3360F Series
High power
Electronic Load
Operation manual

S/N:9003360F04 REV:I

SAFETY SYMBOLS



Direct current (DC)



Alternating current (AC)



Both direct and alternating



Three-phase alternating

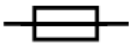


Protective earth

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

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. PRODIGIT 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 PRODIGIT ELECTRONICS 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 **Prodigit Electronics Co., Ltd.** declares under our own responsibility that the product

DC Electronic Load

(Model No.: 3360F、3361F、3362F、3367F)
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

Company Name : Prodigit Electronics Co., Ltd.

Company Address : 8F, No.88, Baojhong Rd., Sindian District, New Taipei City, Taiwan.

Person is responsible for marking this declaration:

PRODIGIT INSTRUMENT PROFESSIONAL

Manufacturer/Importer
Signature:

Date: **2022/10/20** Name:

Dean Wang

Dean Wang
R&D Assistant Manager

UK Declaration of Conformity

We Prodigit Electronics Co., Ltd. declares under our own responsibility that the product

DC Electronic Load

(Model No.: 3360F、3361F、3362F、3367F)

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

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BS EN 61000-4-8: 2010

BS EN 61000-4-11: 2020

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Person is responsible for marking this declaration:

PRODIGIT INSTRUMENT PROFESSIONAL

Manufacturer/Importer

Signature: Dean Wang

Date: **2022/10/20** Name: Dean Wang R&D Assistant Manager

3360F Series High Power Electronic load operation manual
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Chapter 1 Introduction

1-1. General description

The 3360F Series Electronic Load is designed to test, evaluation and burn-in of DC power supplies and batteries. The 3360F Series electronic load can be operated for manual and GPIB operation. The power contour of 3360F 600 Watts Electronic Load is shown in Fig 1-1~1-4, it has an input from 0-20A, and 0 -500V current and voltage operating range respectively. The power contour of 3360F Series. The prodigit 3360F Series high power electronic Load can be controlled locally at the front panel or remotely via computer over the GPIB/RS-232C/USB/LAN. Current (CC) mode, Constant Resistance (CR) mode, and Constant Voltage (CV) mode. and Constant Power (CP) mode. The wide range dynamic load with independent rise and fall current slew rate and analog programming input with arbitrary wave-form input is available in Constant Current mode.

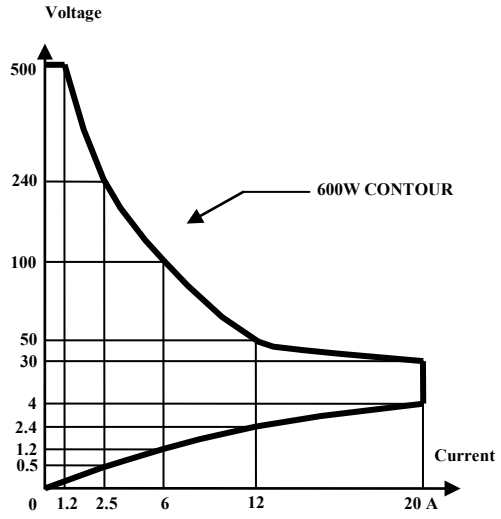


Fig 1-1 3360F Power Contour

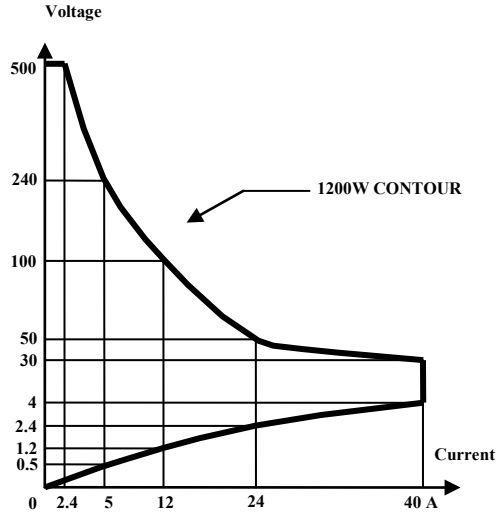


Fig 1-2 3361F Power Contour

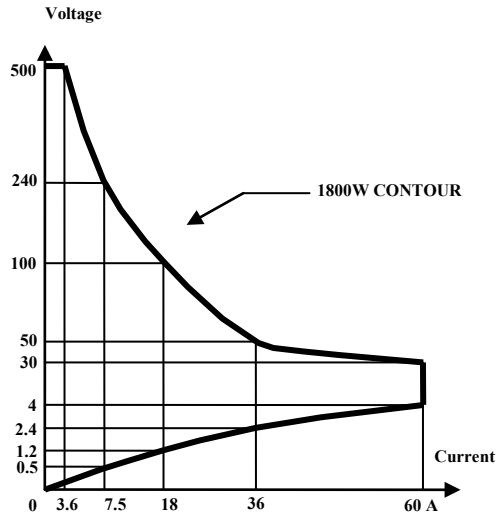


Fig 1-3 3362F Power Contour

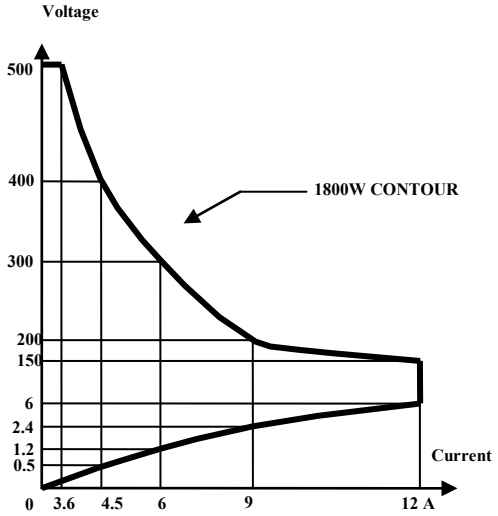


Fig 1-4 3367F Power Contour

CC Mode:

With the operating mode of constant current, the 3360F Electronic load will sink a current in accordance with the programmed value regardless of the input voltage (see Fig.1-5).

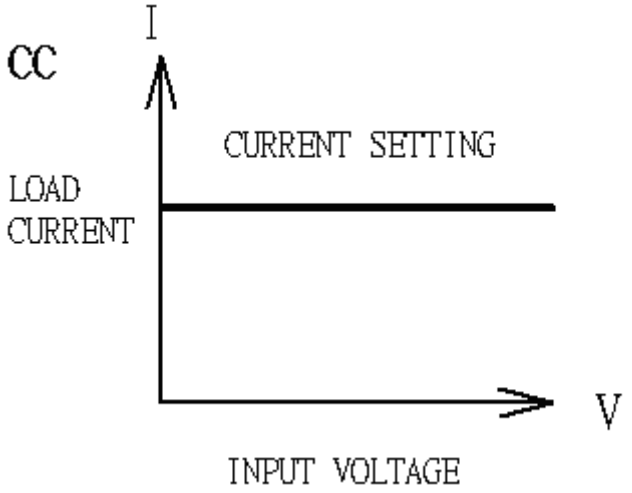


Fig 1-5 Constant Current mode

CR Mode:

At constant resistance mode, The 3360F Electronic Load will sink a current linearly proportional to the load input voltage in accordance with the programmed resistance setting (see Fig 1-6).

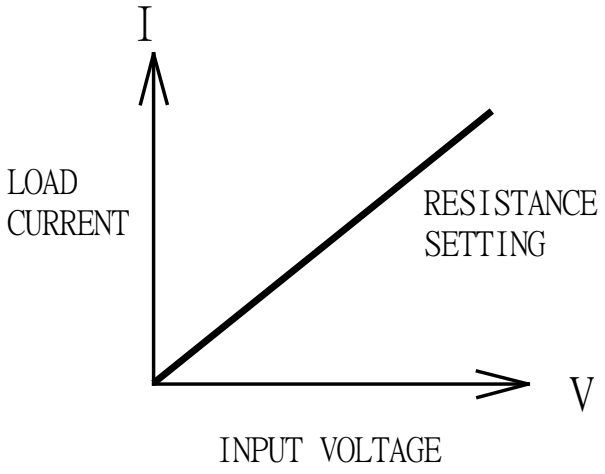


Fig 1-6 Constant Resistance mode

CV Mode:

At constant voltage mode, the 3360F Electronic Load will attempt to sink enough current until the load input voltage is equaled to the programmed value (see Fig 1-7).

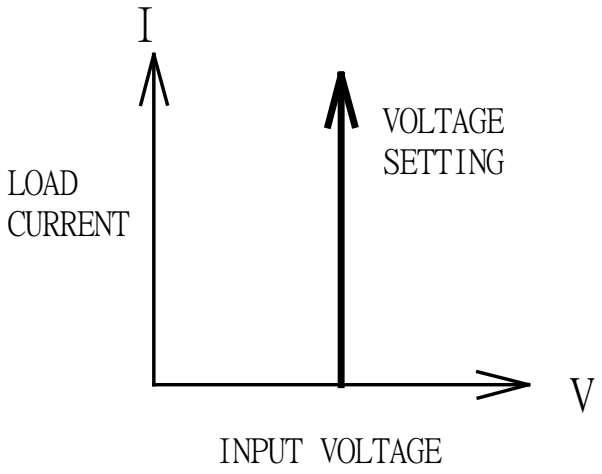


Fig 1-7 Constant Voltage mode

CP Mode:

At Constant Power mode, the 3360F Electronic Load will attempt to sink load power (load voltage x load current) in accordance with the programmed power. (See Fig 1-8).

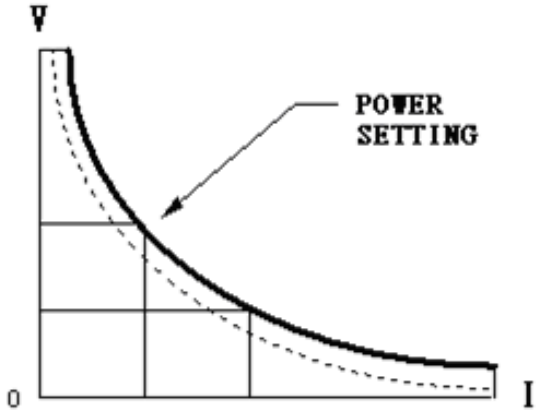


Fig 1-8 Constant Power mode

Dynamic wave form definition:

There are six parameters to generate dynamic wave form or pulse wave form, the 3360F Series Electronic Load will sink current from power source proportional to the dynamic wave form, the dynamic wave form definition is shown in Fig 1-9. The period of dynamic wave form is Thigh + Tlow, dynamic frequency = 1 / (Thigh + Tlow), the Duty cycle = Thigh / (Thigh + Tlow)

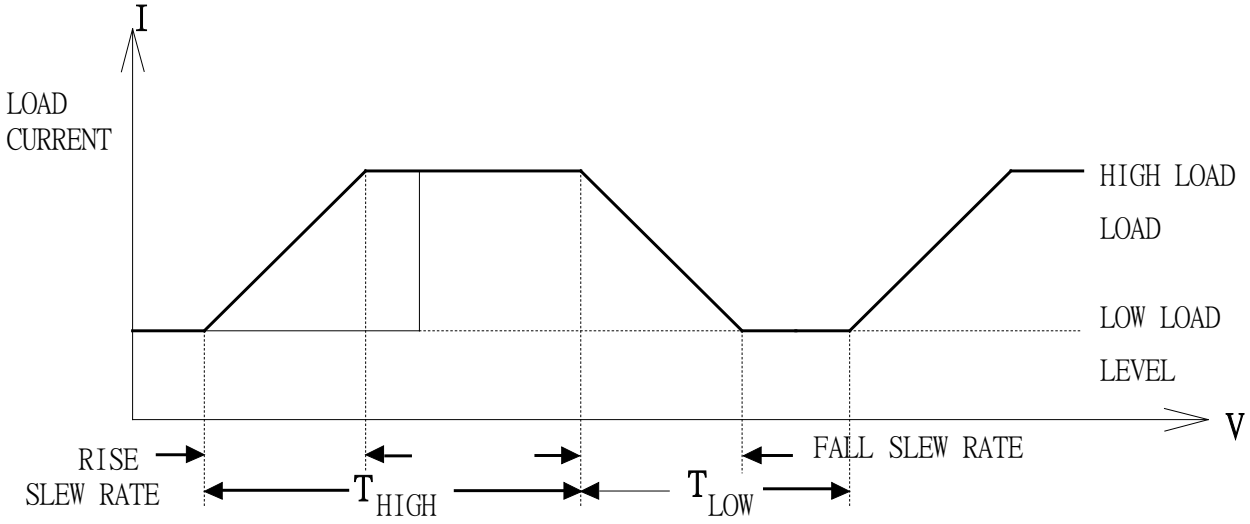


Fig 1-9 Dynamic Wave form

The load current level and load status are can be set with Front panel on each module, GPIB command. It is called manual operation and GPIB operation respectively, the load input voltage and load current can be read back to computer through GPIB.

The GPIB operation is described in Chapter 4 GPIB operation.

Slew Rate:

Slew rate is defined as the change in current or voltage over time. A programmable slew rate allows a controlled transition from one load setting to another to minimize induced voltage drops on inductive power wiring, or to control induced transients on a test device (such as would occur during power supply transient response testing).

In cases where the transition from one setting to another is large, the actual transition time can be Calculated by dividing the voltage or current transition by the slew rate. The actual transition time is Defined as the time required for the input to change from 10% to 90% or from 90% to 10% of the Programmed excursion. In cases where the transition from one setting to another is small, the small Signal bandwidth of the load limits the minimum transition time for all programmable slew rates. Because Of this limitation, the actual transition time is longer than the expected time based on the slew rate, as Shown in Figure 1-10

Therefore, both minimum transition time and slew rate must be considered when determining the actual transition time.

The minimum transition time for a given slew rate as about a 30% or greater load change, the slew rate increases from the minimum transition time to the Maximum transition time at a 100% load change. The actual transition time will be either the minimum transition time, or the total slew time (transition divided by slew rate), whichever is longer.

Use the following formula to calculate the minimum transition time for a given slew rate

Min transition time = 6/slew rate(in amps/second) (6us(6/1)*0.8(10%~90%)=4.8uS)

Use the following formula to calculate the maximum transition time for a given slew rate

Max transition time = 20/slew rate(in amps/second) (20us(20/5)*0.8(10%~90%)=16uS)

EX. CCH=4A, CCL=0A Slew Rate = 1A, The expected time is 3.2uS((4/1)x0.8) but the actual transition time will be limited to 4.8uS

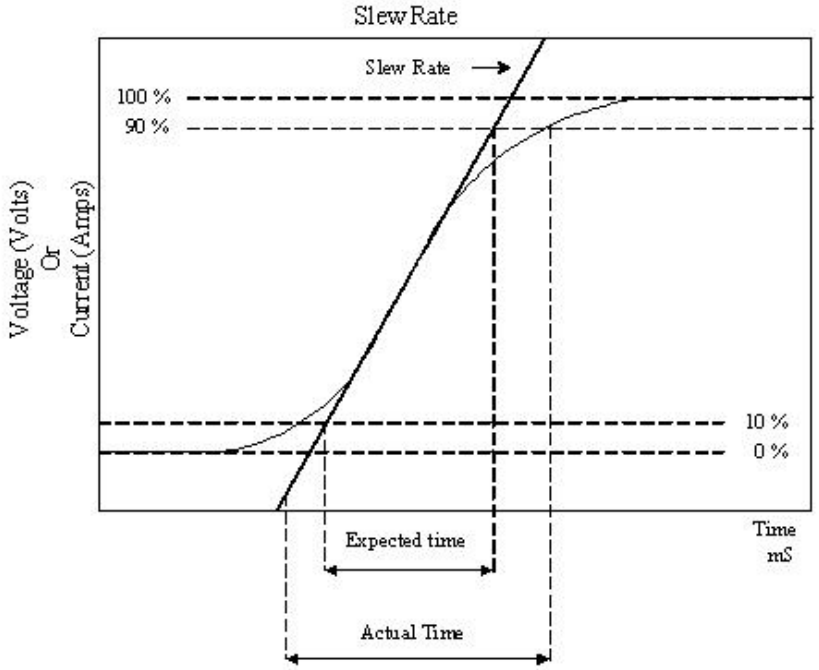


Fig 1-10 Rise Time Transition Limitation

1-2. Features

1-2-1 Flexible configuration of high power Electronic Load.
1-2-2 Fully GPIB control of Load condition setting and meter read back.
1-2-3 Dual high accuracy & resolution 5 digit voltage and current meter.
1-2-4 Built-in pulse generator includes wide Thigh/Tlow dynamic load range, independent Rise/Fall load current slew rate control, and High/Low Load level.
1-2-5 Controllable load current slew rate of load level change, load ON/OFF switch change, and power supply turn ON.
1-2-6 Short circuit test and current measure capability.
1-2-7 Automatic voltage sense capability.
1-2-8 Full protection from over power, over temperature, over voltage, and reverse polarity.
1-2-9 Analog programming input capability at rear panel.

1-3. Accessories

1-3-1	3360F Series operation manual	1 PC
1-3-2	M8 ROUND SCREW	2 PCs
1-3-3	Vsense ─ Alligator Clip(red、black) Cable	1 PC
1-3-4	I-monitor ─ BNC Cable	1 PC
1-3-5	Power Cord	1 PC

1-4. Option

1-4-1 IEEE-488 cable (1 Meter)
1-4-2 IEEE-488 cable (2 Meter)
1-4-3 RS232 interface
1-4-4 GPIB interface
1-4-5 USB interface + USB DRIVER CD
1-4-6 LAN interface + LAN DRIVER CD

1-5. Specifications

AC INPUT	LINE	115V ± 10%	230V ± 10%
	FREQUENCY	50/60 Hz	
	FUSE	T2A/250V(5×20 mm)	T1A/250V(5×20 mm)
	MAX. POWER CONSUMPTION	100VA	
DIMENSIONS (W * H * D)		483 mm × 177 mm × 622mm	
WEIGHT		NET：23.6 Kg Max	

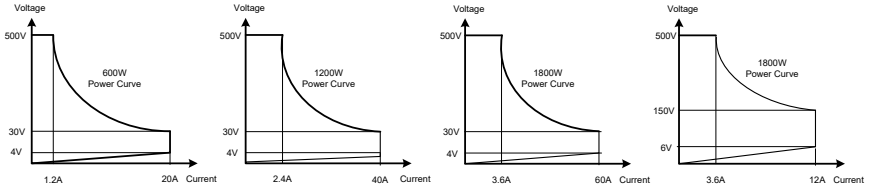
Table 1-1A 3360F Specifications

Model	3360F	3361F	3362F	3367F
Power	600W	1200W	1800W	1800W
Current	0~20A	0~40A	0~60A	0~12A
Voltage	0~500V	0~500V	0~500V	0~500V
Min. Operating Voltage	4V @ 20A	4V @ 40A	4V @ 60A	6V @ 12A
Constant Current Mode				
Range *1	0~2.04A/20.4A	0~4.04A/40.4A	0~6A/60A	0~1.2A/12A
Resolution	0.034mA/0.34mA	0.067mA/0.67mA	0.1mA/1mA	0.02mA/0.2mA
Accuracy	± 0.1% OF (Setting + Range)			
Constant Resistance Mode				
Range	0.5~30~1800KΩ	0.25~15~900KΩ	0.1666~10~600KΩ	0.8333~50~3000KΩ
Resolution	0.5mΩ/0.5555uS	0.25mΩ/1.1111uS	0.1666mΩ/1.6666uS	0.8333mΩ/0.3333uS
Accuracy	± 0.2% OF (Setting + Range)			
Constant Voltage Mode				
Range	60V/500V			
Resolution	1mV/10mV	1mV/10mV	1mV/10mV	1mV/10mV
Accuracy	± 0.05% OF (Setting + Range)			
Constant Power Mode				
Range	60W/600W	120W/1200W	180W/1800W	180W/1800W
Resolution	1mW/10mW	2mW/20mW	3mW/30mW	3mW/30mW
Accuracy	± 0.5% OF (Setting + Range)			
Dynamic Mode –CC				
Timing				
Thigh & Tlow	0.050~9.999 / 99.99 / 999.9 / 9999mS			
Resolution	0.001 / 0.01 / 0.1 / 1mS			
Accuracy	1uS/10uS/100uS/1mS + 50ppm			
Slew rate	1.6mA~100mA/uS 16mA~1000mA/uS	3.2mA~200mA/uS 32mA~2000mA/uS	4.8mA~300mA/uS 48mA~3000mA/uS	0.96mA~60mA/uS 9.6mA~600mA/uS
Resolution	0.4/4mA/us	0.8/8mA/us	1.2/12mA/us	0.24/2.4mA/us
Accuracy	(5% of setting) ± 10 uS			
Min. Rise Time	20uS(typical)			
Current				
Range	2.04A/20.4A	4.02A/40.2A	6A/60A	1.2A/12A
Resolution	0.034mA/0.34mA	0.067mA/0.67mA	0.1mA/1mA	0.02mA/0.2mA
Accuracy	± 0.1% OF (Reading + Range)			
Measurement				
Voltage Read Back				
Range (5 Digital)	0~60V/600V			
Resolution	0.001V/0.01V			
Accuracy	± 0.025% OF (Reading + Range)			
Current Read Back				
Range (5 Digital)	0~2.04A/20.4A	0~4.02A/40.2A	0~6A/60A	0~1.2A/12A
Resolution	0.034mA/0.34mA	0.067mA/0.67mA	0.1mA/1mA	0.02mA/0.2mA
Accuracy	± 0.1% OF (Reading + Range)			
Power Read Back				
Range (5 Digital)	0~60W/600W	0~120W/1200W	0~180W/1800W	0~180W/1800W
Resolution	0.01W			

Accuracy	± 0.125% OF (Reading + Range)			
Program mode(Mainframe)				
Sequence No.	F1~9/16 Steps			
T1/T2 (Dwell)	0.1S~9.9S/Repeat 9999			
Load Setting(External Programming)	0~10V for CC mode F.S.			
GO/NG Check	Voltage/Current/Power			
Protections				
Over Power	105% of Rated Power			
Over Current	105% of Rated Current			
Over Voltage	105% of Rated Voltage			
Over Temp.	Yes			
Interface(Mainframe)				
RS-232	Optional			
GPIB	Optional			
USB	Optional			
Ethernet	Optional			
Others				
Load ON Voltage				
Range	0.4~100.0V			
Resolution	0.4V			
Accuracy	1% of Setting + 2.5V			
Load OFF Voltage				
Range	0~100V			
Resolution	Same as Voltage Meter			
Accuracy	Same as Voltage Meter			
General				
Short Circuit				
Current	20A	40A	60A	12A
Temperature Coefficient	100ppm/℃(typical)			
Power	100Wmax	100Wmax	100Wmax	100Wmax
Operating Temperature *2	0~40℃			
Dimension(HxWxD)	177 x 440 x 445 mm/6.97x17.3x17.5 inch			
Weight	15.2 kg / 33.51 lbs	19.4 Kg/42.77 lbs	23.6 kg / 52.03 lbs	23.6 Kg/52.03 lbs
Safety & EMC	CE			

Note *1 : The range is automatically or forcing to range II only in CC mode

Note *2 : Operating temperature range is 0~40℃, All specifications apply for 25℃±5℃



All specifications are subject to change without notice.

Table 1-1B 3360F Series Specifications

Chapter 2 Installation

2-1. Inspection

The 3360F high power load was carefully inspected before shipment. If instrument damage has occurred during transport, please inform Prodigit's sales and service office or representative.

Your 3360F high power load was shipped with a power cord for the type of outlet used at your location. If the appropriated cord was not included, please contact your nearest Prodigit sales office to obtain the correct cord. Refer to “check line voltage “to check the line voltage selection and fuse type.

2-2. Check line voltage

The 3360F Series high power load can operation with 115, 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 3360F Series load power OFF, disconnect the power cord.

2-2-2 Refer the drawing on the rear panel of 3360F Series high power load in Fig 2-1, set the switches to the proper voltage as describe in the following:

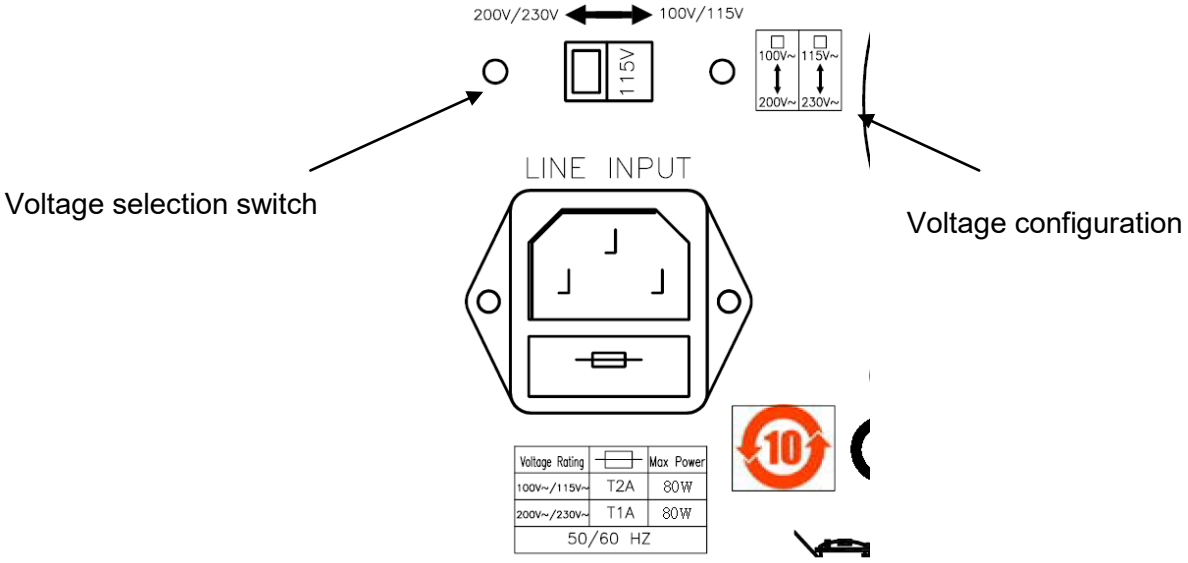


Fig 2-1 SET OF SWITCH

2-3. Fuse Exchange

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

CAUTION

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

WARNING

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.

2-3-3 Check the rating of the line fuse and replace it with the correct fuse if necessary. 100V/115V use T2A/250V (5*20mm), 200V/230V use T1A/250V (5*20mm)

2-3-4 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 specification fuse which indicated in Table 1-1A.

2-3-5 Reinstall fuse holder and connect the power cord.

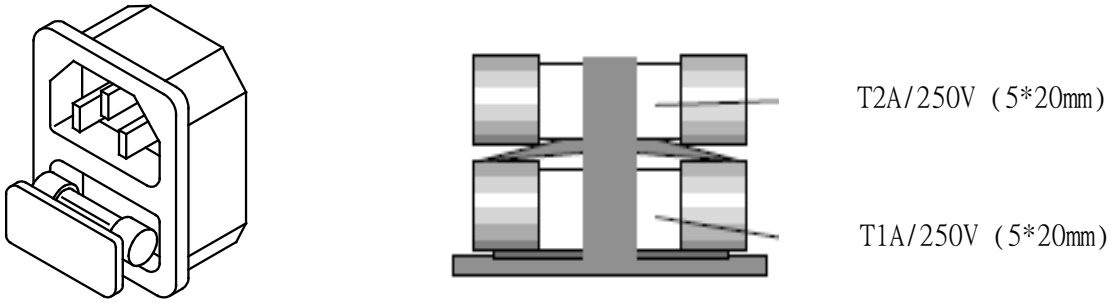


Fig 2-2 FUSE RECEPTACLE

2-4 Grounding requirements



SHOCK HAZARD

1. It is requested to use the 3Pin plug connector only for 3360F mainframe to out of danger when electric leakage. And the complete and proper grounded is necessary.

2. The 3360F Series high power load is equipped with three conductor cable which plugs in an appropriate receptacle to ground the instrument's cover.

2-5. Adjust the feet

The 3360F Series high power load is equipped with feet and tilt stands installed and is ready for used as a bench instrument.
The feet provide a good viewing angle for bench-top use.

2-6. Rack mount

The 3360F Series high power load is designed to permit mounted in a standard 19 inches rack for system application.

2-7. Environmental requirements

- For indoor use only
- installation Category I
- Pollution Degree 2
- Altitude up to 2000 meters
- Relative Humidity 80% RH Max

2-8. Observe the International Electrical Symbol listed below

⚠ Warning ! Risk of electric shock.

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

2-9. Cleaning

To clean this product, use a soft or wet cloth.



- Before you clean this product, power this product off and disconnect the power plug.
- Please do NOT use any organic solvent capable of changing the nature of the plastic such as benzene or acetone.

2-10. Power Up

Operation check

2.10.1 Turn off (O) the POWER switch
2.10.2 Check that the power cord is corrected.
2.10.3 Check that nothing is connected to the DC INPUT (load input terminal) on the front and rear panels.

2-11. Connection to the load Input Terminal on the Rear Panel

Connection procedure of the load input terminal on the rear panel

2.11.1 Turn off POWER switch.
2.11.2 Check that the output of the equipment under test is off.
2.11.3 Connect the load wire to the load input terminal on the rear panel.
2.11.4 Check the polarity of the connection and connect the load wire to the output terminal of the equipment under test.

2-12. 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 Prodigit sales and service office or representative.

2-13. GPIB connection Option

The GPIB connector is on the rear panel which to connect the 3360F mainframe to the controller and other GPIB devices. An GPIB system can be connected in any configuration (star, linear, or both) as long as



Fig 2-3 3360F Series GPIB Rear panel

2-14. RS-232C Connection Option

Fig 2-4 shows the RS-232C connector (Female) on the rear panel connects 3360F mainframe to RS-232C port of computer in one by one configuration .The RS-232C 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 3360F Series Rs-232 Rear panel

2-15. USB Connection Option

Fig 2-5 shows the USB connector in the rear panel of 3360F mainframe. Please refer Appendix B.

The USB card chip PL2303TA only supports operating systems before Win10 (Including).



Fig 2-5 3360F USB Connection Rear panel

2.16. LAN Connection Option

Fig 2-6 shows the LAN connector in the rear panel of 3360F mainframe. Please refer Appendix C.

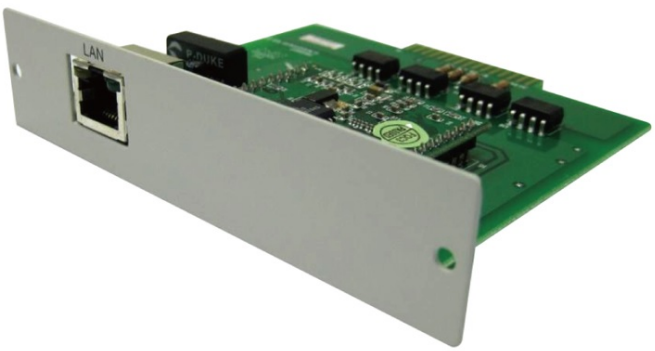


Fig 2-6 3360F LAN Connection Rear panel

2.17. GPIB & RS232 connection

2.17.1 GPIB + RS-232C connector is on the rear panel of 3360F mainframe for Application GPIB or RS-232 C.

2.17.2 GPIB and RS-232C interface can only be used at the same time, to Change the interface must reboot unit.

2.17.3 GPIB connection with three important limitations as Described below:

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

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

2.17.3.3 RS-232C Female Block connections on the back panel, the Connecting Device and the computer RS-232C port to one-way Connection.
(Note: Not 2-wire connection, the detail as 4-2).

2.17.4 Fig 2-7 shows the RS-232C connector (Female) on the rear panel Connects 3360F Mainframe to RS-232C port of computer in one by one Configuration .The RS-232 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 2-7 3360F GPIB & RS232 Connection

2-18. Analog programming Terminal input

The connector on the rear panel connects.

The 0 to 10V Analog signal can program the 0 to full scale input range in the CC mode (0 to 2A range when load current setting is less than 2A, or 0 to 20A range when load current setting is higher than 2A) or in the CP mode (0 to 60W range when load power setting is less than 60W, or 0 to 600W range when load power setting is higher than 60W). The analog programming signal can act alone or it can be summed with the programmed value via GPIB, RS-232,USB,LAN or the front panel. Fig 2-8 shows the analog programming signal (4 Vac, 500Hz) is summed with the 8A programmed setting in CC mode of 3360F Load.

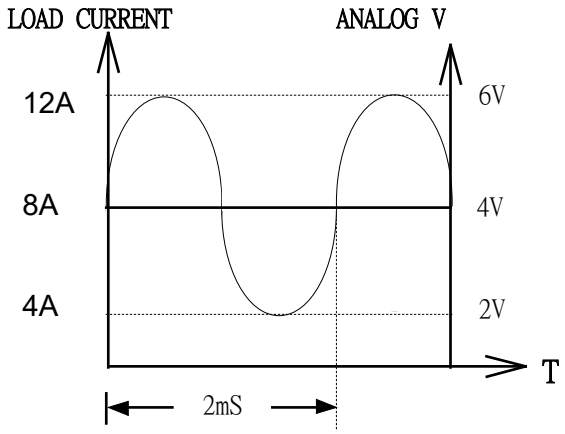


Fig 2-8 Analog programming load current in CC mode operation

2-19. Load current slew rate setting

What is the load current slew rate during load current level change, power supply turn ON/OFF switch between ON, and OFF? The 3360F Electronic load provides all of the above load current slew rate in controllable condition, the rise and fall current slew rate can be set independently from front panel operation or remote programming.

The slew rate determines a rate at which the current changes to a new programmed value. The slew rate can be set at the front panel or via GPIB on the rear panel of 3360F high power load.

The rise and fall slew rate can be independently programmed from 16mA/usec to 1000mA/usec (3360F Load) in the 20A current range and from 1.6mA/usec to 100mA/usec in the 2A current range. This allows a independent controlled transition from Low load current level to High load current level (Rise current slew rate) or from High load current level to Low load current level(Fall current slew rate) to minimize induced voltage drops on the inductive wiring, or to control induced transients on the est. device (power supply transient response testing).

This controllable load current slew rate feature also can eliminate the overload current phenomenon and emulate the actual load current slew rate at turn ON the power supply under test. Fig 2-9 shows the load current slew rate is according to the power supply's output voltage, load level setting and Load ON/OFF switch. So, you could do all items of power supply testing task by using Constant current mode only, it can significantly improve the testing quality and process as well as efficiency.

There are two load current range in 3360F Load, Range I and Range II, the slew rate of range I, range II, RISE/FALL slew rate are listed in chapter 1-5 specifications.5.

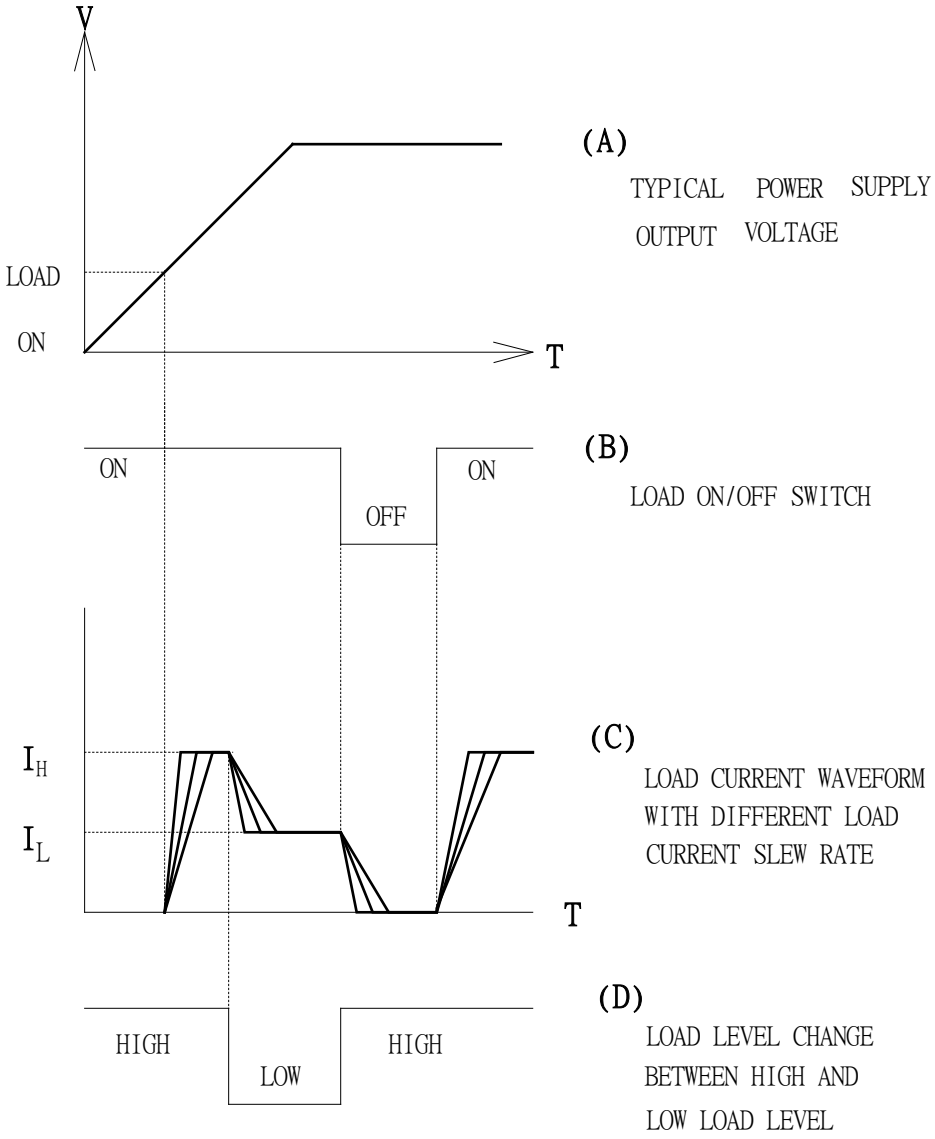


Fig 2-9 The relationship of load current load ON/OFF, load level and output voltage of DC power supply at turn ON

2-20.Emergency stop and Alarm

3360F series electronic load provided emergency stop signal input and alarm signals output interface on the Rear panel, connector to be D-sub25 Pin female port, Emergency stop signal and Alarm signal are isolated.

The emergency stop signal is active low, when emergency stop signal goes to low, the 3360F Series Load will go to load “off” immediately.

The Alarm signal is active low, when any one protection active (OVP, OCP, OPP, OTP), and this time the load will go to load “off” immediately.

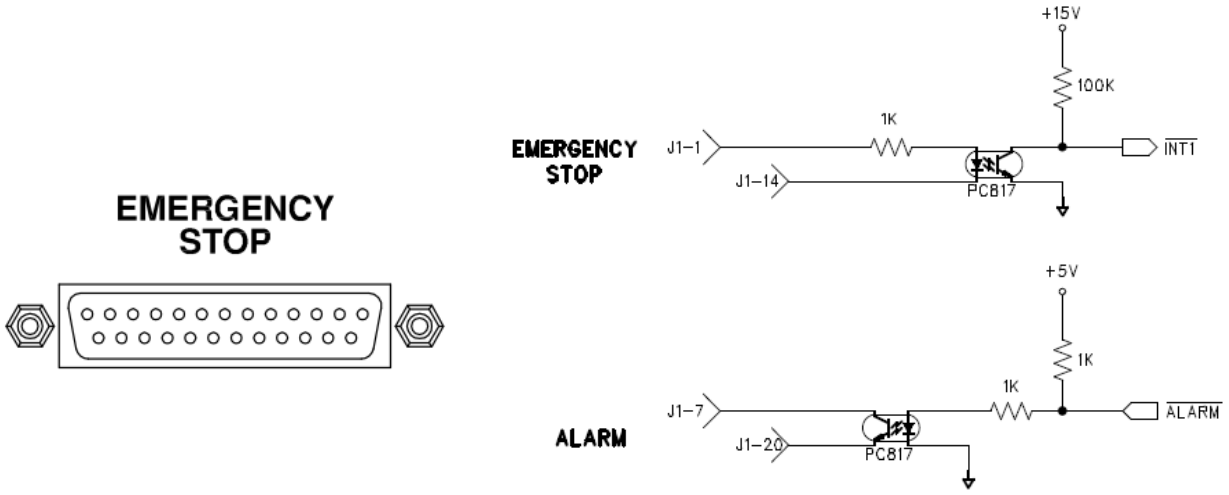


Fig 2-10 Emergency stop controller Connection

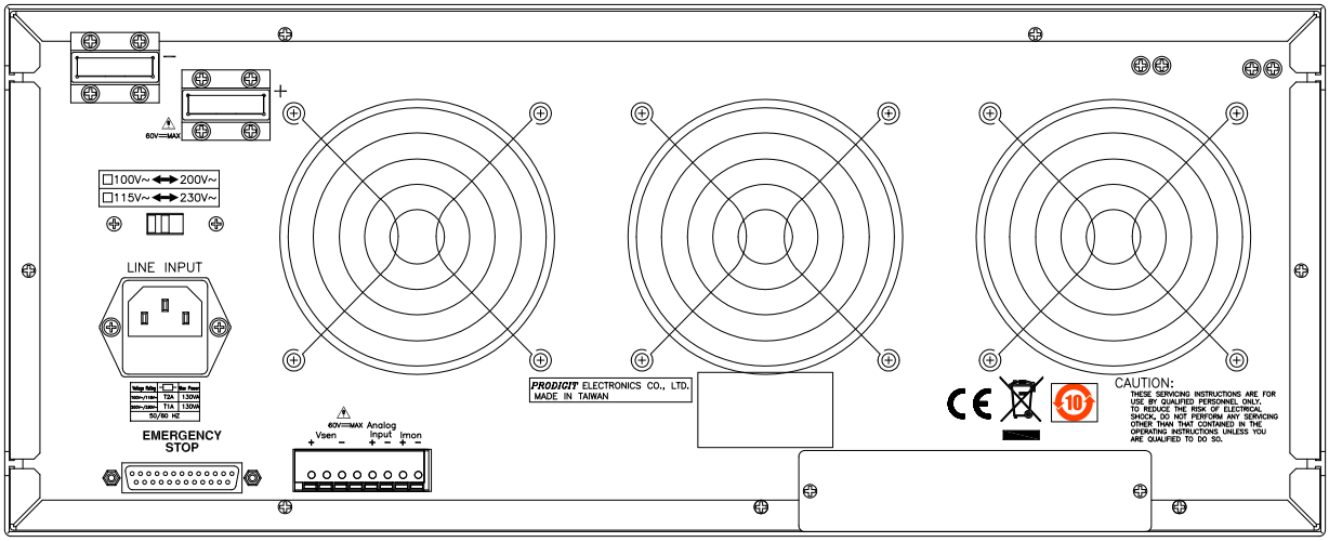


Fig 2-11 3360F series Rear panel

Chapter 3 Operation

This chapter describes the front panel function and operation of each 3360F Series load, the memory Store/Recall, GPIB/RS-232/LAN/USB remote programming are described in the mainframe operation manual. Please refer to the mainframe's operation manual for mainframe store/recall and GPIB/RS-232/LAN/USB programming.

3-1. Front panel description(1)

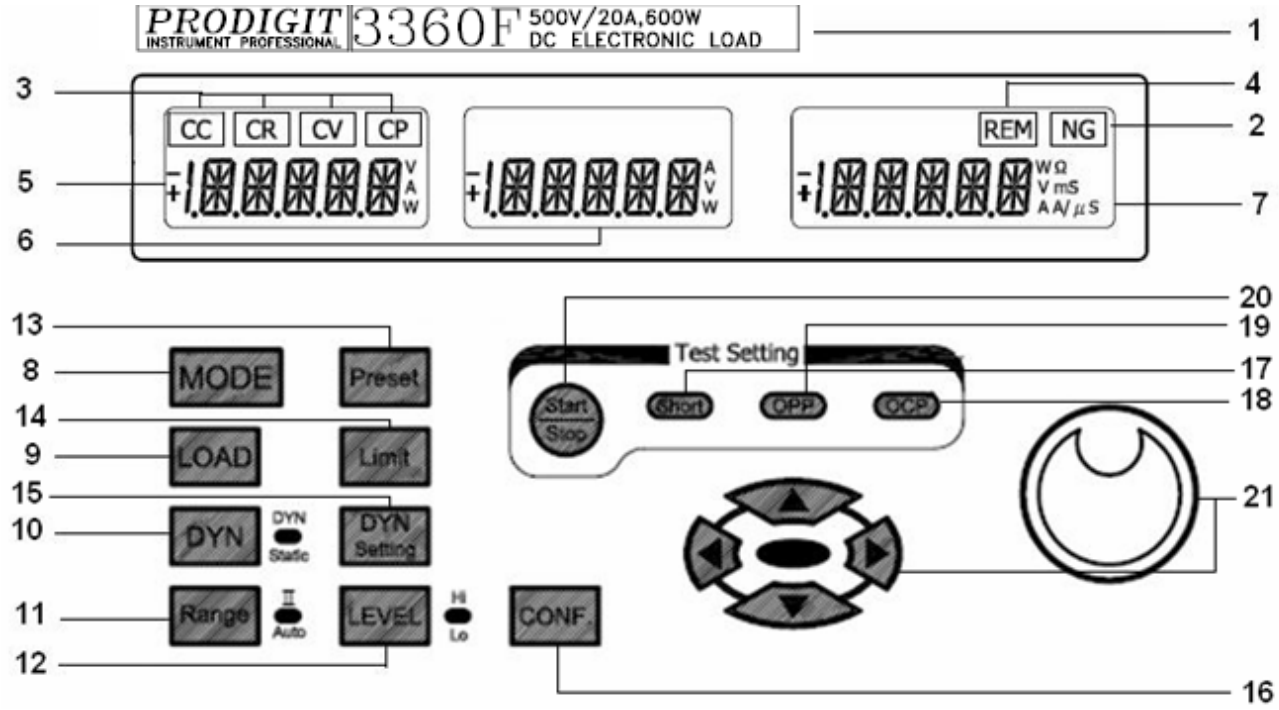


Fig 3-1 3360F-Series High Power Front Panel

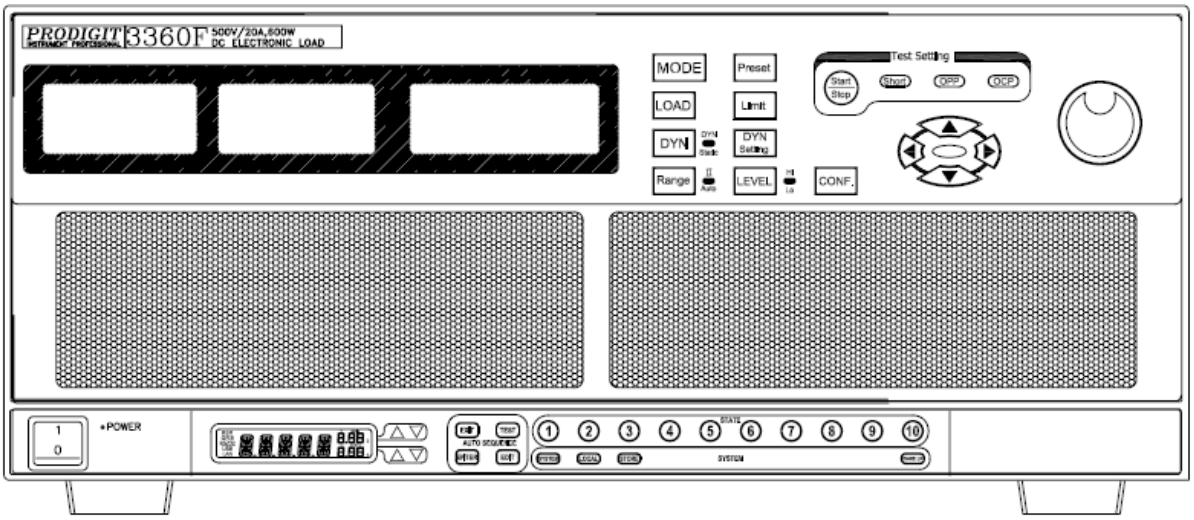


Fig 3-2 3360F Series High Power electronic load

3.1.1 3360F 500V/20A，600W DC ELECTRONIC LOAD

It indicates the model number and specifications of 3360F electronic load.

3.1.2 NG Indicator

When the reading of Vmeter, Ameter, Watt meter exceeds the upper or lower limit set, this indicator will display.

3.1.3 MODE and CC, CR, CV, CP Indicator

There are four operating modes can be selected by press the " MODE " key on the 3360F Electronic Load .

The sequence is Constant Current (CC), Constant Resistance (CR), Constant Voltage (CV), Constant Power (CP) and then repeat while press the" MODE " key, the CC, CR, CV, CP mode indicator will be lit respectively when the appropriate operating mode is selected.

The operating theorem of CC, CR, CV and CP mode is described in Chapter 1-1B, and the application information is described in Chapter 5-3, 5-4, 5-5 and 5-6 respectively.

There are two programming ranges in CC, CR, CV and CP mode respectively, the 3360F can adjust to the best fit range automatically according to the programmed load level. The rule is described below:

3.1.3.1 In Constant Current mode:

The Range I (2A) indicates low load current operating range, Range II (20A) indicated high load current operating range, the detail specification of range load current is listed on the Table 1-1B, the current range is changed automatically in accordance to the programmed load current.

The range 1 is selected automatically if the programmed load current is less than the maximum current of range 1 (2A), and will set to range II automatically when the programmed current is higher than the maximum current of range 1 (2A).

3.1.3.2 In Constant Resistance mode:
Range I indicates low load resistance operating range, Range II indicates high load resistance operating range, the detail resistance range specifications is shown in table 1-1B. The resistance range is changed automatically in accordance to the programmed load resistance.

The 3360F electronic load will set to range 1 automatically if the programmed load resistance is higher than the minimum load resistance of range 1, and will set to range II when the programmed load resistance is lower than the minimum load resistance of range 1.

3.1.3.3 In Constant Voltage mode:
Range I indicates low load voltage operating range, Range II indicates high load voltage operating range, the detail voltage range specifications is shown in table 1-1B. The voltage range is changed automatically in accordance to the programmed load voltage.

The range 1 is selected automatically if the programmed load voltage is less than the maximum voltage of range 1 (60V), and will set to range II automatically when the programmed voltage is higher than the maximum voltage of range 1 (60V).

3.1.3.4 In Constant Power mode:
Range I indicates low load power operating range, Range II indicates high load power operating range, the detail power range specifications is shown in table 1-1B. The power range is changed automatically in accordance to the programmed load power.

The range 1 is selected automatically if the programmed load power is less than the maximum power of range 1 (60W), and will set to range II automatically when the programmed power is higher than the maximum power of range 1 (60W).

3.1.4 Remote LCD Indicator
The Remote LCD Indicator is used to indicate the status of remote operation, all of the front panel operation can not be operated while Remote LCD is ON, in case of Local mode or manual operation, the Remote LCD is OFF.

3.1.5 Right 5 digit LCD display
The 5 digit LCD display is a multi-function display, the functions are described below:
Normal mode:
There is a 5 digit DVM display, display measuring data of the DC input terminal or V-sense input terminal if V-sense AUTO is programmed, or the 5 digit voltage meter displays the voltage of V-sense input terminal if V-sense ON is programmed.

When the auto-sense of V-sense function is programmed, the auto-sense circuit of 3360F electronic load can check the V-sense cable is connected or not, the V-

sense input is detected if it is greater than 7.0V (3360F,) or not, if yes then the 5 digit DVM measures the sense input, otherwise, the 5 digit DVM measures the DC input terminals of the load.

Test Setting Mode:

Short : Short test Enable and Short Setting programming：Display will show “Short”.

OPP : OPP test Enable and OPP Setting programming：Display will show ”OPP”.

OCP : OCP test Enable and OCP Setting programming：Display will show ”OCP”.

Short testing、OCP testing and OPP testing programming, will show Vsense’s voltage or load Input voltage.

3.1.6 Middle 5 digit LCD display

Normal mode:

There is a 5 digit DAM display. The 5 digit DAM displays the measuring current of the DC load When Load ON programming.

Setting Mode:

3.1.6.1 Config ON programming: Display will individually show ”SENSE”, “LDon”, “LDoFF” and “POLAR”.

3.1.6.2 Limit ON programming：Display will individually show”V_Hi”, “V_Lo”, “A_Hi”, “A_Lo”, “W_Hi”, “W_Lo” and “NG”.

3.1.6.3 DYN setting ON programming：Display will individually show ”T-Hi”, ”T-Lo”, ”RISE” and “FALL”.

3.1.6.4 Short test Enable、OCP test Enable and OPP test Enable programming: Display will individually show 「PRESS」.

3.1.6.5 Short setting programming：Display will individually show “TIME”, “V-Hi” and “V-Lo”.

3.1.6.6 OPP setting programming：Display will individually show “PSTAR”, “PSTEP”, “PSTOP” and “VTH”.

3.1.6.7 OCP setting programming：Display will individually show “ISTAR”, “ISTEP”, “ISTOP” and ”VTH”.

3.1.6.8 Short testing programming, the current of actual load current, the unit is "A".

3.1.6.9 OCP testing programming, the setting current , the unit is "A".

3.1.6.10 OPP testing programming, the setting watt , the unit is "W"

3.1.6.11 When Over current protect：Display will show 「OCP」.

3.1.7 Left 5 digit LCD display

Normal mode：The left 5 digit LCD display is show load Consumption duty.

Setting Mode: Setting value is by rotating knob switch.

3.1.7.1 PRESET ON mode display will individually show：

3.1.7.1.1 CC mode's current programming value display, the unit is "A".

3.1.7.1.2 CR mode's resister programming value display, the unit is “Ω”

3.1.7.1.3 CV mode's voltage programming value display, the unit is “V”.

3.1.7.1.4 CP mode's power programming value display, the unit is “W”.

3.1.7.2 LIMIT ON mode display will individually show :

3.1.7.2.1 V_Hi(upper limit voltage) & V_Lo(lower limit voltage) value display, the unit is "V".

3.1.7.2.2 A_Hi(upper limit current) & A_Lo(lower limit current) value display, the unit is "A"

3.1.7.2.3 W_Hi(upper limit power) & W_Lo(lower limit power) value display, the unit is "W"
3.1.7.2.4 NG programming display will show 「ON」or 「OFF」.
3.1.7.3 DYN setting ON mode display will individually show :
3.1.7.3.1 T-Hi(level high time)& T-Lo(level low time) programming value display, the unit is "ms".
3.1.7.3.2 Rise/Fall current slew rate programming value display, the unit is "mA/us".
3.1.7.4 Config ON mode display will individually show:
3.1.7.4.1 SENSE programming display will show「ON」or「AUTO」.
3.1.7.4.2 LDon & LDoff value display, the unit are "V".
3.1.7.4.3 Load polarity value display will show「＋LOAD」or「－LOAD」.
3.1.7.5 Short test Enable、OCP test Enable and OPP test Enable mode will show「START」.
3.1.7.6 Short Setting mode
3.1.7.6.1 Short setting display will show “CONTI”, Short time setting; the unit is “ms”.
3.1.7.6.2 V-Hi & V-Lo value display, the unit is "V".
3.1.7.7 OPP Setting mode
3.1.7.7.1 OPP PSTAR、OPP PSTEP and OPP PSTOP value display, the unit is “W”.
3.1.7.7.2 OPP Vth value display, the unit is “V”.
3.1.7.8 OCP Setting mode
3.1.7.8.1 OCP ISTAR, OCP ISTEP and OCP ISTOP value display, the unit is “A”.
3.1.7.8.2 OCP VTH value display, the unit is “V”.
3.1.7.9 OCP test & OPP test mode display will show「RUN」
3.1.7.10 When Over power protect：Display will show 「OPP」.
3.1.7.11 When Over temperature protect：Display will show 「OTP」.

3.1.8 MODE and CC, CR, CV, CP Indicator

There are four operating modes can be selected by press the " MODE " key on the 3360F Electronic Load.

The sequence is Constant Current (CC), Constant Resistance (CR), Constant Voltage (CV), Constant Power (CP) and then repeat while press the" MODE " key, the CC, CR, CV, CP mode indicator will be lit respectively when the appropriate operating mode is selected.

3.1.9 LOAD ON/OFF key and LED

The 3360F Electronic Load input can be toggled ON/OFF at the front panel's LOAD ON/OFF key. The load current slew rate change uses the slew rate setting, so the load current slew rate will change at the programmed Rise/Fall slew rate setting respectively.

Turning the LOAD OFF does not affect the programmed settings. The LED is OFF to indicate LOAD OFF status. The LOAD will return to the previously programmed values when the LOAD key is turned to ON again.

The Load ON LED indicates the 3360F electronic load is ready to sink current from DC input.

3.1.9.1 Load ON/OFF key: Switch load ON to load OFF in the load, the fall slew rate is according to the slew rate setting on the front panel.

3.1.9.2 DC input voltage: There is a load ON and load OFF voltage control circuit in 3360F electronic load.

When the Device under Test turns ON, the output voltage of D.U.T will increase up from 0 to rated output voltage. The 3360F electronic load will start to sink current after load voltage is higher than load ON voltage setting within the Config key.

The programmed load ON voltage for model 3360F load is from 0.4 to 100V.

When the Device under Test turns OFF, the output voltage of D.U.T will decrease down to 0 volt. The 3360F electronic load will stop to sink current after load voltage is lower than load OFF voltage setting within the Config key.

The programmed load OFF voltage for model 3360F load is from 0 to load ON voltage.

3.1.10 DYN / STA key and LED

This Key is available in Constant Current and Constant Power mode only. In Constant Resistance and Constant Voltage mode, there is no any function in this key and the LED is OFF, the 3360F load will automatically adjust to static mode. In Constant Current and Constant Power mode, the Static or Dynamic mode is toggled by this key; the LED will be lit at Dynamic mode.

3.1.11 Range key and LED

Range AUTO / II Key is for range setting, if Range AUTO LED is OFF, load will setting to Range I or II in accordance with the actual current value. When Range II, LED will ON, the current programming will setting to Range II .

Note: Coercion Range II only in CC Mode.

3.1.12 LEVEL key and LED

In the dynamic mode of Constant Current mode, there is no any effect to the 3360F load although the LED can be indicated the High or Low level in the Static mode. The only fact is switching the 3360F load from Dynamic load to Static load; it can determine the load current is High or Low load current level.

3.1.12.1 In Constant Current mode:
The level is initial setting on High, LEVEL High / Low has two level, Low current level setting must be lower than Level High.

3.1.12.2 In Constant Resistance mode:
The level is initial setting on High, LEVEL High / Low has two level, Low resistance level setting must be higher than Level High.
P.S.：CR Mode Level High / Low level by current perspectives.

3.1.12.3 In Constant Voltage mode:
The level is initial setting on High, LEVEL High / Low has two level, Low voltage level setting must be lower than Level High.
P.S.：CV Mode Level High / Low has "automatic push function”.

3.1.12.4 In Constant Power mode:
The level is initial setting on High, LEVEL High / Low has two level, Low power level setting must be lower than Level High.

P.S Automatically Push Function
Level setting, Level High must be higher or equal than Level Low; When Level High equal to than LEVEL Low, it can not be adjusted anymore.

when Level High equals to lower low, the Automatic push function can push down the level Low value.
Therefore, the Level High can continue adjusting.

3.1.13 PRESET ON/OFF key and LED
At Preset OFF state, the load input voltage is shown on the right 5 digit Meter, and load input current is shown on the middle 5 digit Meter, the load input power is shown on the left 5 digit Meter, the engineering unit "V", "A" and "W" LCD will be lit respectively.

At Preset ON state, the PRES. LED is ON, the left 5 digit Meter will be affected by the CC, Dynamic, CR, CV, and CP operating mode.

In Preset ON condition, the 5 digit DAM indicates the setting load current which cab be from front panel setting or remote system setting.

3.1.13.1 In Constant Current mode:
The High/Low level load current value can be preset at left 5 digit LCD display, the unit is "A", the "A" will be lit as well.

3.1.13.2 In Dynamic load mode:
The Thigh/Tlow parameters value of High/Low load current duration and Rise/Fall setting can be displayed on the left 5 digit LCD display, the unit is "ms", the "ms" will be lit as well.

3.1.13.3 In Constant Resistance mode:
The High/Low level load resistance value can be preset on the left 5 digit LCD display, the engineering unit is "Ω", the "Ω" will be lit as well.

3.1.13.4 In Constant Voltage mode:
The High/Low level load voltage value can be preset on the right 5 digit LCD display, the unit is "V", the "V" will be lit as well.

3.1.13.5 In Constant Power mode:
The High/Low level load power value can be preset on the right 5 digit LCD display, the unit is "W", the "W" will be lit as well.

3.1.14 Limit key and LED

In the 3360F electronic load, the Limit key setting includes the GO/NG check of Digital Voltage meter Upper/Lower limit, Current meter Upper/Lower limit, and Watt meter Upper/Lower limit within the Limit key setting. The setting sequence is shown below:

OFF → DVM Upper/Lower limit → DAM Upper/Lower limit → DWM Upper/Lower limit → GO/NG check ON/OFF → OFF→ Repeat

3.1.15 DYN setting key and LED

DYN setting key is setting Dynamic Mode parameter, There are rise, fall, Thigh and Tlow parameters, Setting the parameter is rotating the knob switch. Press any key to escape the DYN parameters setting mode.

3.1.15.1 Press DYN setting key, LED will ON

3.1.15.2 Setting level High Period, Middle 5 digit LCD display will show “T-Hi” left 5 digit LCD display will show setting value，the unit is “ms”.

3.1.15.3 Setting level Low period, Middle 5 digit LCD display will show “T-Lo”, left 5 digit LCD display will show setting value，the unit is “ms”.

3.1.15.4 Setting ries time，Middle 5 digit LCD display will show ”RISE”, left 5 digit LCD display will show setting value，the unit is “mA/us”.

3.1.15.5 Setting fall time，Middle 5 digit LCD display will show ”FALL”, left 5 digit LCD display will show setting value，the unit is “mA/us”.

3.1.16 Config key and LED

The Config key setting includes the Sense AUTO/ON, Load ON/OFF voltage and Load Polarity. The setting sequence is shown below.

OFF → SENSE AUTO/ON → Load ON/OFF Voltage → Polarity setting → OFF→ Repeat

3.1.17 SHORT key and LED

3.1.17.1 Short test function Enable/Disable Key.

Press “ SHORT” key to enable the short test function and the indicator LED is lit on. The LCD display show “SHORT” on right 5 digits LCD display, shows “PRESS” on middle 5 digits LCD display and shows “START” on left 5 digits LCD display.

3.1.17.2 Short test function parameter setting key.

There are 3 parameter for the SHORT test function. The parameter as TIME, V-Hi and V-Lo.Press “SHORT” key again to set short test time when SHORT test function is enabled. Press SHORT key again to next parameter by the sequence of TIME, V-Hi, V-Lo and disable, press another key to exit the setting and save the setting. The short test parameter description as following.

3.1.17.3 TIME : setting the short test time, The LCD display shows “SHORT”, “TIME” and CONTI(initial) from right to left 5 digits LCD display, the setting range is “CONTI” means continue, 100ms to 10000ms, step 100ms by clockwise rotate the setting knob.

The short test will be no time limitation when setting to CONTI until press “START/STOP” key to stop the short test.

3.1.17.4 V-Hi : Short test voltage check upper limitation setting, The LCD display shows “SHORT”, “V-Hi” and 0.00V(initial) from right to left 5 digits, the

V-Hi setting range from 0.00 to 500.00 step 0.01V by rotating the setting knob.

.3.1.17.5 V-Lo : Short test voltage check lower limitation setting, The LCD display shows “SHORT”, “V-Lo” and 0.00V(initial) from right to left 5 digits, the V-Hi setting range from 0.00 to 500.00 step 0.01V by rotating the setting knob.

Note. The V-Hi and V-Lo parameter is difference with the V-Hi and V-Lo in the LIMIT function.

3.1.17.6 START/STOP Test key.
Press START/STOP key to start or stop the short test by SHORT test setting parameter when SHORT test function is enabled.

The Load will goes to “ON” automatically when press START/STOP key to start the short test and the Load will goes to “OFF” automatically when press START/STOP key to stop the short test. The Load will stay to “ON” If load was “ON” before short test.

The SHORT test function for test the UUT’s short protection, The SHORT test will sink load’s full scale current(3360F 20A) until to fit in with the test condition, and the UUT’s drop voltage is between V_Hi and V_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

Press any key to goes to normal mode of LCD display.

3.1.18 OCP key and LED

3.1.18.1 OCP test function Enable/Disable Key.
Press “ OCP” key to enable the OCP test function and the indicator LED is lit on. The LCD display show “OCP” on right 5 left LCD display, shows “PRESS” on middle 5 digits LCD display and shows “START” on left 5 digits LCD display.

3.1.18.2 OCP test function parameter setting key.
There are 4 parameter for the OCP test function. The parameter as ISTAR, ISTEP, ISTOP and Vth.
Press “OCP” key again to set OCP test parameter ISTAR(start current point) When OCP test function is enabled. Press OCP key again to next parameter by the sequence of ISTEP, ISTOP, Vth and disable, press another key also can to exit the setting and save the setting. The OCP test parameter description as following.

3.1.18.3 ISTAR : setting the start current point, The LCD display shows “OCP”, “ISTAR” and 0.000AI(initial) from right to left 5 digits LCD display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

3.1.18.4 ISTEP : setting the increment step current point, The LCD display shows “OCP”, “ISTEP” and 0.000AI(initial) from right to left 5 digits LCD display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

3.1.18.5 ISTOP : setting the stop current point, The LCD display shows “OCP”, “ISTOP” and 20.0AI(3360F initial) from right to left 5 digits LCD

display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

3.1.18.6 Vth : Setting threshold voltage; The LCD display shows “OCP”, “Vth” and 0.50VI(initial) from right to left 5 digits LCD display, the setting range is 0.00V to the full scale of the Voltage specification. The setting is by rotating the setting knob.

3.1.18.7 START/STOP Test key.

Press START/STOP key to start or stop the OCP test by OCP test setting parameter when OCP test function is enabled.

The Load will goes to “ON” automatically when press START/STOP key to start the OCP test and the Load will goes to “OFF” automatically when press START/STOP key to stop the OCP test. The Load will stay to “ON” If load was “ON” before OCP test.

The OCP test function for test the UUT’s over current protection, The OCP test will start sink current from I-START to increase ISTEP current until the UUT’s output voltage drop-out lower than the threshold voltage(V-th setting), and the OCP trip point is between A_Hi and A_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

Press any key to goes to normal mode of LCD display.

3.1.19 OPP key and LED

3.1.19.1 OPP test function Enable/Disable Key.

Press “ OPP” key to enable the OPP test function and the indicator LED is lit on. The LCD display show “OPP” on right 5 left LCD display, shows “PRESS” on middle 5 digits LCD display and shows “START” on left 5 digits LCD display.

3.1.19.2 OPP test function parameter setting key.

There are 4 parameter for the OPP test function. The parameter as PSTAR, PSTEP, PSTOP and Vth.

Press “OPP” key again to set OPP test parameter PSTAR(start power point) When OPP test function is enabled. Press OPP key again to next parameter by the sequence of PSTEP, PSTOP, Vth and disable, press another key also can to exit the setting and save the setting. The OPP test parameter description as following.

3.1.19.3 PSTAR : setting the start power, The LCD display shows “OPP”, “PSTAR” and 0.00WI(initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The setting is by rotating the setting knob.

3.1.19.4 PSTEP : setting the increment step power, The LCD display shows “OPP”, “PSTEP” and 0.00WI(initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The setting is by rotating the setting knob.

3.1.19.5 PSTOP : setting the stop power, The LCD display shows “OPP”, “PSTOP” and 600.0WI(3360F initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The

setting is by rotating the setting knob.

3.1.19.6 Vth : Setting threshold voltage; The LCD display shows “OPP”, “Vth” and 0.50VI(initial) from right to left 5 digits LCD display, the setting range is 0.00V to the full scale of the Voltage specification. The setting is by rotating the setting knob.

3.1.19.7 START/STOP Test key.

Press START/STOP key to start or stop the OPP test by OPP test setting parameter when OPP test function is enabled.

The Load will goes to “ON” automatically when press START/STOP key to start the OPP test and the Load will goes to “OFF” automatically when press START/STOP key to stop the OPP test. The Load will stay to “ON” If load was “ON” before OPP test.

The OPP test function for test the UUT’s over power protection, The OPP test will start sink current from PSTART to increase PSTEP current until the UUT’s output voltage drop-out lower than the threshold voltage(V-th setting), and the OPP trip point is between P_Hi and P_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

Press any key to goes to normal mode of LCD display.

3.1.20 START/STOP key

3.1.20.1 Press START/STOP key to start or stop the short test by SHORT、OCP & OPP test setting parameter when SHORT、OCP & OPP test function is enabled.

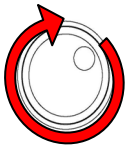
3.1.20.2 The Load will goes to “ON” automatically when press START/STOP key to start the short test and the Load will goes to “OFF” automatically when press START/STOP key to stop the short test. The Load will stay to “ON” If load was “ON” before short test.

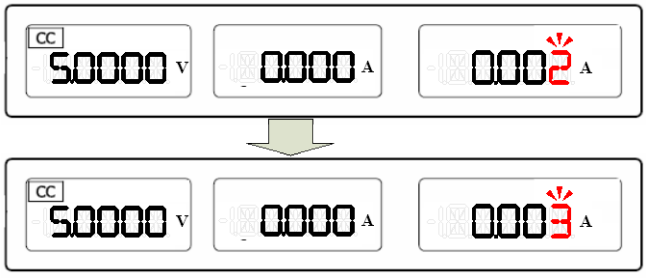
3.1.20.3 The SHORT、OCP & OPP test function for test the UUT’s short protection, The SHORT、OCP & OPP test will sink load’s full scale current(3360F 20A) until to fit in with the test condition, and the UUT’s drop voltage is between V_Hi and V_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

Press any key to goes to normal mode of LCD display.

3.1.21 Knob and Knob key

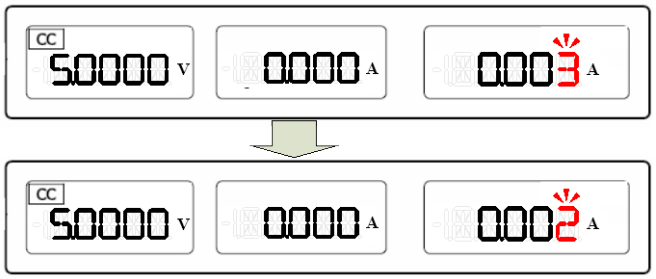
- Right Knob: Setting digit can flash clockwise add setting value.





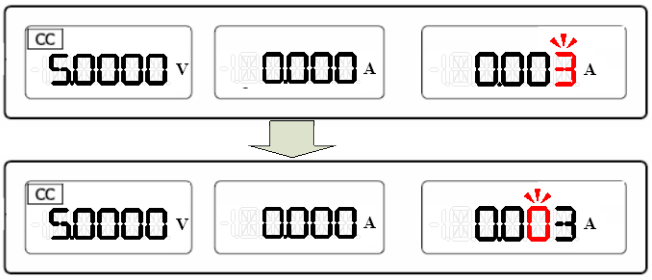
- Left Knob: Setting digit can flash Anti-clockwise to decrease setting value.





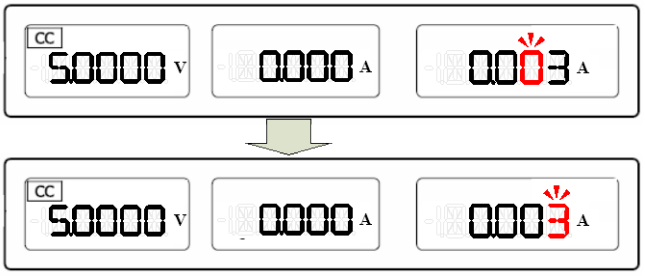
- Knob Left key: Setting digit can flash Left Knob key to push down setting value move left one-digit.



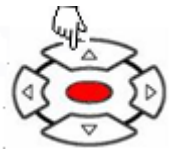


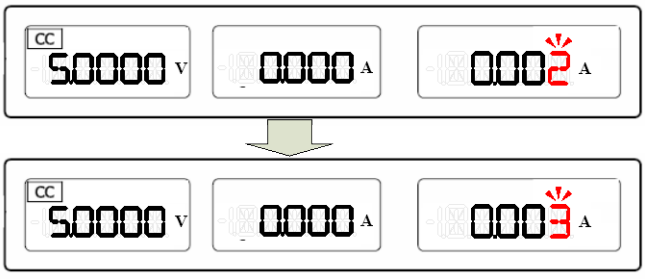
- Knob Right key: Setting digit can flash Knob Right key to push down setting value move Right one-digit.



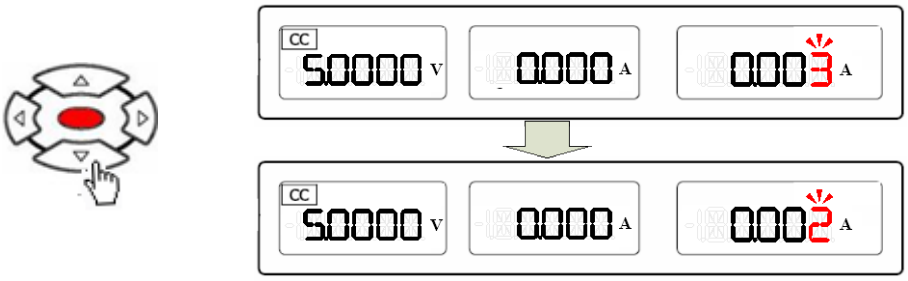


- Knob up key: Setting digit can flash Knob UP KEY to push down add setting value.





- Knob down key: Setting digit can flash Knob down key to push down to decrease setting value.



NOTE: ON CR MODE Right Knob and Knob UP KEY to push down decrease setting value.
ON CR MODE LEFT Knob DOWN KEY to push down add setting value.

3.1.22 +/- DC INPUT Terminal.

The positive and negative terminal of load input connector, it should connect to the positive and ground output for a positive output power supply, or the ground and negative output for a negative output power supply respectively.

3.1.23 V-sense input terminal

To measure the specific voltage points through the V-sense input terminal, refer Fig 3-3 for detail application information.

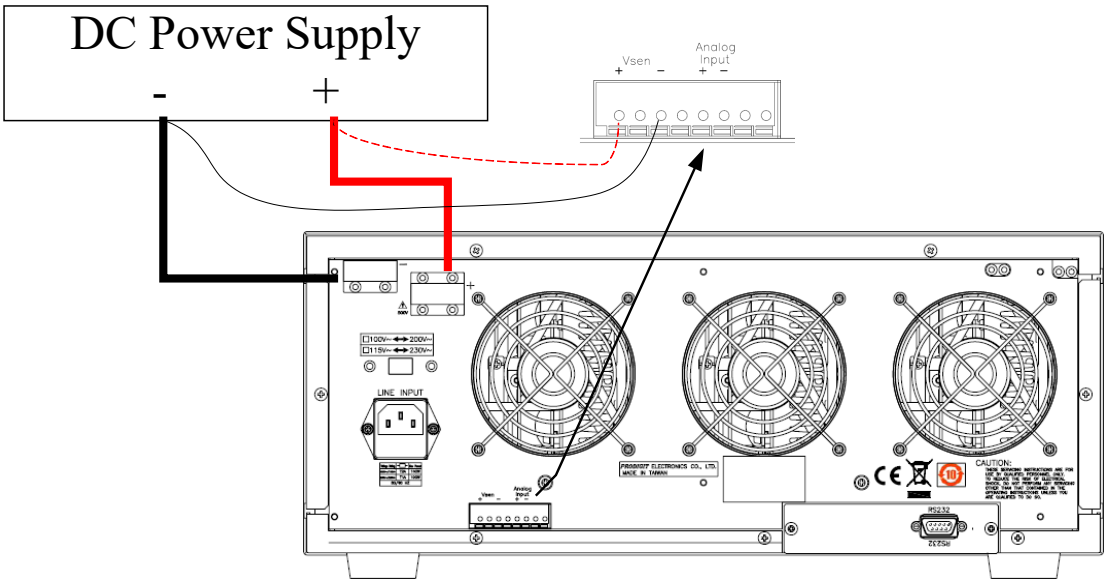
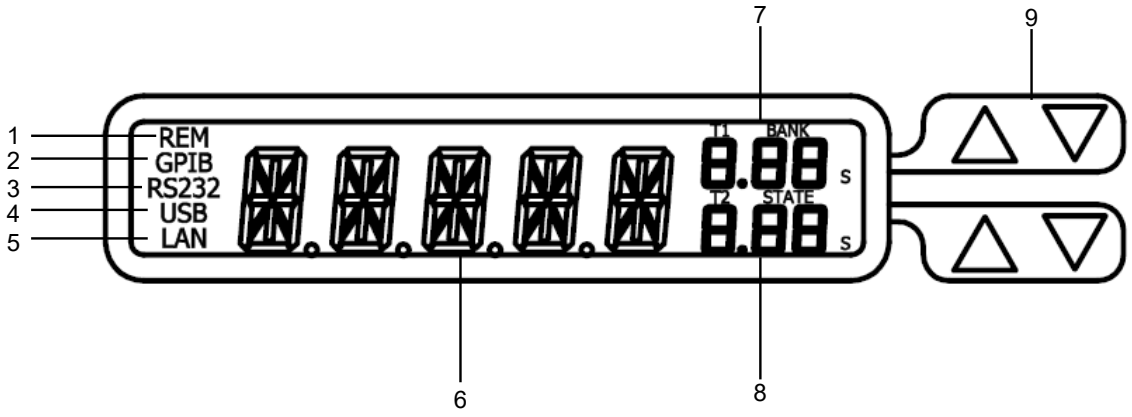


Fig 3-3 Remote sense connection on front panel

3-2. Front panel description(2)

The LCD will be lit the 3360F status when Power ON :



3.2.1 In REMOTE mode:
The REM will be lit when 3360F is controlled through GPIB/RS232/USE/LAN by PC, and it means 3360F is in REMOTE mode, any icon will not effective but LOCAL.

3.2.2 In GPIB mode:
It is GPIB inside. The LCD will be lit GPIB when Power ON. If 3360F is controlled by GPIB through PC, the GPIB will be lit.

3.2.3 In RS232 mode:
It is RS232 inside. The LCD will be lit RS232 when Power ON. If 3360F is controlled by RS232 through PC, the RS232 will be lit.

3.2.4 USB mode Lit :
It is USB interface inside.

3.2.5 LAN mode Lit :
It is LAN interface inside.

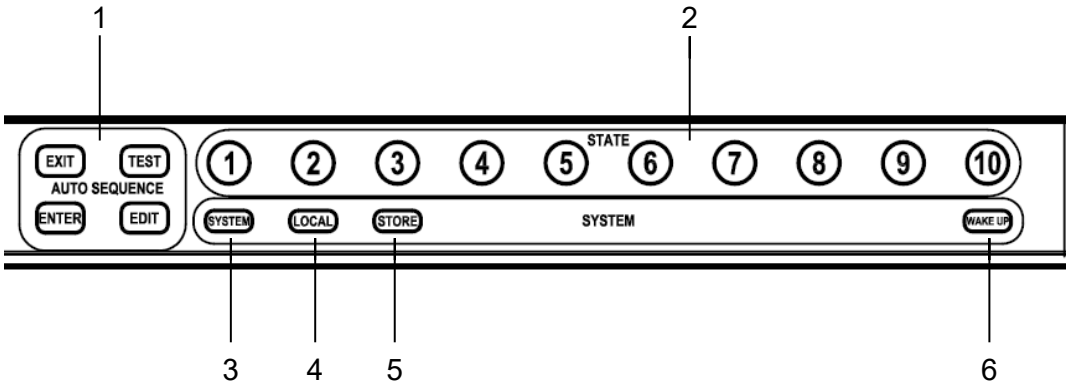
3.2.6 3360F Display:
Power ON the LCD will display Nor. It means Normal.

3.2.7 T1/BANK Display:
One of T1/BANK Display means T1 (Test Time) value when setting AUTO SEQUENCE. And the second one means the BANK value of RECALL/STORE mode.

3.2.8 T2/STATE Display:
One of T2/STATE Display means T2 (DELAY Time) value when setting AUTO SEQIEMCE. And the second one means the STATE value of RECALL/STORE mode.

3.2.9 Press UP/DOWN to adjust T1/BANK and T2/BANK.

3-3. Front panel description(3)



3.3.1 Press these 4 buttons to set AUTO SEQUENCE

3.3.2 STATE1~10 are used for setting and adjusting the AUTO SEQUENCE and testing the RECALL/STORE mode.

3.3.3 Press SYSTEM to set the argument、GPIB address、RS232 BAUD-RATE and buzzer alarm power ON/OFF.

3.3.4 Press LOCAL to exit REMOTE mode.

3.3.5 Press STORE to save the LOAD and the LOAD of WAKE-UP mode status and AUTO SEQUENCE.

3.3.6 Press WAKE-UP to recall the set status of Load when power ON.

3-4. Front panel description(4)

The function keys on the front panel of 3360F mainframe are designed for high testing throughput purpose. There are 150 operation states or testing steps can be store in the EEPROM memory of 3360F Series electronic load module respectively, each state can store or recall the load status and level for Electronic load modules simultaneously.

	3360F
BANK	15
STATE	10
TOTAL STATE	150

3.4.1 STORE process:

3.4.1.1 Set the load status and load level from load module within the mainframe respectively.

3.4.1.2 Select the Memory Bank (01-15) to be stored for 3360F Series load module.

3.4.1.3 Press the STORE key on the 3360F mainframe, the STORE LED is flashing (about one time every second) to indicate ready to store. Press Store key again or wait for about 20 sec to exit the store operation.

Press one of the state 1-10 key, the appropriate state key's LED will be lit immediately, the load level and status of load module is stored into the EEPROM memory this time, then the STORE LED turns to OFF, it means the STORE procedure is completed.

Note:

After press the STORE key, the STORE LED will flash for 20 seconds, if the STATE 1-10 key is not pressed within this 20 seconds, the STORE

LED will be OFF, it indicated the STORE process is not available now, please repeat the STORE procedure for a new STORE operation.
After press the STORE key, then press the STORE key, the STORE LED will be blank, it indicates the STORE process is not available.

After press the STORE key, it is available and useful to operate the front panel key on the 3360F Series Electronic load module. However, the STATE LED will be OFF if any key on any load module is operated, this indicates the front panel state of load module is not the same as STORE state.

3.4.2.1 STORE function:
Please refer chapter section on the 3360F Series electronic load module operation manual to more detail operation flow-chart for store and recall operation.

It can store up to states of 3360F Series load module setting simultaneously, if you store 2 different states in the same state key, the later state will overcome the previous state, it acts as update the new data.

3.4.2.2 RECALL operation:
For 3360F Series, using UP and Down key to select the Memory Bank, then press one of the Memory State 1 through 10 key, the appropriate LED will be lit, the store state on the 3360F mainframe is sending to the electronic load module simultaneously. Before press the states key, you press any key on the load module then the state LED is blank immediately, it indicates the STORE state has been changed on load module's front panel.

3.4.3 WAKE-UP function
This function is designed for auto setting the load status and load level in turning on the 3360F every time. Press WAKE-UP first, the LCD will be lit and shown “CLEAR” to cancel or “SET” to set. Adjust BANK and STATE keys to reset the WAKE-UP. Press STORE key to be stored or EXIT the WAKE-UP.

3.4.4 AUTO SEQUENCE
There are two modes in AUTO SEQUENCE function, EDIT MODE and TEST MODE, The AUTO SEQ mode can be entered by press EDIT key, after that, the LCD will be lit “FX-XX . “FX” means to select the state F1-F9 . “XX” means the test STEP01-16 .

3.4.4.1 EDIT MODE
The EDIT MODE flow chart is described below:

1. There are nine Auto Sequence (F1-F9) can be set within 3360F.
2. Each Auto Sequence has up to 16 test steps, where each step is one Memory of 150 sets store memory.
3. Each test step has T1 (Test Time) and T2 (Delay time), the unit is 100ms; the range is 0.1S - 9.9S in 100mS resolution. 3360F mainframe will check each module GO/NG at the end of T1 (Test time), the next step will be started after duration T2 (Delay time).
4. Setting REPEAT(REPEAT TEST)，Press UP、DOWN key adjustment setting 0~9999，Press STORE SAVE REPEAT value，or Press EXIT key Exit EDIT MODE.

Example: Press UP、DOWN key adjustment setting 2023 the following picture shows.



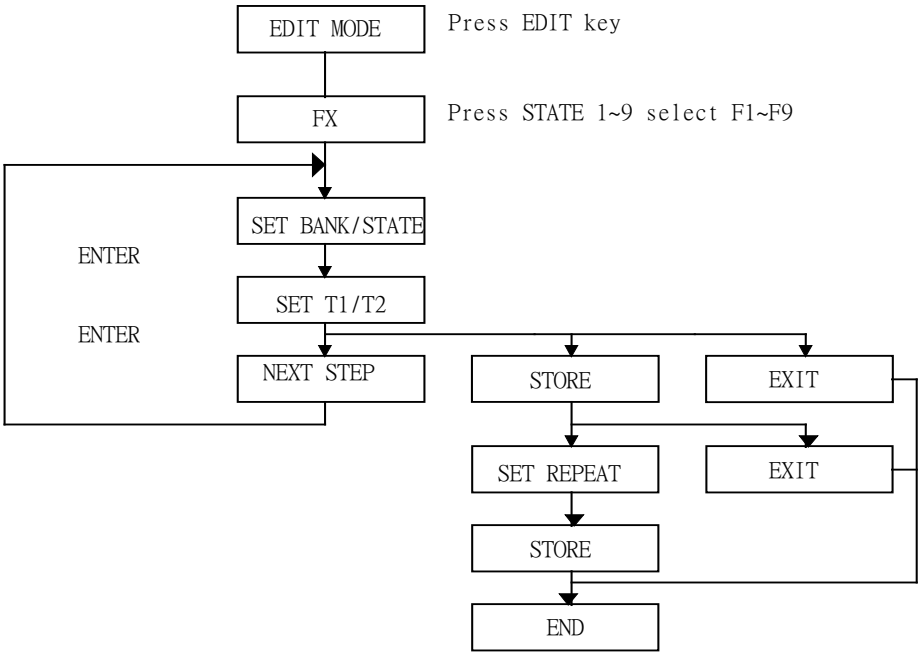
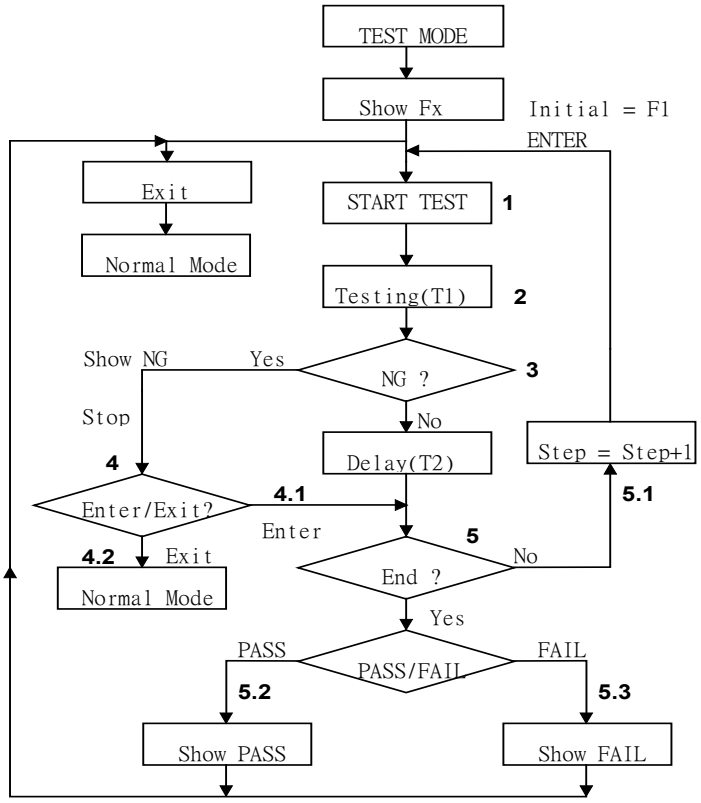


Fig 3-4 STORE (EDIT) MODE OPERATIONO FLOW-CHART

3.4.4.2 TEST MODE

The TEST MODE flow chart is described below:

1. After press TEST, select the state F1-F9 and enter Auto Testing mode.
2. The sequence start from (Step 1 - T1 - T2), then (step 2 - T1 - T2), and so on until last step or stop by press EXIT .The LCD will be lit NG if the result of test is not successful.
3. The LCD display will show PASS if all test in all module are passed, and it will show FAIL if there is at least one failure during the test. If the buzzer sets for the ON, When the test result “PASS” the buzzer will call one time, if test result “FAIL” the buzzer will call two times.
4. User can press ENTER to test again, or the 3360F can quit from AUTO-SEQUENCE mode by press EXIT .



1.Press TEST key

2.Press STATE 1~9 Select F1-F9

3.Press ENTER

1.Recall correspond memory which had been stored in F1-F9 memory

2.Check the GO/NG indicator

3.Stop testing if the result was NG.

3.1 Press ENTER to be continued.

3.2 Press EXIT to end the test,and back to normal mode.

4.If test is GO,than step is last?

4.1 If no than Step+1,continue another step

4.2 If "Yes", than if all the test in all module is pass, show GO

4.3 If "Yes", thanif there is at least one failure during the test, show NG

Fig 3-5 TEST MODE OPERATION FLOW-CHA

3-5. Initial setting of 3360F Series load module

When you receive the 3360F Series electronic load, the load value initial setting after power ON is listed in Table 3-1 ~ Table 3-4 respectively, this is the factory or initial setting.

Item		Initial value	Item		Initial value
CC L+Preset		0.0000 A	LIMIT	V_Hi	500.00 V
CC H+Preset		0.0000 A		V_Lo	0.00 V
CR H+Preset		1800K Ω		I_Hi	20.400 A
CR L+Preset		1800KΩ		I_Lo	0.000 A
CV H+Preset		500.00 V		W_Hi	600.00 W
CV L+Preset		500.00 V		W_Lo	0.00 W
CP L+Preset		0.00W	CONFIG	SENSE	Auto
CP H+Preset		0.00W		LD-ON	4.0 V
DYN	T HI	0.050 mS		LD-OFF	0.500 V
	T L0	0.050 mS		POLAR+LOAD	
	RISE	16.0mA/uS	SHORT		Disable
	FALL	16.0mA/uS	OPP		Disable
			OCP		Disable

Table 3-1 3360F initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.0000 A	LIMIT	V_Hi	500.00 V
CC H+Preset		0.0000 A		V_Lo	0.00 V
CR H+Preset		900K Ω		I_Hi	40.200 A
CR L+Preset		900K Ω		I_Lo	0.000 A
CV H+Preset		500.00 V		W_Hi	1200.0 W
CV L+Preset		500.00 V		W_Lo	0.0 W
CP L+Preset		0.00W	CONFIG	SENSE	Auto
CP H+Preset		0.00W		LD-ON	4.0 V
DYN	T HI	0.050 mS		LD-OFF	0.500 V
	T L0	0.050 mS		POLAR+LOAD	
	RISE	32.0mA/uS	SHORT		Disable
	FALL	32.0mA/uS	OPP		Disable
			OCP		Disable

Table 3-2 3361F initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.0000 A	LIMIT	V_Hi	500.00 V
CC H+Preset		0.0000 A		V_Lo	0.00 V
CR H+Preset		600K Ω		I_Hi	60.000 A
CR L+Preset		600K Ω		I_Lo	0.000 A
CV H+Preset		500.00 V		W_Hi	1800.0 W
CV L+Preset		500.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	0.050 mS		LD-OFF	0.500 V
	T L0	0.050 mS		POLAR+LOAD	
	RISE	4.8mA/uS	SHORT		Disable
	FALL	4.8mA/uS	OPP		Disable
			OCP		Disable

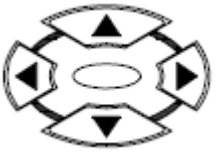
Table 3-3 3362F initialize

Item		Initial value	Item		Initial value
CC L+Preset		0.0000 A	LIMIT	V_Hi	500.00 V
CC H+Preset		0.0000 A		V_Lo	0.00 V
CR H+Preset		3000K Ω		I_Hi	12.000 A
CR L+Preset		3000K Ω		I_Lo	0.000 A
CV H+Preset		500.00 V		W_Hi	1800.0 W
CV L+Preset		500.00 V		W_Lo	0.0 W
CP L+Preset		0.00 W	CONFIG	SENSE	Auto
CP H+Preset		0.00 W		LD-ON	4.0 V
DYN	T HI	0.050 mS		LD-OFF	0.500 V
	T L0	0.050 mS		POLAR+LOAD	
	RISE	0.96mA/uS	SHORT		Disable
	FALL	0.96mA/uS	OPP		Disable
			OCP		Disable

Table 3-4 3367F initialize

3-6. Load current course/fine increase/decrease adjustment knob

Change amount that CC/CR/CV/CP MODE (CR contrary) load current adjusts form 3-5 shows analyzes one degree of relations with knobing. Push the knob when operate (the figure will glimmer), can enter one and analogize , rotate increment right or rotate decrement left, will continue increasing or reducing and reach the minimum value or the maximum to establish constantly to adjust in load current, or the knob no longer continues rotating in the way.

3360F		RANGE I			RANGE II		
FULL SCALE LOAD CURRENT		2.04A			20.4A		
CURRENT	RANGE	0~2.04A/20.4A					
METER	RESOLUTION	0.034mA/0.34mA					
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY							
CC Mode		10.03mA	1.02mA	0.102mA	100.3mA	10.2mA	1.02mA
CR Mode		55.55uS	5.555uS	0.5555uS	50mΩ	5mΩ	0.5mΩ
CV Mode		0.1V	0.01V	0.001V	1V	0.1V	0.01V
CP Mode		0.1W	0.01W	0.001W	1W	0.1W	0.01W

3361F		RANGE I			RANGE II		
FULL SCALE LOAD CURRENT		4.02A			40.2A		
CURRENT	RANGE	0~4.02A/40.2A					
METER	RESOLUTION	0.067mA/0.67mA					
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY							
CC Mode		10.05mA	1.005mA	0.067mA	100.5mA	10.05mA	0.67mA
CR Mode		111.1uS	11.11uS	1.111uS	25mΩ	2.5mΩ	0.25mΩ
CV Mode		0.1V	0.01V	0.001V	1V	0.1V	0.01V
CP Mode		1W	0.1W	0.01W	10W	1W	0.1W

3362F		RANGE I			RANGE II		
FULL SCALE LOAD CURRENT		6A			60 A		
CURRENT	RANGE	0~6A/60A					
METER	RESOLUTION	0.1m A/1mA					
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY							
CC Mode		10mA	1mA	0.1mA	100mA	10mA	1mA
CR Mode		166.66uS	16.666uS	1.6666uS	16.66mΩ	1.666mΩ	0.1666mΩ
CV Mode		0.1V	0.01V	0.001V	1V	0.1V	0.01V
CP Mode		1.002W	0.102W	0.009W	10.02W	1.02W	0.09W

3367F		RANGE I			RANGE II		
FULL SCALE LOAD CURRENT		1.2A			12 A		
CURRENT	RANGE	0~1.2A/12A					
METER	RESOLUTION	0.02mA/0.2mA					
COURSE/FINE LOAD CURRENT ADJUSTMENT knob							
CC Mode		10mA	1mA	0.1mA	100mA	10mA	1mA
CR Mode		33.33uS	3.333uS	0.3333uS	83.33mΩ	8.333mΩ	0.8333mΩ
CV Mode		0.1V	0.01V	0.001V	1V	0.1V	0.01V
CP Mode		1.002W	0.102W	0.009W	10.02W	1.02W	0.09W

Table 3-5 the resolution of range I/II vs. Course/Fine load setting Key

3-7. Protection features

The 3360F Series Electronic load modules include the following protection features:

3-7-1 Over voltage
3-7-2 Over current
3-7-3 Over power
3-7-4 Over temperature

The Over voltage protection circuit is set at a predetermined voltage (525V for 3360F) which can not be changed. If the Over voltage circuit has tripped, it Electronic load input turns OFF immediately to protect the abnormal condition.

When the Over voltage condition is occurred, the Digital Current Meter's LCD display will indicate " OVP ".

CAUTION : Never apply the AC line voltage or input voltage excised than 500V, or it may cause damage of the electronic load module.

The 3360F Series Electronic load can monitor the power dissipation of the load, when the power dissipation is greater than 105% of rate power input, the load module will turn load to OFF state internally.

When the Over power condition is occurred, the Digital Current Meter's LCD display will indicate " OPP ".

As soon as the temperature of 3360F Series heat sink greater than 85 degree, the Over temperature protection is occurred, the Digital Current Meter's LCD display will indicate " OTP " at same time, the 3360F Series Electronic Load will turn load to OFF state internally. Please check the environment condition such as the ambient temperature and distance between the rear panel of Electronic load mainframe and wall is greater than 15cm.

The 3360F Series Electronic load can reset the Over voltage, Over correct, Overpower and over temperature protection if the protection condition is removed and press the " LOAD " key to " ON " state.

The 3360F Series electronic load conducts reverse current when the polarity of the DC source connection is incorrect. The maximum reverse current is 20A for 3360F. If the reverse current excesses the maximum reverse current, it may cause damage of the 3360F Series Electronic Load.

When the reverse condition ，the reverse current is displayed on the 5 digit Current Meter on the front panel, and the 5 digit DCM indicates negative current reading, whenever the reverse current is displayed on the current meter, turn OFF power to the DC source and make the correct connections.

Chapter 4 Remote control programming operation

4-1. Introduction

The rear panel remote control interface of 3360F mainframe is designed to connect PC or NOTEBOOK PC with remote control interface, the NOTEBOOK PC acts as a remote controller of 3360F 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.

4-2. The summary of RS-232 Interface and command

The following RS-232 commands are same as GPIB commands. The RS-232 protocol in 3360F mainframe is listing below:

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

The RS-232C Interface connector of 3360F rear panel, RS-232 is shown in Fig4-1.

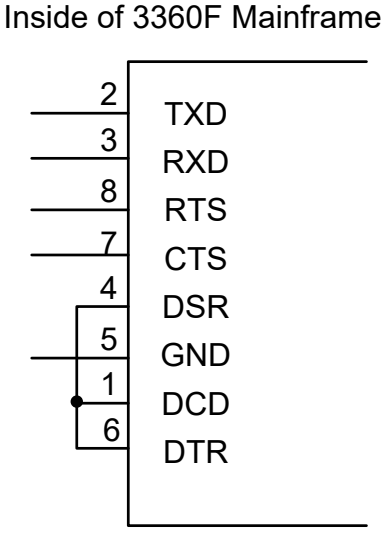


Fig 4-1 RS-232C INTERFACE CONNECTION OF REAR PANEL

4-3. 3360F REMOTE CONTROL COMMAND LIST1

SIMPLE TYPE FORMAT

SETTING PRESET NUMERIC COMMAND	REMARK
RISE{SP} {NR2} { ; | NL}	mA/us
FALL{SP} { ; | NL}	mA/us
PERD：{HIGH | LOW} {SP} {NR2} { ; | NL}	
LDONV{SP} {NR2} { ; | NL}	
LDOFFV{SP} {NR2} { ; | NL}	
CC | CURR：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
CP：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
CR | RES：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
CV | VOLT：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
TCONFIG {SP} {NORMAL|OCP | OPP| SHORT }{;|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}	

Table 4-1 REMOTE CONTROL SETTING COMMAND SUMMARY

QUERY PRESET NUMERIC COMMAND	RETURN
RISE {?} { ; | NL}	###.####
FALL {?} { ; | NL}	###.####
PERD：{HIGH | LOW}{?} { ; | NL}	###.####
LDONV {?}{ ; | NL}	###.####
LDOFFV {?}{ ; | NL}	###.####
CC | CURR：{HIGH | LOW} {?} { ; | NL}	###.####
CP：{HIGH | LOW} {?} { ; | NL}	###.####
CR | RES：{HIGH | LOW} {?} { ; | NL}	###.####
CV | VOLT：{HIGH | LOW} {?} { ; | NL}	###.####
TCONFIG {?}{;|NL}	1:NORMAL 3:OPP 2:OCP 4:SHORT
OCP:START {?} {;|NL}	###.####
OCP:STEP {?}{;|NL}	###.####
OCP:STOP {?}{;|NL}	###.####
VTH {?}{;|NL}	###.####
OPP:START {?} {;|NL}	###.####
OPP:STEP {?}{;|NL}	###.####
OPP:STOP {?}{;|NL}	###.####
STIME {?}{;|NL}	###.####
OCP{?}	###.####
OPP{?}	###.####

Table 4-2 REMOTE CONTROL QUERY COMMAND SUMMARY

LIMIT COMMAND	REMARK
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}	###.####

Table 4-3 REMOTE CONTROL LIMIT COMMAND SUMMARY

STAGE COMMAND	REMARK
LOAD {SP}{ON|OFF|1|0} { ; |NL}	
LOAD {?} { ; |NL}	0：OFF 1：ON
MODE {SP} {CC|CR|CV|CP} { ; NL}	
MODE {?} { ; |NL}	0：CC 1：CR 2：CV 3：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 1：HIGH
DYN {SP} {ON|OFF|1|0} { ; |NL}	
DYN {?} { ; |NL}	0：OFF 1：ON
CLR{ ; |NL}	
ERR {?}{ ; |NL}	
NG {?}{ ; |NL}	0：GO 1：NG
PROT {?}{ ; |NL}	
CCR{SP}{AUTO|R2}{ ; |NL}	
NGENABLE{SP}{ON|OFF}{ ; |NL}	
POLAR{SP}{POS|NEG}{ ; |NL}	
START{ ; |NL}	
STOP{ ; |NL}	
TESTING {?}{ ; |NL}	0：TEST END，1：TESTING

Table 4-4 STAGE COMMAND SUMMARY

System command：Available for all module.

COMMAND	NOTE	RETURN
RECALL {SP} {m [,n] }{ ; |NL}	m=1~10 n=1~15 m:STATE , n:BANK	
STORE {SP} {m [,n] }{ ; |NL}	m=1~10 n=1~15 m:STATE , n:BANK	
REMOTE { ; |NL}	RS232/USB/LAN command	
LOCAL{ ; | NL}	RS232/USB/LAN command	
NAME {?} { ; | NL}		“XXXXX”
*RST { ; □ NL}		

Table 4-5 SYSTEM COMMAND SUMMARY

Measure command

COMMAND	RETURN
MEAS：CURR{?}{ ; | NL}	###.####
MEAS：VOLT{?}{ ; | NL}	###.####
MEAS：POWer{?}{ ; | NL}	###.####

Table 4-6 MEASURE COMMAND SUMMARY

REMARK :
1. Current engineering unit : A
2. Voltage engineering unit : V
3. Resistance engineering unit : Ω
4. Period engineering unit : mS
5. Slew-rate engineering unit : mA/uS
6. Power engineering unit : W

AUTO SEQUENCE : Available for all module.

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,n} { ; | NL}	m=1~10 n=1~15 m:STATE , n:BANK	
T1 {SP} {NR2} { ; | NL}	0.1~9.9(s)	0.1~9.9(sec)
T2 {SP} {NR2} { ; | NL}	0.0~9.9(s)	0.0~9.9(sec)
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 “PASS” or “FAIL:XX” (XX=NG STEP)

Table 4-7 Auto sequence command list

3360F REMOTE CONTROL COMMAND LIST2

COMPLEX TYPE FORMAT

SETTING COMMAND SUMMARY	REMARK
[PRESet：] RISE{SP} {NR2} { ; | NL}	mA/us
[PRESet：] FALL{SP}{ ; | NL}	mA/us
[PRESet：] PERI | PERD：HIGH | LOW {SP} {NR2} { ; | NL}	
[PRESet：] LDONv{SP} {NR2} { ; | NL}	
[PRESet：] LDOFfv{SP} {NR2} { ; | NL}	
[PRESet：] CC| CURR：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
[PRESet：] CP：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
[PRESet：] CR| RES：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
[PRESet：] CV| VOLT：{HIGH | LOW} {SP} {NR2}{ ; | NL}	
[PRESet：]TCONFIG {SP} {NORMAL|OCP| OPP|SHORT}{;|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}	

Table 4-1B REMOTE CONTROL SETTING COMMAND SUMMARY

QUERY COMMAND SUMMARY	RETURN
[PRESet：] RISE {?} { ; | NL}	###.####
[PRESet：] FALL {?} { ; | NL}	###.####
[PRESet：] PERI | PERD：{HIGH | LOW}{?} { ; | NL}	###.####
[PRESet：] LDONv {?}{ ; | NL}	###.####
[PRESet：] LDOFfv {?}{ ; | NL}	###.####
[PRESet：] CC| CURR：{HIGH | LOW} {?} { ; | NL}	###.####
[PRESet：] CP：{HIGH | LOW} {?} { ; | NL}	###.####
[PRESet：] CR| RES：{HIGH | LOW} {?} { ; | NL}	###.####
[PRESet：] CV| VOLT：{HIGH | LOW} {?} { ; | NL}	###.####
[PRESet：] TCONFIG {?}{;|NL}	1:NORMAL 3:OPP 2:OCP 4:SHORT
[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}	###.####

Table 4-2B REMOTE CONTROL 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}	###.####

Table 4-3B REMOTE CONTROL LIMIT COMMAND SUMMARY

STAGE COMMAND	REMARK
[STATe：] LOAD {SP}{ON|OFF} {；|NL}	
[STATe：] LOAD {?} {；|NL}	0：OFF 1：ON
[STATe：] MODE {SP} {CC|CR|CV|CP} {；NL}	
[STATe：] MODE {?} {；|NL}	**0|1|2|3：CC|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/AUTO 1：ON
[STATe：] LEVEl {SP} { LOW|HIGH} {；|NL}	
[STATe：] LEVEl {?} {；|NL}	0：LOW 1：HIGH
[STATe：] LEV{SP} {LOW |HIGH} {；|NL}	
[STATe：] LEV{?} {；|NL}	0：LOW 1：HIGH
[STATe：] DYNamic {SP} {ON|OFF} {；|NL}	
[STATe：] DYNamic {?} {；|NL}	0：OFF 1：ON
[STATe：] CLR{；|NL}	
[STATe：] ERRor {?}{；|NL}	
[STATe：] NO{SP}GOOD {?}{；|NL}	0：GO 1：NG
[STATe：] NG {?}{；|NL}	0：GO 1：NG
[STATe：] PROTect {?}{；|NL}	
[STATe：] CCR{SP}{AUTO|R2}{；|NL}（Note1）	
[STATe：] NGENABLE{SP}{ON|OFF}{；|NL}	
[STATe：]POLAR{SP}{POS|NEG}{；|NL}	
[STATe：]START{；|NL}	
[STATe：]STOP{；|NL}	
[STATe：]TESTING {?}{；|NL}	0：TEST END，1：TESTING

Table 4-4B STAGE COMMAND SUMMARY

SYSTEM COMMAND: available for all module

COMMAND	NOTE	RETURN
[SYStem：] RECall {SP} {m [,n] }{ ; | NL}	m=1~10 n=1~15	
[SYStem：] STORe {SP} {m [,n] }{ ; | NL}	m=1~10 n=1~15	
[SYStem：] REMOTE { ; | NL}	RS232/USB/LAN command	
[SYStem：] LOCAL{ ; | NL}	RS232/USB/LAN command	
[SYStem：] NAME {?} { ; | NL}		“XXXXX”
[SYStem：]*RST { ; □ NL}		

Table 4-5B SYSTEM COMMAND SUMMARY

measure command: available for all module

COMMAND	RETURN
MEASure：CURRent{?}{ ; | NL}	###.####
MEASure：VOLTage{?}{ ; | NL}	###.####
MEASure：POW{?}{ ; | NL}	###.####

Table 4-6B MEASURE COMMAND SUMMARY

REMARK :
1. Current engineering unit : A
2. Voltage engineering unit : V
3. Resistance engineering unit : Ω
4. Period engineering unit : mS
5. Slew-rate engineering unit : mA/uS
6. Power engineering unit : W

Auto sequence : available for all module

AUTO SEQUENCE 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,n} { ; | NL}	m=1~10 n=1~15 m:STATE , n:BANK	
T1 {SP} {NR2} { ; | NL}	0.1~9.9(s)	0.1~9.9(sec)
T2 {SP} {NR2} { ; | NL}	0.0~9.9(s)	0.0~9.9(sec)
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 “PASS” or “FAIL:XX” (XX=NG STEP)

Table 4-8B Auto sequence command list

4-4. 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.

4-5. Remote Control Command Language description

{ } ： The contents of the { } symbol must be used as a part or data of the GPIB command, it can not 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 3360F mainframe is listed in Table 4-9.

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.

4-6. Remote control command description

4.6.1 PRESET　Set and Read the Default of Load

RISE

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

Purpose： Set and read the RISE SLEW-RATE

Description：

1. The definition of RISE SLEW-RATE is load level change or dynamic load can be programmed of RISE and FALL are completely independent.
2. The value of RISE has to be included the number of the decimal point, otherwise the command will not be available.
3. 3360F will set to the maximum value of the model automatically when the set RISE is over the specification of Load.
4. The unit is mA/uS.

FALL

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

Purpose： Set and read the FALL SLEW-RATE

Description：

1. The definition of FALL SLEW-RATE is load level change or dynamic load can be programmed of RISE and FALL are completely independent.
2. 3360F will set to the maximum value of the model automatically when the FALL which has been set is over the specification of Load.
3. The unit is mA/uS .

PERI or PERD

Syntax ： [PRESet：] PERI|PERD：HIGH|LOW{SP}{ NR2}{；|NL}
[PRESet：] PERI|PERD：HIGH|LOW？{；|NL}

Purpose：Set and read the TLOW and Thigh of DYNAMIC when loading

Description：

1. A period of loading waveform of DYNAMIC is combined by TLOW and THIGH.
2. The value of TLOW and THIGH have to be included the number of the decimal point, otherwise the command will not be available.
3. The least significant number is the 5th behind the decimal point.
4. 3360F will set the value of TLOW or THIGH automatically when the value which has been set is over the maximum of the Load.
5. The unit is mS.

LDONv

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

Purpose：Set and Read the voltage of LOAD ON

Description：This command is for setting the Load voltage value of LOAD ON.

LDOFfv

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

Purpose：Set and read the voltage of LOAD OFF

Description：This command is for setting the Load voltage value of LOAD OFF.

CURR：HIGH|LOW

Syntax：[PRESet：] CC|CURR：HIGH|LOW{SP}{ NR2}{；|NL}
[PRESet：] CC|CURR：HIGH|LOW ？{；|NL}

Purpose： Set and read the current of HIGH|LOW

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

1. The required value of current must be included the number of the decimal point, otherwise the command will not be available.
2. The least significant number is the 5th behind the decimal point.
3. 3360F will set the maximum value of current of the Load automatically when the value which has been set is over the maximum of the Load.
4. The value of LOW has to be smaller than HIGH.
5. The unit is A

CP：{ HIGH|LOW}

Syntax： [PRESet：] CP：{ HIGH|LOW}{SP}{ NR2}{；|NL}
[PRESet：] CP：{ HIGH|LOW} ？ {；|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：{ HIGH|LOW}

Syntax： [PRESet：] CR|RES：{ HIGH|LOW}{SP}{ NR2}{；|NL}
[PRESet：] CR|RES：{ HIGH|LOW}？ {；|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. The required value of resistance must be included the number of the decimal point, otherwise the command will not be available.
2. The least significant number is the 3rd behind the decimal point.
3. 3360F will set to the maximum value of the model automatically when the value of Resistance which has been set is over the specification of Load.
4. The Resistance value which has been set of LOW has to be smaller than HIGH.
5. The unit is Ω.

CV：{ HIGH|LOW}

Syntax： [PRESet：] CV：{ HIGH|LOW}{SP}{ NR2}{；|NL}
[PRESet：] CV：{ HIGH|LOW}？ {；|NL}

Purpose：Set and Read the value of Load Voltage

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

1. The required value of resistance must be included the number of the decimal point, otherwise the command will not be available.

2. The least significant number is the 5th behind the decimal point.
3. 3360F will set to the maximum value of the model automatically when the value of Voltage which has been set is over the specification of Load.
4. The Voltage value which has been set of LOW has to be smaller than HIGH.
5.The unit is Voltage (V)

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

TCONFIG

Syntax： [PRESet：] TONFIG {NORMAL|OCP|OVP|OPP|SHORT}{；|NL}
[PRESet：] TONFIG ？{；|NL}

Purpose：Set and read the function of Dynamic test

Description：There are four options of this command. Those are NORMAL mode、OCP test 、OPP test and SHORT 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)

OCP

Syntax： OCP?

Purpose： Set read OCP testing current.

Description： This command is used for setting OCP test read OCP current.

OPP

Syntax：OPP?

Purpose：Set read OPP testing watt.

Description：This command is used for setting OPP test read OPP watt.

4-6-2、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〞.

[LIMit：] 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, NG indicating light will come on to indicate 〝NO GOOD〞.

4-6-3、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 are meant to be CC｜CR｜CV｜CP

	CC (0)	CR (1)	CV (2)	CP (3)
3360F	V	V	V	V

Table 4-9 module for each Series

[STATe：] SHORt {SP}{ON｜OFF}

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

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

Description：This command is for setting the Load to make a short-circuit test. While setting for the ON, the V+, V- pin of Load like short-circuit status.

[STATe：] PRESet {SP}{ON｜OFF}

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

Purpose：Set the upper or lower 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｜AUTO}

Syntax： [STATe：] SENSe{SP}{ON｜OFF｜AUTO }{；｜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. In 3360F, the optional are ON and AUTO. So, if setting for AUTO, it means the voltage is got and read from VSENSE. But if no voltage is inputted from VSENSE, the voltage will be inputted from INPUT Connector.

[STATe：] LEVel {SP}{HIGH｜LOW} or LEV {SP}{HIGH｜LOW}

Syntax： [STATe：] LEVel {SP}{HIGH｜LOW }{；｜NL}
[STATe：] LEVel ？{；｜NL}
[STATe：] LEV{SP}{HIGH｜LOW}{；｜NL}
[STATe：] LEV？{；｜NL}

Purpose：Set and read the LOW and HIGH 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：] DYNamic{SP}{ON｜OFF}

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

Purpose：Set and read whether the status is Dynamic or Static of Load

Description：1. DYN ON , set for a DYNAMIC Load
2. DYN OFF, set for a STATIC Load

[STATe：] CLR

Syntax：[STATe：] CLR{；｜NL}

Purpose： Clear the error flag of 3360F 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：] NG？

Syntax： [STATe：] NG？{；｜NL}

Purpose：Query if there have NG flag in this 3360F

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 3360F

Description：1.PROT? means the status of Protection of 3360F. “1” means OPP occurred.”4”means OVP. “8” means OCP. Table 4-10 shows the corresponding number of protection status

2.Use command CLR to clear the register of PROT status to be “0”

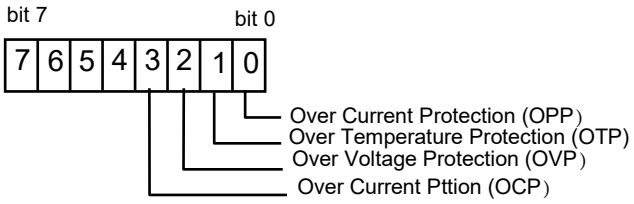


Table 4-10 register of PROT status

[STATe：] CCR {AUTO|R2}

Syntax： [STATe：] CCR {AUTO|R2}{；|NL}

Purpose：Set the CC MODE RANGE to be forced to switch to RANGE II

Description：It will switch the RANGE position automatically when setting for AUTO Set R2 when implementing RANGE II

[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：] POLAR {POS|NEG}

Syntax： [STATe：] POLAR {POS|NEG} {；|NL}

Purpose：Set for the display of the voltage meter shows the pole is contrary or not

Description：Set the display of the voltage meter shows the pole. If it shows POS, that means the pole is not contrary. If the pole is contrary , it will show NEG

[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

4-6-4、SYSTEM Set and Read the Status of 3360F

[SYStem：] RECall{ SP }m{ ,n }

Syntax：[SYStem：] RECall{ SP }m{ ,n }{；|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)=1~10，n(BANK)=1~15。

If the operating module is other Series, omit “n” and it will be operated in the BANK which has been shown on the display.

For Example

RECALL 2，15 → Recall the status of Loading which had been saved in the 2nd and 15th BANK of the memory

REC 3 → Recall the status of Loading which had been saved in the 3rd of memory. If 3360F is operated , it will be operated in the BANK which has been shown on the display.

[SYStem：] STORe{SP}m{,n}

Syntax：[SYStem：] STORe{SP}m{,n}{；|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)=1~10，n(BANK)=1~15 .

If 3360F is operated, omit “n” and it will be operated in the BANK which has been shown on the display

For Example

STORE 2，15 → Save the status of Loading which had been saved in the 2nd and 15th BANK of memory.

STOR 3 → Save the status of Loading to the 3rd memory . If it is operated with 3360F, BANK will be set the BANK which shows on the display.

	3360F
BANK(n)	15
STATE(m)	10
TOTAL STATE	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 4-11 :

MODEL
3360F
3361F
3362F
3367F

Table 4-11 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

4-6-5、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 meter, 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 meter, and the unit is Voltage(V)

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

Chapter 5 Applications

This chapter describes the application information of 3360F Series Electronic Load.

5-1. Local sense connections

Fig 5-1 illustrates a typical set up with the electronic load connected to the DC power supply. Local sensing is used in application where lead lengths are relatively short, or where load regulation is not critical.

The 5 digit voltage Meter of 3360F Electronic load measures the voltage of DC INPUT Terminal automatically; load leads should be bundled or tie-wrapped together to minimize inductance.

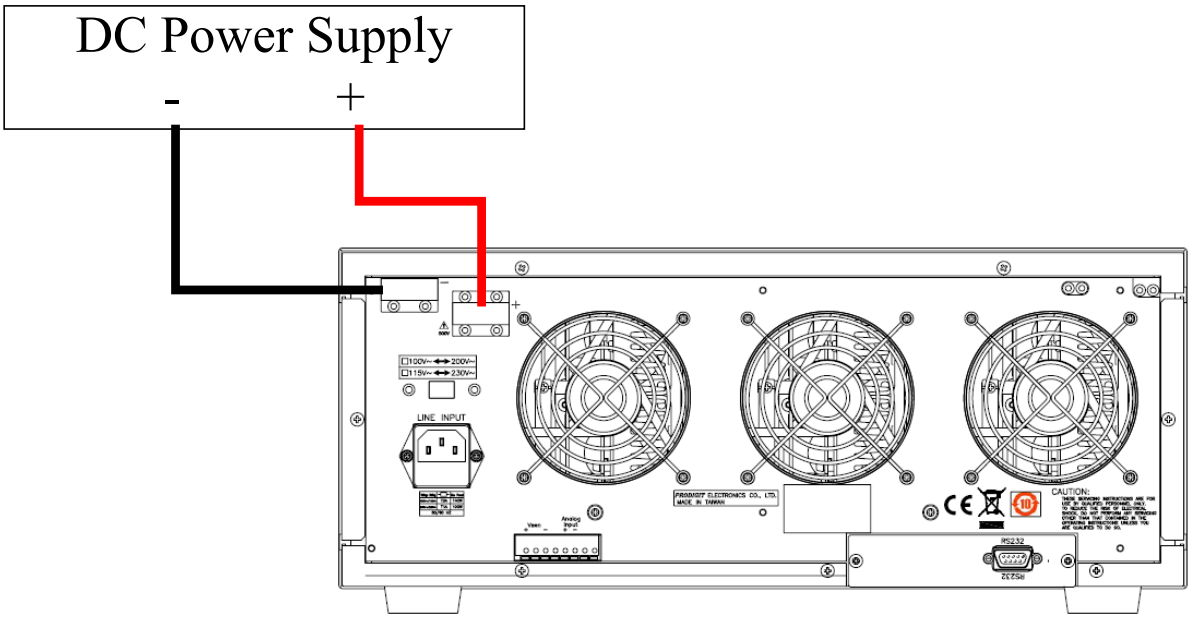


Fig 5-1 Local voltage sense connections

5-2. Remote sense connections

Fig 5-2 illustrates a typical set up with the electronic load connected for remote sense operation. The remote Vsense cables of the electronic load are connected to the output of the power supply. Remote sensing compensates for the voltage drop in applications that require long lead lengths.

The 5 digit voltage Meter of 3360F electronic load measures the voltage of Vsense input Terminal automatically, so the high accuracy 5 digit voltage Meter can measure the specific points voltage of the power supply's output voltage.

Load leads should be bundled or tie wrapped together to minimize inductance.

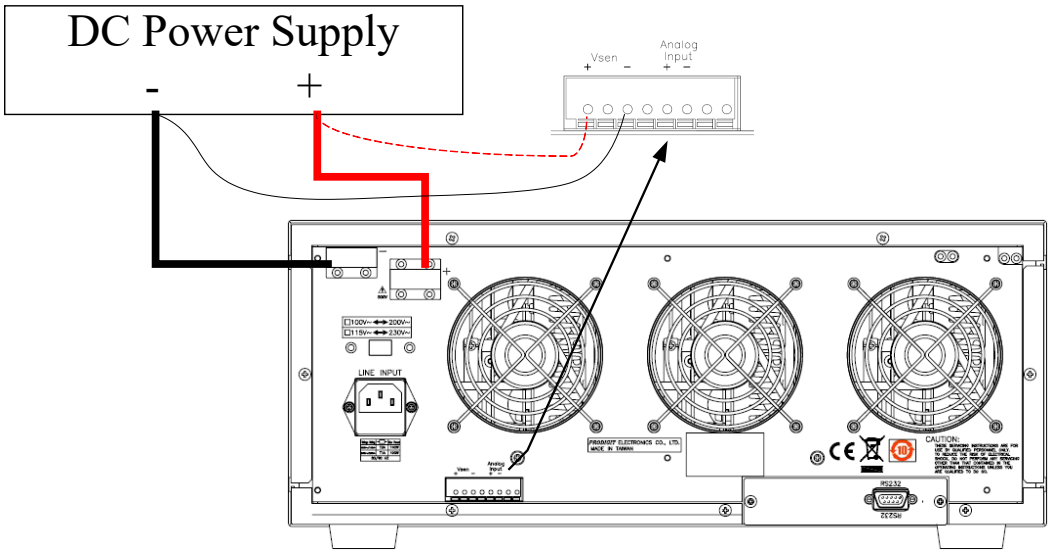


Fig 5-2 Remote voltage sense connections

5-3. Constant Current mode application

The Constant Current mode is very suitable to test the LOAD REGULATION, CROSS REGULATION, OUTPUT VOLTAGE and DYNAMIC REGULATION of the power supply testing, and test the DISCHARGE CHARACTERISTIC, LIFE CYCLE of the battery testing.

1. Static mode: (Fig 5-3)
   Major application:
   a. Voltage source testing.
   b. Power supply load regulation testing
   c. Battery discharge testing

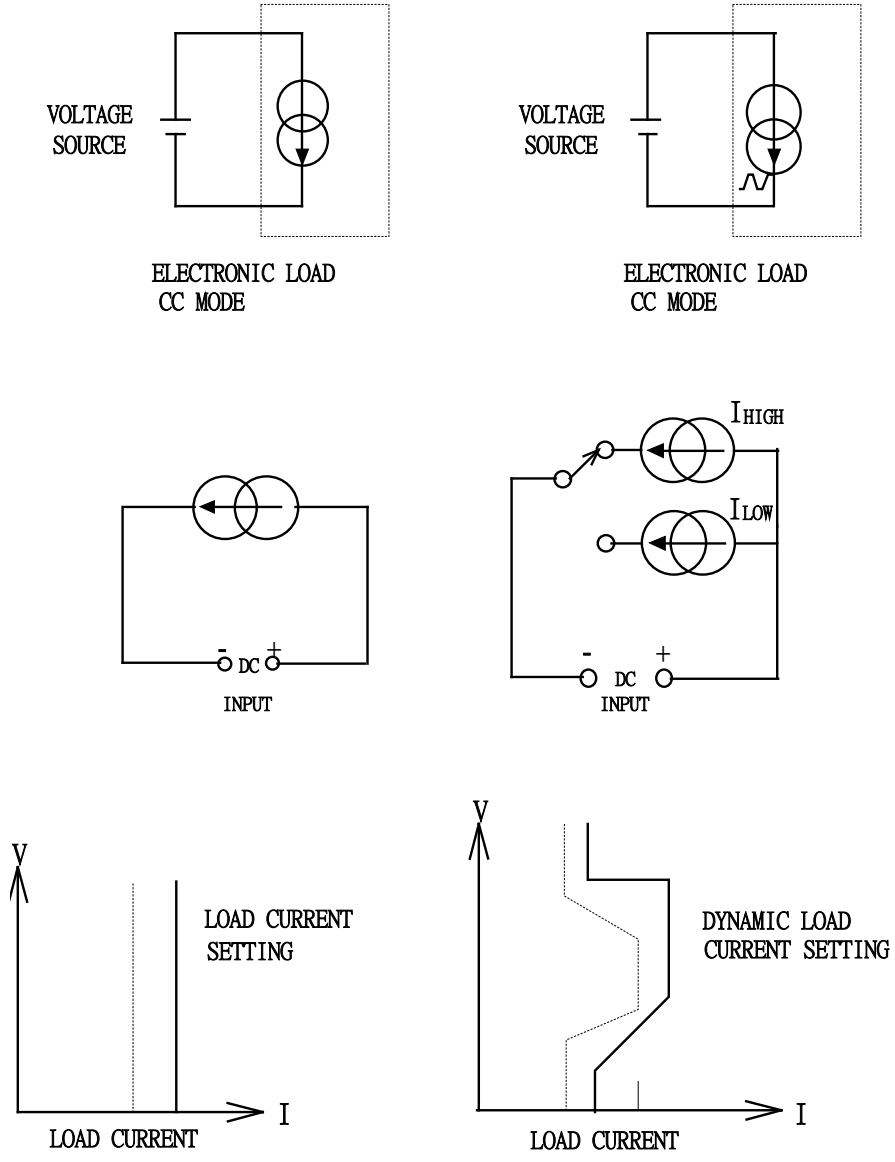


Fig 5-3 constant mode application

2. Dynamic mode:

I. Built-in Pulse generator: (Fig 5-4)
Major application:
a. Power supply load transient response testing
b. Power recovery time testing
c. Pulse load simulation
d. Power component testing

Description:
The maximum Rise/Fall current slew rate or minimum Rise/fall time is the time required for the load input to change from 10% to 90% or from 90% to 10% of the programmed High to Low load level.
Rise slew rate = | Ilow - Ihigh | / Ta (mA/us)
Fall slew rate = (Ihigh - Ilow) / Tb (mA/us)
Rise time = Ta = | Ilow - Ihigh | / Rise slew rate
Fall time = Tb = (Ihigh - Ilow) / Fall slew rate

ii.Analog programming input: (Fig 5-4)
Major application:
a. Simulate real load condition
b. Battery discharge testing

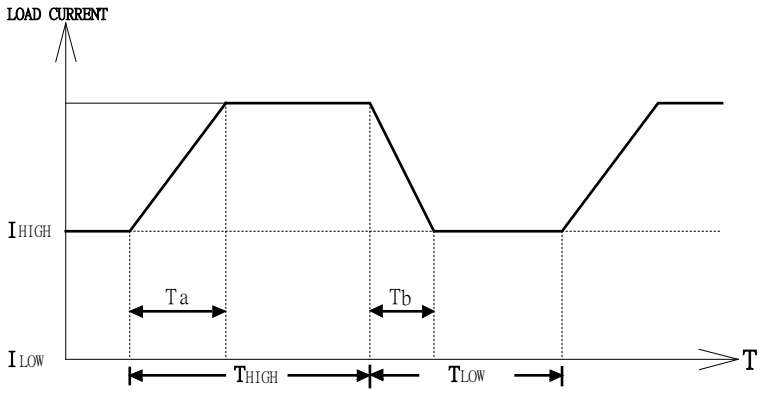


Fig 5-4 Dynamic load current with independent programmed Rise/Fall slew rate

5-4. Constant Voltage mode application

Major application:

a. Current source testing.

b. Power supply current limit characteristic testing

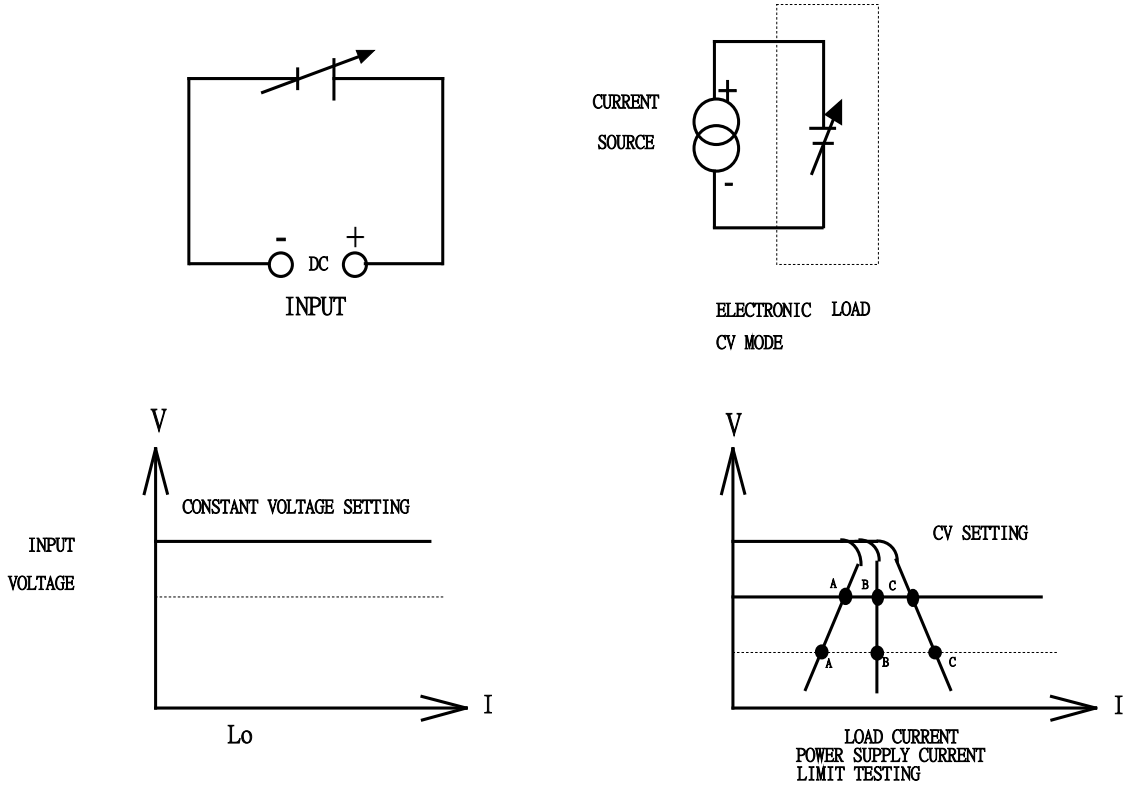


Fig 5-5 Constant Voltage mode application

5-5. Constant Resistance mode application

Major application:

a. Voltage source or Current source testing

b. Power resister simulation.

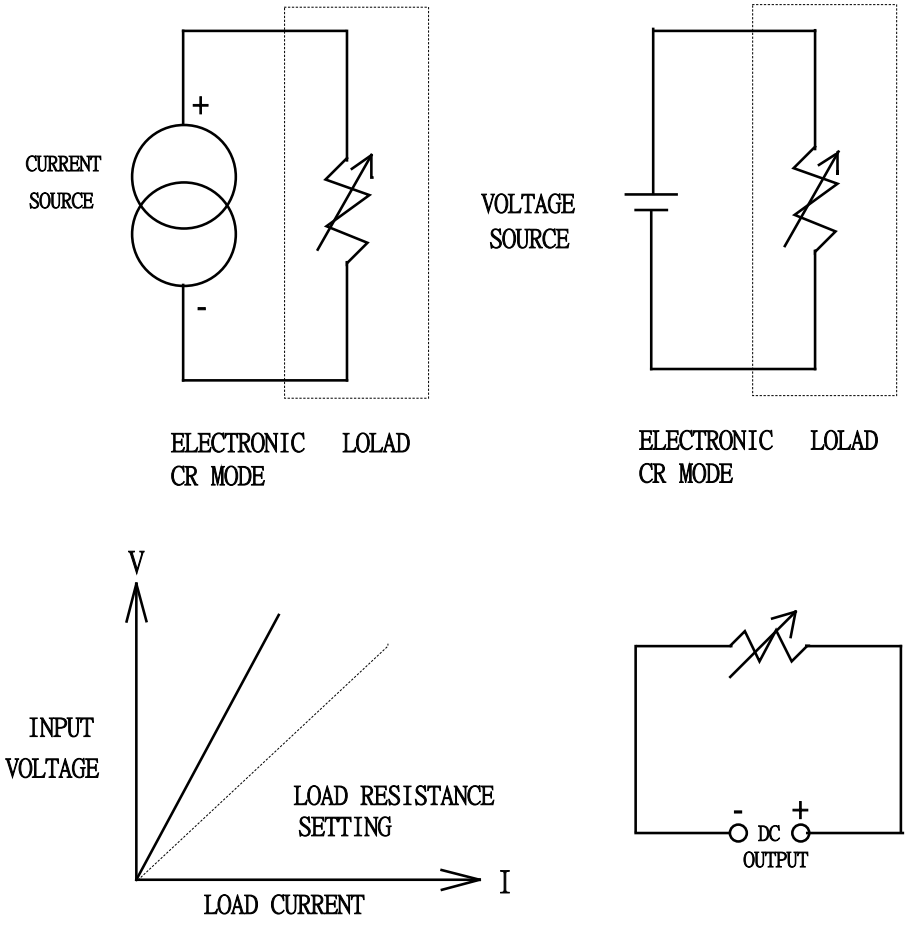


Fig 5-6 Constant Resistance mode Application

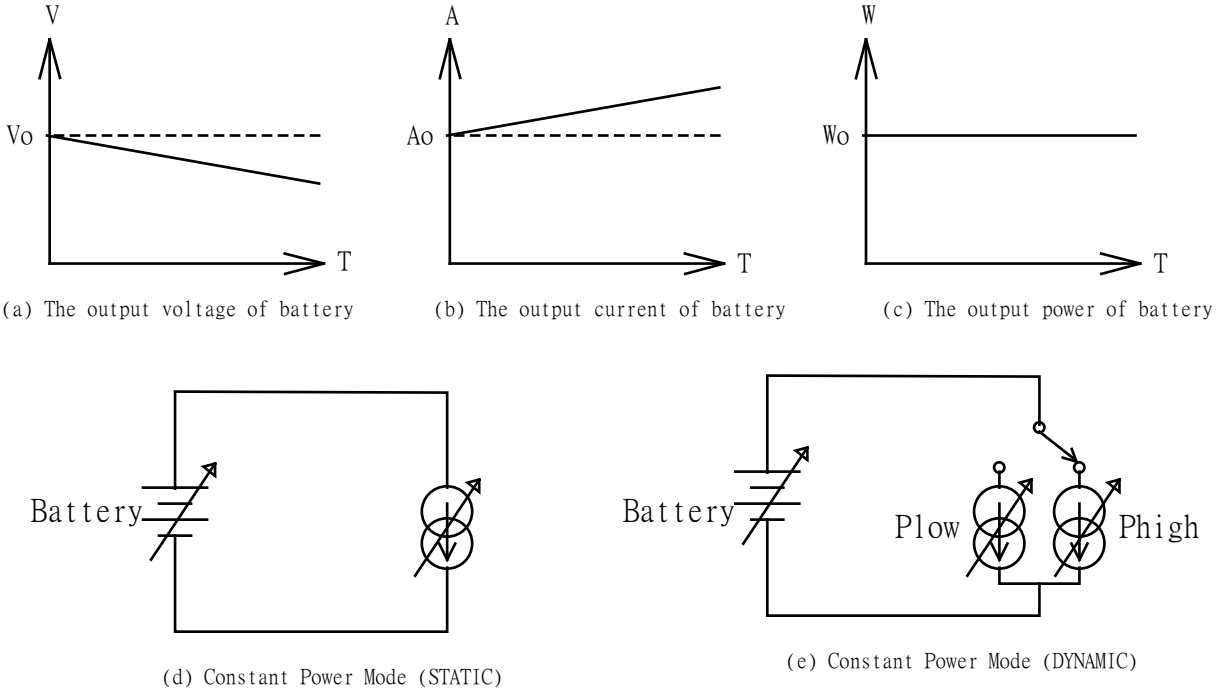
5-6. Constant Power mode application

The Constant Power mode is designed for Battery's energy capacity evaluation and testing.

Primary or secondary battery is the power source for every portable electronics products, such as notebook computer, video camera, etc. The output voltage of battery will start to drop (Fig 5-7a) according to the output current and usage duration time (Fig 5-7b), however, it should provide a stable power output regardless of output voltage (Fig 5-7c), therefore, the energy capacity (output power x time) is one of the most important factor to evaluate a battery.

The CP mode of 3360F electronic load is designed to test the above characteristics of a battery, it can sink constant power load for a battery, the load current will increase automatically in accordance to the output voltage drop of battery, the load power will be the same to the load power setting of CP mode (Fig 5-7d), the 3360F CP mode electronic load with time record can be used to evaluate the energy capacity or discharge life time of a battery.

Moreover, the real power could be a dynamic loading condition, the 3360F CP mode can be operated in Dynamic power load as well, setting the STA/DYN to DYN on the front panel or remote programming, 3360F can sink dynamic power waveform to test the dynamic characteristics of battery (Fig 5-7e).



(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 5-7 CONSTANT POWER MODE APPLICATION

5-7. Constant current source operation

The Electronic load can also be used as a high current constant current source if the following connection is made. This function can be used as a battery charger or other application. It can also combine two or more modules as one unit by parallel connection for higher current operation.

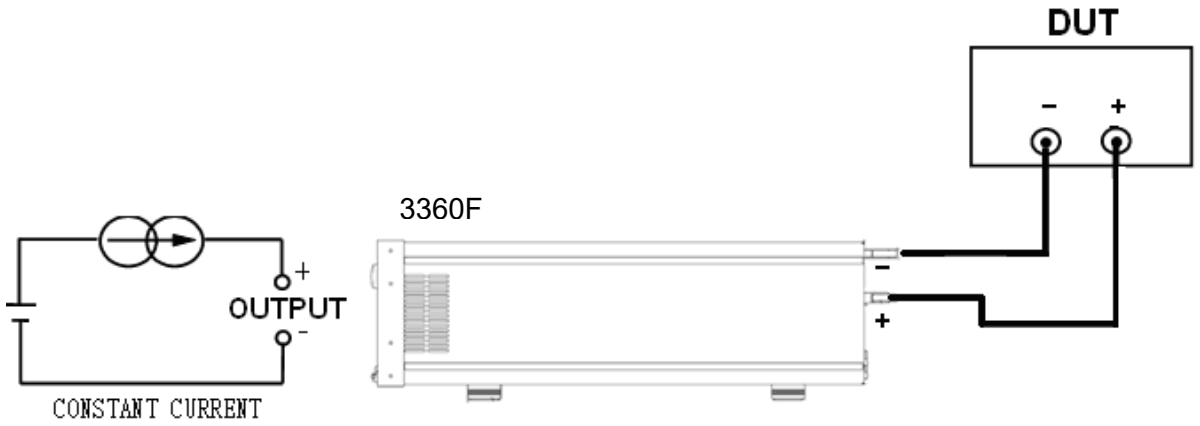


Fig 5-8 Constant current source connection

5-8. Zero-Volt loading application

As shown in Fig 5-8, the electronic load can be connected in Series with a DC voltage source which output voltage greater than 6V. so that the device under test that are connected to the electronic load can be operated down to a Zero-Volt condition, the DC voltage source provides the minimum 6V operating voltage required by the Electronic load. This application is suitable for low voltage Battery cell with high discharge current testing.

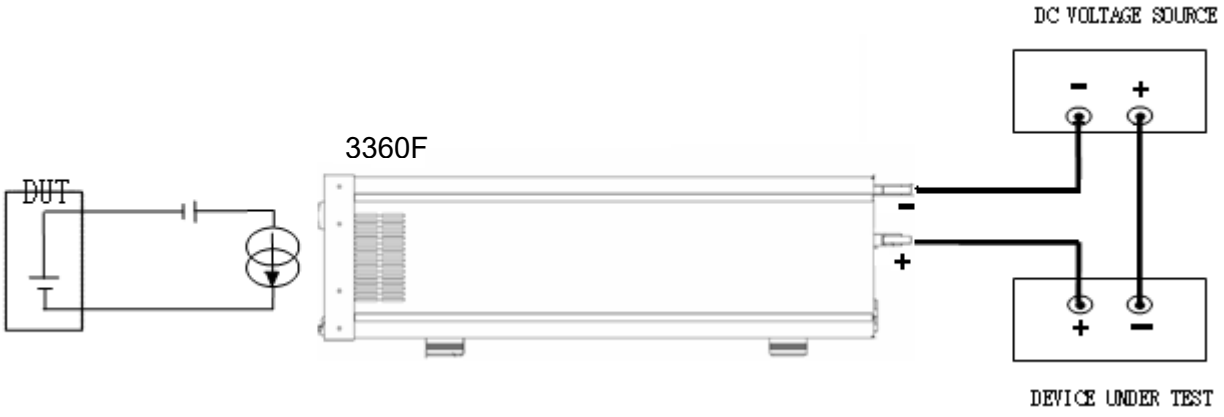


Fig 5-9 Zero-Volt loading connection

5-9. Parallel operation

When the power or current rating is not enough on the electronic load module, you can combine two or more electronic load modules as one unit by parallel two or more modules. At this time, the total load current and power is the sum of the two or more load modules also. This connection can extend the electronic load module to a higher power and current rating.

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.

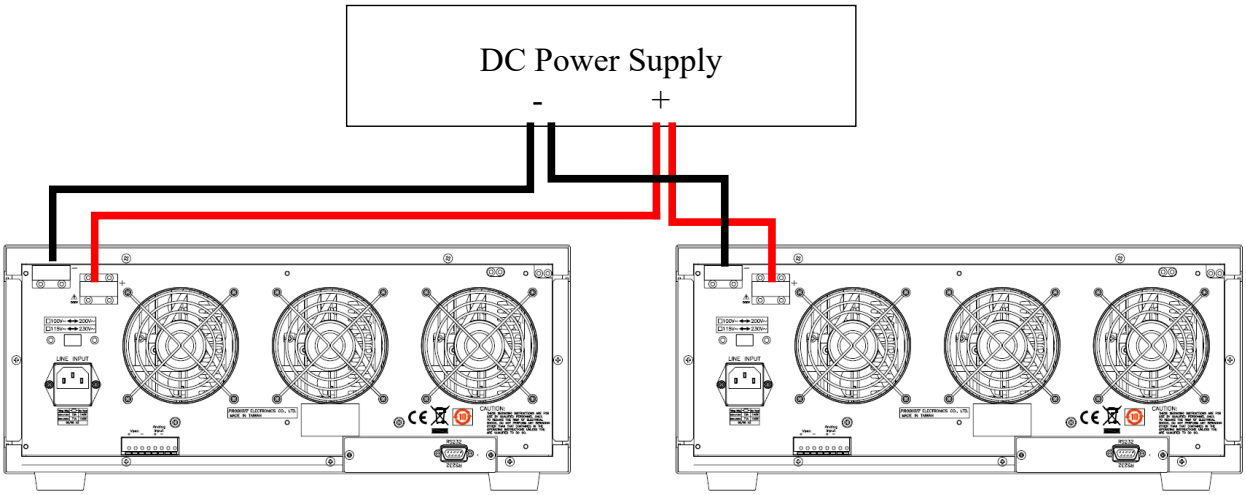


Fig 5-10 Parallel operation connection

5-10. Power Supply OCP testing

5.10.1 There is a method for power supply Over Current Protection (OCP) testing:
Power Supply OCP testing using CC mode method.

5.10.2 OCP test function Enable/Disable Key.
Press " OCP" key to enable the OCP test function and the indicator LED is lit on. The LCD display show "OCP" on right 5 digits LCD display, shows "PRESS" on middle 5 digits LCD display and shows "START" on left 5 digits LCD display.

5.10.3 There are 4 parameter for the OCP test function. The parameter as ISTAR, ISTEP, ISTOP and Vth.
Press "OCP" key again to set OCP test parameter **ISTAR**(start current point) When OCP test function is enabled. Press OCP key again to next parameter by the sequence of **ISTEP**, **ISTOP**, **Vth** and disable, press another key also can to exit the setting and save the setting. The OCP test parameter description as following.

5.10.3.1 **Istar** : setting the start current point, The LCD display shows "OCP", "ISTAR" and 0.000A(initial) from right to left 5 digits LCD display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

5.10.3.2 **Istep** : setting the increment step current point, The LCD display shows "OCP", "ISTEP" and 0.000A(initial) from right to left 5 digits LCD display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

5.10.3.3 **Istop** : setting the stop current point, The LCD display shows "OCP", "ISTOP" and 20.0A(3360F initial) from right to left 5 digits LCD display, the setting range is 0.000A to the full scale of the CC mode specification. The setting is by rotating the setting knob.

5.10.3.4 **Vth** : Setting threshold voltage; The LCD display shows "OCP", "Vth" and 6.000VI(3360F initial) from right to left 5 digits LCD display, the setting range is 0.000V to the full scale of the Voltage specification. The setting is by rotating the setting knob.

5.10.4 START/STOP Test key.
Press START/STOP key to start or stop the OCP test by OCP test setting parameter when OCP test function is enabled.
The Load will goes to "ON" automatically when press START/STOP key to start the OCP test and the Load will goes to "OFF" automatically when press START/STOP key to stop the OCP test. The Load will stay to "ON" If load was "ON" before OCP test.
The OCP test function for test the UUT's over current protection, The OCP test will start sink current from I-START to increase ISTEP current until 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 middle 5 digits LCD display will shows "PASS", otherwise shows "FAIL".
Press any key to goes to normal mode of LCD display.

5.10.5 Remote control OCP

EX：

REMOTE	（Set Remote）
TCONFIG OCP	（Set OCP test）
OCP:START 3	（Set start load current 3A）
OCP:STEP 1	（Set step load current 1A）
OCP:STOP 5	（Set stop load current 5A）
VTH 0.6	（Set OCP VTH 0.6V）
IL 0	（Set current low limit 0A）
IH 5	（Set current high limit 5A）
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）

5-11. Power Supply OPP testing

5.11.1 There is a method for power supply Over Power Protection (OPP) testing: Power Supply OPP testing using CC mode method.

5.11.2 OPP test function Enable/Disable Key.
Press " OPP" key to enable the OPP test function and the indicator LED is lit on. The LCD display show "OPP" on right 5 digits LCD display, shows "PRESS" on middle 5 digits LCD display and shows "START" on left 5 digits LCD display.

5.11.3 OPP test function parameter setting key.
There are 4 parameter for the OPP test function. The parameter as **Pstar**, **Pstep**, **Pstop** and **Vth**.
Press "OPP" key again to set OPP test parameter PSTAR(start power point) When OPP test function is enabled. Press OPP key again to next parameter by the sequence of PSTEP, PSTOP, Vth and disable, press another key also can to exit the setting and save the setting. The OPP test parameter description as following.

5.11.3.1 **Pstar** : setting the start power point, The LCD display shows "OPP", "PSTAR" and 0.00W(initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The setting is by rotating the setting knob.

5.11.3.2 **Pstep** : setting the increment step power, The LCD display shows "OPP", "PSTEP" and 0.00W(initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The setting is by rotating the setting knob.

5.11.3.3 **Pstop** : setting the stop power point, The LCD display shows "OPP", "PSTOP" and 600.0W(3360F initial) from right to left 5 digits LCD display, the setting range is 0.00W to the full scale of the CP mode specification. The setting is by rotating the setting knob.

5.11.3.4 **Vth** : Setting threshold voltage; The LCD display shows "OPP", "Vth" and 6.00V(3360F initial) from right to left 5 digits LCD display, the setting range is 0.00V to the full scale of the Voltage specification. The setting is by rotating the setting knob.

5.11.4 START/STOP Test key.
Press START/STOP key to start or stop the OPP test by OPP test setting parameter when OPP test function is enabled.
The Load will goes to "ON" automatically when press START/STOP key to start the OPP test and the Load will goes to "OFF" automatically when press START/STOP key to stop the OPP test. The Load will stay to "ON" If load was "ON" before OPP test.
The OPP test function for test the UUT's over power protection, The OPP test will start sink current from PSTART to increase PSTEP current until the UUT's output voltage drop-out lower than the threshold voltage(V-th setting), and the OPP trip point is between P_Hi and P_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".
Press any key to goes to normal mode of LCD display.

5.11.5 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 0.6	（Set OPP VTH 0.6V）
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）

5-12. Power Supply SHORT testing

5.12.1 The low short resistance is implemented by drives the Power MOSFET to the maximum rated load current at SHORT ON mode and Load ON status.

5.12.2 Short test function Enable/Disable Key.

Press " SHORT" key to enable the short test function and the indicator LED is lit on. The LCD display show "SHORT" on right 5 digits LCD display, shows "PRESS" on middle 5 digits LCD display and shows "START" on left 5 digits LCD display.

5.12.3 Short test function parameter setting key.

There are 3 parameter for the SHORT test function. The parameter as TIME, V-Hi and V-Lo.

Press "SHORT" key again to set short test time when SHORT test function is enabled. Press SHORT key again to next parameter by the sequence of **TIME**, **V-Hi**, **V-Lo** and disable, press another key to exit the setting and save the setting.

The short test parameter description as following.

5.12.3.1 **TIME** : setting the short test time, The LCD display shows "SHORT", "TIME" and CONTI(initial) from right to left 5 digits LCD display, the setting range is "CONTI" means continue, 100mS to 10000mS step 100mS by clockwise rotate the setting knob.

The short test will be no time limitation when setting to CONTI until press "START/STOP" key to stop the short test.

5.12.3.2 **V-Hi** : Short test voltage check upper limitation setting, The LCD display shows "SHORT", "V-Hi" and 500.00V(initial) from right to left 5 digits, the V-Hi setting range from 0.00 to 500.00 step 0.001V by rotating the setting knob.

5.12.3.3 **V-Lo** : Short test voltage check lower limitation setting, The LCD display shows "SHORT", "V-Lo" and 0.00V(initial) from right to left 5 digits, the V-Hi setting range from 0.00V to 500.00V step 0.01V by rotating the setting knob.

Note. The V-Hi and V-Lo parameter is difference with the V-Hi and V-Lo in the LIMIT function.

5.12.4 START/STOP Test key.

Press START/STOP key to start or stop the short test by SHORT test setting parameter when SHORT test function is enabled.

The Load will goes to "ON" automatically when press START/STOP key to start the short test and the Load will goes to "OFF" automatically when press START/STOP key to stop the short test. The Load will stay to "ON" If load was "ON" before short test.

The SHORT test function for test the UUT's short protection, The SHORT test will sink load's full scale current(3360F 20A) until to fit in with the test condition, and the UUT's drop voltage is between V_Hi and V_Lo limitation, then left 5 digits LCD display will shows "PASS", otherwise shows "FAIL".

Press any key to goes to normal mode of LCD display.

5.12.5 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）

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 PRODIGIT 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 3360F 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 3360F 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

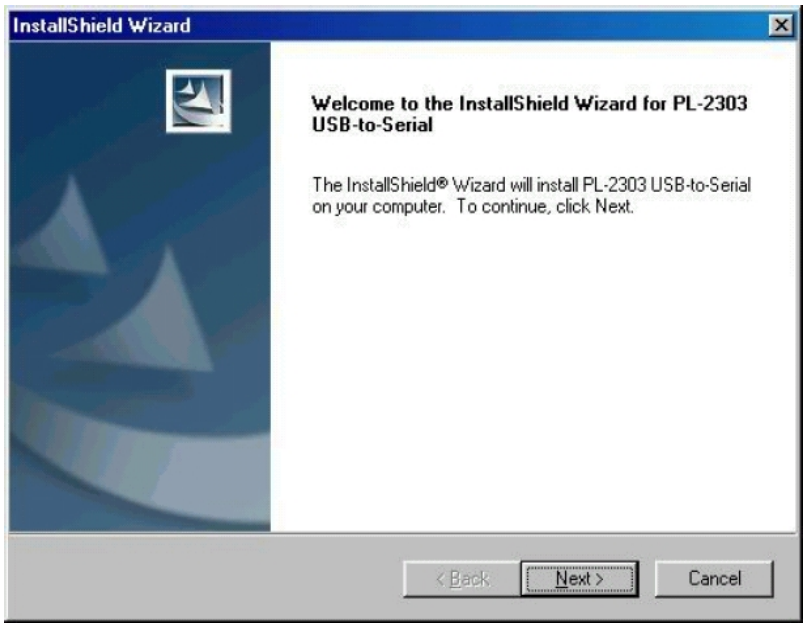
LOAD DECL.BAS using BASICA MERGE command.

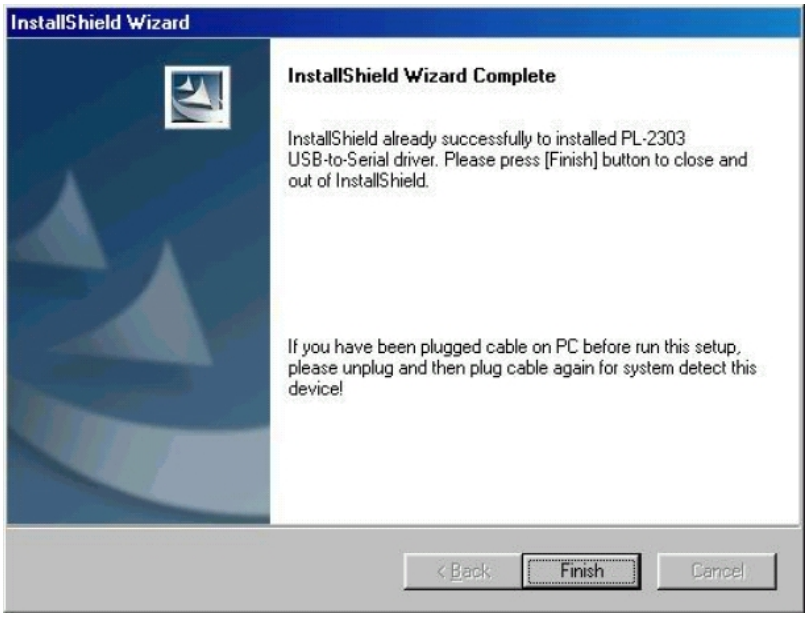
```
100 REM You must merge this code with DECL.BAS
105 REM
110 REM Assign a unique identifier to the device "dev5" and store it in variable load%.
125 REM
130     udname$ = "dev5"
140     CALL ibfind (udname$,load%)
145 REM
150 REM Check for error on ibfind call
155 REM
160     IF load% < 0 THEN GOTO 2000
165 REM
170 REM Clear the device
175 REM
180     CALL ibclr (load%)
185 REM
190 REM Get the 3360F load specification
195 REM
200     wrt$ = "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
```

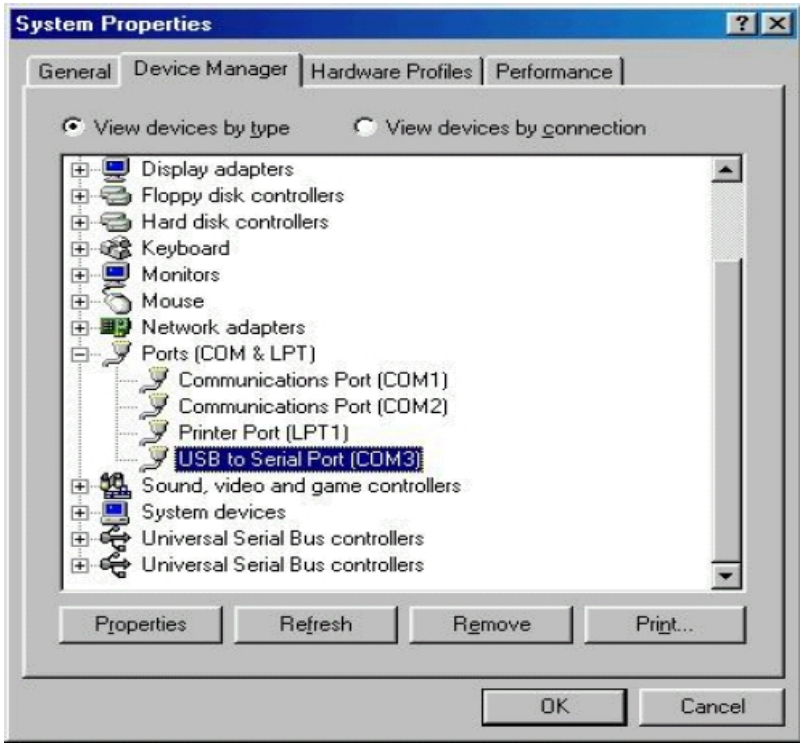
Appendix B 3360F USB Instruction

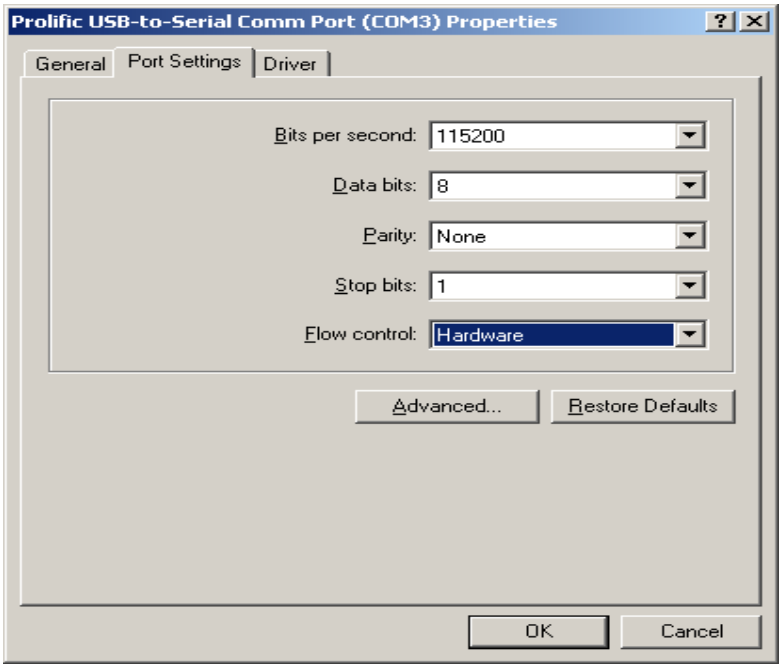
1.Install the USB DRIVER，select USB\SETUP\PL-2303 Driver Installer.exe





2. After the installation , connect the 3360F 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 3360F with COM3.





Appendix C 3360F LAN Instruction

1. Connecting AC power and the network line to the 3360F 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.

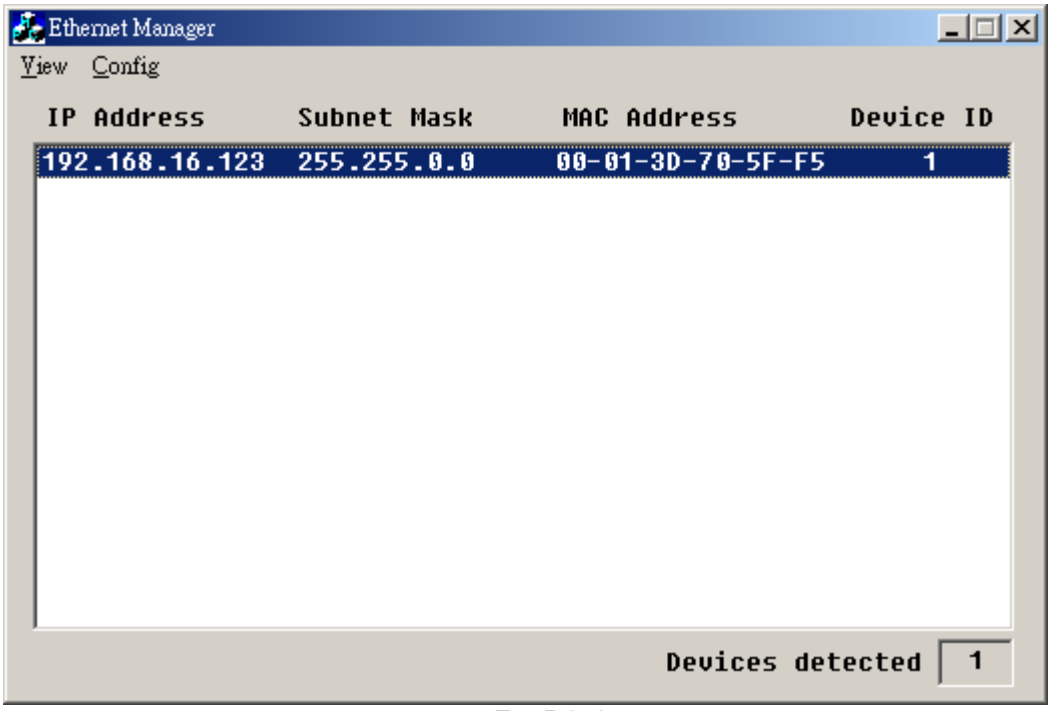
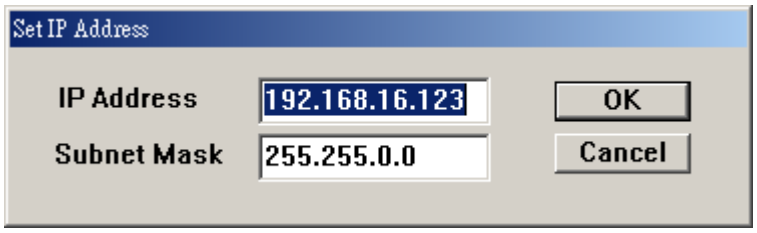


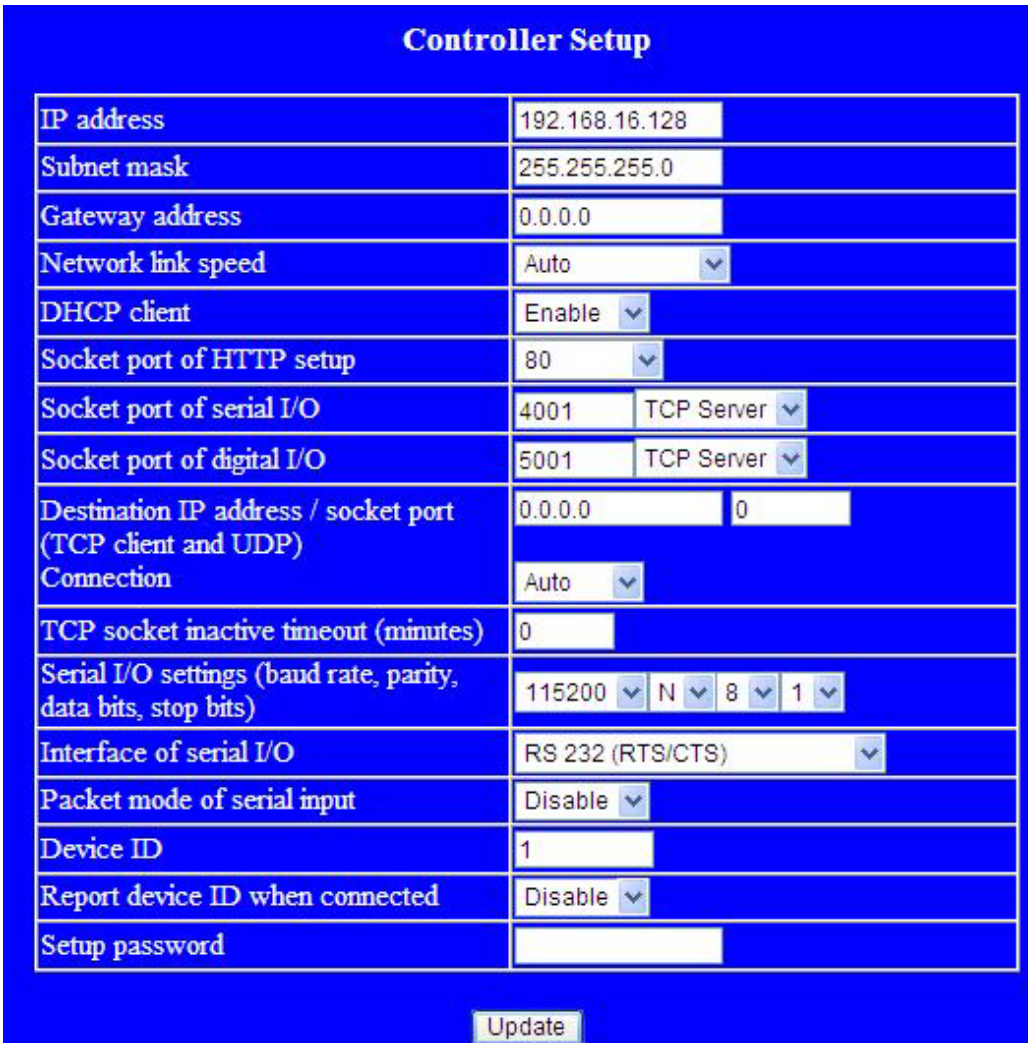
FIG D2-1

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 an 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 3360F Mainframe Auto. Sequ function provide EDIT, ENTER, EXIT, TEST and STORE 5 keys operation.

Edit mode

1. Set mode, Range, current level … Load Setting and Load ON
2. Press STORE key to store the load setting in memory bank
3. Repeat 1~2, for the sequence load setting.
4. Press EDIT key of 3360F mainframe.
5. Press 1~9 number key program number.
6. Press BANK up/down key to select memory bank.
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 STORE to confirm the step
11. LCD shows “REP.” to setting repeat count.
12. Press up/down key to set repeat count of sequence loop.
13. Press STORE to confirm the sequence edit.

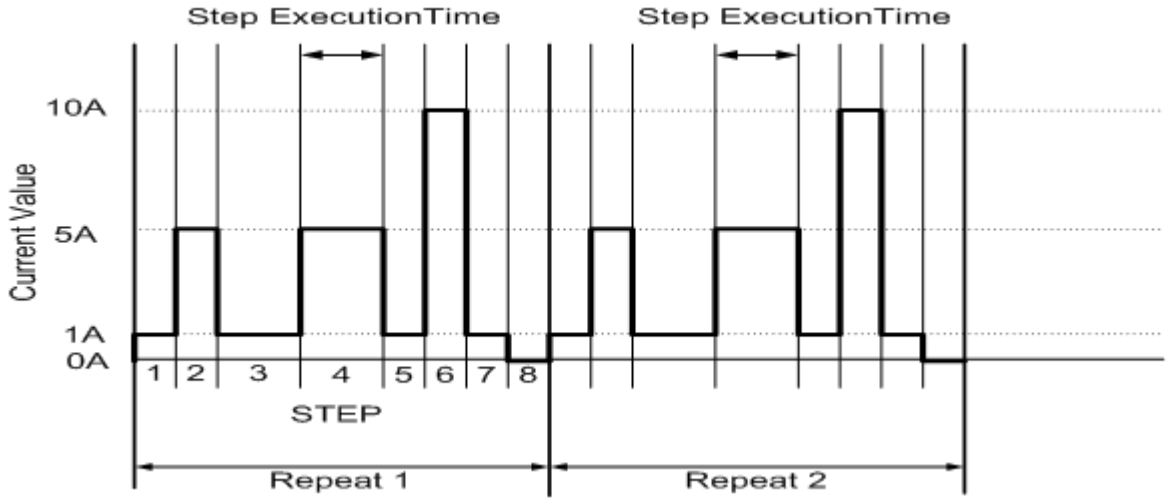
Test mode

1. Press TEST key of 3360F mainframe,
2. Press 1~9 number to select sequence number
3. Press ENTER to execution the sequence
4. The LCD shows “PASS” or “FAIL” after testing.

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

Creating the program

1. Setting the Load current level and store to bank 3 state 1~8
2. Set the operation mode
   Press the mode key to CC mode.
3. Set the range
   Press RANGE key to force range 2
4. Press Load ON
5. Set the current value as step 1~8 and store to memory bank 3 state 1~8
6. Press EDIT key of 3360F mainframe
7. Press sequence number 3 to edit the sequence
8. Press up/down key to memory bank 3 and state 1
9. Press ENTER key to confirm the sequence memory
10. Press up/down key to setting execution time(T1+ T2)
11. Press ENTER key to confirm the sequence step
12. Repeat 7~10 to setting step 1~8
13. Press STORE key to confirm step 1~8
14. Press up/down key to 1 to repeat one times.
15. Press STORE to confirm the repeat count.

Testing Waveform

