESET Setting: CC/LIN/CR/CV/CP Mode as Figure, CC setting 30A=Master 30A + Slave 1 10A+ Slave 2 10A, LIN setting 30A=Master 30A + Slave 1 10A+ Slave 2 10A, CR: 800Ω=Master//Slave1//Slave2=800Ω//2400Ω//2400，CP:9900W=Master 9900W+Slave 1 3300W + Slave 2 3300W.

Master boost Display


Slave1 Display


Slave2 Display


Figure CC Set 30A

Master boost Display


Slave1 Display


Slave2 Display


Figure LIN Set 30A

Master boost Display


Slave 1 Display


Slave 2 Display


Figure CR Set 2400Ω

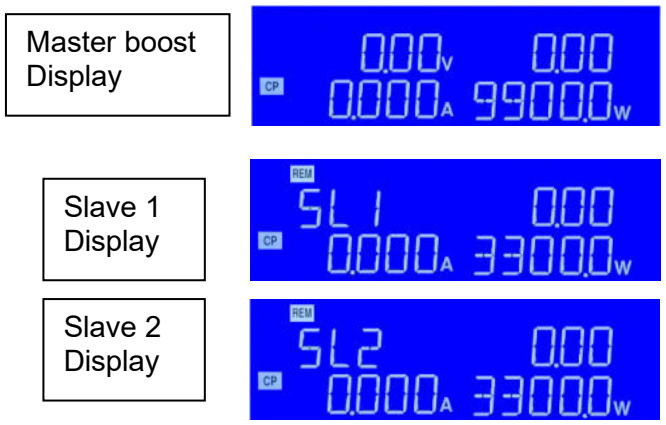



Figure CP Set 9900W

3.5.1.12. Master Mode operation except CC /LIN / CR / CV / CP MODE, The following functions will be disable.

- Recall/Store Disable.
- ALL test item functions disable.( That will be enable When master mode setting to 3PH)
- EXTIN Disable

3.5.1.13. REMOTE operating: Master Mode can use the command as follows

| SETTING PRESET NUMERIC COMMAND | REMARK |
|---|---|
| MODE {SP} {CC\|LIN\|CR\|CV\|CP} {;NL} | |
| OCL{SP} {NR2} {;\| NL} | |
| OPL{SP} {NR2} {;\| NL} | |
| SENS {SP} {ON\|OFF\|1\|0} {;\|NL} | 0:OFF, 1:ON |
| ON:ANG{SP} {NR2} {;\| NL} | 0~359 |
| OFF:ANG{SP} {NR2} {;\| NL} | 0~359 |
| CC\|CURR:{A\|B} {SP} {NR2}{;\| NL} | |
| LIN:{A\|B} {SP} {NR2}{;\| NL} | |
| CR\|RES:{A\|B} {SP} {NR2}{;\| NL} | |
| CV \| VOLT: {A\|B}{SP}{NR2}{;\|NL} | |
| CVI: {A\|B}{SP}{NR2}{;\|NL} | |
| CP:{A\|B} {SP} {NR2}{;\| NL} | |
| MODE {SP} {CC\|LIN\|CR\|CP} {;\|NL} | |
| LEV {SP} { A\|B\|0\|1} {;\|NL} | |
| FREQ {SP} {AUTO\|NR2} {;\|NL} | 0, 40 ~440Hz |
| PF {SP} {NR2} {;\|NL} | |
| CF {SP} {NR2} {;\|NL} | 1.4~5.0 ;<br>1.3(TRAIL),1.2(LEAD)<br>1.1(LDNEG), 1.0(LDPOS) |
| LOAD {SP}{ON\|OFF\|1\|0} {;\|NL} | |
| MEAS:CURR {?}{;\| NL} | |
| MEAS:VOLT {?}{;\| NL} | |
| MEAS:POW {?}{;\| NL} | |
| MEAS:VA {?}{;\| NL} | |

| | |
|---|---|
| MEAS: VAR {?}{;\| NL} | |
| MEAS: PF {?}{;\| NL} | |
| MEAS:CF {?}{;\| NL} | |
| MEAS:FREQ {?}{;\| NL} | |
| MEAS:V_THD {?}{;\| NL} | |
| MEAS:I_THD {?}{;\| NL} | |
| MEAS:V_HARM {?}{;\| NL} | |
| MEAS:I_HARM {?}{;\| NL} | |
| HARM {SP} {NR1} {;\| NL} | 1~50;select Harmonic step |
| SYNC {SP}{ON\| OFF} {;\| NL} | |
| MEAS:TYPE{SP} {RMS\|PEAK\|MAX\|MIN} {;\| NL} | |
| REMOTE {;\| NL} | RS232/USB/LAN command |
| LOCAL{;\| NL} | RS232/USB/LAN command |

Table 3-1

3.5.1.14. 3PH Mode use the command:In addition 3PH Mode can use the "GLOB:" command in Table 3-3.

| AUTO SEQUENCE Set the command | NOTE | RETURN |
|---|---|---|
| FILE {SP} {n}{;\| NL} | n=1~9 | 1~9 |
| STEP {SP} {n} {;\| NL} | n=1~32 | 1~32 |
| TOTSTEP {SP} {n}{;\| NL} | Total step n=1~32 | 1~32 |
| SB {SP} {n} {;\| NL} | LOAD State n=1~150 | 1~150 |
| TIME {SP} {NR2} {;\| NL} | 100~9999(ms) | 100~9999(msec) |
| SAVE {;\| NL} | Save “File n” data | |
| REPEAT {SP} {n} {;\| NL} | n=0~9999 | 0~9999 |
| RUN {SP} {F} {n} {;\| NL} | n=1~9 | AUTO REPLY<br>“PASS” or “FAIL:XX”<br>(XX=NG STEP) |
| BEEP{SP}{ON\| OFF}{;\| NL} | SET BUZZER ON/OFF | |

Table 3-2 AUTO SEQUENCE 3PH MODE can not be used command

| COMMAND | RETURN |
|---|---|
| | Master,Slave1,Slave2, |
| GLOB: MEAS: CURR {?}{;\| NL} | ###.###,###.###,###.###, |
| GLOB: MEAS: VOLT {?}{;\| NL} | ###.##,###.##,###.##, |
| GLOB: MEAS: POW {?}{;\| NL} | ####.#,####.#,####.#, |
| GLOB: MEAS: VAR {?}{;\| NL} | ####.#,####.#,####.#, |
| GLOB: MEAS: VA {?}{;\| NL} | ###.####,###.####,###.####, |
| GLOB: MEAS: V_THD {?}{;\| NL} | ###.##,###.##,###.##, |
| GLOB: MEAS: I_THD {?}{;\| NL} | ###.##,###.##,###.##, |
| GLOB: MEAS: V_HARM {?}{;\| NL} | ###.##,###.##,###.##, |
| GLOB: MEAS: I_HARM {?}{;\| NL} | ###.###,###.###,###.###, |
| GLOB: MEAS: PF {?}{;\| NL} | ###.##,###.##,###.##, |
| GLOB: MEAS: CF {?}{;\| NL} | ####.#,####.#,####.#, |
| GLOB: MEAS: FREQ {?}{;\| NL} | ####.#,####.#,####.#, |

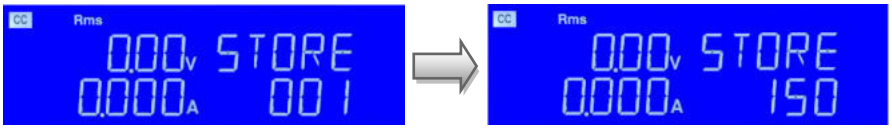
Table 3-3 3PH MODE GLOB command

3.5.2. The function keys on the front panel of ELP/ACP series mainframe are designed for high Testing throughput purpose. There are 150 operation states or testing steps can be Store in the EEPROM memory of ELP/ACP series electronic load Respectively, each State can store or recall the load status and level for Electronic load simultaneously.

| | ELP/ACP Series |
|---|---|
| STATE | 150 |

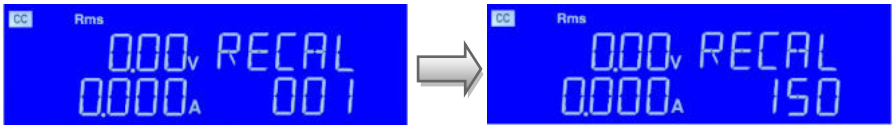
3.5.2.1. Store process:

- Set the load status and load level.
- Press the STORE key to enter the storage state.
- Press UP, DOWN key or KEYPAD to adjust, press the ENTER OK to Save the STATE.



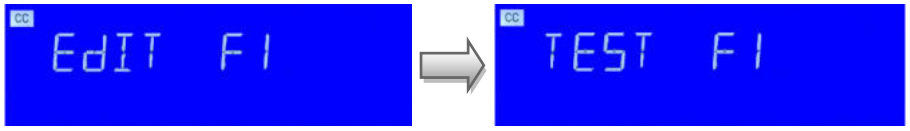

3.5.2.2. Recall operation:

- Press RECALL to enter the call state.
- Press UP, DOWN key or KEYPAD to adjust.
- Finally, Press the ENTER key to confirm, In the electronic load front
- Panel, set the value that would call out the information in accordance With re-Setting.



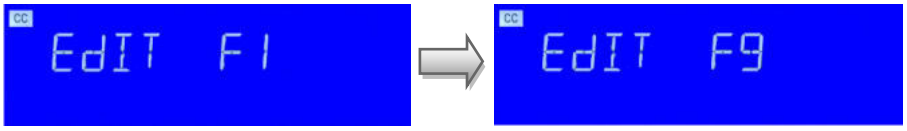

3.5.3. SEQ Instructions

Press SEQ key to enter SEQ setting mode, LED indicator ON, the setting sequence is as follows: Use UP and DOWN keys to set EDIT F1 or TEST F1 mode, if you want to Leave SYSTEM (Exit)

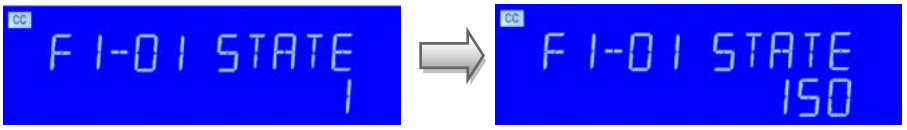



3.5.3.1. EDIT MODE

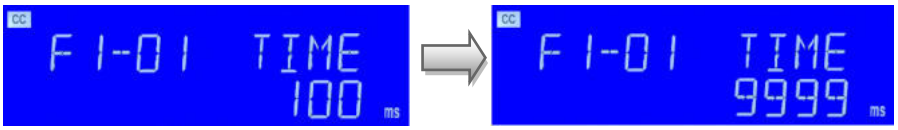
- Press the SEQ. key to enter the AUTO SEQUENCE Mode，Press UP, DOWN key to select EDIT, the LCD display shows “EDIT” on left 5 Digit LCD display, the right 5 digit LCD display “FX”, “FX” means to select the State F1-F9,Press keypad key 1 ~ 9 choose F1 ~ F9.



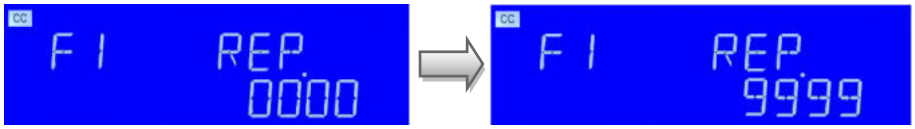
- Press ENTER key, the LCD display shows “FX-XX” on left 5 digit LCD display, Middle 5 digit LCD display ”STATE” , right 5 digit LCD display setting 1~150, “FX” means to select the state F1-F9. “XX” means the test STEP01-16,setting State value,press UP and down Key or keypad to adjust setting.




- Test time setting:
  Press ENTER to set TIME value, press UP, DOWN keys or KEYPAD to adjust Settings, range from 100 ms~9999ms.
  Press SAVE key to finish editing the action is set to REPEAT if you do not save The settings, press the EXIT key to leave edit mode.




- Setting REPEAT(REPEAT TEST) ,Press UP and DOWN key or Keypad to Adjust setting 0~9999, Press SAVE REPEAT Value, or press EXIT key Exit EDIT MODE.



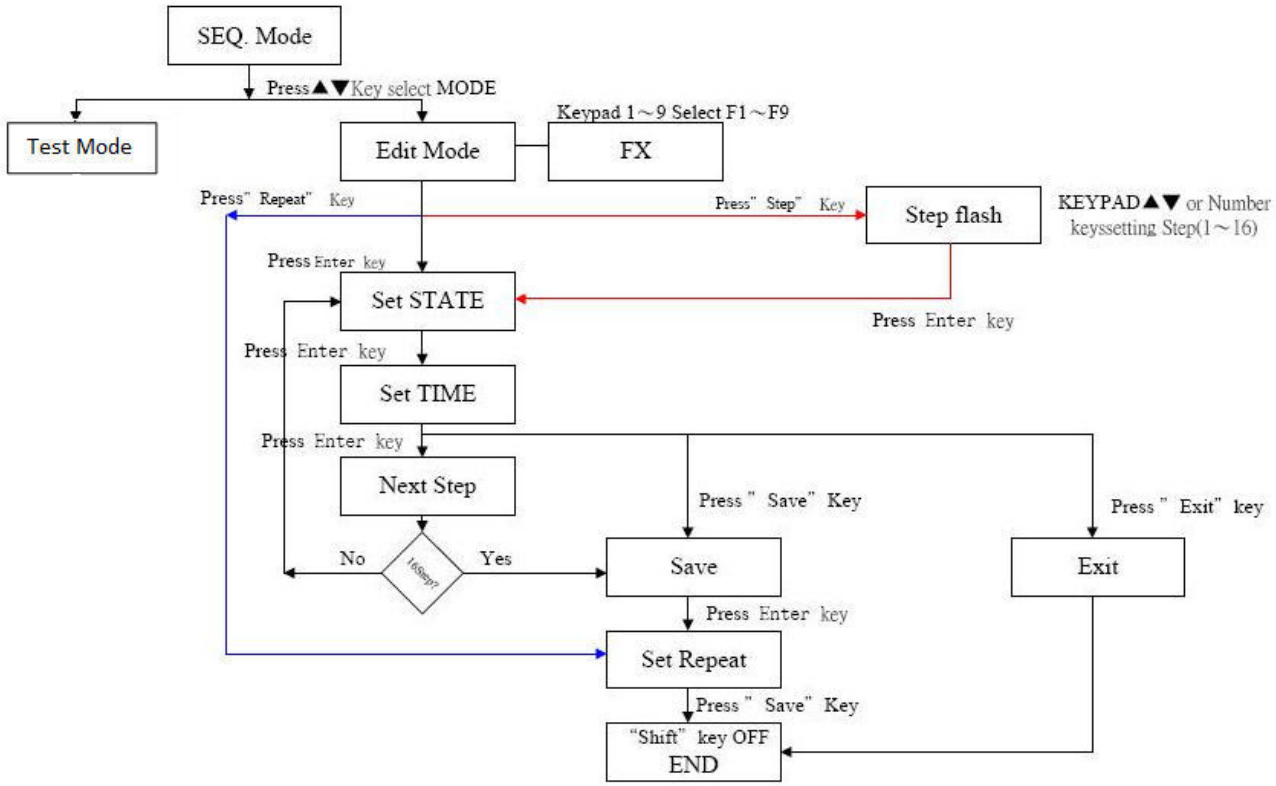
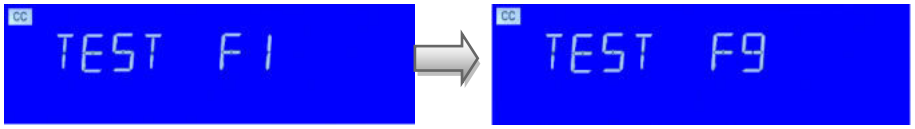




Fig 3-5 STORE (EDIT) MODE OPERATIONO FLOW-CHART

3.5.3.2. TEST MODE

Press the SEQ. key simultaneously to enter the AUTO SEQUENCE Mode, and press UP or DOWN key to TEST function, To use the key pad to setting 1~9 for F1 to F9 and press ENTER key to execute the automatic test mode.

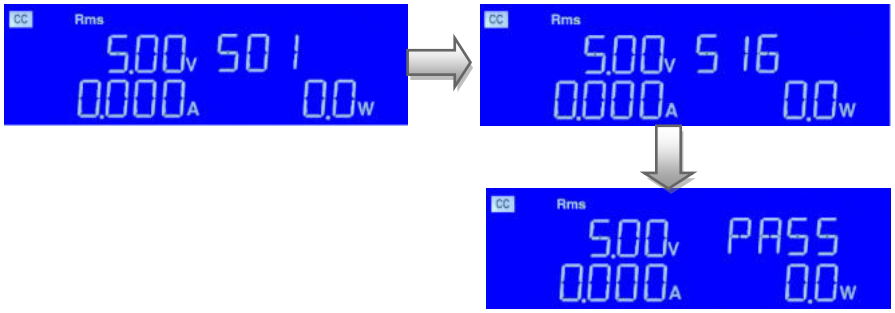



To execute the automatically test mode the LCD display will display "SXX", S means step and XX means step no(step 1~16) to indicated which step no under the testing, if the test Result is NG; the LCD display will show "NG" (flashing) and suspension of the test until user press ENTER key to continue test or press EXIT key to leave the test mode, the automatically test mode will be finish when test to the end of step or press EXIT key to leave the test mode.

If all the test steps are OK, the test result is PASS, LCD display will show "PASS"; if any one step is NG, the test result will be FAIL; LCD display will show "FAIL", If the beeper ON/OFF is set to ON, when the test result is PASS the beeper will beep one sound, if the test result is FAIL, the beeper will beep 2 sounds.

When the test is finished, user can press the ENTER key again to test or press EXIT key to leave the test mode.

Example 1: The test step setting to 16 step, press the TEST key, the execute result is PASS, the LCD display shown PASS.



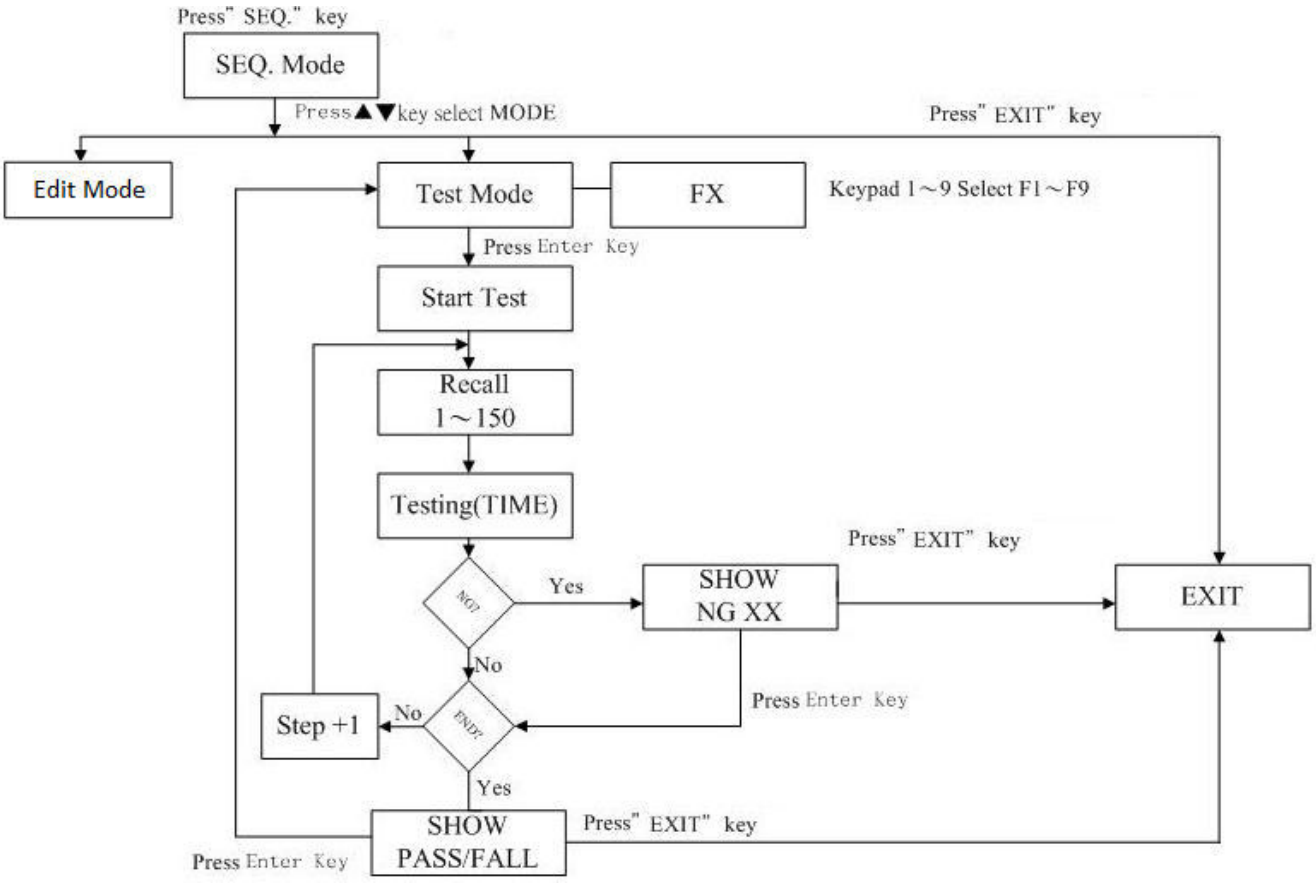



Fig 3-6 TEST MODE OPERATION FLOW-CHA

## 3-6. Initial setting of ELP/ACP series load

The following tables detail the initial settings of the ELP/ACP series of Load when Shipped from the factory.

| Item | Initial value | Item | | Initial value |
|---|---|---|---|---|
| CC A+Preset | 0.000A | LIMIT | V_Hi | 600.00V |
| CC B+Preset | 0.000A | | V_Lo | 0.00V |
| LIN A+Preset | 0.000A | | I_Hi | 40.000A |
| LIN B+Preset | 0.000A | | I_Lo | 0.000A |
| CR A+Preset | 32000Ω | | W_Hi | 4000.0W |
| CR B+Preset | 32000Ω | | W_Lo | 0.0W |
| CP A+Preset | 0.0W | | VA_Hi | 4000.0VA |
| CP B+Preset | 0.0W | | VA_Lo | 0.0VA |
| CV A+Preset | 500.00V | | OPL | 3937.5W |
| CV B+Preset | 500.00V | | OCL | 39.375A |
| | | CONFIG | EXTIN | OFF |
| | | | SYNC | OFF |
| | | | LDON | 0 |
| | | | LDOFF | 0 |
| | | | BW | 13 |
| | | | AVG | 1 |
| | | | CPRSP | 0 |
| | | | CYCLE | 1 |

Table 3-4 ELP/ACP 3750 initialize

| Item | Initial value | Item | | Initial value |
|---|---|---|---|---|
| CC A+Preset | 0.000A | LIMIT | V_Hi | 600.00V |
| CC B+Preset | 0.000A | | V_Lo | 0.00V |
| LIN A+Preset | 0.000A | | I_Hi | 30.000A |
| LIN B+Preset | 0.000A | | I_Lo | 0.000A |
| CR A+Preset | 42666Ω | | W_Hi | 3000.0W |
| CR B+Preset | 42666Ω | | W_Lo | 0.0W |
| CP A+Preset | 0.0W | | VA_Hi | 3000.0VA |
| CP B+Preset | 0.0W | | VA_Lo | 0.0VA |
| CV A+Preset | 500.00V | | OPL | 2940.0W |
| CV B+Preset | 500.00V | | OCL | 29.400A |
| | | CONFIG | EXTIN | OFF |
| | | | SYNC | OFF |
| | | | LDON | 0 |
| | | | LDOFF | 0 |
| | | | BW | 13 |
| | | | AVG | 1 |
| | | | CPRSP | 0 |
| | | | CYCLE | 1 |

Table 3-5 ELP/ACP 2800 initialize

| Item | Initial value | Item | | Initial value |
|---|---|---|---|---|
| CC A+Preset | 0.000A | LIMIT | V_Hi | 600.00V |
| CC B+Preset | 0.000A | | V_Lo | 0.00V |
| LIN A+Preset | 0.000A | | I_Hi | 20.000A |
| LIN B+Preset | 0.000A | | I_Lo | 0.000A |
| CR A+Preset | 64000Ω | | W_Hi | 2000.0W |
| CR B+Preset | 64000Ω | | W_Lo | 0.0W |
| CP A+Preset | 0.0W | | VA_Hi | 2000.0VA |
| CP B+Preset | 0.0W | | VA_Lo | 0.0VA |
| CV A+Preset | 500.00V | | OPL | 1968.75W |
| CV B+Preset | 500.00V | | OCL | 19.687A |
| | | CONFIG | EXTIN | OFF |
| | | | SYNC | OFF |
| | | | LDON | 0 |
| | | | LDOFF | 0 |
| | | | BW | 15 |
| | | | AVG | 1 |
| | | | CPRSP | 0 |
| | | | CYCLE | 1 |

Table 3-6 ELP/ACP 1875 initialize

| Item | Initial value | Item | | Initial value |
|---|---|---|---|---|
| CC A+Preset | 0.000A | LIMIT | V_Hi | 750.00V |
| CC B+Preset | 0.000A | | V_Lo | 0.00V |
| LIN A+Preset | 0.000A | | I_Hi | 30.000A |
| LIN B+Preset | 0.000A | | I_Lo | 0.000A |
| CR A+Preset | 50000Ω | | W_Hi | 4000.0W |
| CR B+Preset | 50000Ω | | W_Lo | 0.0W |
| CP A+Preset | 0.0W | | VA_Hi | 4000.0VA |
| CP B+Preset | 0.0W | | VA_Lo | 0.0VA |
| CV A+Preset | 500.00V | | OPL | 3937.5W |
| CV B+Preset | 500.00V | | OCL | 29.400A |
| | | CONFIG | EXTIN | OFF |
| | | | SYNC | OFF |
| | | | LDON | 0 |
| | | | LDOFF | 0 |
| | | | BW | 13 |
| | | | AVG | 1 |
| | | | CPRSP | 0 |
| | | | CYCLE | 1 |

Table 3-7 3750HV initialize

| Item | Initial value | Item | | Initial value |
|---|---|---|---|---|
| CC A+Preset | 0.000A | LIMIT | V_Hi | 750.00V |
| CC B+Preset | 0.000A | | V_Lo | 0.00V |
| LIN A+Preset | 0.000A | | I_Hi | 20.000A |
| LIN B+Preset | 0.000A | | I_Lo | 0.000A |
| CR A+Preset | 80000Ω | | W_Hi | 3000.0W |
| CR B+Preset | 80000Ω | | W_Lo | 0.0W |
| CP A+Preset | 0.0W | | VA_Hi | 3000.0VA |
| CP B+Preset | 0.0W | | VA_Lo | 0.0VA |
| CV A+Preset | 500.00V | | OPL | 2940.0W |
| CV B+Preset | 500.00V | | OCL | 19.687A |
| | | CONFIG | EXTIN | OFF |
| | | | SYNC | OFF |
| | | | LDON | 0 |
| | | | LDOFF | 0 |
| | | | BW | 13 |
| | | | AVG | 1 |
| | | | CPRSP | 0 |
| | | | CYCLE | 1 |

Table 3-8 ELP/ACP 2800HV initialize

## 3-7. Protection features

The protection features of the ELP/ACP series Electronic load modules are as follows:

3.7.1. **Overvoltage protection:** The Electronic Load input will turn OFF if the overvoltage circuit is tripped. The message OVP will be displayed on the LCD. When the OVP fault has been removed the load can be set to sink power again. While the unit will attempt to protect itself given an OVP state it is strongly advised to guard against any potential OVP fault state by using external protection and the correctly rated electronic load.

CAUTION:Do not apply a AC/DC voltage that is higher than ELP/ACP series Load rating.
If this advice is ignored it is likely that damage will be caused to the electronic load module.
This damage will not be covered by the warranty.

The Overvoltage protection circuit is set at a predetermined voltage and cannot be adjusted. The OVP level is 105% of the ELP/ACP Series nominal voltage rating.

3.7.2. Over current protection (OCP): The OCP protection will engage if the current being taken by the load reaches 105% of the load module's maximum current. The message OCP will be displayed on the front panel and the unit will switch to its LOAD OFF state. Once the source of the over current has been removed the load can be switched on again.

3.7.3. Over power protection (OPP): The ELP/ACP series Electronic Load monitors the power dissipation level. The input to the load is automatically switched to LOAD OFF if the power dissipation is greater than 105% of the rated power input. If an over power condition occurs the display will show OPP

3.7.4. Over temperature protection (OTP): The load internal temperature at the heat sink is monitored. If the temperature reaches approximately 100°C the OTP message will be displayed and the unit will automatically switch to the LOAD OFF state. If an OTP error occurs please check the ambient temperature is between 0 to 40°C. Also ensure that the front and rear air vents of the mainframe are not obstructed. The air flow is taken from the front of the mainframe and exhausted from the rear. Therefore a suitable gap needs to be left at the rear of the mainframe. A minimum of 15cm is recommended. After a suitable cooling period the load can be switched.

# Chapter 4 COMMUNICATION INTERFACE PROGRAMMING OPERATION

## 4-1. Introduction

The rear panel remote control interface of ELP/ACP Series mainframe is designed to connect PC or NOTEBOOK PC with remote control interface, the NOTEBOOK PC acts as a remote controller of ELP/ACP Series Electronic Load.

This feature can be used as an automatic load/cross load regulation and centering voltage testing for a switching power supply or an rechargeable battery charge/discharge characteristic testing. The function capability of rear panel remote control interface not only can set the load level and load status, but also can read back the load voltage and load current.

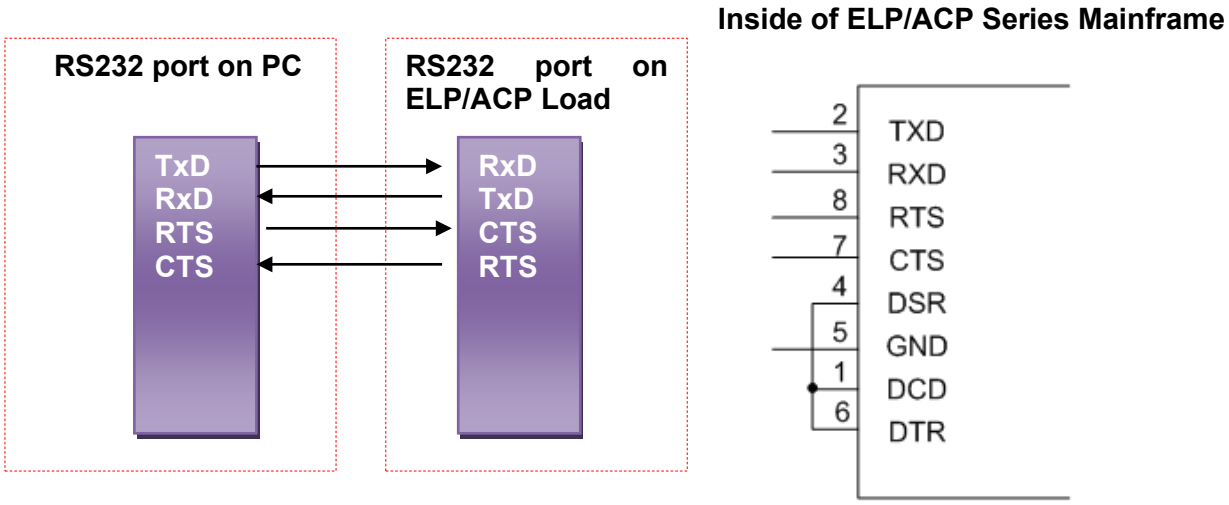
**NOTE: When use USB/LAN interface controls the ELP/ACP Series, the ELP/ACP Series will convert the USB/LAN interface to RS232 interface.**

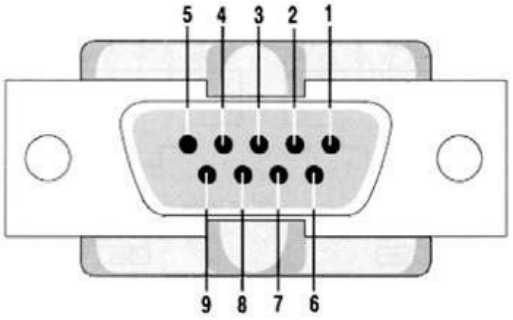
## 4-2. The summary of RS232 Interface and command

The following RS232 commands are same as GPIB commands. The RS232 protocol in ELP/ACP Series mainframe is listing below:

Baud-rate : 9600~115200bps
Parity : None
Data bit : 8 bits
Stop bit : 1 bit
Handshaking : Hardware (RTS/CTS).

The RS232 Interface connector of ELP/ACP Series rear panel, RS232 is shown in Fig4-1.






| PIN | Abbreviation | Description |
|---|---|---|
| Pin1 | CD | Carrier Detect |
| Pin2 | RXD | Receive |
| Pin3 | TXD | Transmit |
| Pin4 | DTR | Data Terminal Ready |
| Pin5 | GND | Ground |
| Pin6 | DSR | Data Set Ready |
| Pin7 | RTS | Request To Send |
| Pin8 | CTS | Clear To Send |
| Pin9 | RI | Ring Indicator |

Fig 4-1 RS232 INTERFACE CONNECTION OF REAR PANEL

## 4-3. ELP/ACP SERIES COMMUNICATION INTERFACE PROGRAMMING COMMAND LIST 1

SIMPLE TYPE FORMAT

| SETTING PRESET NUMERIC COMMAND | note |
|---|---|
| HARM{SP} {NR1} {;\| NL} | HARMONICS 1~50 |
| LIN:{A \| B} {SP} {NR2}{;\| NL} | |
| CC \| CURR:{A \| B} {SP} {NR2}{;\| NL} | |
| CP:{A \| B} {SP} {NR2}{;\| NL} | |
| CR \| RES:{A \| B} {SP} {NR2}{;\| NL} | |
| CV \| VOLT:{A \| B} {SP} {NR2}{;\| NL} | |
| CVI:{A \| B} {SP} {NR2}{;\| NL} | CV CURR |
| TCONFIG{SP} {NORMAL \| SHORT \| OPP \| OCP \| NLIN \| NLCR \| FUSE \| BATT \| TRANS \| INRUSH \| SURGE \| ITHD} {; \| NL} | |
| OCP:START {SP} {NR2}{;\|NL} | |
| OCP:STEP {SP} {NR2}{;\|NL} | |
| OCP:STOP {SP} {NR2}{;\|NL} | |
| VTH {SP} {NR2}{;\|NL} | |
| OPP:START {SP} {NR2}{;\|NL} | |
| OPP:STEP {SP} {NR2}{;\|NL} | |
| OPP:STOP {SP} {NR2}{;\|NL} | |
| STIME {SP} {NR2}{;\|NL} | |
| PF {SP} {+\|-} {NR2}{;\|NL} | Power factor |
| CF {SP} {NR2}{;\|NL} | Crest factor |
| BATT:MODE {SP}{CC\|LIN\|CV\|CP}{;\|NL} | |
| BATT:TIME {SP} {NR1}{;\|NL} | |
| EXTIN{SP}{ON\|OFF}{;\|NL} | |
| TURBO {SP}{ON\|OFF}{;\|NL} | |
| FUSE:CC {SP}{NR2}{;\|NL} | |
| FUSE:TIME {SP} {NR2}{;\|NL} | |
| FUSE:TYPE {SP} {TRIP\|NTRIP}{;\|NL} | |
| FUSE:REP {SP} {NR1}{;\|NL} | |
| AVG{SP} {NR2}{;\|NL} | NR2:1\|2\|4\|8\|16 |
| CPRSP{SP} {NR2}{;\|NL} {;\|NL} | NR2:0~7 |
| CYCLE{SP} {NR2}{;\|NL} | NR2:1~16 |
| ON:ANG{SP} {NR2}{;\|NL} | 0~359 |
| OFF:ANG{SP} {NR2}{;\|NL} | 0~359 |
| BW {SP} {AUTO \| NR2} {; \| NL} | |
| FREQ {SP} {AUTO\| NR2}{;\|NL} | 0,40~440Hz |

| | |
|---|---|
| ITIME {SP} {NR2}{;\|NL} | 0.1ms~100.0ms |
| ISTART {SP} {NR2}{;\|NL} | |
| ISTEP {SP} {NR2}{;\|NL} | |
| ISTOP{SP} {NR2}{;\|NL} | |
| SURGE:Tn{SP} {NR2}{;\|NL} | |
| SURGE:Sn{SP} {NR2}{;\|NL} | |
| SNUB {SP}AUTO\|ON\|OFF{;\|NL} | |
| ITHD:PCT {SP} {NR2} {; \| NL} | |
| ITHD:CC {SP} {NR2} {; \| NL} | |
| IMODE {SP} {CC \| CR \| 0 \| 1} {; \| NL} | |
| RSTART {SP} {NR2} {; \| NL} | |
| RSTEP {SP} {NR2} {; \| NL} | |
| RSTOP{SP} {NR2} {; \| NL} | |
| IPEAK {SP} {NR2} {; \| NL} | |
| ICYCLE {SP} {NR2} {; \| NL} | |

Table 4-1 COMMUNICATION INTERFACE PROGRAMMING SETTING COMMAND SUMMARY

| QUERY PRESET NUMERIC COMMAND | RETURN |
|---|---|
| | |
| HARM{?} {NR2} {;\|NL} | ## |
| LIN:{A\|B}{?} {;\|NL} | +###.### |
| CC\|CURR:{A\|B} {?} {;\|NL} | ##.### |
| CP:{A\|B} {?} {;\|NL} | +####.# |
| CR\|RES:{A\|B} {?} {;\|NL} | #####.#### |
| CV\|VOLT:{A\|B} {?} {;\|NL} | ###.## |
| CVI{?} {;\|NL} | +##.### |
| TCONFIG {?}{;\|NL} | 1:NORMAL 7:FUSE<br>2:SHORT 8:BATT<br>3:OPP 9:Trans<br>4:OCP 10:INRUSH<br>5: non-LIN 11:SURGE<br>6: nocLIN+CR |
| OCP: START {?} {;\|NL} | +##.### |
| OCP: STEP {?}{;\|NL} | +##.### |
| OCP: STOP {?}{;\|NL} | +##.### |
| VTH {?}{;\|NL} | +###.## |
| OPP: START {?} {;\|NL} | +####.# |
| OPP: STEP {?}{;\|NL} | +####.# |
| OPP: STOP {?}{;\|NL} | +####.# |
| STIME {?}{;\|NL} | +##### |
| PF {?}{;\|NL} | ±###.## |
| CF {?} {NR2}{;\|NL} | +####.# |

| | |
|---|---|
| OCP {?} | +##.### |
| OPP {?} | +####.# |
| BATT: MODE {?}{;\|NL} | 0~3=CC/LIN/CR/CP |
| BATT: TIME {?}{;\|NL} | +##### |
| DISC: TIME {?}{;\|NL} | |
| DISC: AH {?}{;\|NL} | |
| EXTIN {?}{;\|NL} | 0~1 |
| TURBO {?}{;\|NL} | 0~1 |
| FUSE: CC {?}{;\|NL} | +##.### |
| FUSE: TIME {?}{;\|NL} | +####.# |
| FUSE: TYPE {?}{;\|NL} | 0~1 |
| FUSE: REP {?}{;\|NL} | 0~255 |
| TRIP: TIME {?}{;\|NL} | +####.# |
| TRANS: TIME {?}{;\|NL} | +###.## |
| AVG {?}{;\|NL} | 1\|2\|4\|8\|16 |
| CPRSP {?}{;\|NL} | 0~7 |
| CYCLE {?}{;\|NL} | 0~16 |
| ON: ANG {?}{;\|NL} | +##### |
| OFF: ANG {?}{;\|NL} | +##### |
| REP: COUNT {?}{;\|NL} | +##### |
| BW {?}{;\|NL} | 1~15 |
| FREQ {?}{;\|NL} | +###.# |
| ITIME {?}{;\|NL} | +####.# |
| ISTART {?}{;\|NL} | +##.### |
| ISTEP {?}{;\|NL} | +##.### |
| ISTOP {?}{;\|NL} | +##.### |
| SURGE: Tn{?}{;\|NL} | +###.## |
| SURGE: Sn{?}{;\|NL} | +##.### |
| SNUB {?}{;\|NL} | |
| ITHD: PCT? {; \| NL} | |
| ITHD:CC ? {; \| NL} | |
| IMODE ? {; \| NL} | |
| RSTART? {; \| NL} | |
| RSTEP? {; \| NL} | |
| RSTOP? {; \| NL} | |
| IPEAK ? {; \| NL} | |
| ICYCLE? {; \| NL} | |

Table 4-2 COMMUNICATION INTERFACE PROGRAMMING QUERY COMMAND SUMMARY

| LIMIT COMMAND | RETURN |
|---|---|
| | |
| IH\|IL{SP}{NR2}{;\|NL} | |
| IH\|IL {?}{;\|NL} | +###.### |

| | |
|---|---|
| WH\|WL{SP}{NR2}{;\|NL} | |
| WH\|WL {?}{;\|NL} | +####.# |
| VH\|VL{SP}{NR2}{;\|NL} | |
| VH\|VL {?}{;\|NL} | +####.# |
| SVH\|SVL{SP}{NR2}{;\|NL} | |
| SVH\|SVL {?}{;\|NL} | +###.## |
| VAH\|VAL{SP}{NR2}{;\|NL} | |
| VAH\|VAL {?}{;\|NL} | +#####.# |
| OPL\|OCL{SP}{NR2}{;\|NL} | Over power limit/Over current limit |
| OPL\|OCL {?}{;\|NL} | +####.#/+##.### |

Table 4-3 COMMUNICATION INTERFACE PROGRAMMING LIMIT COMMAND SUMMARY

| STAGE COMMAND | REMARK |
|---|---|
| | |
| LOAD {SP}{ON\|OFF\|1\|0} {;\|NL} | |
| LOAD {?} {;\|NL} | 0:OFF 1:ON |
| MODE {SP} {CC\|LIN\|CR\|CV\|CP} {;NL} | |
| MODE {?} {;\|NL} | 0\|1\|2\|3\|4:CC\|LIN\|CR\|CV\|CP |
| SHOR {SP} {ON\|OFF\|1\|0} {;\|NL} | |
| SHOR {?} {;\|NL} | 0:OFF 1:ON |
| PRES {SP} {ON\|OFF\|1\|0} {;\|NL} | |
| PRES {?} {;\|NL} | 0:OFF 1:ON |
| SENS {SP} {ON\|OFF\|AUTO\|1\|0} {;\|NL} | |
| SENS {?} {;\|NL} | 0:OFF/AUTO 1:ON |
| LEV {SP} { LOW\|HIGH\|0\|1} {;\|NL} | |
| LEV {?} {;\|NL} | 0:LOW/A<br>1:HIGH/B |
| CLR{;\|NL} | |
| CLR:METER{;\|NL} | |
| ERR {?}{;\|NL} | |
| NG {?}{;\|NL} | 0:GO 1:NG |
| PROT {?}{;\|NL} | |
| NGENABLE{SP}{ON\|OFF}{;\|NL} | |
| START{;\|NL} | |
| STOP{;\|NL} | |
| TESTING {?}{;\|NL} | 0:TEST END,1:TESTING |
| SYNC {SP}{ON\|OFF\|1\|0} {;\|NL} | |
| SYNC {?} {;\|NL} | 0:OFF 1:ON |

Table 4-4 STAGE COMMAND SUMMARY

System command：

| COMMAND | NOTE | RETURN |
|---|---|---|
| RECALL {SP} {m }{;\| NL} | m=1~150 , m:STATE | |
| STORE {SP} {m }{;\| NL} | m=1~150<br>m:STATE | |
| REMOTE {;\| NL} | RS232/USB/LAN command | |
| LOCAL{;\| NL} | RS232/USB/LAN command | |
| NAME {?} {;\| NL} | | “XXXX” |

Table 4-5 SYSTEM COMMAND SUMMARY

Measure command

| COMMAND | RETURN |
|---|---|
| MEAS:TYPE{SP} {RMS\|PEAK\|MAX\|MIN} {;\| NL} | |
| MEAS: CURR {?}{;\| NL} | ###.### |
| MEAS: VOLT {?}{;\| NL} | ###.## |
| MEAS: POW {?}{;\| NL} | ####.# |
| MEAS: VAR {?}{;\| NL} | ####.# |
| MEAS: VA {?}{;\| NL} | ####.# |
| MEAS: V_THD {?}{;\| NL} | ###.## |
| MEAS: I_THD {?}{;\| NL} | ###.## |
| MEAS: V_HARM {?}{;\| NL} | ###.## |
| MEAS: I_HARM {?}{;\| NL} | ###.### |

Table 4-6 MEASURE COMMAND SUMMARY

REMARK:

1. Current engineering unit: A/Arms
2. Resistance engineering unit: Ω
3. Voltage engineering unit: V/Vrms
4. Period engineering unit: mS
5. Frequency engineering unit: Hz.
6. Power engineering unit: W
7. Volt-Ampere engineering unit: VA

AUTO SEQUENCE:

| AUTO SEQUENCE SET COMMAND | NOTE | RETURN |
|---|---|---|
| FILE {SP} {n}{;\| NL} | n=1~9 | 1~9 |
| STEP {SP} {n} {;\| NL} | n=1~16 | 1~32 |
| TOTSTEP {SP} {n}{;\| NL} | Total step n=1~16 | 1~32 |
| SB {SP} {n} {;\| NL} | LOAD State n=1~150 | 1~150 |
| TIME {SP} {NR2} {;\| NL} | 100~9999(ms) | 100~9999(msec) |
| SAVE {;\| NL} | Save “File n” data | |
| REPEAT {SP} {n} {;\| NL} | n=0~9999 | 0~9999 |
| RUN {SP} {F} {n} {;\| NL} | n=1~9 | AUTO REPLY<br>“PASS” or “FAIL:XX”<br>(XX=NG STEP) |
| BEEP{SP}{ON\|OFF}{;\|NL} | SET BUZZER ON/OFF | |

Table 4-7 AUTO SEQUENCE COMMAND LIST

## 4-4. ELP/ACP SERIES COMMUNICATION INTERFACE PROGRAMMING COMMAND LIST 2

COMPLEX TYPE FORMAT

| SETTING COMMAND SUMMARY | REMARK |
|---|---|
| | |
| [PRESet:] HARMonics{SP} {NR1} {;\| NL} | |
| [PRESet:] LIN:A\|B {SP} {NR2} {;\| NL} | |
| [PRESet:] CC\| CURR:{A\|B} {SP} {NR2}{;\| NL} | |
| [PRESet:] CP:{A\|B} {SP} {NR2}{;\| NL} | |
| [PRESet:] CR\| RES:{A\|B} {SP} {NR2}{;\| NL} | |
| [PRESet:] CV\| VOLT:{A\|B} {SP} {NR2}{;\| NL} | |
| [PRESet:] CVI:{A\|B} {SP} {NR2}{;\| NL} | |
| [PRESet：] TCONFIG{SP} {NORMAL \| SHORT \| OPP \| OCP \| NLIN \| NLCR \| FUSE \| BATT \| TRANS \| INRUSH \| SURGE \| ITHD} {; \| NL} | |
| [PRESet:] OCP:START {SP} {NR2}{;\|NL} | |
| [PRESet:] OCP:STEP {SP} {NR2}{;\|NL} | |
| [PRESet:] OCP:STOP {SP} {NR2}{;\|NL} | |
| [PRESet:] VTH {SP} {NR2}{;\|NL} | |
| [PRESet:] OPP:START {SP} {NR2}{;\|NL} | |
| [PRESet:] OPP:STEP {SP} {NR2}{;\|NL} | |
| [PRESet:] OPP:STOP {SP} {NR2}{;\|NL} | |
| [PRESet:] STIME {SP} {NR2}{;\|NL} | |
| [PRESet:] PF {SP} {+\|-} {NR2}{;\|NL} | Power factor |
| [PRESet:] CF {SP} {NR2}{;\|NL} | Crest factor |
| [PRESet:] BATT:MODE {SP} {CC\|LIN\|CV\|CP}{;\|NL} | |
| [PRESet:] BATT:TIME {SP} {NR1}}{;\|NL} | |
| [PRESet:] EXTIN {SP} {ON\|OFF}{;\|NL} | |
| [PRESet:] TURBO {SP} {ON\|OFF}{;\|NL} | |
| [PRESet:] FUSE: CC{SP}{NR2}{;\|NL} | |
| [PRESet:] FUSE: TIME {SP} {NR2}{;\|NL} | |
| [PRESet:] FUSE: TYPE {SP} {TRIP\|NTRIP}{;\|NL} | |
| [PRESet:] FUSE: REP {SP} {NR1}{;\|NL} | |
| [PRESet:] AVG{SP} {NR2}{;\|NL} | NR2:1\|2\|4\|8\|16 |
| [PRESet:] CPRSP{SP} {NR2}{;\|NL} | NR2:0~7 |
| [PRESet:] CYCLE{SP} {NR2}{;\|NL} | NR2:1~16 |
| [PRESet:] ON:ANG{SP} {NR2}{;\|NL} | 0~359 |
| [PRESet:] OFF:ANG{SP} {NR2}{;\|NL} | 0~359 |
| [PRESet：] BW {SP} {AUTO \| NR2} {; \| NL} | |
| [PRESet:]FREQ{SP} {NR2}{;\|NL} | |

| | |
|---|---|
| [PRESet:]ITIME {SP} {NR2}{;\|NL} | 0.1ms~100.0ms |
| [PRESet:]ISTART {SP} {NR2}{;\|NL} | |
| [PRESet:]ISTEP {SP} {NR2}{;\|NL} | |
| [PRESet:]ISTOP{SP} {NR2}{;\|NL} | |
| [PRESet:]SURGE:Tn{SP} {NR2}{;\|NL} | |
| [PRESet:]SURGE:Sn{SP} {NR2}{;\|NL} | |
| [PRESet:]SNUB {SP}AUTO\|ON\|OFF{;\|NL} | |
| [PRESet：] ITHD:PCT {SP} {NR2} {; \| NL} | |
| [PRESet：] ITHD:PCT {SP} {NR2} {; \| NL} | |
| [PRESet：] ITHD:CC {SP} {NR2} {; \| NL} | |
| [PRESet：] IMODE {SP} {CC \| CR \| 0 \| 1} {; \| NL} | |
| [PRESet：] RSTART {SP} {NR2} {; \| NL} | |
| [PRESet：] RSTEP {SP} {NR2} {; \| NL} | |
| [PRESet：] RSTOP{SP} {NR2} {; \| NL} | |
| [PRESet：] IPEAK {SP} {NR2} {; \| NL} | |
| [PRESet：] ICYCLE {SP} {NR2} {; \| NL} | |

Table 4-1B COMMUNICATION INTERFACE PROGRAMMING SETTING COMMAND SUMMARY

| QUERY COMMAND SUMMARY | RETURN |
|---|---|
| | |
| [PRESet:] HARMonics{?}{;\| NL} | ## |
| [PRESet:] LIN:{A \| B}{?}{;\| NL} | ##.### |
| [PRESet:] CC\| CURR:{A \| B} {?} {;\| NL} | ##.### |
| [PRESet:] CP:{A \| B} {?} {;\| NL} | ####.# |
| [PRESet:] CR\| RES:{A \| B} {?} {;\| NL} | #####.#### |
| [PRESet:] CV\| VOLT:{A \| B} {?} {;\| NL} | ###.## |
| [PRESet:] TCONFIG {?}{;\|NL} | 1:NORMAL 7:FUSE<br>2:SHORT 8:BATT<br>3:OPP 9:Trans<br>4:OCP 10:INRUSH<br>5: non-LIN 11:SURGE<br>6: nocLIN+CR |
| [PRESet:] OCP: START {?} {;\|NL} | ##.### |
| [PRESet:] OCP: STEP {?}{;\|NL} | ##.### |
| [PRESet:] OCP: STOP {?}{;\|NL} | ##.### |
| [PRESet:] VTH {?}{;\|NL} | ###.## |
| [PRESet:] OPP: START {?} {;\|NL} | ####.# |
| [PRESet:] OPP: STEP {?}{;\|NL} | ####.# |
| [PRESet:] OPP: STOP {?}{;\|NL} | ####.# |
| [PRESet:] STIME {?}{;\|NL} | ##### |
| [PRESet:] PF {?}{;\|NL} | ###.## |
| [PRESet:] CF {?}{;\|NL} | ####.# |

| | |
|---|---|
| [PRESet:] OCP {?}{;\|NL} | |
| [PRESet:] OPP {?}{;\|NL} | |
| [PRESet:] BATT MODE {?}{;\|NL} | |
| [PRESet:] BATT TIME {?}{;\|NL} | |
| [PRESet:] DISC: TIME {?}{;\|NL} | |
| [PRESet:] DISC: AH {?}{;\|NL} | |
| [PRESet:] EXTIN {?}{;\|NL} | |
| [PRESet:] TURBO {?}{;\|NL} | |
| [PRESet:] FUSE: CC {?}{;\|NL} | |
| [PRESet:] FUSE: TIME {?}{;\|NL} | |
| [PRESet:] FUSE: TYPE {?}{;\|NL} | |
| [PRESet:] FUSE: REP {?}{;\|NL} | |
| [PRESet:] TRIP: TIME {?}{;\|NL} | |
| [PRESet:] TRANS: TIME {?}{;\|NL} | |
| [PRESet:] AVG {?}{;\|NL} | 1\|2\|4\|8\|16 |
| [PRESet:] CPRSP {?}{;\|NL} | 0~7 |
| [PRESet:] CYCLE {?}{;\|NL} | 0~16 |
| [PRESet:] ON: ANG {?}{;\|NL} | +##### |
| [PRESet:] OFF: ANG {?}{;\|NL} | +##### |
| [PRESet:] REP: COUNT {?}{;\|NL} | +##### |
| [PRESet:] BW {?}{;\|NL} | 1~15 |
| [PRESet:] FREQ {?}{;\|NL} | +###.# |
| [PRESet:] ITIME {?}{;\|NL} | +####.# |
| [PRESet:] ISTART {?}{;\|NL} | +##.### |
| [PRESet:] ISTEP {?}{;\|NL} | +##.### |
| [PRESet:] ISTOP {?}{;\|NL} | +##.### |
| [PRESet:] SURGE: Tn{?}{;\|NL} | +###.## |
| [PRESet:] SURGE:Sn{?}{;\|NL} | +##.### |
| [PRESet:] SNUB {?}{;\|NL} | |
| [PRESet：] ITHD:PCT ? {; \| NL} | |
| [PRESet：]ITHD:CC ? {; \| NL} | |
| [PRESet：]IMODE ? {; \| NL} | |
| [PRESet：]RSTART? {; \| NL} | |
| [PRESet：]RSTEP? {; \| NL} | |
| [PRESet：]RSTOP? {; \| NL} | |
| [PRESet：]IPEAK ? {; \| NL} | |

Table4-2B COMMUNICATION INTERFACE PROGRAMMING SETTING QUERY COMMAND SUMMARY

| LIMIT | RETURN |
|---|---|
| | |
| LIMit:CURRent:{HIGH\|LOW}{SP}{NR2}{;\| NL} | |
| LIMit:CURRent:{HIGH\|LOW}{?}{;\| NL} | ##.### |
| IH\|IL{SP}{NR2}{;\| NL} | |
| IH\|IL {?}{;\| NL} | ##.### |
| LIMit:POWer:{HIGH\|LOW}{SP}{NR2}{;\| NL} | |
| LIMit:POWer:{HIGH\|LOW}{?}{;\| NL} | ####.# |
| WH\|WL{SP}{NR2}{;\| NL} | |
| WH\|WL {?}{;\| NL} | ####.# |
| LIMit:VOLTage:{HIGH\|LOW}{SP}{NR2}{;\| NL} | |
| LIMit:VOLTage:{HIGH\|LOW}{?}{;\| NL} | ###.## |
| VH\|VL{SP}{NR2}{;\| NL} | |
| VH\|VL {?}{;\| NL} | ###.## |
| SVH\|SVL{SP}{NR2}{;\| NL} | |
| SVH\|SVL {?}{;\| NL} | ###.## |
| VAH\|VAL{SP}{NR2}{;\| NL} | |
| VAH\|VAL {?}{;\| NL} | ####.# |
| OPL\|OCL{SP}{NR2}{;\| NL} | Over power limit/Over current limit |
| OPL\|OCL {?}{;\| NL} | ####.# / ##.### |

Table 4-3B COMMUNICATION INTERFACE PROGRAMMING LIMIT COMMAND SUMMARY

| STAGE COMMAND | REMARK |
|---|---|
| | |
| [STATe:] LOAD {SP}{ON\|OFF} {;\|NL} | |
| [STATe:] LOAD {?} {;\|NL} | 0:OFF 1:ON |
| [STATe:] MODE {SP} {CC\|LIN\|CR\|CV\|CP} {;NL} | |
| [STATe:] MODE {?} {;\|NL} | 0\|1\|2\|3\|4:CC\|LIN\|CR\|CV\|CP |
| [STATe:] SHORt {SP} {ON\|OFF} {;\|NL} | |
| [STATe:] SHORt {?} {;\|NL} | 0:OFF 1:ON |
| [STATe:] PRESet {SP} {ON\|OFF} {;\|NL} | |
| [STATe:] PRESet {?} {;\|NL} | 0:OFF 1:ON |
| [STATe:] SENSe {SP} {ON\|OFF\|AUTO } {;\|NL} | |
| [STATe:] SENSe {?} {;\|NL} | 0:OFF 1:ON |
| [STATe:] LEVEl {SP} {A\|B} {;\|NL} | |
| [STATe:] LEVEl {?} {;\|NL} | 0:A<br>1:B |
| [STATe:] LEV{SP} {A \|B} {;\|NL} | |
| [STATe:] LEV{?} {;\|NL} | 0:A<br>1:B |
| [STATe:] CLRerr{;\|NL} | |
| [STATe:] CLR:METER{ ; \| NL} | |
| [STATe:] ERRor {?}{;\|NL} | |
| [STATe:] NO{SP}GOOD {?}{;\|NL} | 0:GO 1:NG |

| | |
|---|---|
| [STATe:] NG {?}{;\|NL} | 0:GO 1:NG |
| [STATe:] PROTect {?}{;\|NL} | |
| [STATe:] NGENABLE{SP}{ON\|OFF}{;\|NL} | |
| [STATe:]START{;\|NL} | |
| [STATe:]STOP{;\|NL} | |
| [STATe:]TESTING {?}{;\|NL} | 0:TEST END,1:TESTING |
| [STATe:] SYNCronize {SP}{ON\|OFF} {;\|NL} | |
| [STATe:] SYNCronize {?} {;\|NL} | 0:OFF 1:ON |

Table 4-4B STAGE COMMAND SUMMARY

SYSTEM COMMAND:

| COMMAND | NOTE | RETURN |
|---|---|---|
| [SYStem:] RECall {SP} {m }{;\| NL} | m=1~150 | |
| [SYStem:] STORe {SP} {m }{;\| NL} | m=1~150 | |
| [SYStem:] REMOTE {;\| NL} | RS232/USB/LAN command | |
| [SYStem:] LOCAL{;\| NL} | RS232/USB/LAN command | |
| [SYStem:] NAME {?} {;\| NL} | | “XXXX” |

Table 4-5B SYSTEM COMMAND SUMMARY

Measure command:

| COMMAND | RETURN |
|---|---|
| MEASure:TYPE{SP} {RMS\|PEAK\|MAX\|MIN} {;\| NL} | |
| MEASure: CURRent {?}{;\| NL} | ###.### |
| MEASure: VOLTage {?}{;\| NL} | ###.## |
| MEASure:POW {?}{;\| NL} | ####.# |
| MEASure:VAR {?}{;\| NL} | ####.# |
| MEASure:VA {?}{;\| NL} | ####.# |
| MEASure:V_THD {?}{;\| NL} | ###.## |
| MEASure:I_THD {?}{;\| NL} | ###.## |
| MEASure:V_HARM {?}{;\| NL} | ###.## |
| MEASure:I_HARM {?}{;\| NL} | ###.### |

Table 4-6B MEASURE COMMAND SUMMARY

REMARK:

1. Current engineering unit: A/Arms
2. Resistance engineering unit: Ω
3. Voltage engineering unit: V/Vrms
4. Period engineering unit: mS
5. Frequency engineering unit: Hz.
6. Power engineering unit: W
7. Volt-Ampere engineering unit: VA

## 4-5. The description of abbreviation

SP：Space, the ASCII code is 20 Hexadecimal.

；：Semicolon, Program line terminator, the ASCII code is OA Hexadecimal.

NL：New line, Program line terminator, the ASCII code is OA Hexadecimal.

NR2：Digits with decimal point. It can be accepted in the range and format of ###.#####.

**For Example：**

30.12345, 5.0

The description of GPIB programming command syntax.

## 4-6. COMMUNICATION INTERFACE PROGRAMMING COMMAND SYNTAX DESCRIPTION

{ } ：The contents of the { } symbol must be used as a part or data of the GPIB command, it cannot be omitted.

[ ] ：The contents of the [ ] symbol indicts the command can be used or not. It depends on the testing application.

| ：This symbol means option. For example〝LOW|HIGH〞means it can only use LOW or HIGH as the command, it can choose only one as the setting command.

Terminator：You have to send the program line terminator character after send the GPIB command, the available command terminator characters which can be accepted in ELP/ACP Series mainframe is listed in Table 4-8.

| |
|---|
| LF |
| LF WITH EOI |
| CR，LF |
| CR，LF WITH EOI |

Table 4-8 GPIB COMMAND TERMINATOR

Semicolon〝;〞： The semicolon〝;〞is a back-up command, the semicolon allows you to combine command statement on one line to create command message.

## 4-7. COMMUNICATION INTERFACE PROGRAMMING COMMAND DESCRIPTION

### 4.7.1.PRESET Set and Read the Default of Load

**HARM**

Syntax: [PRESet:] HARM{SP} {NR1} {;|NL}

[ PRESet:] HARM{?} {;|NL}

Purpose：Set and read the HARMONICS

Description：Set and read the HARMONICS

**LIN**

Syntax: [ PRESet:] LIN :A|B {SP}{NR2}{;|NL}
[ PRESet:] LIN: A|B {?} {;|NL}

Purpose: Set and read the linear current.

Description: Set and read the linear current.

**ON: ANG**

Syntax: [ PRESet:] ON:ANG {SP}{NR2}{;|NL}
[ PRESet:] ON:ANG{?}{;|NL}

Purpose: Set and Read the loading angle control.

Description: Supports the loading angle control, the full range of 0-359 degree.

**OFF: ANG**

Syntax: [ PRESet:]OFF:ANG{SP}{ NR2}{;|NL}
[ PRESet:]OFF: ANG {?}{ ;|NL}

Purpose: Set and read the unloading angle control.

Description: Supports the unloading angle control, the full range of 0-359 degree.

**CC|CURR: A|B**

Syntax: [ PRESet:] CC|CURR:{A|B}{SP}{ NR2}{;|NL}
[ PRESet:] CC|CURR:{A|B} {?} {;|NL}

Purpose: Set and read the current of A or B.

Description: This command is for setting the required Load current. And this Command must be followed the next notices:

1. Level A load and Level B load current settings are independent.
2. The unit is A.

**CP:{ A|B}**

Syntax: [ PRESet:] CP:{ A|B}{SP}{ NR2}{;|NL}
[ PRESet:] CP: {A|B} {?} {;|NL}

Purpose: Set and read the value of Watt

Description: This command is for setting the required value of Watt, and the unit is W.

**CR|RES: {A|B}**

Syntax: [ PRESet:] CR|RES:{ A|B}{SP}{ NR2}{;|NL}
[ PRESet:] CR|RES: { A|B} {?} {;|NL}

Purpose:Set and read the value of Resistance

Description:This command is used for setting the required value of Load Resistance. And this command must be followed the next notices:

1. Level A load and Level B load resistance settings are independent.
2. The unit is Ω.

**CV|VOLT: {A|B}**

Syntax: [ PRESet:] CV:{A|B} {SP}{ NR2}{;|NL}
[ PRESet:] CV :{ A|B} {?} {;|NL}
[ PRESet:] VOLT :{ A|B}{SP}{ NR2}{;|NL}
[ PRESet:] VOLT:{A|B}{?} {;|NL}

Purpose: Set and read the value of Voltage.

Description：This command is to set the voltage value of the electronic load. When issuing the command, NOTE to the following items:

1) The Voltage setting values of group A load and group B load are independent.
2) The unit is Voltage (V).

**CVI :{ A｜B}**

Syntax: [ PRESet:] CVI: {A｜B} {SP}{ NR2}{;｜NL}
[ PRESet:] CVI: {A｜B} {?} {;｜NL}

Purpose：Set and read the initial current of the load constant voltage mode.

Description：This command is to set the current value of the electronic load. When issuing the command, NOTE to the following items:

1) The current setting values of group A load and group B load are independent.
2) The unit is ampere (A).

**TCONFIG**

Syntax: [PRESet:] TONFIG {NORMAL|OCP|OPP|SHORT|NLIN|NLCR|FUSE |BATT|TRANS|INRUSH|SURGE|ITHD}{；｜NL}
[PRESet:] TONFIG {?} {；｜NL}

Purpose: Set and read the of test Item

Description: There are nine options of this command: NORMAL mode, OCP test, OPP test, SHORT, NLIN, NLCR, FUSE, BATT, TRANS, INRUSH, SURGE test and ITHD.

**ITIME**

Syntax: [PRESet:] TIME {SP}{NR2}{;｜NL}
[PRESet:]ITIME {?}

Purpose: Set and read the INRUSH current time

Description: Use this command to set the interval for current decrement. The setting Range is 0.1ms~100.0ms.

**ISTART**

Syntax: [PRESet:] ISTART {SP}{NR2}{;｜NL}
[PRESet:] ISTART {?}

Purpose: Set and read the starting current set point for the inrush current test.

Description: The starting current is set to twice the current specification.

**ISTEP**

Syntax: [PRESet:] ISTEP {SP}{NR2}{;｜NL}
[PRESet:] ISTEP {?}

Purpose: Set and read the set value of the decrement current of the inrush current test.

Description: The step current is set to twice the current specification.

**ISTOP**

Syntax: [PRESet:] ISTOP {SP}{NR2}{;｜NL}
[PRESet:] ISTOP {?}

Purpose: Set and read the set value of the minimum current for the inrush current test.

Description: Minimum current setting range current specification.

**SURGE:Tn**

Syntax: [PRESet:]SURGE:Tn {SP}{NR2}{;|NL}
[PRESet:] SURGE:Tn {?}

Purpose: Set and read the time setting for the surge current test.

Description: n: 1~3, the time to load current in three stages.
When n=1, 2, the time setting range is 0.01~0.50 seconds.
When n=3, the time setting range is 0.01~9.99 seconds or continuous loading.

**SURGE:Sn**

Syntax: [PRESet:]SURGE:Sn {SP}{NR2}{;|NL}
[PRESet:] SURGE:Sn {?}

Purpose: Set and read the load current value of the surge current test.

Description: n: 1~3, the load current in three stages.
When n=1, 2, the load current setting range is twice the current specification.
When n=3, the load current setting range is the current specification.

**SNUB AUTO|ON|OFF**

Syntax: SNUB {SP} AUTO|ON|OFF {;|NL}

Purpose: Set the SNUB AUTO/ON/OFF

Description: Set the SNUB AUTO or SNUB ON or SNUB OFF.

**OCP: START**

Syntax：[PRESet：] OCP: START {SP}{NR2}{；|NL}
[PRESet：] OCP: START {?} {；|NL}

Purpose：Set and read the initial value of OCP test

Description：This command is used for setting the required initial value (I-START) of OCP test

**OCP: STEP**

Syntax： [PRESet：] OCP:STEP {SP}{NR2}{；|NL}
[PRESet：] OCP:STEP{?} {；|NL}

Purpose：Set and read the increasing value of OCP test

Description：This command is used for setting the increasing value(I-STEP) of OCP test

**OCP: STOP**

Syntax： [PRESet：] OCP:STOP {SP}{NR2}{；|NL}
[PRESet：] OCP:STOP {?} {；|NL}

Purpose：Set and read the maximum value of OCP test

Description：This command is used for setting the maximum value (I-STOP) of OCP test.

**VTH**

Syntax： [PRESet：] VTH {SP}{NR2}{；|NL}
[PRESet：] VTH {?} {；|NL}

Purpose：Set and read the value of the Threshold Voltage

Description：This command is used for setting the Threshold Voltage. That is the OCP/OPP of this Load model when the output voltage of appliance is lower or equaled to the VTH

**OPP: START**

Syntax: [PRESet:] OPP: START {SP}{NR2}{;|NL}
[PRESet:] OPP: START {?} {;|NL}

Purpose: Set and read the initial value of OPP test

Description: This command is used for setting the initial value (P-START) of OPP Test

**OPP: STEP**

Syntax: [PRESet:] OPP:STEP {SP}{NR2}{;|NL}
[PRESet:] OPP:STEP {?} {;|NL}

Purpose：Set and read the increasing value of OPP test

Description：This command is used for setting the increasing value (P-STEP)of OPP Test.

**OPP: STOP**

Syntax: [PRESet:] OPP: STOP {SP}{NR2}{;|NL}
[PRESet:] OPP: STOP {?} {;|NL}

Purpose: Set and read the maximum value of OPP test

Description: This command is used for setting the maximum value (P-STOP)of OPP test

**STIME**

Syntax: [PRESet:] STIME {SP}{NR2}{;|NL}
[PRESet:] STIME {?} {;|NL}

Purpose：Set and read time of the short-circuit test

Description：This command is used for setting time of the short-circuit test. If time set to 0, it means that have no the time limit and continue to be short –circuited. The unit is milli-second (ms)

**PF**

Syntax： [PRESet:] PF {SP}{+|-}{NR2}{;|NL}
[PRESet:] PF {?} {;|NL}

Purpose：Set and read Power factor.

Description：This command is set Power factor, the setting range is 0.01 ~ 1.00.

**CF**

Syntax: [PRESet:] CF {SP}{NR2}{;|NL}
[PRESet:] CF {?} {;|NL}

Purpose: Set and read the crest factor.

Description:This command is set crest factor,the setting range is 1.4142~5.0.

**BATT: MODE**

Syntax: [PRESet:] BATT:MODE {SP}{CC|CR|CV|CP|LIN}{;|NL}
[PRESet:] BATT: MODE {?}{;|NL}

Purpose：Set and read the Battery test mode.

Description：This command is set and read the Battery test mode.

**BATT: TIME**

Syntax:[PRESet:] BATT:TIME {SP} }{NR1 }{;|NL}
[PRESet:] BATT: TIME {?}{;|NL}

Purpose:Set and read the Battery test time.

Description:This command is set and read the Battery test time, the setting range is 1S~99999S.

**DISC: TIME**
Syntax: [PRESet:] DISC: TIME {?}{;|NL}
Purpose:Read the battery discharge time.
Description:This command is when the test end, read the battery discharge time, the Range of 1S ~ 99999S.

**DISC: AH**
Syntax: [PRESet:] DISC: AH {?}{;|NL}
Purpose: Read the battery capacity.
Description:This command is when the test end, read the battery capacity.

**EXTIN: ON/OFF**
Syntax:[PRESet:] EXTIN: {SP} ON|OFF}{;|NL}
[PRESet:] EXTIN{?}{;|NL}
Purpose: Set the external input signal .
Description:This command is set EXTIN ON or OFF.

**TURBO: {SP}{ON|OFF}**
Syntax:[PRESet:] TURBO{ON|OFF}{;|NL}
[PRESet:] TURBO {?}{;|NL}
Purpose: Set and read theTURBO mode can be set to ON or OFF.
Description：In TURBO mode, output double maximum rated current in short time.

**FUSE:CC**
Syntax：[PRESet:] FUSE:CC {SP}{NR2 }{;|NL}
[PRESet:] FUSE: CC {?}{;|NL}
Purpose: Set and read fuse test current value.
Description：This command is to set or read the fuse test current value, In normal mode The range is 0 ~ 37.5A, In TURBO mode the range is 0 ~ 75A.

**FUSE: TIME**
Syntax: [PRESet:] FUSE: TIME {SP} }{NR2 }{;|NL}
[PRESet:] FUSE: TIME {?}{;|NL}
Purpose: Set and read fuse test time.
Description：This command is to set or read the fuse test time, the setting range is 0.1S ~ 9999.9S.

**FUSE: TYPE**
Syntax： [PRESet:] FUSE:TYPE {SP} }{TRIP|NTRIP }{;|NL}
[PRESet:] FUSE: TYPE {?}{;|NL}
Purpose: Set and read fuse type.
Description：This command is to set or read fuse TRIP or NTRIP.

**FUSE: REP**
Syntax:[PRESet:] FUSE:REP {SP} }{NR1 }{;|NL}
[PRESet:] FUSE: REP {?}{;|NL}
Purpose: Set and read the fuse repeat tests number of times.
Description：Set and read the fuse repeat tests number of times,the setting range is 0 ~ 255 times.

**TRIP: TIME**
Syntax: [PRESet:] TRIP: TIME {?}{;|NL}
Purpose: read the fuse fusing time.
Description：This command is when the test end, read the fuse fusing time.

**TRANS: TIME**
Syntax：[PRESet:] TRANS: TIME {?}{;|NL}
Purpose: read UPS Transfer time.
Description：This command is when the test end, read the UPS Transfer time.

**AVG**
Syntax: [PRESet:] AVG {SP} {NR2}{;|NL}
[PRESet:] AVG? {; |NL}
Purpose: Set and read back the average 1, 2, 4, 8, and 16.
Description：Set and read back the average 1, 2, 4, 8, and 16, the default is 1 without averaging.

**CPRSP**
Syntax: [PRESet:] CPRSP {SP} {NR2}{;|NL}
[PRESet:] CPRSP? {;|NL}
Purpose: Set and read back the CPRSP 0~7. the default is 0.

Description：CPRSP is set to the constant power response speed 0~4 for linear current constant power load, 0 is the fastest to adjust the load power response, 3 is the slowest 4~7 is the standard current constant power load 4 to adjust the load power The response is the fastest, and the slowest default is 0.

**CYCLE**
Syntax: [PRESet:] CYCLE {SP} {NR2}{;|NL}
[PRESet:] CYCLE? {;|NL}
Purpose: Set and read back the CYCLE ,can be set from 1 to 16.
Description：The set is 8 that are 8 Cycles to do the meter value processing.

**BW**
Syntax: [PRESet:] BW {SP} {AUTO | NR2} {; | NL}
[PRESet:] BW? {;|NL}
Purpose: Set and read the BW 0~15.
Description：Set and read the bandwidth from 0 to 15 bandwidth, 15 is the fastest, and the initial value is AUTO. In BW AUTO, set the load current to be 14 when the load current is less than 1/3 of the specification, and automatically set to 13 when it's greater than 1/3 of the specification.

**FREQ**
Syntax: [PRESet:] FREQ {SP}{AUTO|NR2}{;|NL}
[PRESet:] FREQ? {;|NL}
Purpose: Set and read the frequency.
Description: For frequency detect by automatically setting; FREQ AUTO; the system will detect the input voltage, if the input voltage frequency not between 40 and 440Hz that will be setting to DC.
For frequency setting to DC; FREQ 0; setting the frequency to 0 means DC.
For fix frequency setting to 50 or 60 or 400Hz; FREQ 50.0 or FREQ 60.0 or FREQ 400.0

**REP: COUNT**
Syntax: [PRESet:] REP: COUNT? {;|NL}
Purpose: use fuse test.
Description：Read the number of repeated tests.

**ITHD**：**PCT**
Syntax: ITHD:PCT {SP} {NR2} {; | NL}
ITHD:PCT ? {SP} {; | NL
Purpose: Set and read the percentage of the ITHD
Description: Set the percentage of ITHD of the current, range from 00% ~ 25%

**ITHD**：**CC**
Syntax: ITHD:CC {SP} {NR2} {; | NL}
ITHD:CC ? {SP} {; | NL}
Purpose: Set and read the current value
Description: Set the current value for the electronic load starts loading in ITHD mode

**IMODE**
Syntax: IMODE {SP} {CC | CR | 0 | 1} {; | NL}
IMODE ? {SP} {; | NL}
Purpose: Set and read the inrush current test
Description: Select constant current or constant resistance for loading in inrush current test.

**RSTART**
Syntax: RSTART {SP} {NR2} {; | NL}
RSTART ? {SP} {; | NL}
Purpose: Set and read the initial resistance of the inrush current test
Description: Set the initial resistance of the inrush current test

**RSTEP**
Syntax: RSTEP {SP} {NR2} {; | NL}
RSTEP ? {SP} {; | NL}
Purpose: Set and read the incremental resistance of the inrush current test
Description: Set the incremental resistance of the inrush current test

**RSTOP**
Syntax: RSTOP{SP} {NR2} {; | NL}
RSTOP ? {SP} {; | NL}
Purpose: Set and read the terminal resistance of inrush current test
Description: Set the terminal resistance of the inrush current test

**IPEAK**

Syntax: IPEAK {SP} {NR2} {; | NL}
IPEAK ? {SP} {; | NL}

Purpose: Set and read the peak current of inrush current test

Description: Set the peak current of the inrush current test, and the maximum value of the setting range is 5 times of the specification

**ICYCLE**

Syntax: ICYCLE {SP} {NR2} {; | NL}
ICYCLE ? {SP} {; | NL}

Purpose: Set and read the cycle of the inrush current test

Description: In the inrush current test AC mode, the setting unit of the current decreasing time is cycle, and the setting range is from 0.5 to 5.0

4.7.2. LIMIT Set and read the top and bottom of the Load judgment NG limit

**[LIMit:]CURRent:{ HIGH|LOW} or IH|IL**

Syntax: [LIMit]:CURRent:{ HIGH|LOW}{SP}{ NR2 }{;|NL}
[LIMit]:CURRent:{ HIGH|LOW} {?}{;|NL}
[IH|IL]{SP}{NR2}{;|NL}
[IH|IL} ?{;|NL}

Purpose：To set the upper/lower limit value of threshold current.

Description：This command is to set the lower limit value of threshold current. When load sink current is lower than this lower limit value or higher than the upper limit value, NG indicating light will come on to indicate〝NO GOOD〞.

**[LIMit:]POWer:{ HIGH|LOW} or WH|WL**

Syntax: [LIMit]:POWer:{ HIGH|LOW}{SP}{ NR2 }{;|NL}
[LIMit]:POWer:{ HIGH|LOW} {?}{;|NL}
[WH|WL]{SP}{ NR2 }{;|NL}
[WH|WL]?{;|NL}

Purpose:To set the upper/lower limit value of threshold power (W).

Description：This command is to set the upper/lower limit value of threshold power (WATT). When power (WATT) is lower than this lower limit value or higher than the upper limit value, NG indicating light will come on to indicate〝NO GOOD〞.

**[LIMit:] VOLtage:{ HIGH|LOW} or VH|VL**

Syntax: [LIMit] VOLtage:{ HIGH|LOW}{SP}{ NR2 }{;|NL}
[LIMit] VOLtage:{ HIGH|LOW} {?}{;|NL}
[VH|VL]{SP}{ NR2 }{;|NL}
[VH|VL}?{;|NL}

Purpose: To set the upper/lower limit value of threshold voltage.

Description: This command is to set the upper/lower limit value of threshold voltage. When input voltage is lower than the lower limit value or higher than the upper limit value, NG indicating light will come on to indicate〝NO GOOD〞.

**SVH | SVL**

Syntax: [LIMit:] {SVH | SVL}{SP}{ NR2 }{; | NL}
[LIMit:] { SVH | SVL} {?}{; | NL}

Purpose : To set the upper/lower limit value of short current.

Description: This command is to set the upper/lower limit value of short current. When short current is lower than the lower limit value or higher than the upper limit value, set the upper limit of the comparison voltage. When the input voltage is higher than the upper limit, it means that the short circuit test has failed.

4.7.3. STAGE Set and read the status of Load

**[STATe:] LOAD {SP}{ON | OFF}**

Syntax: [STATe:] LOAD {SP}{ON | OFF}{; | NL}
[STATe:] LOAD {?}{; | NL}

Purpose: Set and read the status of Sink Current or not

Description: This command is used for setting the status of Sink Current . When setting it to ON, the Load is going to sink current from appliance. When setting it to OFF, the Load would not act.

**[STATe:] MODE {SP}{CC | CR | CV | CP}**

Syntax: [STATe:] MODE {SP}{CC | CR | CV | CP}{; | NL}
[STATe:] MODE {?}{; | NL}

Purpose: Set and read the mode of LOAD

Description : Load is acting under these four modes as the following TABLE 4-9. When reading the Loading Operation mode, the return value 0 | 1 | 2 | 3 | 4 are meant to be CC | LIN | CR | CV | CP

| Mode | CC | LIN | CR | CV | CP |
|---|---|---|---|---|---|
| (value) | 0 | 1 | 2 | 3 | 4 |
| ELP/ACP series | V | V | V | V | V |

Table 4-9 module for each series

**[STATe:] PRESet {SP}{ON | OFF}**

Syntax: [STATe:] PRESet {SP}{ON | OFF}{; | NL}
[STATe:] PRESet {?} {; | NL}

Purpose: Set the left or right digit multi-function meter to display the programming load level.

Description: This command is for select the left 5 digit LCD display to show current setting or DWM.

Pres ON: To select the LCD display to shows current setting

Pres OFF: To select the LCD Display is 〝DWM〞

**[STATe:] SENSe{SP}{ON|OFF }**

Syntax: [STATe:] SENSe{SP}{ON|OFF }{;|NL}
[STATe:] SENSe {?} {;|NL}

Purpose: Set and read the Load voltage to read whether is carried by the VSENSE or not.

Description: This command is for setting the Load voltage to read whether is carried by VSENSE or INPUT Connector. When setting for ON, the voltage is got from VSENSE, and setting for OFF, the voltage is got from INPUT Connector.

**[STATe:] LEVel {SP}{A|B} or LEV {SP}{A|B}**

Syntax: [STATe:] LEVel {SP}{A|B }{;|NL}
[STATe:] LEVel {?} {;|NL}
[STATe:] LEV{SP}{A|B}{;|NL}
[STATe:] LEV{?} {;|NL}

Purpose:Set and read the A and B of Load

Description: LEV LOW is a low level value of current on CC mode. It is a low level value of resistance on CR mode. It is a low level value of voltage on CV mode. It is a low level value of power on CP mode.

**[ STATe:] CLRerr**

Syntax:[ STATe:] CLRerr {;|NL}

Purpose: Clear the error flag of ELP/ACP Series which during the period of working

Description:This command is for clearing the contents in the register of PROT and ERR. After implementation, the contents of these two registers will be “0”.

**[ STATe:] CLR: Meter**

Syntax: [ STATe : ] CLR: Meter { ;|NL}

Purpose: Clear the meter record value.

Description: Clear the maximum and minimum recorded values of the RMS measured by The meter.

**[ STATe:] ERRor**

Syntax:[ STATe:] ERRor {?} {;|NL}

Purpose:Read status register value.

Description:

1. ERR? : Read the register of ERR status. TABLE 4-10 shows the Corresponding number of ERR status
2. Use command CLR to clear the register of ERR status to be”0”

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

ERROR COMMAND

| BIT ID | BIT VALUE | REMARK |
|---|---|---|
| bit 5 | 0 = Off, 1 = Triggered | Command error (e.g. syntax error) |

Table 4-10 Error register

**[STATe:] NG?**

Syntax: [ STATe:] NG {?}{;|NL}

Purpose: Query if there have NG flag in this ELP/ACP Series

Description: Set command NG?to show the NG status. Set for “0” the LCD of NG(NO GOOD) will be put out .Set for ”1” the LCD will be lit. -

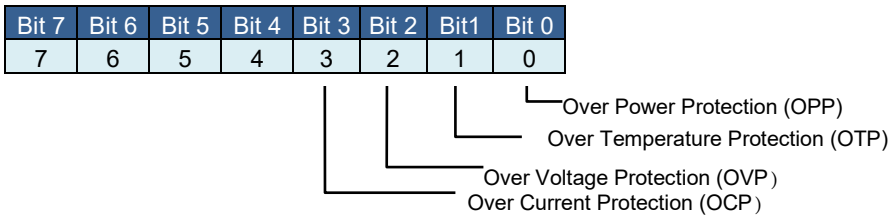
**[STATe:] PROTect?**

Syntax: [ STATe:] PROTect {?}{;|NL}

Purpose: Query if there have protection flag which had been set in this ELP/ACP Series

Description:

1. PROT? Means the status of Protection of ELP/ACP. “1” means OPP occurred.”4”means OVP. “8” means OCP. Table 4-11 shows the corresponding number of protection status
2. Use command CLR to clear the register of PROT status to be “0”




| BIT ID | BIT VALUE | REMARK |
|---|---|---|
| bit 0 | 0 = Off, 1 = Triggered | Over Power Protection (OPP) |
| bit 1 | 0 = Off, 1 = Triggered | Over Temperature Protection (OTP) |
| bit 2 | 0 = Off, 1 = Triggered | Over Voltage Protection (OVP) |
| bit 3 | 0 = Off, 1 = Triggered | Over Current Protection (OCP) |

Table 4-11 register of PROT status

**[STATe:] NGEABLE {ON|OFF}**

Syntax: [STATe:] NGEABLE {ON|OFF} {;|NL}

Purpose: To set the GO/NG check function enable or disable.

Description: To set the function of NG judgment opens when POWER ON. When setting for POWER OFF, the function of NG judgment will not be implemented.

**[STATe:] START**

Syntax: [STATe:]START {;|NL}

Purpose: Set for Load to implement the test.

Description: Set for Load to implement the test, and according to TEST CONFIG (TCONFIG), the Load will start to test the items and parameters which are Required

**[STATe:] STOP**

Syntax: [STATe:] STOP {;|NL}

Purpose: Set for Load to stop the test

Description: Set for Load to stop the test

**[STATe:] TESTING?**

Syntax: [STATe:]TESTING {?} {;|NL}

Purpose: Check whether the current electronic load is in the test state.

Description: Check whether the current electronic load is in the test state, 1: testing 0: Test end.

Example: START
TESTING?
NG?
STOP

**[STATe:] SYNCronize**

Syntax: [STATe:]SYNCronize {SP}{ON|OFF} {;|NL}
[STATe:]SYNCronize {?} {;|NL}

Purpose: Load sync signal.

Description: Electronic load sync signal,1: SYNC ON 0: SYNC OFF。

4.7.4. SYSTEM Set and Read the Status of ELP/ACP Series

**[SYStem:] RECall{ SP }m{ ,n }**

Syntax: [ SYStem:] RECall{ SP }m{;|NL}

Purpose: Recall the status of Loading which had been saved in the Memory

Description: This command is for recalling the status of Load which had been saved In the Memory.

m(STATE)=1~150。

For Example

RECALL 2 → Recall the status of Loading which had been saved in the 2nd of the memory

**[SYStem:] STORe{SP}m{,n}**

Syntax:[SYStem:] STORe{SP}m{;|NL}

Purpose：Save the status of Loading to the Memory

Description：This command is for saving the status of Loading to the Memory.

m(STATE)=1~150

For Example

STORE 2 → Save the status of loading which had been saved in the 2nd of memory.

| | ELP/ACP Series |
|---|---|
| STATE(n) | 150 |

**[SYStem:] NAME**?

Syntax:[SYStem:] NAME {?} {;|NL}

Purpose: Read the model number of Load

Description: This command is for reading the model number of Load. If no module is Operating, the display will be lit “NULL”, or it will be lit the model number as table 4-12:

| MODEL |
|---|
| ELP/ACP 3750 |
| ELP/ACP 2800 |
| ELP/ACP 1875 |
| ELP/ACP 3750HV |
| ELP/ACP 2800HV |

Table 4-12 MODEL NUMBER

**[SYStem:] REMOTE**
Syntax: [SYStem:] REMOTE {; | NL}
Purpose: Command to enter the REMOTE status (only for RS232)
Description: This command is for controlling the RS232

**[SYStem:] LOCAL**
Syntax: [SYStem:] LOCAL {; | NL}
Purpose: Command to exit the REMOTE status (only for RS232)
Description: This command is for finishing the RS232

4.7.5. MEASURE Measure the actual current and voltage value of Load

**MEASure:CURRent**?
Syntax: MEASure:CURRent{?}{; | NL}
Purpose: Read the current which is loading of Load
Description: Read the five numbers of current meters, and the unit is Ampere (A)

**MEASure:VOLTage**?
Syntax: MEASure:VOLTage{?}{; | NL}
Purpose: Read the voltage which is loading of Load
Description：Read the five numbers of current meters, and the unit is Voltage (V)

**MEASure:POWer?**
Syntax: MEASure:POWer{?}{; | NL}
Purpose: Read the power which is loading of Load
Description: Read the five numbers of current meters, and the unit is Watt (W)

**MEASure:VAR?**
Syntax: MEASure:VAR {?}{; | NL}
Purpose:Read the reactive power which is loading of Load.
Description: Read the reactive power which is loading of Load, Unit is Var.

**MEASure:VA?**
Syntax: MEASure:VA {?}{; | NL}
Purpose: Read the apparent power which is loading of Load.
Description: Read the apparent power which is loading of Load, Unit is VA

**MEASure:V_THD?**
Syntax:MEASure:V_HD {?}{;|NL}
Purpose:Read the Voltage harmonic distortion of the Load.
Description:Read the Voltage harmonic distortion of the Load.

**MEASure:I_THD?**
Syntax:MEASure:I_HD {?}{;|NL}
Purpose:Read the current harmonic distortion of the Load.
Description:Read the current harmonic distortion of the Load.

**MEASure:V_HARM?**
Syntax：MEASure：V_HARM {?}{;|NL}
Purpose：Read the Voltage harmonic distortion order of the Load.
Description：Read the Voltage harmonic distortion order of the Load.

**MEASure:I_HARM?**
Syntax:MEASure:I_HARM {?}{;|NL}
Purpose:Read the current harmonic distortion order of the Load.
Description:Read the current harmonic distortion order of the Load.

# Chapter 5 Applications

This chapter details the basic operating modes along with some common applications in which the ELP/ACP series Electronic Load are used.

## 5-1. Local sense connections

Local sensing is used in applications where the lead lengths are relatively short, or where load regulation is not critical. When connected in local sense mode the 5 digit voltage meter of the ELP/ACP series Electronic load measures the voltage at its DC input terminals. The connecting leads between the DUT and the Electronic Load should be bundled or tie wrapped together to minimize inductance.

Fig 5-1 illustrates a typical set up with the electronic load connected to the DC power supply.

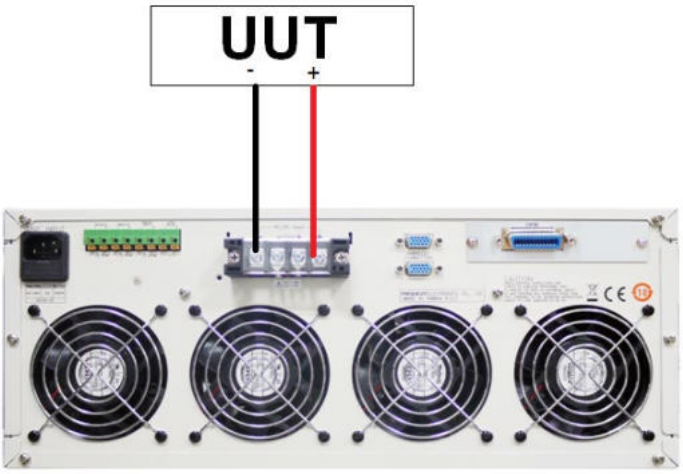



Fig 5-1 Local voltage sense connections

## 5-2. Remote sense connections

Remote sensing compensates for the voltage drop in applications that require long lead lengths. It is useful under low voltage high current conditions. The remote voltage sense terminals (Vs+) and (Vs-) of the load are connected to (+) and (-) output of the AC/DC Source. Be sure to observe the correct polarity or damage may occur. The power and sense cables should be bundled or tie wrapped together to minimize inductance.

Fig 5-2 illustrates a typical set up with the electronic load connected for remote sense operation.

If V-sense is set to 'ON' and the sense terminals are connected to the DUT the load will check and compensate for all voltage drops. The maximum voltage sense compensation is the same as the rating of the ELP/ACP.

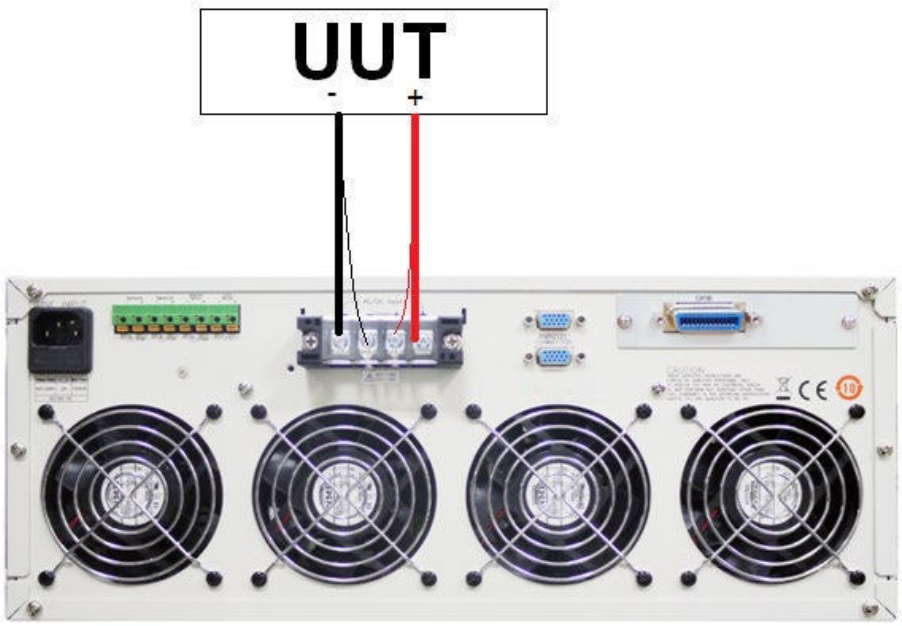



Fig 5-2 Remote voltage sense connections

## 5-3. Constant Current mode and LIN mode application

The Constant Current (CC) mode is ideal for testing the Load Regulation, Cross Regulation, Output Voltage of the power supply under test. The CC mode can also be used to test the Discharge Characteristics and the Life Cycle of cells and battery packs. In CC operation the ELP/ACP series can operate as a static load with switchable high and low current levels. It is also possible to operate the load enabling the user to adjust sink current with time.

**Linear C.C. Mode**
During Linear C.C. mode, the load current input into ELP/ACP Series High Power Electronic Load depends on the current setting regardless of the input voltage, e.g., the current setting remains unchanged. The load input current signal will follow input voltage signal that is useful for step wave-form and square wave-form device.

The LIN mode is within a AGC circuit and the control signal will response with input voltage. We call it LIN mode.
The AGC circuit produces a constant amplitude output signal so long as the amplitude of the input signal exceeds an adjustable reference voltage applied to the peak detector. The reference voltage may be changed to change the range of input voltage resulting in a constant-amplitude output.
The AGC circuit responds almost instantly to control a sudden increase in input voltage.

The AGC circuit is especially suitable for Step waveform, Square waveform and the input voltage with distortion waveform.

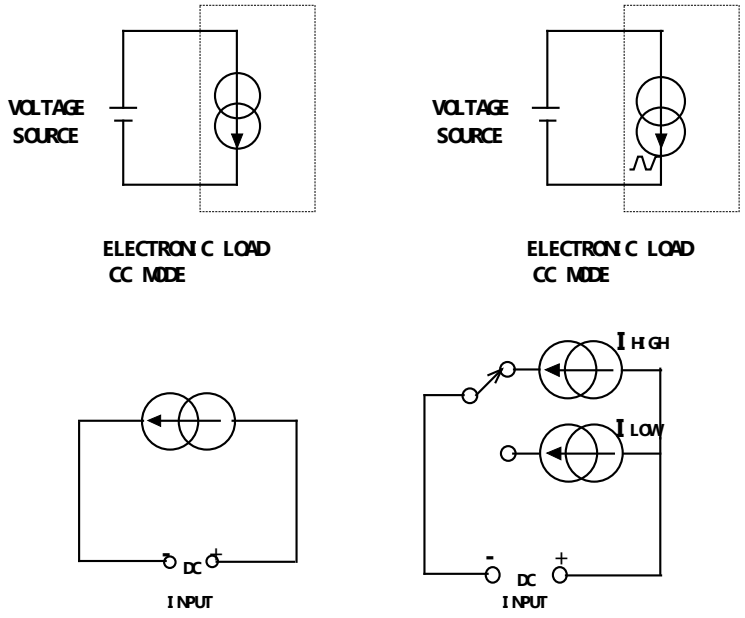



Fig 5-3 constant CURRENT &  mode application

## 5-4. Constant Resistance mode application

Operating in Constant Resistance mode is useful for testing both voltage and current sources. The CR mode is particularly suited for the ‘soft start’ of power supplies. This is explained in more detail below.

### 5.4.1 Power supply power up sequence

In constant current mode the demand at initial ‘Load ON’ of the preset current value is almost instantaneous. This might cause the Device under Test (DUT) problems meeting the relatively high current demand at initial switch on. .

For example: A 5V/50A output power supply may not be able to deliver 50A over its entire start-up range of 0-5 volts. In many cases the power supply’s short circuit or over current protection circuit cause the power supply to shut down. This is because the power supply is trying to deliver the 50A at a voltage level that is too low.

The answer to this problem is not to use CC mode but to use CR mode instead. This is because in CR mode the current and voltage ramp up together providing a ‘soft start’ when compared to standard CC mode.

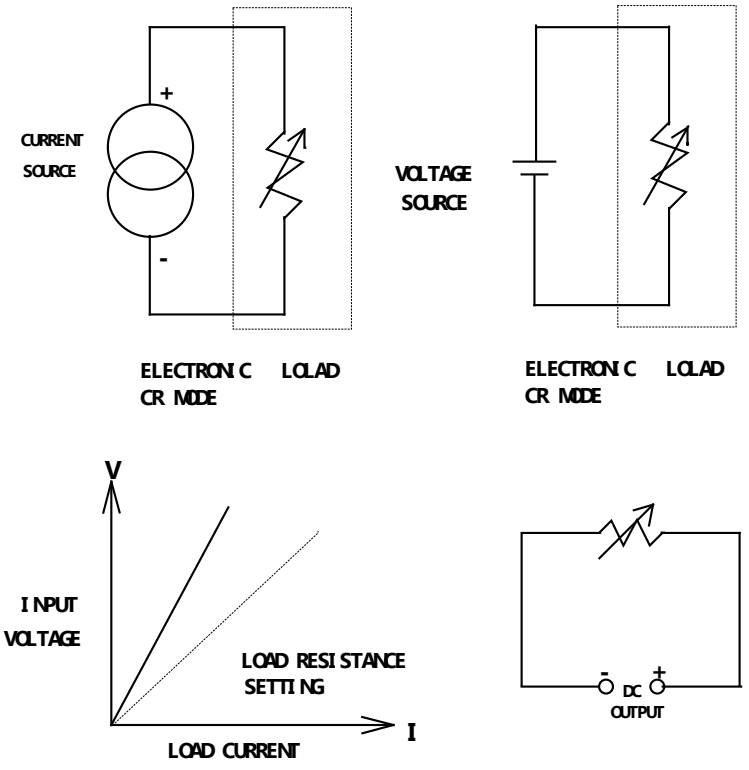



Fig 5-4 Constant Resistance mode Application

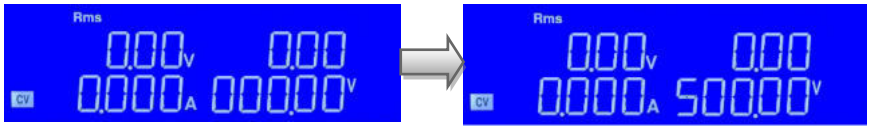
## 5-5. Constant Voltage mode application

In Constant Voltage (CV) operation the load will attempt to sink as much current as required in order to reach the set voltage value. CV operation is useful in checking the load regulation of dc current sources. The CV mode is also ideal for characterizing the current limit of dc power supplies. These application areas are explained a little more below.

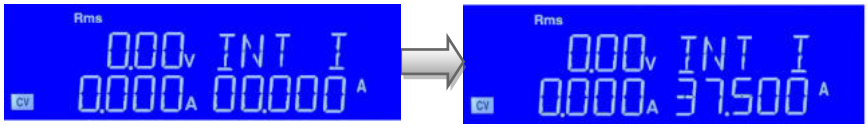
### 5.5.1 Current source testing.

A common application for a dc current source is as a battery charger. Most battery chargers are designed to automatically adjust their charging current according to the battery voltage. In CV mode the electronic load will sink the current that is needed to reach the desired voltage. The CV mode is therefore ideal for checking the charge current at a particular voltage level.

Set the CV voltage value, press the MODE key to CV MODE, press the Preset key, use the knob and key to set the CV voltage value, set the voltage range from 0 to 500V, and adjust the different voltage values according to the EUT.




Set the CV starting current, press the MODE key to CV MODE, press the Preset key to INT I, use the knob and key to set the starting current, set the current range from 0 to 37.5A, and adjust the different current values according to the EUT.




If the battery charger is tested at a number of different voltage levels in CV mode a current curve can be recorded. Thus the battery charger's load regulation can be checked during development, production and batch testing.

### 5.5.2 Power supply current limit characterization

The current limit is a necessary function for power supplies. The fold back current limit curve is very common for fixed output switching power supplies. The constant current limit curve is more popular for adjustable laboratory power supplies.

It is very difficult or impossible to find the current limit curve by CC or CR mode. However it becomes simple by using CV mode. The user sets the CV voltage and Records the output current. Plotting the current measurements against the voltage Settings result in the output current limit curve of a power supply (Figure 5-5).

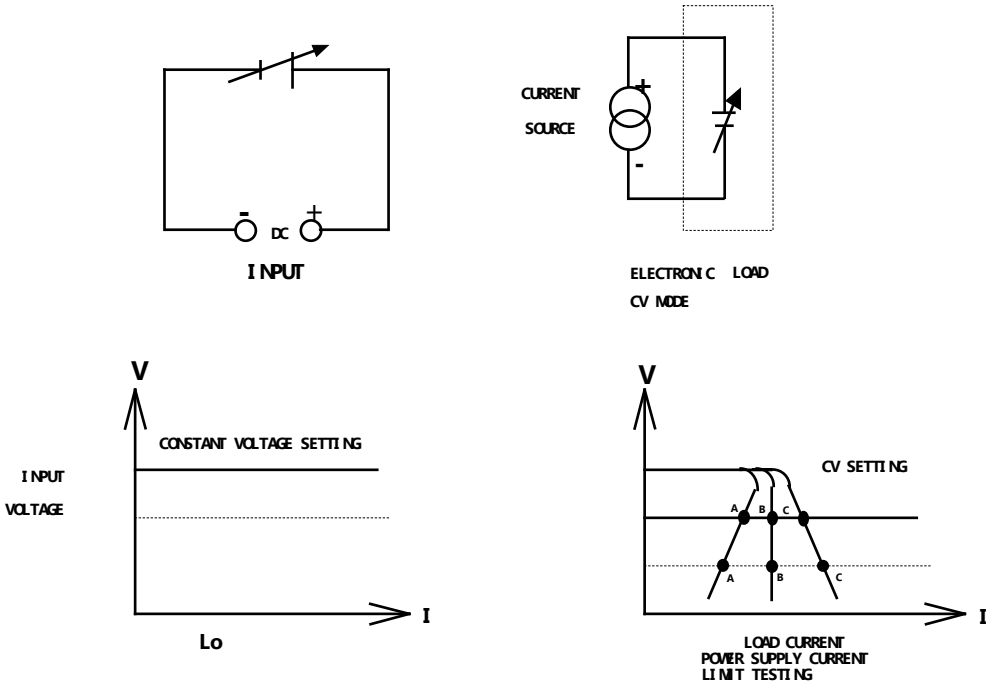



Fig 5-5 Constant Voltage mode application

## 5-6. Constant Power mode application

### 5.6.1 Battery Evaluation

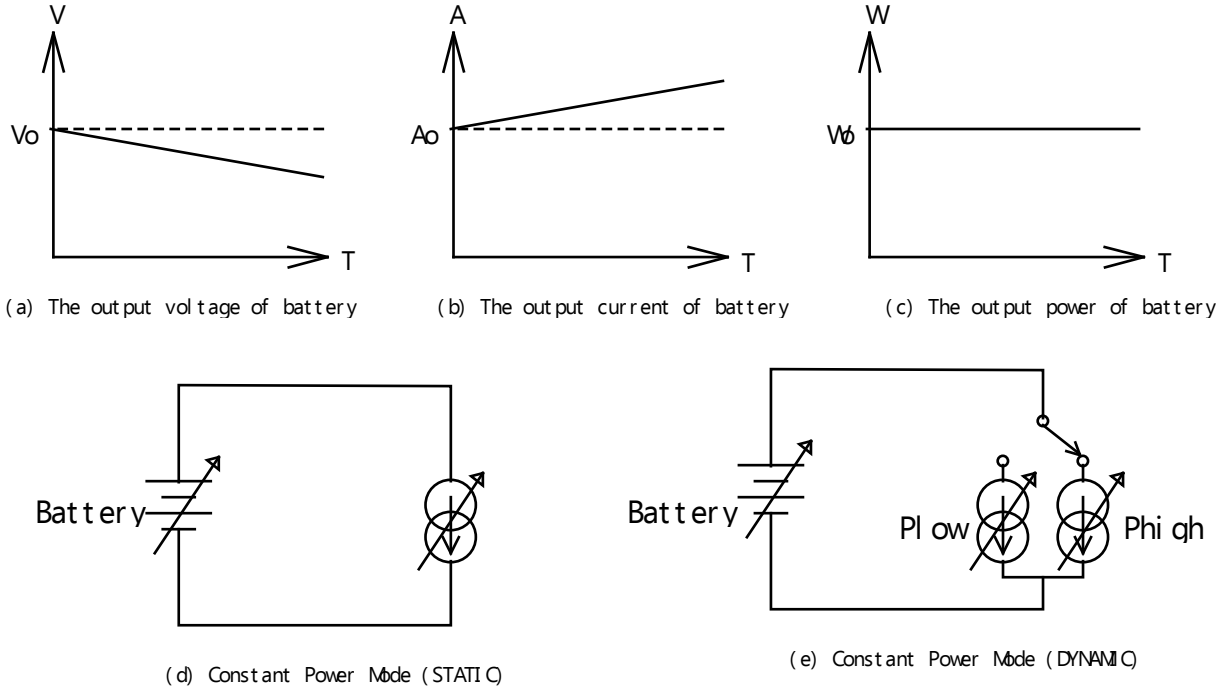
Primary or secondary batteries are the power source for a wide range of portable electronics products, such as notebook computers, video cameras and mobile phones. To ensure long usage times and customer satisfaction the battery pack should be able to provide a constant power for the longest time possible.

It can be measured that the output voltage of a battery will drop over time (Fig 5-6a). The rate of voltage decay depends on a number of factors including duty cycle, chemistry type, battery age and ambient temperature.

So to keep the device powered for the longest possible time the battery must be able to provide a stable power output regardless of output voltage (Fig 5-6c). In order to maintain a constant power the output current will need to increase over time to compensate for the reducing voltage (Fig 5-6b).

Operating the ELP/ACP series electronic load in CP mode is ideal for testing the characteristics of a battery. This is because as the battery voltage drops the load current will automatically increase in order to keep the CP setting. By logging sink values against time the test engineer can also measure the battery's energy capacity at various discharge rates.

The ELP/ACP series also features an adjustable Load OFF setting. This allows a voltage level to be set so that the electronic load automatically stops sinking power upon reaching this preset voltage. This can be used to ensure the battery is not subjected to a damaging deep discharge.




(a) The output voltage of battery (b) The output current of battery (c) The output power of battery

(d) Constant Power Mode (STATIC) (e) Constant Power Mode (DYNAMIC)

Fig 5-6 CONSTANT POWER MODE APPLICATION

## 5-7. Battery discharge test application

ELP/ACP series AC & DC electronic load has built-in new TYPE1~TYPE3 battery discharge test, You can select the desired battery test mode, the test results can be directly displayed on the LCD display for battery AH capacity, the voltage value after discharge and the cumulative Discharge time.

### 5.7.1. Constant Current Discharge Test

1. Set mode is constant current


2. Set discharge current


3. Set the crest factor

This function is only used when testing UPS discharge. When testing the battery Discharge is no CF function.


4. Set the Phase Lead or lag

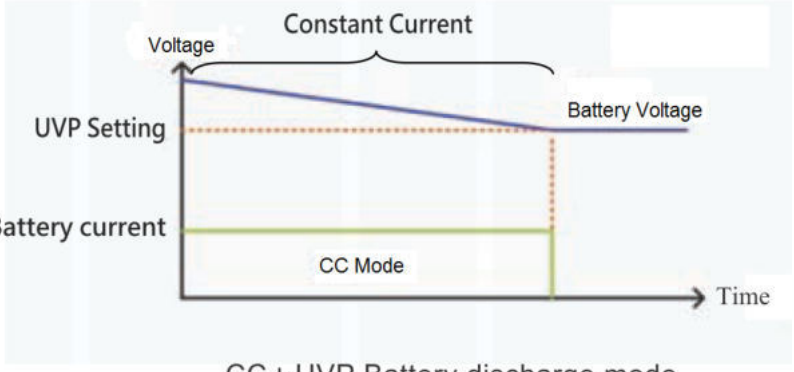
This function is only used when testing UPS discharge. When testing the battery Discharge is no Phase Lead or lag function.


5. Set the Phase angle

This function is only used when testing UPS discharge. When testing the battery Discharge is no Phase angle function.


6. Set the discharge time


7. Set the UVP Voltage


CC + UVP Battery discharge mode

Type 1

5.7.2. Constant Power Discharge Test

1. Set mode is constant Power


2. Set the discharge power

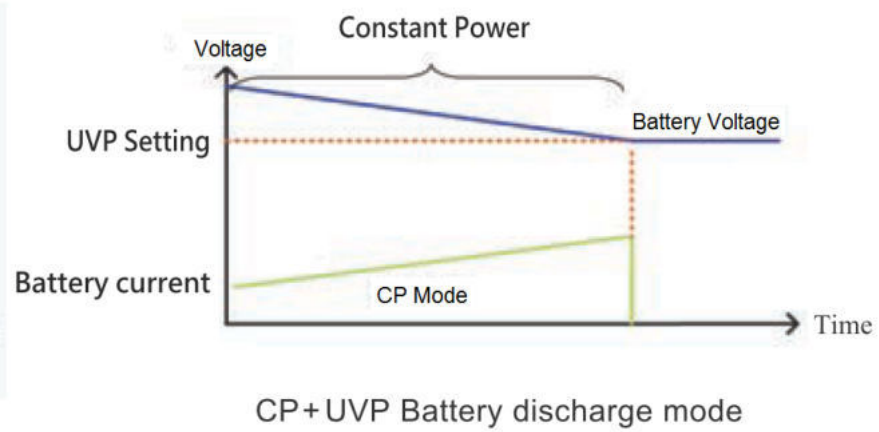

3. Set the crest factor
This function is only used when testing UPS discharge. When testing the battery Discharge is no CF function.


4. Set the Phase Lead or lag
This function is only used when testing UPS discharge. When testing the battery Discharge is no Phase Lead or lag function.


5. Set the Phase angle
This function is only used when testing UPS discharge. When testing the battery Discharge is no Phase angle function.


6. Set the discharge time


7. Set the UVP Voltage

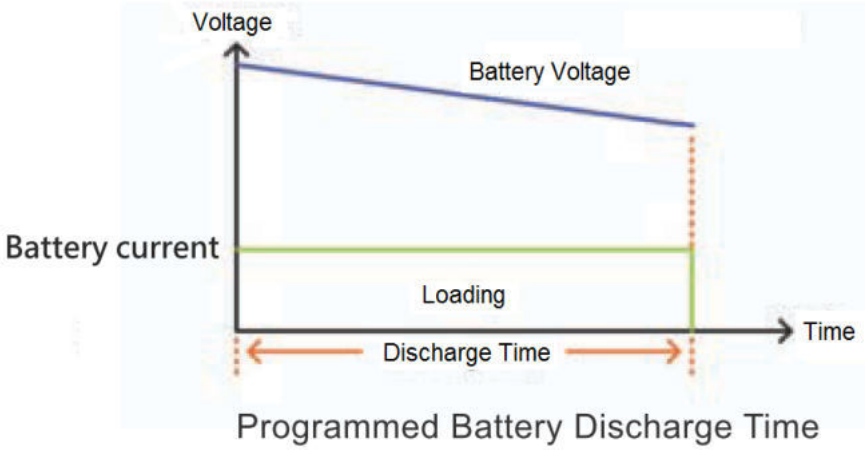




CP+UVP Battery discharge mode

Type 2

5.7.3. Setting the discharge time test

Set the discharge time from 1 to 99999 seconds. When the discharge time reaches the set time, The discharge will automatically stop and the measured battery capacity and voltage will be Monitor Display.


Programmed Battery Discharge Time

Type 3

## 5-8. Current protection component test

Current protection component include Fuse, Circuit breakers and a new PTC Resettable Fuse etc.., its function is when the circuit current exceeds the design of the rated value, that Is, if the load exceeds the design of the current capacity, the circuit will be disconnected, in Order to avoid overheating, even fire. At the abnormal situation occurs it must be able to Provide circuit break protection capability, while within the normal current range it must Continue to provide current.

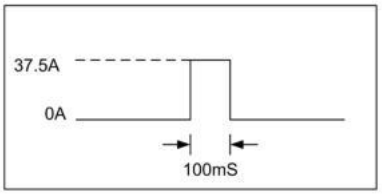
Fuse

Breaker

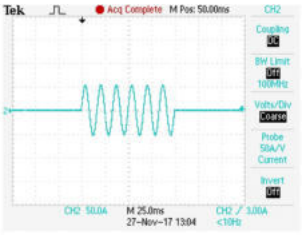
PTC

| MODEL | | ELP/ACP 3750 | ELP/ACP 2800 | ELP/ACP 1875 |
|---|---|---|---|---|
| Power (W) | | 3750 W | 2800W | 1875 W |
| Current(Ampere) | | 37.5 Arms / 112.5Apeak | 28 Arms / 84Apeak | 18.75 Arms / 56.25Apeak |
| Voltage(Volt) | | 50~350Vrms / 500Vdc | | |
| **Fuse Test mode** | | | | |
| Max. Current | Turbo OFF | 37.5Arms | 28.0Arms | 18.75Arms |
| | Turbo ON | 75.0Arms (x2) *2 | 56.0Arms | 37.5Arms |
| Trip & Non-Trip Time | Turbo OFF | 0.1~9999.9sec. | | |
| | Turbo ON | 0.1~1.0sec. | | |
| Meas. Accuracy | | ±0.003 Sec. | | |
| Repeat Cycle | | 0~255 | | |
| **Short/OPP/OCP Test Function** | | | | |
| Short Time | Turbo OFF | 0.1S ~ 10Sec. Or Cont. | | |
| | Turbo ON | 0.1S ~ 1Sec | | |
| OPP/OCP Step Time | Turbo OFF | 100ms | | |
| | Turbo ON | 100ms, up to 10 Steps | | |
| OCP Istop | Turbo OFF | 37.5Arms | 28.0Arms | 18.75Arms |
| | Turbo ON | 75.0Arms | 56.0Arms | 37.5Arms |
| OPP Pstop | Turbo OFF | 3750W | 2800W | 1875W |
| | Turbo ON | 7500W | 5600W | 3750W |


Turbo OFF, Short 100mS 37.5A

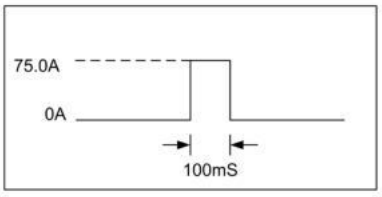



Turbo OFF, Short 100mS 37.5A setting

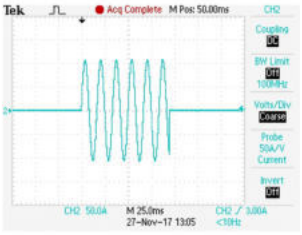



Turbo OFF, Short 100mS 37.5A


Turbo ON, Short 100mS 75.0A




Turbo ON, Short 100mS 75.0A setting




Turbo ON, Short 100mS 75.0 A

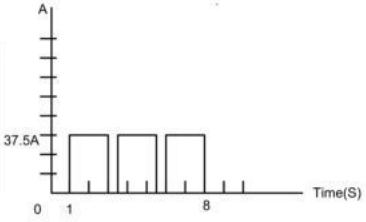
The current protection component has usually a product relationship of current and time, That is, the greater the current through the current protection component, the shorter the Reaction time to protect the circuit.

Due to this feature, the ELP/ACP series AC & DC electronic load, in particular for the Verification of current protection components, has developed a Fuse Test function to test And verify such protection element with an electronic load of rated current and power.

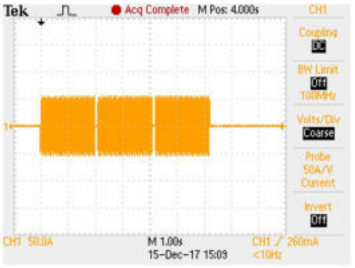
Basically, Fuse test has Trip (fuse) and Non-Trip (no fuse) 2 types.
Fuse Test setting parameters include test current (Istart), test time (Time), test repeat Number REPEAT TIME etc.

In the Trip fuse test, it is used to test when the current occurs too large abnormalities must Be able to provide the protection of the circuit break that means current protection Components need the fuse action, therefore the test current needs to be greater than the Fuse current rating.
For the trip test mode of the ELP/ACP series AC & DC electronic load, the LCD shows the Repeat times and the blow time of current protection component after the tested fuse blows.
In the Non-Trip fuse test, the current protection component is required to achieve non-blow Action, so the test current needs to be lower than the fuse current rating that is used to Verify the fuse must not blow during normal current range.
For the Non-trip test mode of the ELP/ACP series AC&DC electronic load, the LCD display Shows Repeat number information after the tested fuse does not blow.


Turbo : OFF, Fuse mode

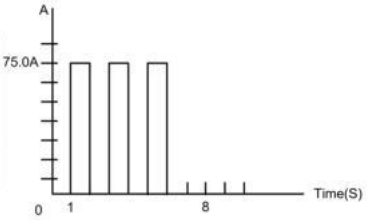



setting : Turbo : OFF, Fuse ON,
CC pulse 37.5A, 2S

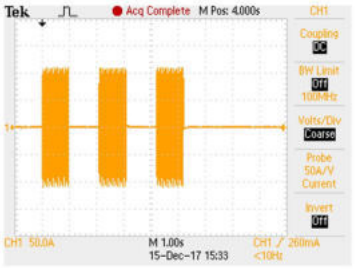



Turbo : OFF, Fuse ON,
CC pulse 37.5A, 2S


Turbo : ON, Fuse mode



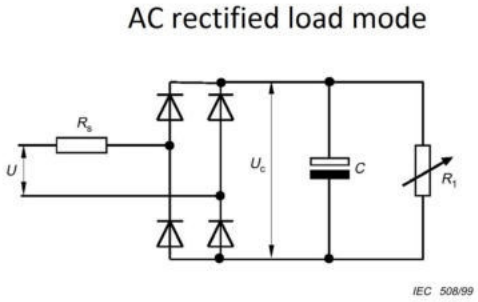

setting : Turbo : ON, Fuse ON,
CC pulse 75.0A, 1S

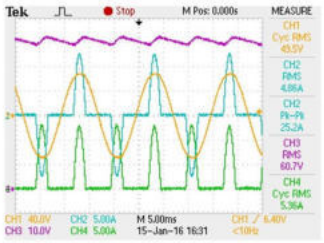



Turbo : ON, Fuse ON,
CC pulse 75A, 1S

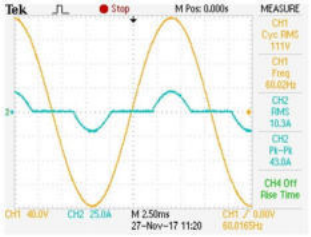
## 5-9. AC rectified load simulation

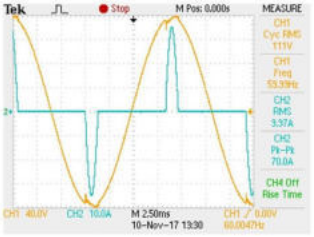
ELP/ACP AC&DC electronic load AC rectified load mode is fully compliance with the IEC test Specification requirements for the UPS, IEC 62040-3 UPS Efficiency Measurement Nonlinear and IEC 61683 Resistive Plus Non-Linear, respectively, ELP/ACP AC rectifier load mode Is used CC + CR load mode and maintain current THD at 80%, to simulate the actual Electronic device which is connecting the UPS. ( IEC62040-3 UPS Efficiency Measurement non-Linear and IEC61683 Resistive Plus Non-Linear)



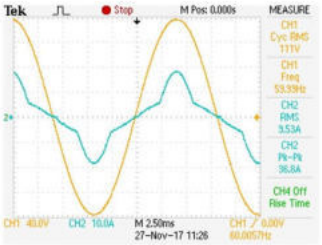



V/A Waveform

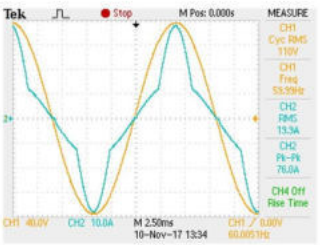




UPS test Non-Linear CC mode



110V, 5A + 22ohm Test Waveform



110V, 10A + 11ohm Test Waveform

PV Inverter test Non-Linear CC + Resistive mode(CC+CR)

## 5-10. Parallel operation

It is possible to operate load in parallel if the power and/or current capability of a single ELP/ACP series load is not sufficient.

The positive and negative outputs of the power supply are connected individually to each load module as shown in the Fig 5-7 below. The setting is made at each individual load module. The total load current is the sum of the load currents being taken by each load.

Note: 1. the electronic load only may carry on the parallel operation under the fixed electric current pattern.
2. The electronic load do not use under series connection.

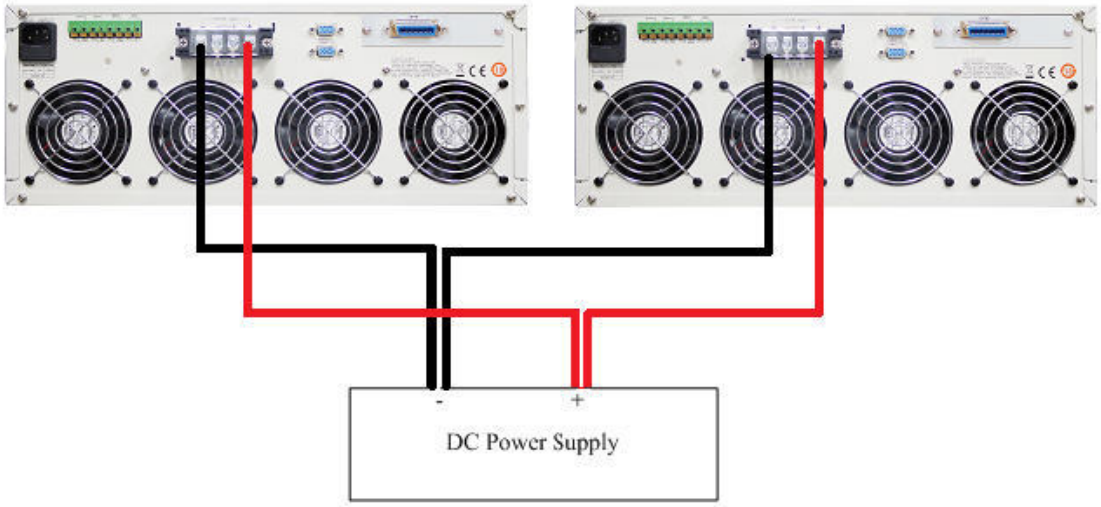



Fig 5-7 ELP/ACP series load parallel operation

## 5-11.(Inrush Current)

Supporting the capacitive load of the power supply at startup and the sudden load access test during operation to verify the current when the appliance is turned on and when the appliance is suddenly connected, Is the Inverter output voltage transient response stable, as shown in Figure 5-8 and 5-9.

| MODEL | ELP/ACP 3750 | ELP/ACP 2800 | ELP/ACP 1875 | ELP/ACP 3750HV | ELP/ACP 2800HV |
|---|---|---|---|---|---|
| **Programmable Inrush current simulation: Istart - Istop / Tsep** | | | | | |
| Istart, Inrush Start Current | 0~75A | 0~56A | 0~37.5A | 0~56A | 0~37.5A |
| Inrush Step time | 0.1mS~100mS | | | | |
| Istop, Inrush stop current | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| **Programmable Surge current simulation: S1/T1 - S2/T2 - S3/T3** | | | | | |
| S1 and S2 Current | 0~75A | 0~56A | 0~37.5A | 0~56A | 0~37.5A |
| T1 and T2 Time | 0.01S~0.5Sec. | | | | |
| S3 Current | 0~37.5A | 0~28A | 0~18.75A | 0~28A | 0~18.75A |
| T3 Time | 0.01S ~9.99Sec. Or Cont. | | | | |

| MODEL | ELP/ACP 7500 | ELP/ACP 11250 |
|---|---|---|
| **Programmable Inrush current simulation: Istart - Istop / Tsep** | | |
| Istart, Inrush Start Current | 0~150A | 0~225A |
| Inrush Step time | 0.1mS~100mS | |
| Istop, Inrush stop current | 0~75A | 0~112.5A |
| **Programmable Surge current simulation: S1/T1 - S2/T2 - S3/T3** | | |
| S1 and S2 Current | 0~150A | 0~225A |
| T1 and T2 Time | 0.01S~0.5Sec. | |
| S3 Current | 0~75A | 0~112.5A |
| T3 Time | 0.01S ~9.99Sec. Or Cont. | |

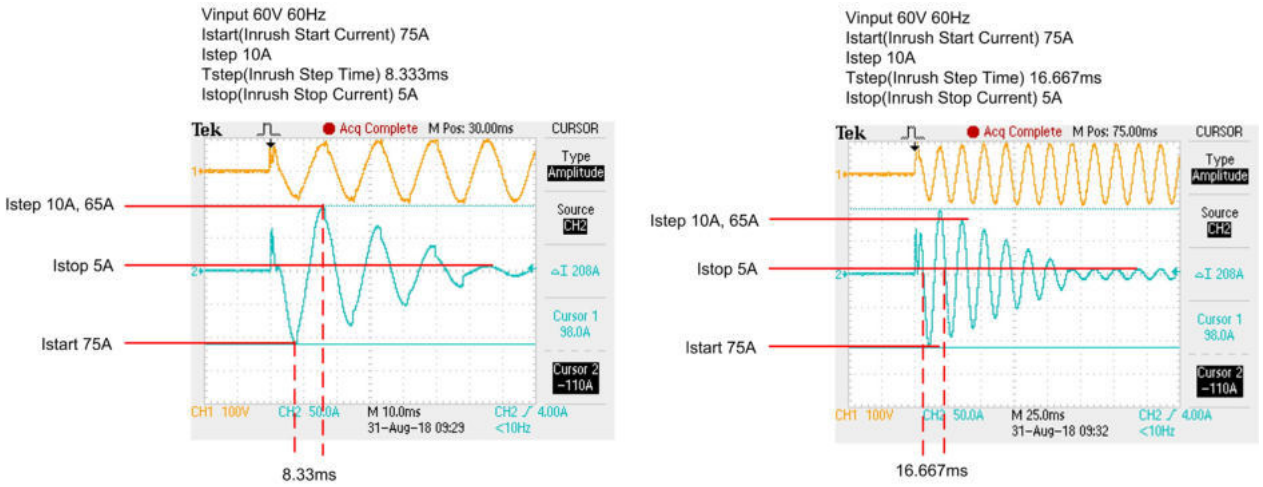



Fig 5-8 Inrush Current test at power on

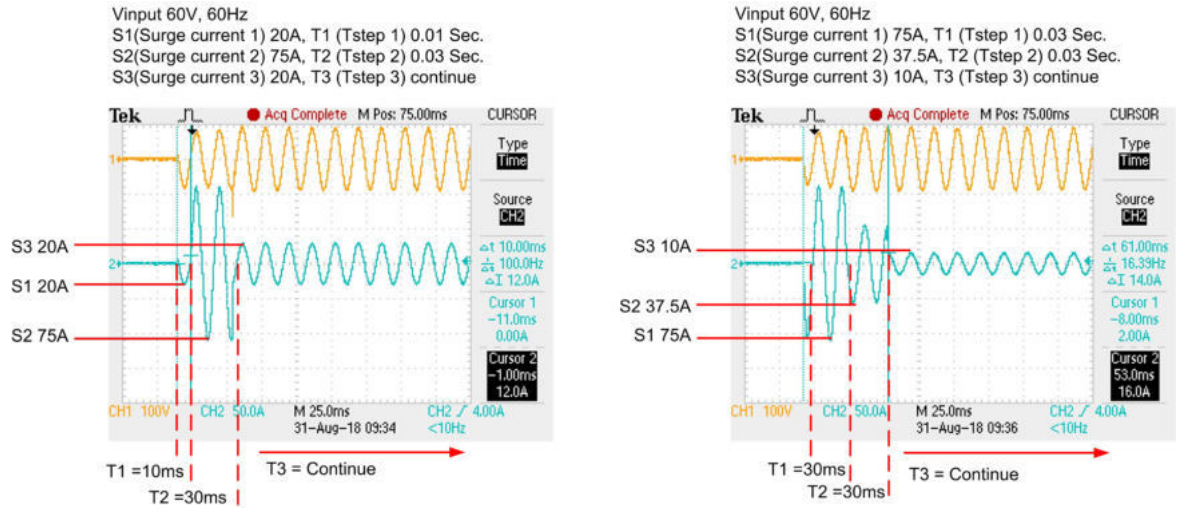



Fig 5-9 Surge Current test when the appliance is connected

## 5-12. Power Supply OCP testing

### 5.12.1. OCP Manual control

Example:

5.12.1.1. First, press Limit Key function to setting I_Hi 8A.


5.12.1.2. Press Limit Key function to setting I_Lo 0A.


5.12.1.3. Setting OCP test, press OCP key to the next step.

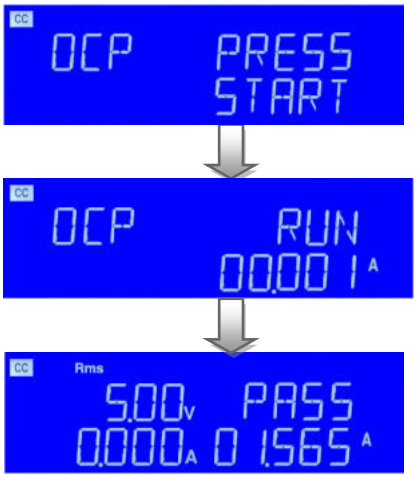

5.12.1.4. Setting start load current 0A, press OCP key to the next step.


5.12.1.5. Setting step load current 0.01A, press OCP key to the next step.


5.12.1.6. Setting stop load current 5A, press OCP key to the next step.


5.12.1.7. Setting OCP VTH 5.00V, press OCP key to the next step.

5.12.1.8. Press START/STOP test key.




5.12.1.9. The UUT's output voltage drop-out lower than the threshold voltage (V-th Setting), and the OCP trip point is between I_Hi and I_Lo limitation, then Right upper 5 digits LCD display will shows "PASS", otherwise shows "FAIL".


5.12.2. Remote control OCP

EX:

| | |
|---|---|
| REMOTE | （Set Remote） |
| TCONFIG OCP | （Set OCP test） |
| OCP:START 0.1 | （Set start load current 0.1A） |
| OCP:STEP 0.01 | （Set step load current 0.01A） |
| OCP:STOP 2 | （Set stop load current 2A） |
| VTH 3.0 | （Set OCP VTH 3.0V） |
| IL 0 | （Set current low limit 0A） |
| IH 2 | （Set current high limit 2A） |
| NGENABLE ON | （Set NG Enable ON） |
| START | （Start OCP testing） |
| TESTING? | （Ask Testing? 1：Testing，0：Testing End） |
| NG? | （Ask PASS/FAIL?，0：PASS，1：FAIL） |
| OCP? | （Ask OCP current value） |
| STOP | （Stop OCP testing） |

## 5-13. Power Supply OPP testing

### 5.13.1. OPP Manual control

Example:

5.13.1.1. First, press Limit Key function to setting W_Hi 30.00W..


5.13.1.2. Press Limit Key function to setting W_Lo 0W..


5.13.1.3. Setting OPP test, press OPP key to the next step.

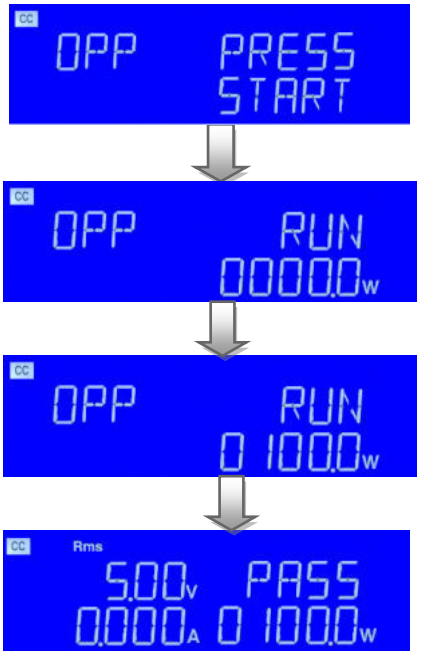

5.13.1.4. Setting start load watt 0W, press OPP key to the next step.


5.13.1.5. Press up key, set step load watt 5W, press OPP key to the next step.


5.13.1.6. Press up key, set stop load watt 100W, press OPP key to the next step.


5.13.1.7. Setting OPP VTH 5.00V，press OPP key to the next step.

5.13.1.8. Press START/STOP Test key.




5.13.1.9. The UUT's output voltage drop-out lower than the threshold voltage (V-th Setting), and the OPP trip point is between W_Hi and W_Lo limitation, Then Right upper 5 digits LCD display will shows "PASS", otherwise Shows "FAIL".


5.13.2. Remote control OPP

EX：

| | |
|---|---|
| REMOTE | （Set Remote） |
| TCONFIG OPP | （Set OCP test） |
| OPP:START 3 | （Set start load watt 3W） |
| OPP:STEP 1 | （Set step load watt 1W） |
| OPP:STOP 5 | （Set stop load watt 5W） |
| VTH 3.0 | （Set OPP VTH 3.0V） |
| WL 0 | （Set watt low limit 0W） |
| WH 5 | （Set watt high limit 5W） |
| NGENABLE ON | （Set NG Enable ON） |
| START | （Start OPP testing） |
| TESTING? | （Ask Testing? 1：Testing，0：Testing End） |
| NG? | （Ask PASS/FAIL?，0：PASS，1：FAIL） |
| OPP? | （Ask OPP watt value） |
| STOP | （Stop OPP testing） |

## 5-14. SHORT testing

### 5.14.1. SHORT Manual control

Example:

5.14.1.1. Setting SHORT test, press Short key to the next step.


5.14.1.2. Press UP key, setting Short time to 10000ms, press Short key to the Next Step.


5.14.1.3. Press down key, setting V-Hi voltage to 6.00V, press Short key to the Next Step.


5.14.1.4. Press down key, setting V-Lo voltage to 0V, press Short key to the Next Step.


5.14.1.5. Press START/STOP test key.


5.14.1.6. Short test finish, the UUT's drop voltage is between V_Hi and V_Lo Limitation, then right upper 5 digits LCD display will shows "PASS"

5.14.1.7. The UUT's not drop voltage is between V_Hi and V_Lo limitation, LCD display will shows FAIL.


5.14.2. Remote control SHORT

EX：

| | |
|---|---|
| REMOTE | （Set Remote） |
| TCONFIG SHORT | （Set SHORT test） |
| STIME 1 | （Set short time 1ms） |
| START | （Start　SHORT testing） |
| TESTING? | （Ask Testing? 1：Testing，0：Testing End） |
| STOP | （Stop SHORT testing） |

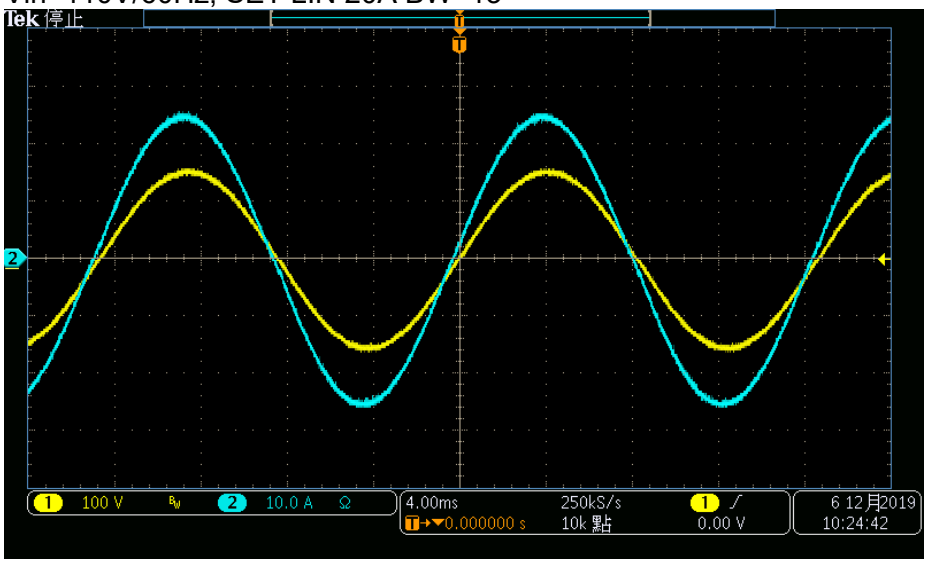
## 5-15. BW Setting

In order to match the bandwidth of different UUTs, the ELP/ACP series electronic load is designed with a settable bandwidth function.
The setting range is 0 ~ 15, where 0 is the slowest and 15 is the fastest.
When the bandwidth of the UUT does not match the bandwidth of the electronic load, there will be oscillations.
Please adjust the BW setting value appropriately to meet the UUT response speed.

VIN=110V/60Hz; SET LIN 20A BW=15


CH1=Vinput ; CH2=Current

Vin=110V/60Hz; SET LIN 20A BW=13




CH1=Vinput；CH2=Current

## 5-16. Special waveform applications

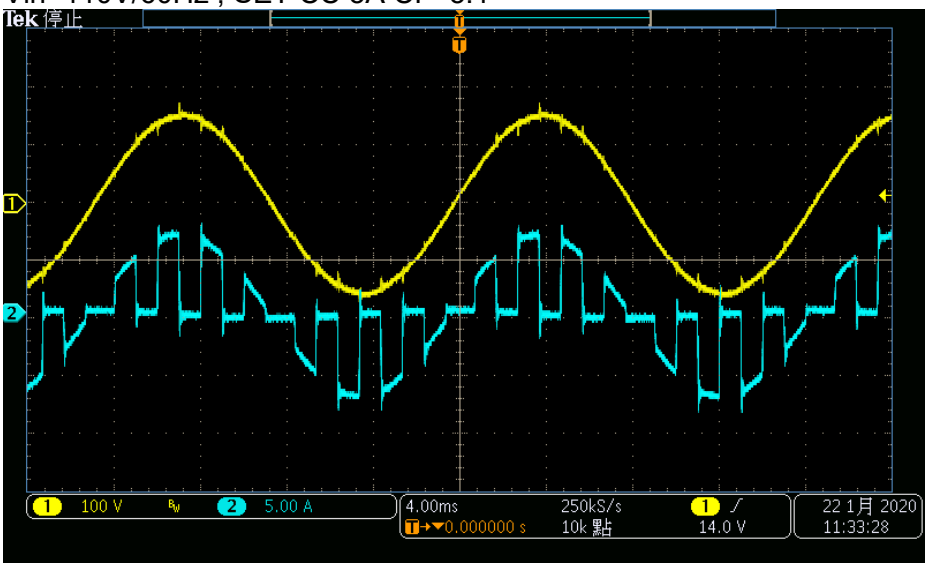
The simulated UPS or the DUT, whose load current will alternate on / off, is designed to Have a Waveform of 1ms ON and 1ms OFF at 50Hz or 60Hz.

The setting method is in the constant current mode. After pressing the CF key, enter 5.1 or 5.2 from the number keys and then press “Enter” to set.

When the setting is completed, the frequency will be set to the corresponding value Simultaneously.

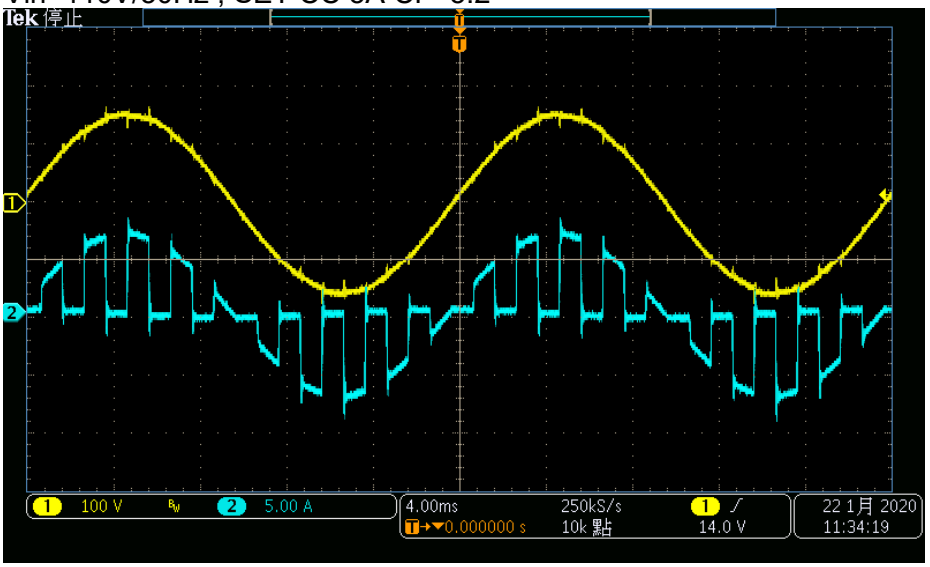
CF = 5.1: Frequency 60Hz, 1ms ON / 1ms OFF.
CF = 5.2: Frequency 50Hz, 1ms ON / 1ms OFF.

Vin=110V/60Hz ; SET CC 5A CF=5.1




CH1=Vinput ; CH2=Current

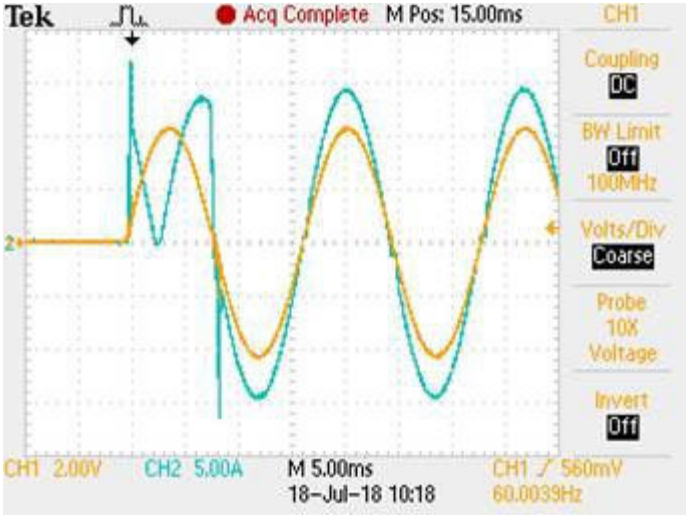
Vin=110V/50Hz ; SET CC 5A CF=5.2




CH1=Vinput ; CH2=Current

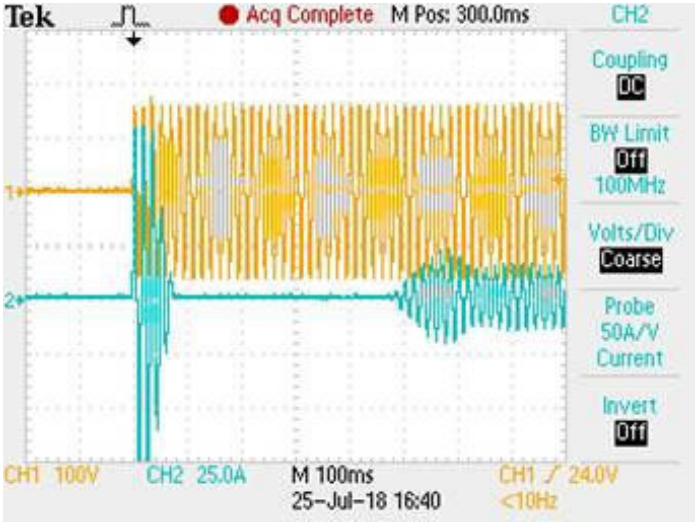
## 5-17. Load test instructions are as follows

The ON-LOAD function can first keep the load on when the DUT is not supplied with power. When the DUT outputs voltage, it immediately enters the load state.
In the constant current mode, because there is no sync signal in the first week of the output voltage of the DUT, there may be a phase error problem.




CH1: DUT voltage output CH2: Load current

*Linear constant current mode, after the output voltage of the DUT, it takes tens to hundreds of ms to adjust the waveform gain




CH1: DUT voltage output CH2: Load current

# Appendix A GPIB programming Example

C Example Program

/* Link this program with appropriate *cib*.obj. */

/* This application program is written in TURBO C 2.0 for the IBM PC-AT compatible. The National Instruments Cooperation (NIC) Model PC-2A board provides the interface between the PC-AT and a ET System electronic GmbH MPAL ELECTRONIC LOAD. The appropriate *cib*.obj file is required in each program to properly link the NIC board to C LANGUAGE. and include the <decl.h.> HEADER FILE to C LANGUAGE. */

```
#include <stdio.h>
#include <dos.h>
#include <math.h>
#include "decl.h"        /* NI GPIB CARD HEADER FILE */

main()
{
    char ouster[20],rdbuf[15],spec[10];
    int i,ch,load;
/* Assign unique identifier to the device "dev5" and store in variable load. check for error. ibfind error =
negative value returned. */
    if((load = ibfind("dev5")) < 0)        /*   Device variable name is load   */
      {                                    /*   GPIB address is   5   */
        printf("\r*** INTERFACE ERROR ! ***\a\n");
        printf("\r\nError routine to notify that ibfind failed.\n");
        printf("\r\nCheck software configuration.\n");
        exit(1);
      }
/*   Clear the device   */
    if((ibclr(load)) & ERR);
      {
        printf("INTERFACE ERROR ! \a");
        exit (1);
      }
    clrscr();
/* Clear load error register */
      {
      outstr=chan[0];
      ibwrt(load,outstr,6);
      ibwrt(load,"CLR",3);
      }
```

```
    ibwrt( load,"NAME?",5)              /*   Get the ELP/ACP series load specification   */
    strset(rdbuf,'\0');                 /*   Clear rdbuf string buffer   */
    strset(spec,'\0');                  /*   Clear spec string buffer   */
    ibrd(load,spec,20);
    if (spec[3] == '9')
        printf("\n ELP/ACP series specification error !");
/*   Set the channel 1, preset off, current sink 1.0 amps and load on commands to the load. */
    ibwrt( load,"chan 1;pres off;curr:low 0.0;curr:high 1.0;load on ",43);
    ibwrt( load,"meas:curr ?",10);
/*   Get the load actially sink current from the load   */
    ibrd( load,rdbuf,20);
/*   go to local.   */
    ibloc(load);
}
```

BASICA Example Program

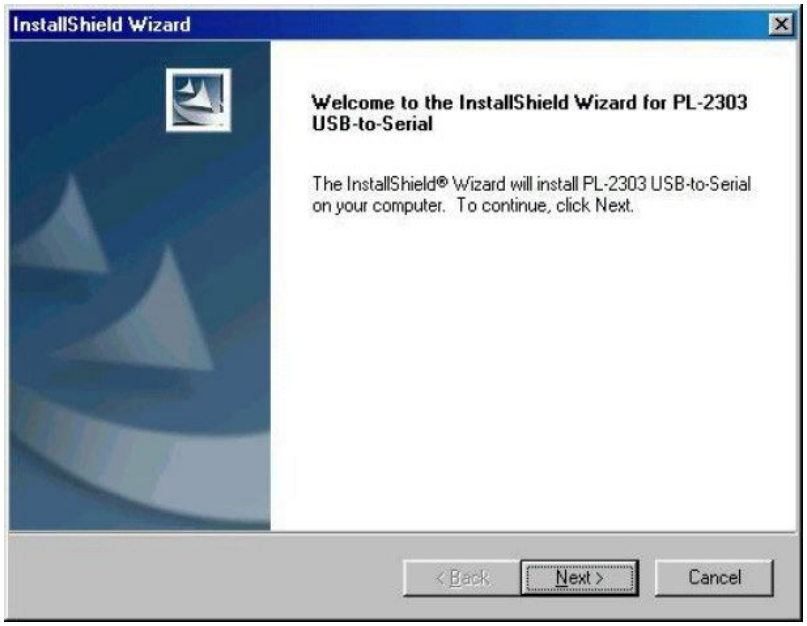
LOAD DECL.BAS using BASICA MERGE command.

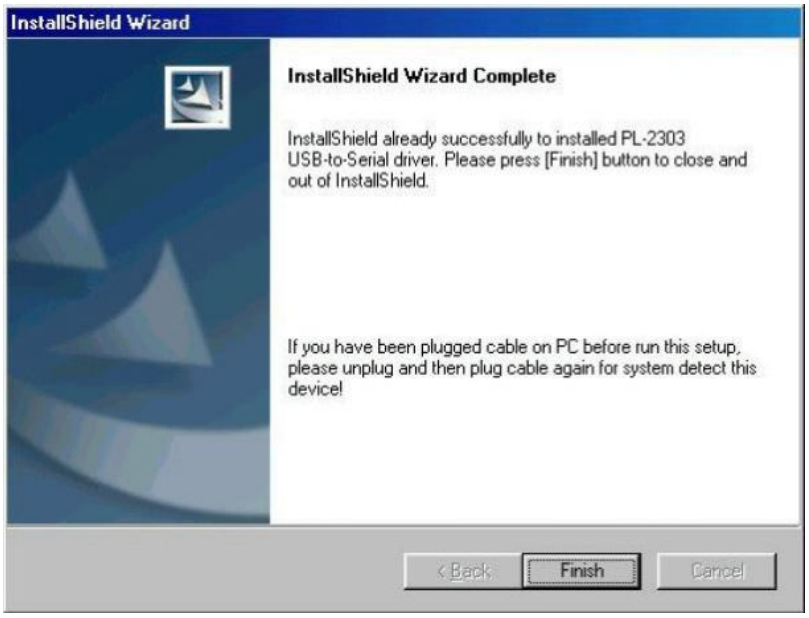
```
100 REM You must merge this code with DECL.BAS
105 REM
110 REM Assign a unique identifier to the device "dev5" and store it in variable load%.
125 REM
130         udname$ = "dev5"
140         CALL ibfind (udname$,load%)
145 REM
150 REM Check for error on ibfind call
155 REM
160         IF load% < 0 THEN GOTO 2000
165 REM
170 REM Clear the device
175 REM
180         CALL ibclr (load%)
185 REM
190 REM Get the 36260 load specification
195 REM
200         wrt$ = "NAME?" : CALL ibwrt(load%,wrt$)
210         rd$ = space$(20) : CALL ibrd(load%,rd$)
215 REM
220 REM Set the preset off, current sink 1.0 amps and load on commands to the load.
225 REM
230         wrt$ = "pres off;curr:low 0.0;curr:high 1.0;load on"
240         CALL ibwrt(load%,wrt$)
245 REM
250 REM Get the load actially sink current from the load
255 REM
260         wrt$ = "meas:curr?" : CALL ibwrt(load%,wrt$)
270         rd$ = space$(20) : CALL ibrd(load%,rd$)
275 REM
280 REM Go to local
285 REM
290 CALL ibloc(load%)

2000 REM Error routine to notify that ibfind failed.
2010 REM Check software configuration.
2020 PRINT "ibfind error !" : STOP
```

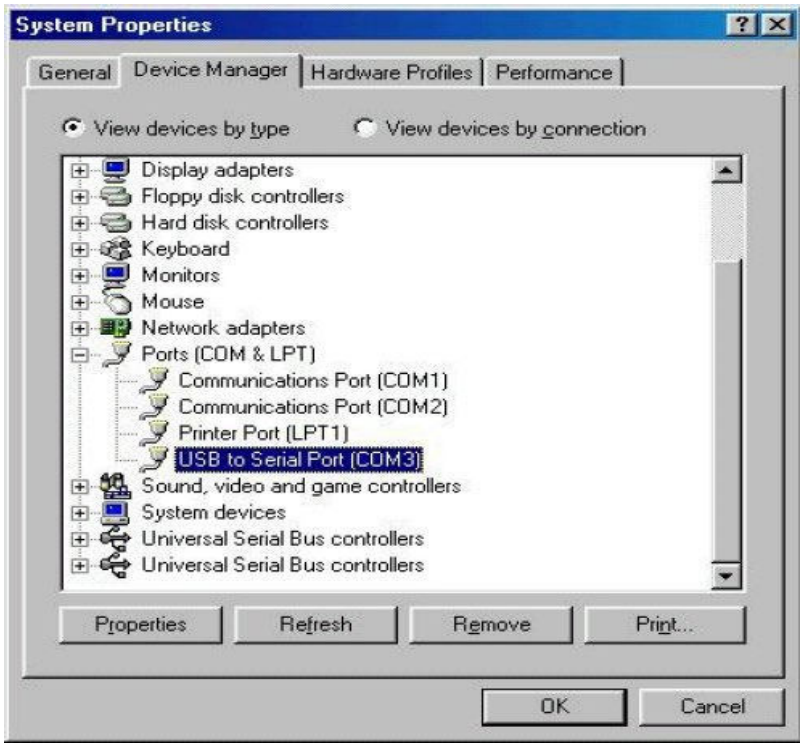
# Appendix B ELP/ACP series USB Instruction

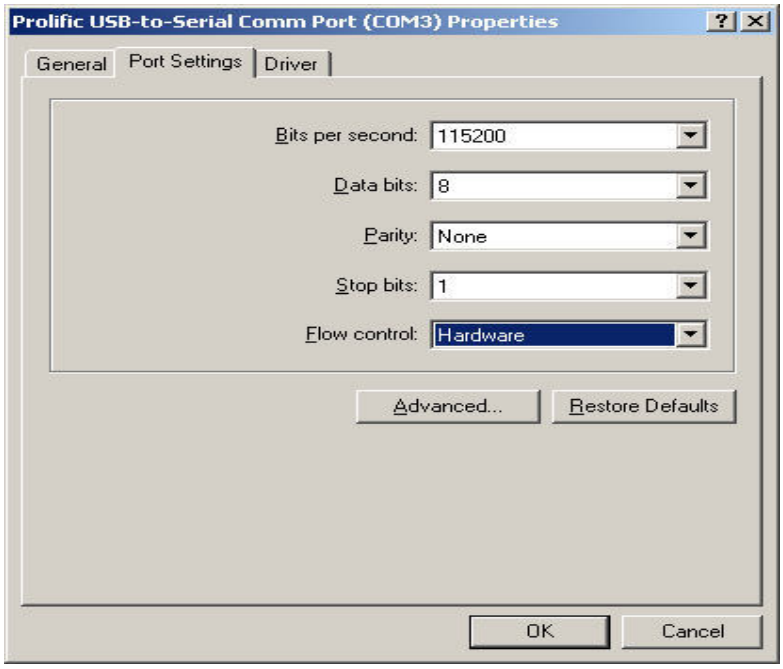
1. Install the USB DRIVER select USB\SETUP\PL-2303 Driver Installer.exe



2. After the installation, connect the ELP/ACP series and PC with USB. Then select the item USB to Serial Port (COM3), set the BAUD-RATE and Flow control to 115200bps and Hardware to control ELP/ACP series with COM3.



# Appendix C ELP/ACP series LAN Instruction

1. Connecting AC power and the network line to the ELP/ACP series mainframe, connect the other Side of the network line to the HUB.

2. Run the ETM.EXE which bellows the path of the LAN on the CDROM drive, it will show as fig D2-1 if not , please press F5 to search again, or check the first step was succeed or not.

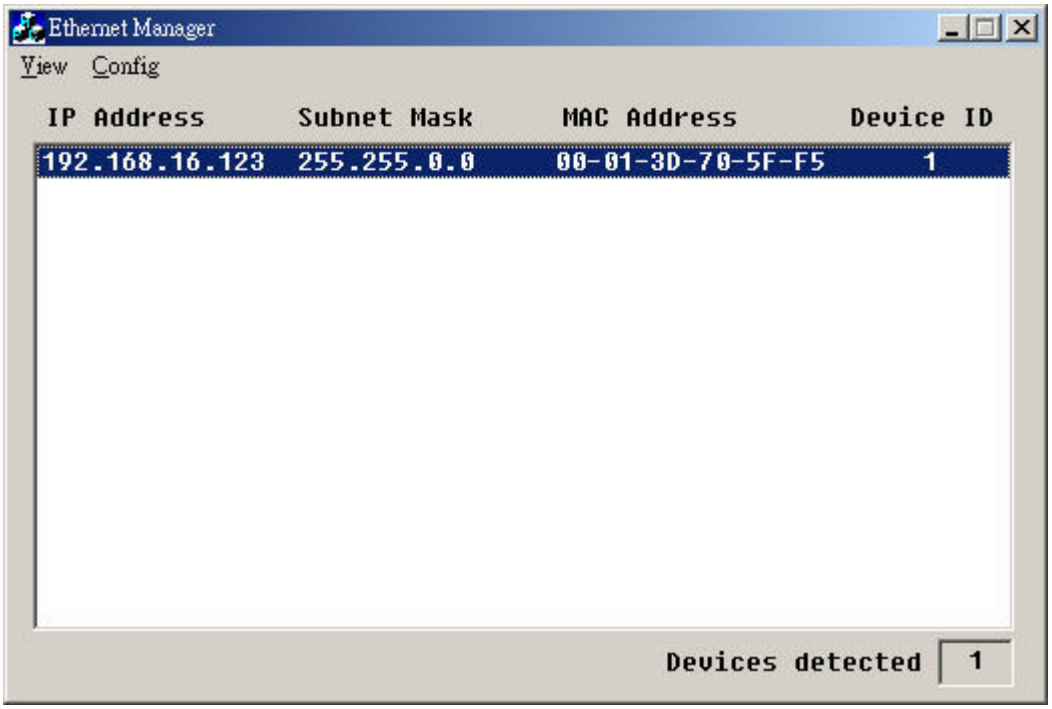
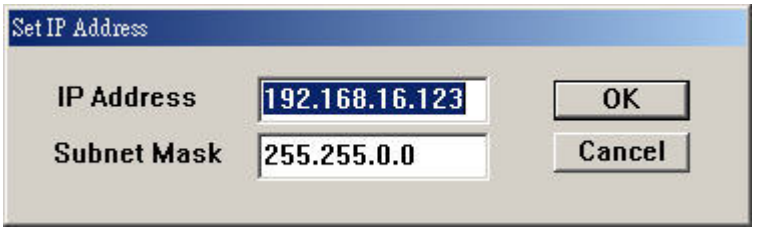


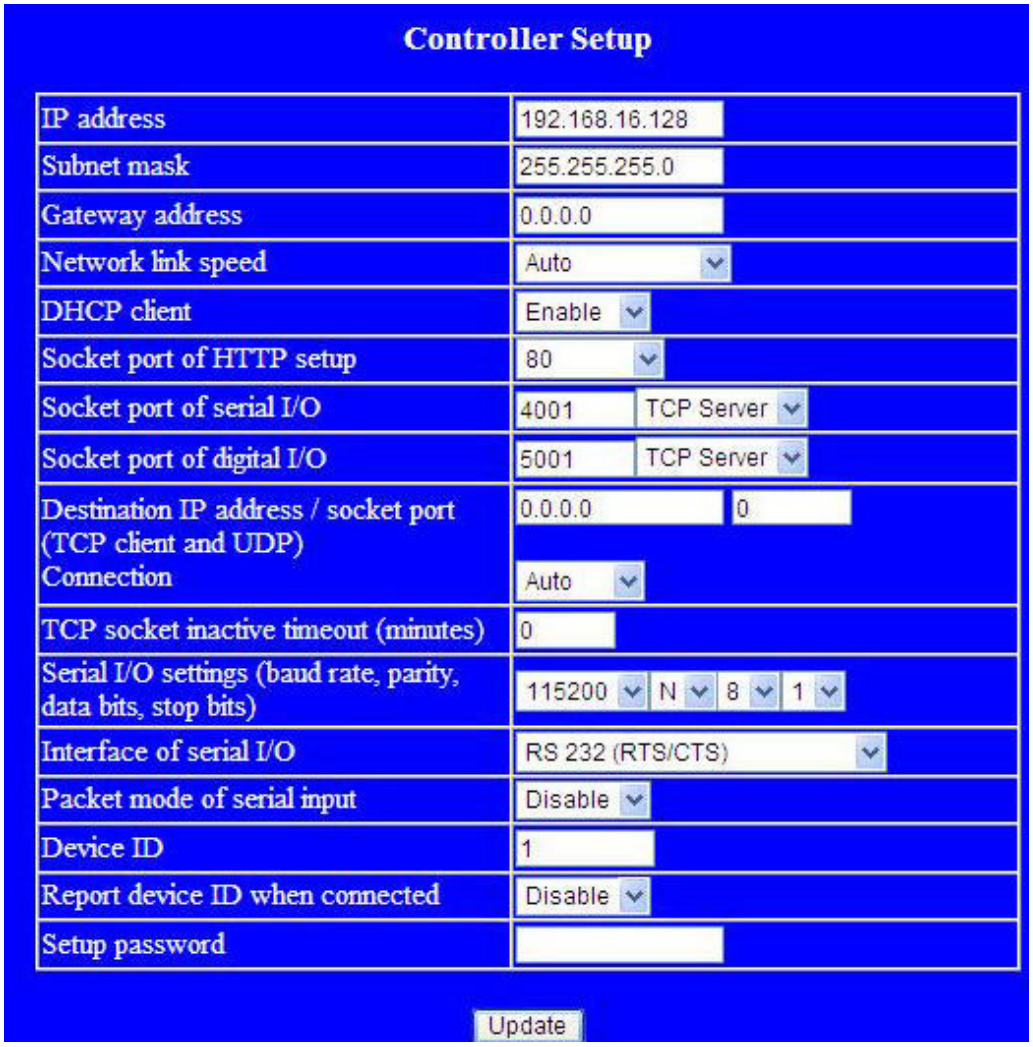

FIG D2-1

3. It will be shown the installation which has been searched on the screen , click it and select the Set IP Address bellows Config :




4. Set a useful IP Address and Subnet Mask.

5. It will be shown the Setup Device as the following figure if all steps was corrected to be run.




6. Insert the numbers as the following :

6.1 IP Address: as recommended according to your network
6.2 Subnet Mask: as recommended according to your network
6.3 Gateway Address: as recommended according to your network
6.4 Network link speed: Auto
6.5 DHCP client: Enable
6.6 Socket port of HTTP setup: 80
6.7 Socket port of serial I/O: 4001，TCP Server
6.8 Socket port of digital I/O: 5001，TCP Server
6.9 Destination IP address / socket port (TCP client and UDP) Connection: Auto
6.10 TCP socket inactive timeout(minutes):Set the network disconnection after N minutes, Set 0 minutes will work forever.
6.11 Serial I/O settings (baud rate, parity, data, bits, stop bits): 115200, N, 8, 1
6.12 Interface of serial I/O: RS 232 (RTS/CTS)
6.13 Packet mode of serial input: Disable
6.14 Device ID : 5
6.15 Report device ID when connected：Auto
6.16 Setup password: Not required

# Appendix D ELP/ACP series Auto. Sequence function provide EDIT, ENTER, EXIT, TEST and STORE 5 keys operation.

## Edit mode

1. Set mode, Range, current level … Load Setting an, Load ON
2. Press STORE key to store the load setting in memory STATE
3. Repeat 1~2, for the sequence load setting.
4. Press SEQ. key of ELP/ACP series front panel.
5. Press up/down key to select Edit Mode.
6. Press 1~9 number key program number.
7. Press STATE up/down key to select memory state.
8. Press ENTER to next step.
9. Repeat 6~8 to edit Step of sequence
10. Press SAVE to confirm the step
11. LCD shows “rept” to setting repeat count.
12. Press up/down key to set repeat count of sequence loop.
13. Press ENTER to confirm the sequence edit.

## Test mode

1. Press SEQ. key of ELP/ACP series front panel.
2. Press up/down key to select Test Mode.
3. Press 1~9 number to select sequence number
4. Press ENTER to execution the sequence
5. The LCD shows “PASS” or “FAIL” after testing.

AUTO SEQUENCE:

| AUTO SEQUENCE SET COMMAND | NOTE | RETURN |
|---|---|---|
| FILE {SP} {n}{;\| NL} | n=1~9 | 1~9 |
| STEP {SP} {n} {; \| NL} | n=1~16 | 1~16 |
| TOTSTEP {SP} {n}{; \| NL} | Total step n=1~16 | 1~16 |
| SB {SP} {m} { ; \| NL} | m=1~150<br>m:STATE | |
| TIME {SP} {NR2} { ; \| NL} | 100~9999(ms) | 100~9999(ms) |
| SAVE { ; \| NL} | Save “File n” data | |
| REPEAT {SP} {n} { ; \| NL} | n=0~9999 | 0~9999 |
| RUN {SP} {F} {n} { ; \| NL} | N=1~9 | AUTO REPLY<br>“PASS” or “FAIL:XX”<br>(XX=NG STEP) |

**Example Sequence**

In this example, we will create a program based on following Figure.

The program repeats steps 1 to 8 two times. After repeating the sequence two times, the load is turned off and the sequence ends.


| Sequence Number | Step Number | Current Value | Execution Time(T1+T2) |
|---|---|---|---|
| 3 | 1 | 1A | 200mS |
| 3 | 2 | 5A | 200mS |
| 3 | 3 | 1A | 400mS |
| 3 | 4 | 5A | 400mS |
| 3 | 5 | 1A | 200mS |
| 3 | 6 | 10A | 200mS |
| 3 | 7 | 1A | 200mS |
| 3 | 8 | 0A | 200mS |

T1, Delay time minimum 0 ms, T2 interval time minimu 100ms

## Creating the program

1. Setting the Load current level and store to state 1~8
2. Set the operation mode; Press the mode key to CC mode.
3. Press Load ON
4. Set the current value as step 1~8 and store to memory state 1~8
5. Press EDIT key of ELP/ACP series mainframe
6. Press up/down key to select Edit Mode
7. Press sequence number 3 to edit the sequence
8. Press up/down key to memory state 1
9. Press ENTER key to confirm the sequence memory
10. Press up/down key to setting execution time
11. Press ENTER key to confirm the sequence step
12. Repeat 8~12 to setting step 1~8
13. Press SAVE key to confirm step 1~8
14. Press up/down key to 1 to repeat one times.
15. Press ENTER to confirm the repeat count.

## Testing Waveform