3250A Series
High Power LOAD
Operation Manual

S/N: 9003250A02 rev:A

PRODIGIT
INSTRUMENT PROFESSIONAL

Material Contents Declaration

(材料含量宣称)

(Part Name) 零件名称	Hazardous Substance (有毒有害物质或元素)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴 联苯 (PBB)	多溴 二苯醚 (PBDE)
PCBA (印刷电路装配件)	X	O	X	O	O	O
Electrical part not on PCBA's 未在PCBA上的电子零件	X	O	X	O	O	O
Metal parts **金属零件**	O	O	O	X	O	O
Plastic parts 塑料零件	O	O	O	O	X	X
Wiring 电线	X	O	O	O	O	O
Package **封装**	X	O	O	O	O	O

对销售之日的所售产品,本表显示, PRODIGIT 供应链的电子信息产品可能包含这些物质。注意:在所售产品中可能会也可能不会含有所有所列的部件。This table shows where these substances may be found in the supply chain of Prodigit electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product. ○:表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006 标准规定的限量要求以下。○: Indicates that the concentration of the hazardous substance in all homogeneous materials in the parts is below the relevant threshold of the SJ/T 113632006 standard. ×:表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006 标准规定的限量要求 ×: Indicates that the concentration of the hazardous substance of at least one of all homogeneous materials in the parts is above the relevant threshold of the SJ/T 11363-2006 standard.

Note(注释):

1.Prodigit has not fully transitioned to lead-free solder assembly at this moment；However, most of the components used are RoHS compliant.
(此刻，Prodigit 并非完全过渡到无铅焊料组装；但是大部份的元器件一至于RoHS的规定。)

2. The product is labeled with an environment-friendly usage period in years.

The marked period is assumed under the operating environment specified in the product specifications.
(产品标注了环境友好的使用期限制(年)。所标注的环境使用期限假定是在此产品定义的使用环境之下。)

Example of a marking for a 10 year period:
(例如此标制环境使用期限为10年)

3250A Series High Power Load Operation Manual
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FIGURES

Tables

Chapter 1 Introduction

1-1 General Description

3250A Series High Power Electronic Load is used for evaluation of the specification characteristics of AC/DC high power suppliers and the service life characteristics of batteries. Especially for step wave-form, square wave-form UPS, inverter device.
3250A Series High Power Electronic Load can be used to work with GPIB/RS-232C interface and panel manual operation can be made available. The work area of 3250A 300W is as shown in Fig.1-1. The work scope of its voltage and current is 0-60V and 0-20A respectively.

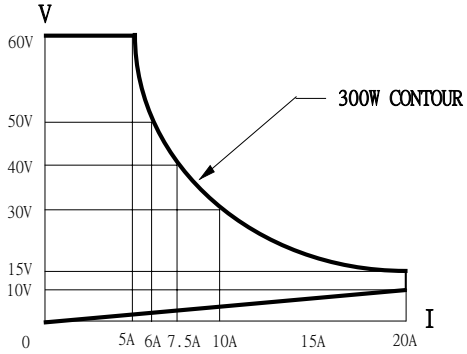


Fig.1-1 3250A 0-60V/0-20A Electronic Load Power Curve

The work area of 3251A 300W is as shown in Fig.1-2 The work scope of its voltage and current is 0～150V and 0-6A respectively.

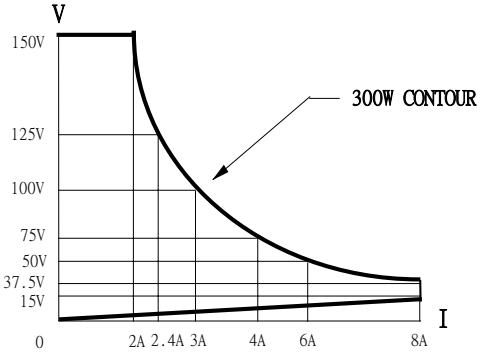


Fig.1-2 3251A 0～150V/0-6A Electronic Load Power Curve

The work area of 3252A 300W is as shown in Fig.1-3. The work scope of its voltage and current is 0～300V and 0～4A respectively.

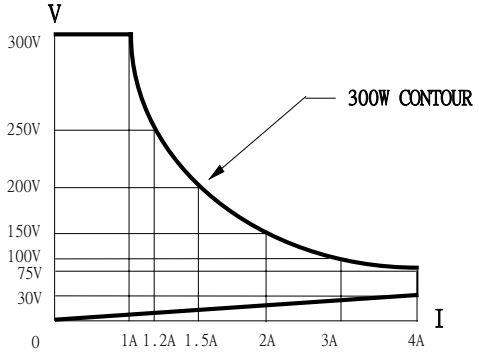


Fig.1-3 3252A 0-300/0-4A Electronic Load Power Curve

The work mode of 3250A Series High Power Electronic Load includes C.C, Linear C.C., C.R.

C.C. Mode

During C.C. mode, the load current input into 3250A Series High Power Electronic Load depends on the current setting regardless of the input voltage, e.g., the current setting remains unchanged. Please refer to Fig.1-4 below：

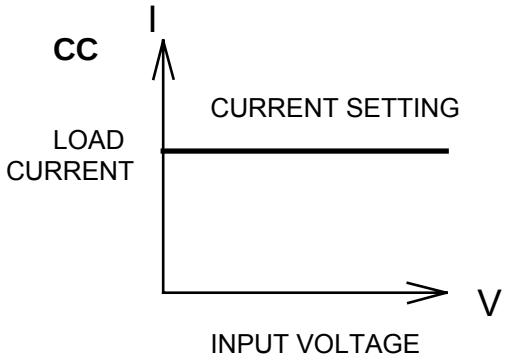


Fig.1-4 Characteristics of C.C. Mode

Linear C.C. Mode

During Linear C.C. mode, the load current input into 3250A Series High Power Electronic Load depends on the current setting regardless of the input voltage, e.g., the current setting remains unchanged. Please refer to Fig.1-4. The load input current signal will follow input voltage signal, That is useful for step wave-form and square wave-form device.

C.R. Mode

During C.R. mode, the load current input into 3250A Series High Power Electronic Load depends on the resistance setting. At this time, the load current is in direct proportion to input voltage, e.g. the resistance setting remains unchanged. Please refer to Fig. 1.5 below

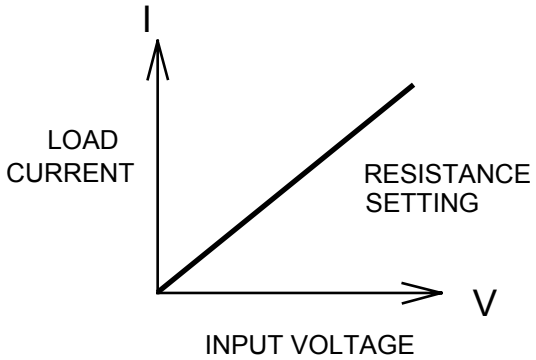


Fig.1-5 Characteristics of C.R. Mode

The load setting of 3250A Series Electronic Load and the load condition setting of the front panel can be made through the front panel manual operation, GPIB command and RS-232C command (Please refer to 3300 Mainframe Operation Instructions). The load voltage and current can be transmitted to the computer through GPIB or RS-232C bus-bar. For operation of GPIB and RS-232C, please refer to 3300 Mainframe Operation Manual.

1-2 Characteristics of 3250A Series High Power Electronic Load

1.2.1 Interface function of full GPIB control, including setting of load condition and read-back of Vmeter and Ameter.
1.2.2 Dual High Accuracy/High Resolution 4 1/2 digit Vmeter and Ameter.
1.2.3 In CC mode, frequency range for 40~70Hz.
1.2.4 In CC mode, the settable Crest Factor can be set to Maximum 3.5.
1.2.5 Automatic judging ability for GO/NG.
1.2.6 Switch-able automatic voltage sensing ability.
1.2.7 Protection functions include Over - Voltage, Over - Current, Over - Power and Over - Temperature.
1.2.8 Software calibration ability.
1.2.9 Cooling fan control device with revolution change function.
1.2.10 Isolated Current Monitor BNC output with full scale of 10V.

1-3 Accessories

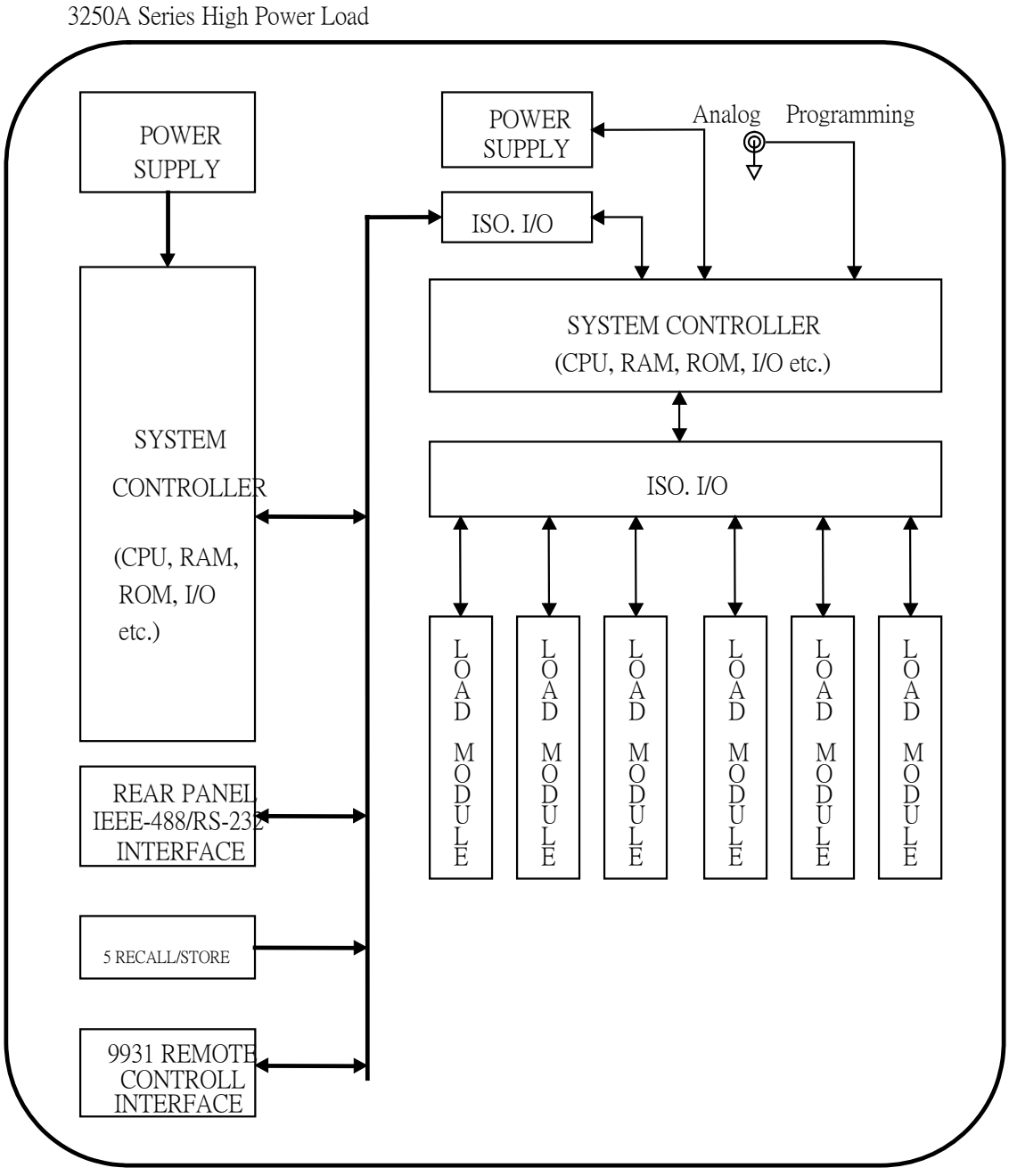
1.3.1	Vsense Input BNC Connector	1PC
1.3.2	Banana Terminal (Black)	1 PC
1.3.3	Banana Terminal (Red)	1 PC
1.3.4	King-Size Hook-Type Terminal	2 PC
1.3.5	3250A Series High Power AC/DC Electronic Load Operation Manual	1 PC

1-4 Specification

MODEL		3250A	3251A	3252A
LOAD INPUT RATINGS Power (VA) Current(Ampere) Voltage(Volt)		 300 VA 20 Arms 60 Vrms	 300 VA 8 Arms 150 Vrms	 300 VA 4 Arms 300 Vrms
PROTECTION： Over Power Protection Over Current Protection Over Vlotage Protection Over Temp. Protection		 ≒ 315 VA ≒ 21 A ≒ 63 V 85℃	 ≒ 315 VA ≒ 8.4 A ≒175.5 V 85℃	 ≒ 315 VA ≒ 4.2 A ≒ 315 V 85℃
CC MODE & Linear CC MODE	Range	0～10/10～20 A	0～4/4～8 A	0～2/2～4 A
	Resolution	2.5/5 mA	1/2 mA	0.5/1 mA
	Accuracy	±0.5% of （setting ＋ range）		
	Low Current	0 ~ 1 A	0 ~ 0.4 A	0 ~ 0.2 A
	Accuracy	± 2 % of (setting + range)		
CR MODE	Range II/I	0.3～1.2/1.2～4.8K	1.875～7.5/7.5～30K	7.5～30/30～120K
	Resolution	0.83/0.2083 mS	0.13/0.033 mS	0.033/0.0083 mS
	Accuracy	±0.5% of （setting ＋ range）		
CREST FACTOR (CCMODE ONLY)	Range	√2 ~ 3.5 / 1.5 ~ 1.9 / 3.0 ~ 3.4		
	Resolution	0.5 / 0.1 / 0.1		
VOLTAGE READBACK V METER	Range	60 V	150 V	300V
	Resolution	0.01 V	0.01 V	0.1V
	Accuracy	±(0.5% of reading ＋ 0.2% of range)		
CURRENT READBACK A METER	Range	20 A	8 A	4 A
	Resolution	0.01 A	0.001 A	0.001 A
	Accuracy	±（0.5% of reading ＋ 2% of range） ±0.5% of （reading ＋ range）@ 50/60 Hz		
WATT READBACK W METER	Range	300 W		
	Resolution	0.1 W		
	Accuracy	±（0.5% of reading）± 3W		
VA METER		Vrms×Arms Correspond To Vrms and Arms		
FREQUENCY Range		DC, 40 ~ 70 Hz（CC Mode） DC ~ 70 Hz（CR Mode）		
Imonitor （Isolated）		5 A/V	2 A/V	1 A/V

Table 1-1 3250A Series Specification

1-5 System Block Diagram



Chapter 2 Installation

This Chapter deals with the procedures and method for installing the 3250A Series Electronic Load in and removing the same from 3300C Mainframe.Upon being installed in the 3300C Mainframe, 3250A Series Electronic Load can be used immediately without any adjustment.

2-1 Installation & Removal of 3250A Series Electronic Load

Unless 3300C Mainframe and 3250A Series Electronic Load are purchased separately, the latter shall be installed in the former for delivery.

If the 3250A Series Electronic Load is installed in 3300C/3302C Mainframe, in addition to panel manual control, control of 3250A Electronic Load can also be made by means of GPIB and RS-232C remote control interface connected with the computer for control by software program. In addition to being installed in 3300C Mainframe, 3250A Series Electronic Load can also be installed in 3301 Mainframe. If so, control can only be made by means of panel manual operation instead of using GPIB interface on the 3300C Mainframe, also, the 5 sets of storage/memory function on 3300C Mainframe is not applicable to 3250A Series Electronic Load. Please observe the following procedures when you attempt to install 3250A Series Electronic Load in or remove the same from 3300C Mainframe to facilitate Mainframe assembly or re-assembling:

Procedures for installation of 3250A Series Electronic Load:

2.1.1 Prior to installation of 3250A Series Electronic Load, please turn off the power switch of 3300C Mainframe lest the module and elements inside the Mainframe should be damaged.

2.1.2 Align the upper and lower guide-slot of the module position inside the Mainframe into which the installation is desired and install 3250A Series Electronic Load in such a position.

2.1.3 As shown in Fig.2-2, push 3250A Series Electronic Load into the Mainframe by pressing against load input terminal on the front panel for pushing toward the Mainframe until full engagement is made.

2.1.4 Lock up the fixing screw located at lower right side of the front panel.

2.1.5 Turn on the power of 3300C Mainframe until 3250A Series Electronic Load is installed properly.

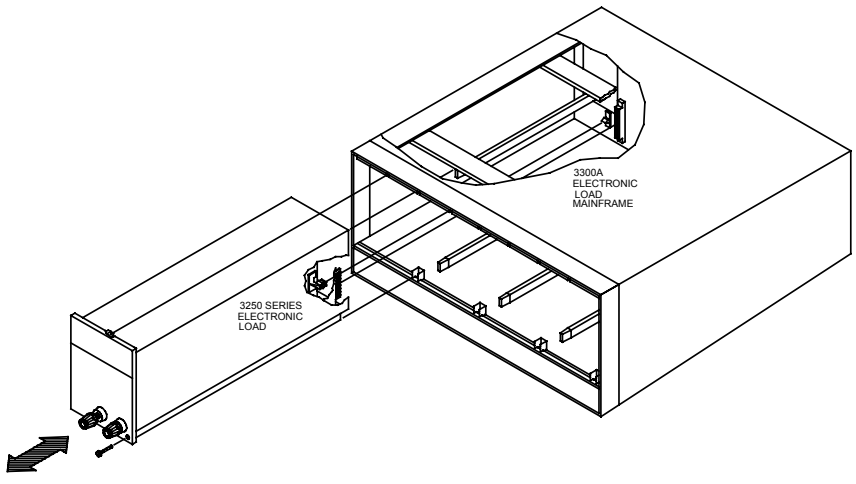


Fig.2-2 Installation & Removal of 3250A Series Electronic Load Module

Chapter 3 Manual Operation

This Chapter deals with the front panel manual operation of 3250A Series High Power Electronic Load. With regard to calibration procedures, please refer to 3250A Series High Power Load Calibration Manual. With regard to the control of GPIB/RS-232C control, please refer to Chapter 4 GPIB/RS-232C Remote Operation.

3-1 Description of Front Panel

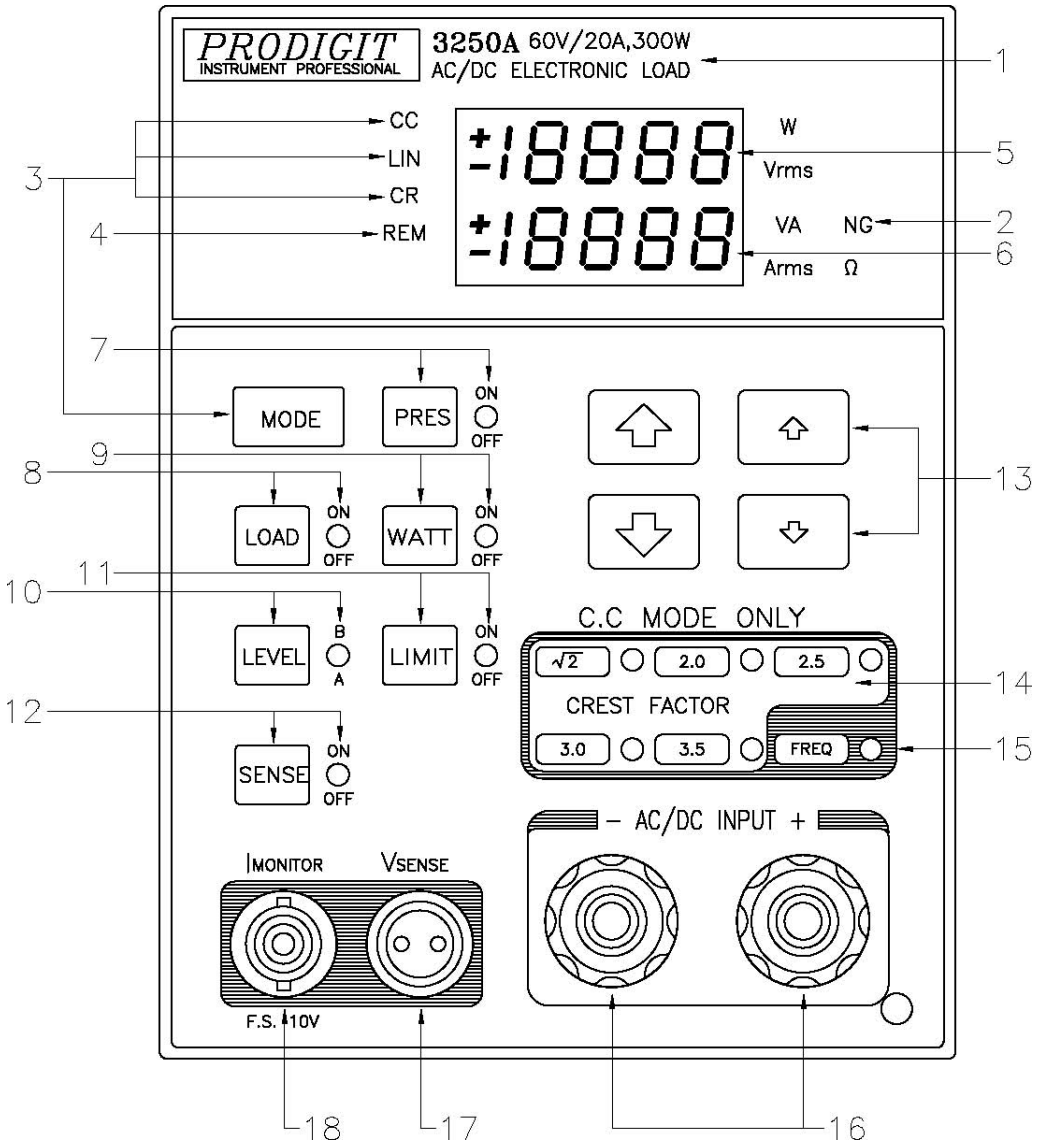


Fig.3-1 Front Panel of 3250A Series High Power Electronic Load

3.1.1 3250A 600V/20A, 300W AC/DC Electronic Load
Refers to model number, voltage, current and power specification of 3250A Series High Power AC/DC Electronic Load.

3.1.2 NG LED Indicator
When the reading of Vmeter, Ameter, wattmeter or VA meter exceeds the upper or lower limit set, this indicator will display.

3.1.3 MODE Key and LED indicator of CC, LIN, CR
On the 3250A Series High Power Electronic Load, there are two working modes which can be selected by MODE KEY with the sequence of C.C., Linear C.C. and C.R., then switching can be made in such a sequence. However, LED indicator of CC, LIN, CR will display the working mode selected.

3.1.4 REM LED Indicator
When 3250A Series High Power Electronic Load is connected with computer program for control and operation, REM LED Indicator will come on. In such a case, panel manual operation will become null and void. When REM LED indicator comes off, panel manual operation will resume.

3.1.5 Upper 4-1/2 Digit Monitor
This 4-1/2 Digit Monitor is a multi-function monitor. Its functions are described as follows:

3.1.5.1 Under general conditions:
This monitor will be a 4-1/2 digit voltmeter to display the voltage at the load input end or Vsense BNC input end.

3.1.5.2 Under WATT ON condition:
This monitor will be a 4-1/2 digit wattmeter to display the power of the load.

3.1.5.3 Under LIMIT ON condition:
This monitor will display the upper limit of the voltmeter, Ameter, wattmeter and VA meter. Its displaying sequence is as follows:

3.1.5.3.1 Display the upper limit of voltmeter with the unit as〝Vrms〞.
3.1.5.3.2 Display the upper limit of ammeter with the unit as〝Arms〞.
3.1.5.3.3 Display the upper limit of wattmeter with the unit as〝W〞.
3.1.5.3.4 Display the upper limit of VA meter with the unit as〝VA〞.

3.1.5.4 Upon protection conditions:
For over-voltage protection, monitor displays〝oVP〞.

3.1.5.5 Under FREQ ON condition:
The monitor will display EfEq, bAn, Sync function settings, its displaying sequence is as follows:

3.1.5.5.1 Under frequency setting function, monitor displays〝FrEq〞.
3.1.5.5.2 Under Bank selection function, monitor displays〝bAn〞.
3.1.5.5.3 Under SYNC selection function, monitor displays〝Sync〞.

3.1.6 Lower 4-1/2 Digit Monitor

3.1.6.1 Under Preset OFF condition:
This monitor will be a 4-1/2 digit ammeter to display the load current actually flowing into the electronic load.

3.1.6.2 Under Preset ON conditioin:
This monitor can display the set value of the front panel manual operation or the set value upon remote control.

3.1.6.2.1 Display the set value of C.C. Level A and B under C.C.mode with the unit as〝Arms〞.

3.1.6.2.2 Display the set value of C.R. Level A and B under C.R. mode with the unit as〝Ω.〞

3.1.6.2.3 Upon protection condition:
Upon over-current, over-power and over-temerature,〝oCP〞,〝oPP〞and〝oTP〞will be displayed respectively.

3.1.6.3 Under LIMIT ON condition:

3.1.6.3.1 Display the lower limit of voltmeter with the unit as〝Vrms〞.

3.1.6.3.2 Display the lower limit of ammeter with the unit as〝Arms〞.

3.1.6.3.3 Display the lower limit of Wattmeter with the unit as〝W〞

3.1.6.3.4 Display the lower limit of VA meter with the unit as〝VA〞.

3.1.6.4 Under REEQ ON condition:

3.1.6.4.1 Under frequency setting function, monitor will display DC, 0.1～70.0, Auto.

3.1.6.4.2 Under bank selection function, monitor will display 0～10.

3.1.6.4.3 Under sync selection function, monitor will display〝ON〞,〝OFF〞.

3.1.7 PRES ON/OFF Key and LED Monitor

Depressing PRES Key will be ON, further depressing will be OFF, further depressing will be ON again and so on. ON means Preset ON, e.g., to preset condition display to ON. OFF means preset OFF, e.g., the condition is not preset and shall be the actual condition of the voltage and current of the load.

Under Preset OFF condition, the upper 4 1/2 digit monitor displays the voltage input to electronic load while the lower 4 1/2 digit monitor displays the current flowing into electronic load with the unit as〝Vrms〞&〝Arms〞respectively and the unit indicator will come on also.

Under Preset ON condition, PRES LED monitor is ON, both upper and lower 4 1/2 digit monitors will have different displays with the change of working mode as shown below:

3.1.7.1 C.C.Mode:
The setting value of Level A / B load current can be displayed on the lower 4 1/2 digit monitor with the unit as〝Arms〞, LED indicator will be ON.

3.1.7.2 Linear C.C. Mode:
The setting value of Level A / B load current can be displayed on the lower 4 1/2 digit monitor with the unit as〝Arms〞, LED indicator will be ON.

3.1.7.3 C.R.Mode:
The setting value of Level A/B load resistance can be displayed on the lower 4 1/2 digit monitor with the unit as〝Ω〞, LED indicator will be ON.

3.1.8 Load ON/OFF Key and LED Indicator

Whether or not the electronic load input end of 3250A series High Power is loaded with current can be controlled by Load ON/OFF Key. Under Load OFF condition and upon Load ON, the electronic load of 3250A series High Power will return to the load condition set originally and Load LED is ON indicating that the electronic load is at present under Load ON condition and is ready at any time to be loaded with the load current of the AC/DC input power source.

3.1.9 Watt ON/OFF Key and LED Indicator

Depressing Watt Key will be ON, further depressing will be OFF, further depressing will be ON again and so on. ON means Watt ON, e.g., to indicate the Watt VA condition of actual loading. OFF means Watt OFF, e.g., to indicate the voltage and current condition of actual loading.

3.1.9.1 Under Preset OFF condition, the upper 4 1/2 digit monitor displays the Watt consumed for electronic loading while the lower 4 1/2 digit monitor displays the VA flowing into electronic load with the unit as〝W〞, 〝VA〞 respectively and the unit indicator will come on.

3.1.9.2 Under Preset ON condition, both upper and lower 4 1/2 digit monitors will have different displays with the change of working mode as shown below:

3.1.9.2.1 C.C.Mode:

The setting value of Level A/B load current can be displayed on the lower 4 1/2 digit monitor with the unit as〝Arms〞and LED indicator will come on.

3.1.9.2.2 Linear C.C. Mode:

The setting value of Level A/B load current can be displayed on the lower 4 1/2 digit monitor with the unit as〝Arms〞and LED indicator will come on.

3.1.9.2.3 C.R.Mode:

The setting value of Level A/B load resistance can be displayed on the lower 4 1/2 digit monitor with the unit as〝Ω〞and LED indicator will be ON.

3.1.10 Level A/B Key and LED Monitor

Depressing Level Key will be B , further depressing will be A, further depressing will be B again and so on. B means Level B (LED ON), e.g., to move out Level A, then move in Level B. A means Level A (LED OFF), e.g., to move out Level B, then move in Level A.

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

3.1.11 Limit ON/OFF Key and LED indicator

Being depressed, LED will come on and in LIMIT ON condition:

3.1.11.1 Both upper and lower 4-1/2 digit monitors display the upper and lower limit of the voltmeter with the unit as〝Vrms〞.

3.1.11.2 Both upper and lower 4-1/2 digit monitors display the upper and lower limit of the ammeter with the unit as〝Arms〞.

3.1.11.3 Both upper and lower 4-1/2 digit monitors display the upper and lower limit of the watt meter with the unit as〝W〞

3.1.11.4 Both upper and lower 4-1.2 digit monitors display the upper and lower limit

of the VA meter with the unit as〝VA〞

When depressing is made to five time, LED will come off and in Limit OFF condition. Please refer to 3.1.13.2 for upper and lower limit adjustment.

3.1.12 SENSE ON/OFF Key and LED Indicator

The voltmeter and internal trigger circuit of 3250A Series High Power Electronic Load can be controlled by this Key thus determining whether or not the input to the voltmeter is made from the AC input end (OFF) or Vsense end (ON). Upon Vsense ON, LED indicator will be ON and the 4-1/2 digit voltmeter can display the voltage read from Vsense. Upon Vsense OFF, the 4-1/2 voltmeter can display the voltage read from AC input end.

3.1.13 Load Current Rough Tuning/Fine Tuning, Up/Down Key

3.1.13.1 Under usual or PRESET Light Lit Condition:

3.1.13.1.1 ⇧ ⇩ : Set Value Rough Tuning Up/Down Key.

3.1.13.1.2 ↑ ↓ : Set Value Fine Tuning Up/Down Key.

3.1.13.2 Upon LIMIT Light ON:

3.1.13.2.1 ⇧ ⇩ : Upper limit value Up/Down Key.

3.1.13.2.2 ↑ ↓ : Lower limit value Up/Down Key.

3.1.13.3 Upon FREQ light ON:

3.1.13.3.1 FrEq: ⇧ ⇩ is freq. Rough Tuning Up/Down Key↑ ↓ is freq. Fine Tuning Up/Down Key.

3.1.13.3.2 bAn:⇧ ↑ is Fine Tuning Up Key ⇧ ⇩ ↓ is Fine Tuning Down Key.

3.1.13.3.3 Sync: ⇧ ↑ is ON Key ⇩ ↓ is OFF Key.

3.1.14 √2, 2.0, 2.5, 3.0, 3.5 Key and LED indicator.

This key only functions upon C.C. mode and all LED off upon Linear C.C. mode and C.R. mode.

These keys are used to change the current C.F. (Peak Factor) of C.C. mode. However, in change of BANK, these keys will define different C.F. values.

3.1.15 FREQ Key and LED indicator

C.C. mode: After depressing, LED will come on, the first depressing shows FREQ, further depressing shows BANK (No such function for DC), another pressing shows SYNC, depressing again will be off.

Linear C.C. and C.R. mode: LED will come on, the first depressing shows FREQ, depressing again will be off.

For the following items, except for 3.1.15.3,

3.1.15.1 FREQ (For Frequency Setting) : Setting Range: DC, 0.1～70.0 Hz, Auto.

3.1.15.1 BANK (For Bank Setting) : 0～10 totaling 11 banks (This function will be invalid for DC).

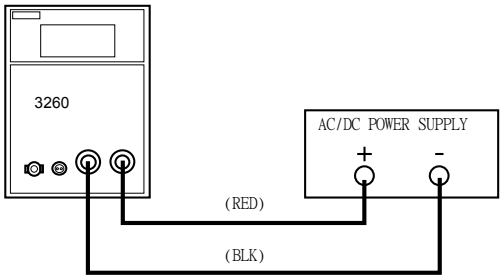
3.1.15.3 SNYC (Current Bank Sync Signal Selection):
ON is external Sync, OFF is internal Sync.

3.1.16 AC/DC Load Input Connector

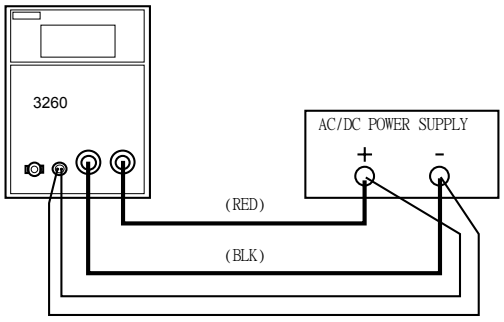
When Load Input Connector is used, be sure that the rated specification of the voltage and current of the 3250A Series High Power Electronic Load shall not be exceeded. Upon wiring, please refer to 3.4 lest the internal circuit and connector

should be damaged.

3.1.17 Vsense BNC, Voltage Sensing Input BNC Connector.
In order to solve the voltage drop of the conductor under the condition of big load current, Vsense-CLIP cable can be used to connect with the specific point to be measured thus obtaining the specific voltage value. Please refer to the application information of Fig.3-2.



Connecting Method under small load current condition



Connecting Method under small load current condition

Fig.3-2 Typical Way for Connecting 3250A Series High Power Electronic Load

3.1.18 Imonitor Current Monitoring output BNC Connector
Imonitor output signal is designed mainly to facilitate connection with the oscillograph so that the waveform of the load current can be observed. Regardless of Preset ON or OFF, the analog signal output from Imonitor is in direct proportion with the load current flowing through the load current. Please refer to the relationship between the analog voltage output signal and load current of 3250A Series High Power Electronic Load listed in Table 3-1. The full scale of Imonitor is 4V.

The Imonitor BNC output signal in 3250A Series High Power Electronic Load is through an isolated amplifier, e.g., the earth potential of the output analog signal and the earth potential of the DC load input are separated with each other. In this way, when connection is made with the oscillograph of which another input is connected with both ends of the load, the metering error shall not be resulted from the negative end of the Imonitor BNC output flowing to the negative end via the oscillograph due to different potential. On the other hand, When the positive and negative power

source is measured and the two load current wave forms are observed at the same time, two sets of Imonitor can be connected with Ch1 and Ch2 of the oscillograph.

As the general input of the oscillograph has no isolated insulation device, therefore, if the Imonitor output has no isolated insulation device after connection is made, short-circuit will happen to the power source to be measured thus disabling the measuring. This is because the Imonitor output of the general electronic load shares the same reference point with the earth of the load input. However, as a light insulation isolated amplifier is contained in the 3250A Series High Power Electronic Load, the condition cited above can be avoided, e.g., the load current wave form of two sets of positive and negative power sources to be measured can be observed simultaneously without causing any affection or inconvenience.

	3250A	3251A	3252A
Imonitor	5 A/V	2A/V	1A/V

Table 3-1 3250A Series High Power Electronic Load Imonitor Specification

3-2 Setting of Freq. & Selection of Bank & Sync.

3.4.1 Frequency Setting:

The range for setting the frequency of 3250A Series High Power AC/DC Electronic Load is from Dc, 0.1～70.0 Hz.

The authorization for setting the frequency of 3250A Series High Power AC/DC Electronic Load is the frequency output by U.U.T. Upon completion of setting, the SYNC trigger setting has to be set to OFF and the setting value of such a frequency will be valid. If the frequency setting is less than 0.1 Hz, the frequency setting value shall be set automatically to DC.

3.4.2 Bank Selection:

3250A Series High Power AC/DC Electronic Load provides 11 built-in sets totaling 55 wave form information. The content of Bank is as shown in Table 3-2. Please refer to Appendix for details.

Note： When Frequency is set to DC, the wave form information shall be fixed at DC level, also, this Bank selection function will not be provided until after Frequency is set to AC.

	BANK	A	B	C	D	E
SINE WAVE	0	√2	2.0	2.5	3.0	3.5
	1	1.5	1.6	1.7	1.8	1.9
	2	3.0	3.1	3.2	3.3	3.4
C.F.= 2.0	3	P.F.=-0.85	P.F.=-0.80	P.F.=-0.75	P.F.=-0.70	P.F.=-0.65
C.F.= 2.5	4	P.F.=-0.70	P.F.=-0.65	P.F.=-0.60	P.F.=-0.50	P.F.=-0.40
C.F.= 3.5	5	P.F.=-0.50	P.F.=-0.45	P.F.=-0.40	P.F.=-0.35	P.F.=-0.30
C.F.= 2.0	6	P.F.=0.85	P.F.=0.80	P.F.=0.75	P.F.=0.70	P.F.=0.65
C.F.= 2.5	7	P.F.=0.70	P.F.=0.65	P.F.=0.60	P.F.=0.50	P.F.=0.40
C.F.= 3.5	8	P.F.=0.50	P.F.=0.45	P.F.=0.40	P.F.=0.35	P.F.=0.30
Square Wave	9	1	1.1	1.2	1.3	1.4
DC	10	√2dc	2dc	2.5dc	3.0dc	3.5dc

Table 3-2 3250A Built-In Wave Form Data Bank

3.4.3 SYNC Selection:

3.4.3.1 Exterior SYNC Signal(SYNC ON)

The user can input a SYNC signal to the Analog Programming Input BNC terminal of the back plate of 3250A. Based on this exterior SYNC signal, 3250A Series High Power Electronic Load can be conversed to SYNC trigger signal via internal isolated circuit thus controlling the SYNC of the load current and voltage, in other words, the phase of load current will vary with SYNC trigger signal.

Note：The SYNC signal input from exterior must be the signal of which the duty cycle is 50%.

3.4.3.2 Internal SYNC signal(SYNC OFF):

The internal SYNC signal source of 3250A Series High Power Electronic Load is taken from the signal at the end of input connector for generating current SYNC signal via internal zero crossing circuit and isolation circuit.

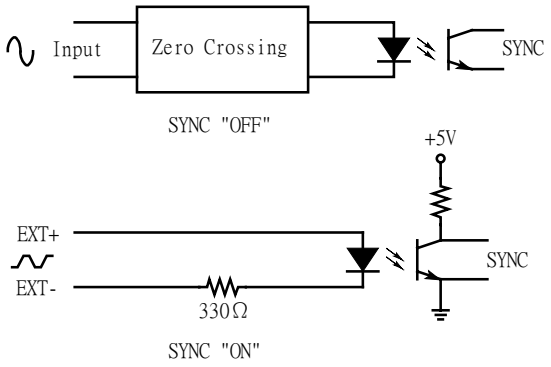


Fig.3-3 Description of Sync.

3-3 Initial setting parameter of 3250A Series High Power Electronic Load

The initial setting parameters of 3250A Series High Power Electronic Load are described from Table 3-3 to 3-5 respectively.

3.3.1 Last Setting

All 3250A Series High Power Electronic Loads have the function for simplifying the setting procedures. This function is called〝Last Setting〞e.g., All 3250A Series High Power Electronic Load, undergone the initial inspection program procedure (Power on), can be immediately changed back to the setting condition prior to Machine OFF thus simplifying the procedures for re-setting after machine being turned off.

3.3.2 Reset

If the memory data of 3250A Series High Power Electronic Load has been sabotaged, for example, unstable power source or noises will result in possible error of information in NVRAM (such as the indication on the front panel is different from the actual condition), under such a case, reset shall be made to correct the errors.

For reset of 3250A Series High Power Electronic Load,〝SENSE〞and〝PRES〞button shall be depressed simultaneously. In such a case, the front panel monitor will display model number and edition repeatedly and initialize the setting parameter of 3250A Series High Power Electronic Load as shown in Tables 3-3 ～ 3-5 until the

button is released.

Description	Condition/Value	Description	Condition/Value
MODE	CC	C.F.	√2
LOAD	OFF	FREQ	FREQ = 60.0Hz
LEVEL	A		BANK = 0
SENSE	OFF		SYNC = OFF
PRES	OFF	CC LEVEL A	0.000A
WATT	OFF	CC LEVEL B	0.000A
LIMIT	VLIMIT = 80.00V	LIN LEVEL A	0.000A
	ALIMIT = 25.00A	LIN LEVEL B	0.000A
	WLIMIT = 400.0W	CR LEVEL A	4800Ω
	VALIMIT = 400.0W	CR LEVEL B	4800Ω

Table 3-3 3250A Initial Condition Setting

Description	Condition/Value	Description	Condition/Value
MODE	CC	C.F.	√2
LOAD	OFF	FREQ	FREQ = 60.0Hz
LEVEL	A		BANK = 0
SENSE	OFF		SYNC = OFF
PRES	OFF	CC LEVEL A	0.000A
WATT	OFF	CC LEVEL B	0.000A
LIMIT	VLIMIT = 200.00V	LIN LEVEL A	0.000A
	ALIMIT = 10.000A	LIN LEVEL B	0.000A
	WLIMIT = 400.0W	CR LEVEL A	30E3Ω
	VALIMIT = 400.0W	CR LEVEL B	30E3Ω

Table 3-4 3251A Initial Condition Setting

Description	Condition/Value	Description	Condition/Value
MODE	CC	C.F.	√2
LOAD	OFF	FREQ	FREQ = 60.0Hz
LEVEL	A		BANK = 0
SENSE	OFF		SYNC = OFF
PRES	OFF	CC LEVEL A	0.000A
WATT	OFF	CC LEVEL B	0.000A
LIMIT	VLIMIT = 400.0V	LIN LEVEL A	0.000A
	ALIMIT = 5.000A	LIN LEVEL B	0.000A
	WLIMIT = 400.0W	CR LEVEL A	120E3Ω
	VALIMIT = 400.0W	CR LEVEL B	120E3Ω

Table 3-5 3252A initial Condition Setting

3-4 Consideration of Load Input Connector and Connecting Lead Wire

Load Input Connector used for 3250A Series High Power Electronic Load is the 5-purpose input connector of which the usage is as follows:

3.4.1 Plug Connector:

This is the most common way for connecting the equipment to be measured with 3250A Series High Power Electronic Load. It is recommended that this connector shall be used when the load current is less than 20A because the rated current of the plug connector is 20A. Please avoid excess of the rated current to prevent damage due to overheat. The maximum gauge of the connecting wire is AWG #14.

3.4.2 Hook-Type Terminal

The attachments of 3250A Series High Power Electronic Load include two (2) hook-type terminals for connecting the equipment to be measured with the wire of AC load input connector of the electronic load. Hook-type terminal can provide the input connector with good contacting characteristics. It is recommended that the hook-type terminal can be used for any occasion. The maximum gauge of the connecting wire is AWG #10.

3.4.3 Lead Wire Insertion Type:

This is the most simple way to insert the connecting wire into the holes on the metal portion of the input connector. The maximum gauge of the connecting wire is AWG #14.

3.4.4 Plug Connector and Hook-Type Terminal:

This method can provide higher current rating and lower impedance of the connecting wire. When input load current is higher than 20A or the connecting lead wire is longer, this method will be optimum.

3.4.5 Plug Connector and Lead Wire Insert Type:

This method can be used when the input current is higher than 20A or the connecting lead wire is longer. When the object to be measured is connected with the electronic load, it is most important that the size of the connecting wire shall be taken into account. In order to prevent overheat thus maintaining good adjustment rate, the requirement of minimum size of the connecting wire or minimum size of the wire gauge shall be met. During actual application, please pay attention to the size of wire gauge and note that the voltage drop of each connecting wire shall be less than 0.5V.

3.5 Rough Tuning, Fine Tuning & Increment & Decrement Adjustment of Load Current.

The maximum load current of 3250A Series High Power Electronic Load can be adjusted to 20.00A, 8.000A, 4.000A respectively.

The relationship between the adjustment variation of the load current or resolution and buttons is as shown in Table 3-6. During operation, when the time for depressing one of the four buttons, e.g., rough tuning, fine tuning, increment and decrement, exceeds one second, the resolution of load current adjustment shall change once per 10ms, e.g., the speed for variation of load current will increase so that setting the load current can be completed in the shortest period of time. Unless max. or min. value has been reached or depressing has been interrupted.

3250A		Range I		Range II	
FULL SCALE LOAD CURRENT		10 A		20 A	
CURRENT METER	RANGE	20.00 A			
	RESOLUTION	0.01 A			
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY		↑	↑	↑	↑
KEY'S STEP RESOLUTION		25 mA	2.5 mA	50 mA	5 mA

3251A		Range I		Range II	
FULL SCALE LOAD CURRENT		4A		8 A	
CURRENT METER	RANGE	8.000 A			
	RESOLUTION	0.001 A			
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY		↑	↑	↑	↑
KEY'S STEP RESOLUTION		10 mA	1 mA	20 mA	2 mA

3252A		Range I		Range II	
FULL SCALE LOAD CURRENT		2 A		4A	
CURRENT METER	RANGE	4.000 A			
	RESOLUTION	0.001 A			
COURSE/FINE LOAD CURRENT ADJUSTMENT KEY		↑	↑	↑	↑
KEY'S STEP RESOLUTION		5 mA	0.5 mA	10 mA	1 mA

Table 3-6 3250A Series Rough Tuning, Fine Tuning & Increment & Decrement Adjustment of Load Current

3-6 Imonitor (Output)

Imonitor BNC output is designed to monitor the input load current of electronic load. It can be connected with oscillograph or recorder for observation.

Via the isolated insulation amplifier in the 3250A Series Electronic Load, Imonitor can output 0～4Vrms/0～10 Vp-p full scale signal to indicate mean root square value (peak value) load current from 0 to full scale. The isolated insulation voltage between the load input end of the module in 3250A electronic load and Imonitor BNC output end is 250V. Also, the reference potential at the negative end of BNC is the same as the GPIB earth potential of 3300C Mainframe. As the isolated insulation amplifier inside the 3250A Series Electronic Load can provide a complete and convenient testing solution, it can not only solve the problem on voltage and current during testing, but also the problem of earth phase connection when one oscillograph is used for observation, because in general oscillograph, the negative end Ch1 of input BNC communicates with Ch2 and has the same potential as that of the housing of ocillograph.

In observation of the current wave form of the positive and negative output power source of the power source to be measured, the isolated insulation characteristics are very effective. In such a way, connection with the oscillograph sharing same input will not create the output short-circuit on the object to be measured because the reference potential of Imonitor output in general electronic load can communicate with the negative end of load input, e.g., if there is no isolated insulation amplifier for the same potential, short-circuit will happen upon measuring.

3-7 Operation Flow Chart of 3250A Series Electronic Load

The typical load and procedures for setting the condition of 3250A Series High Power Electronic Load are shown in Fig.3-4.

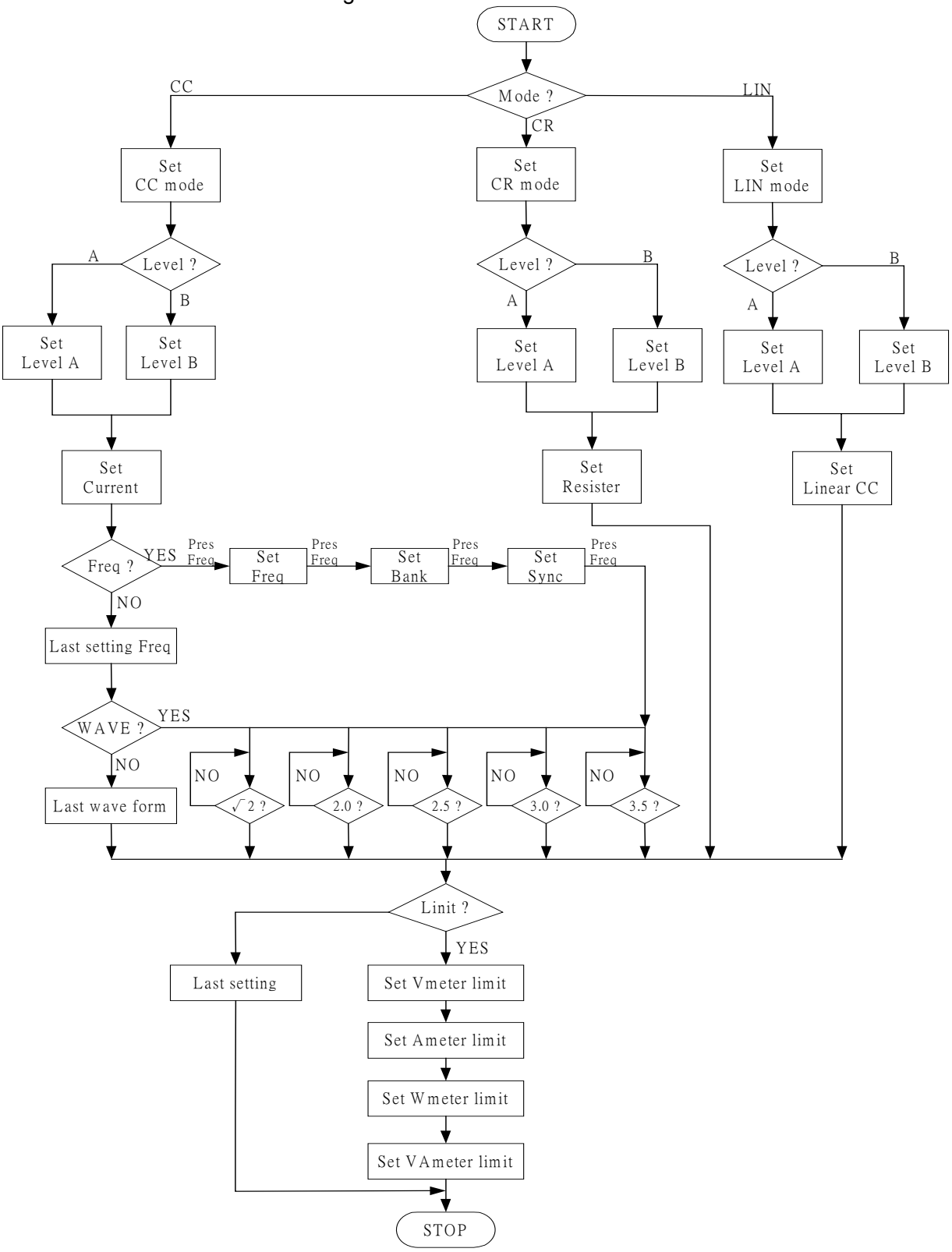


Fig.3-4 3250A Series High Power Electronic Load Operation Flow Chart

3-8 Protection Features

There are four protection functions for the 3250A Series High Power Electronic Load, namely, Over-Voltage, Over-Current, Over-Power and Over-Temperature. When electronic load exceeds the normal work area range, one of the above 4 functions will come to effect. When any one protection comes to effect, load will be changed to OFF to protect electronic load thus preventing damage resulting from abnormal operation range. Also, protection status is indicated by flickering to allow the user understand present condition. Various protection functions are cited below:

3.8.1 Over Voltage

The protection point of over voltage protection (O.V.P.) is preset in the 3250A series High Power electronic load. The setting values of over voltage protection are shown on table 3-7. When O.V.P occurs, the 4 1/2 digit monitor on the upper side of the front panel of 3260 series High Power electronic load will display〝oVP〞with flickering to indicate〝Under Protection〞. Once the over voltage condition disappears, the upper 4 1/2 digit monitor will resume to normal condition.

Model	O.V.P.
3250A	63.00 V
3251A	157.5 V
3252A	315.0 V

Table 3-7 3250A Series over voltage protection setting value

3.8.2 Over Current

The protection point of over current protection (O.C.P.) is preset in the 3250A series High Power electronic load. The setting values of over current protection are shown on table 3-8. When O.C.P. occurs, the 4 1/2 digit monitor on the lower side of the front panel of series High Power electronic load will display〝oCP〞with flickering to indicate〝Under Protection〞.Once the over current condition disappears, the lower 4 1/2 digit monitor will resume to normal condition.

Model	O.C.P.
3250A	21.0 A
3251A	8.40 A
3252A	4.20 A

Table 3-8 3250A Series over current protection setting value

3.8.3 Over Power

The protection point of over power protection (O.P.P.) is preset in the 3250A series High Power electronic load. The setting values of over power protection are shown table 3-9. When O.P.P. occurs, the 4 1/2 digit monitor on the lower side of the front panel of 3250A series High Power electronic load will display 〝oPP〞 with flickering to indicate 〝Under Protection〞 .Once the over power condition disappears, the lower 4 1/2 digit monitor will resume to normal condition.

Model	O.P.P.
3250A	315 VA
3251A	315 VA
3252A	315 VA

Table 3-9 3260 Series over power protection setting value

3.8.4 Over Temperature

3250A Series High Power electronic load is provided with temperature sensor. When the temperature of heat dissipater exceeds about 85℃±5℃,over temperature protection will occur and 4 1/2 digit monitor at the lower side of the front panel of 3250A series High Power electronic load will display 〝oTP〞 with flickering indicates 〝Under Protection〞 . Once the over temperature condition disappears, the lower 4 1/2 digit monitor will resume to normal.

Upon occurrence of over temperature protection, please check the ambient working temperature and ventilation for normality. Please note that the air outlet on the back of the electronic load shall be away from the wall by more than 15 cm to keep good ventilation.

3-9 Load ON voltage adjustment

The factory set " Load ON " voltage is 2 volt, the 3250A series Electronic load module starts to sink current from power supply until the input voltage of 3250A series Electronic Load module over the "Load ON" voltage.
The adjustable " Load ON " voltage is ranged from 2V to 20V, and is set by VR6 on the PCB

3.9.1.As the load ON voltage setting trimmer is located at the first PCB (P/N: 65232601) when you open the Alumina plate of 3250A series Electronic Load module,

3.9.2.Remove the 3300 mainframe's right hand side Alumina plate by loosen its screw on the rear panel.

3.9.3.Put the 3250A series Electronic load module which load ON voltage to be adjusted into the most right hand side of 3300 mainframe, (the load ON voltage setting trimmer VR5 can be adjusted here during the power of 3300 mainframe is turned ON.)

3.9.4. Using screw drive to set the VR6 to the most counter clockwise position. (Maximum load ON voltage) then connect the AC power source(50Hz or 60Hz) to the AC Load input of 3250A series module, adjust the AC output voltage to the required Load ON voltage, the voltage of AC power source should be less than the maximum rating of the LOAD ON voltage.

3.9.5. Set Load ON/OFF key to ON state, the "load" LED annuciator should be ON on the front panel, and set the load current to 1 Amp by using Preset key, the set the Preset OFF again after the load current is set.(Freq.= 50Hz or 60Hz).

3.9.6.Adjust the load ON voltage setting trimmer VR6 clockwise very slowly and stop immediately until the load start to sink current from power source , then the LOAD ON voltage setting is finished in this procedure.

3.9.7.Using the reverse procedure to re-install the 3250A series Electronic load module.

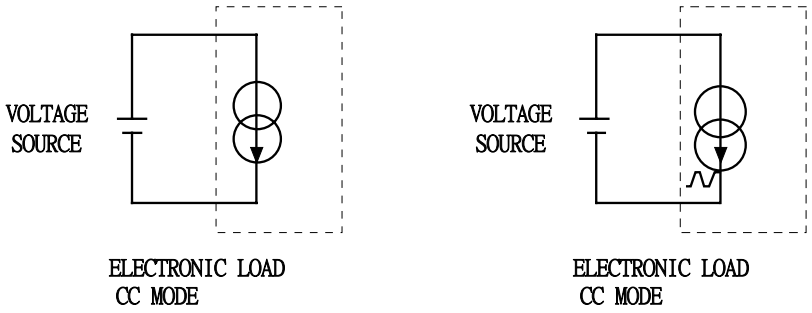
Chapter 4 Application

Some general application examples for 3250A series High Power electronic load are given in this chapter.

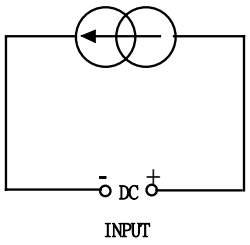
4-1 CC Operation Mode Application

CC Operation mode is very suitable for load regulation, cross regulation and output voltage adjust tests of the power supplier and for battery discharge testing and service life cycle testing.

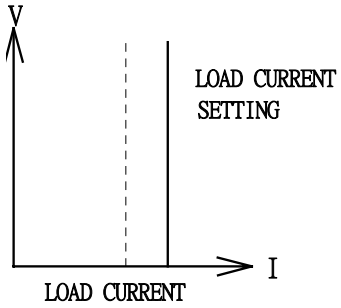
4.1.1 Voltage Source Testing



4.1.2 Power Supply Load Regulation Testing

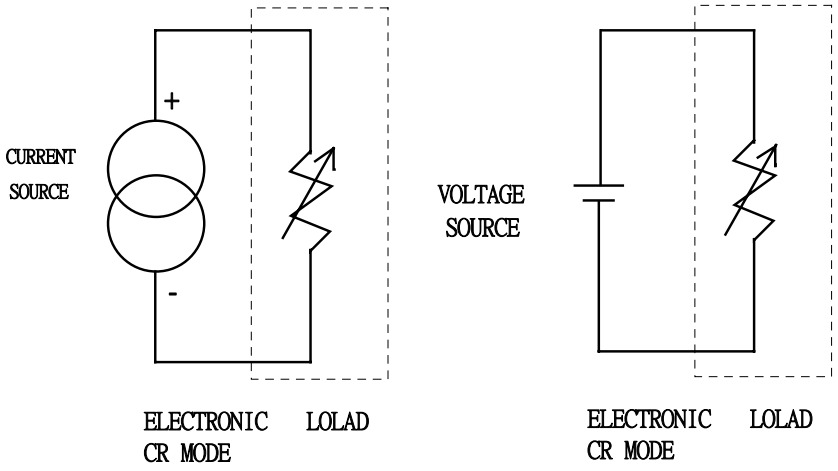


4.1.3 Battery Discharge Testing

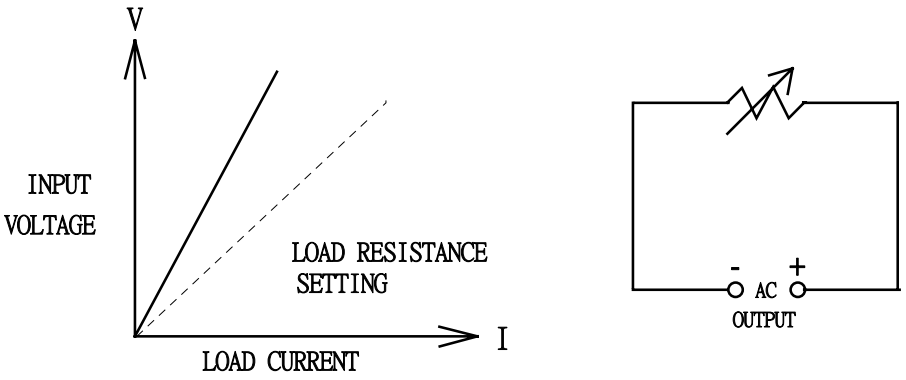


4-2 CR Operation Mode Application

4.2.1 Voltage Source or Current Source Testing

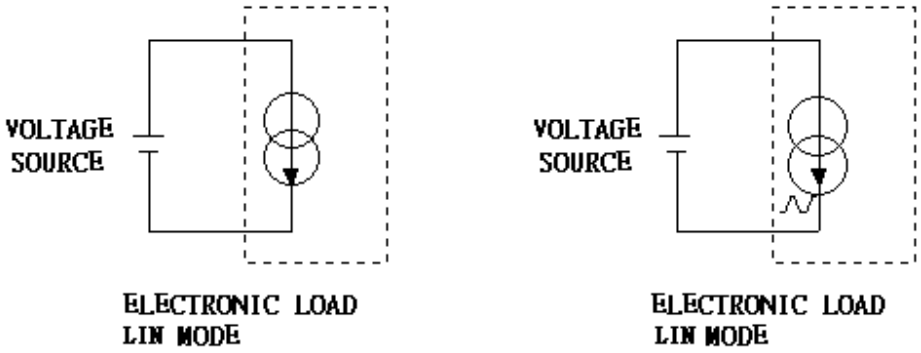


4.2.2 Power Resister Simulation

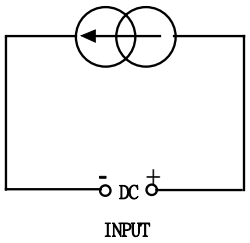


4-3 LIN Operation Mode Application

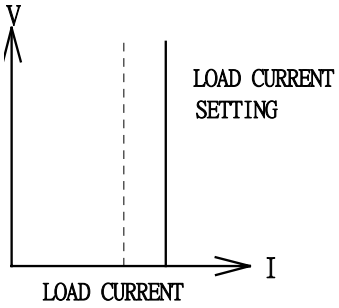
4.3.1 Voltage Source Testing



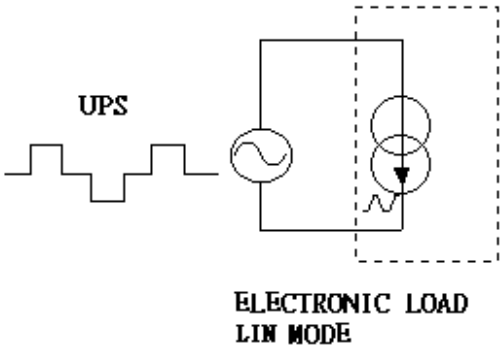
4.3.2 Power Supply Load Regulation Testing



4.3.3 Battery Discharge Testing

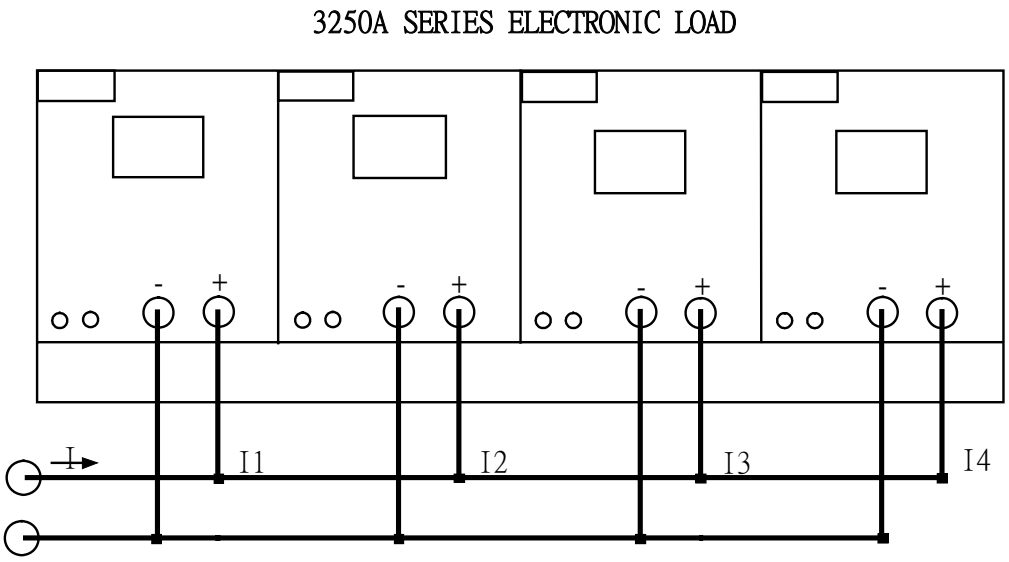


4.3.4 Uninterruptible Power Supply



4-4 3250A Parallel Operation Application

When the power of 3250A series electronic load module is found insufficient, the user can combine two sets or more load modules in parallel. In this way, total load current will be two sets of modules or even more sets. Such a connection will expand the power and current of the electronic load.



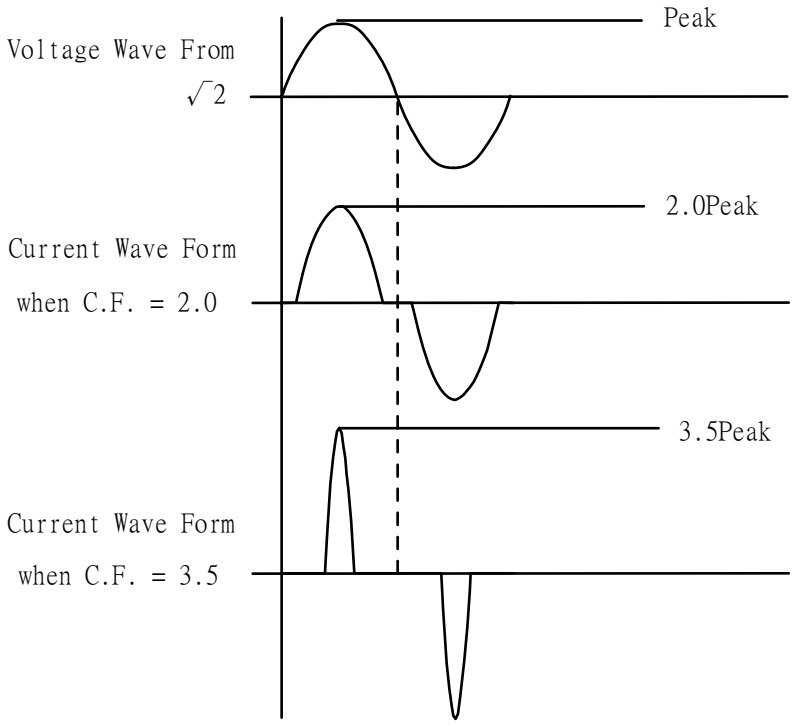
* I = I1+I2+I3+I4

Appendix I Wave Form Data Bank

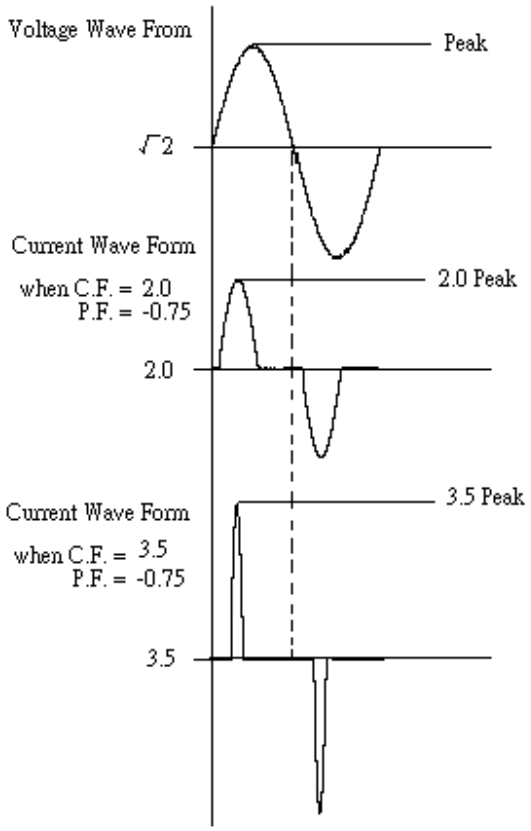
3250A Series High Power electronic load module provides built-in 11 sets totaling 55 banks which are described as follows:

	BANK	A	B	C	D	E
sine wave	0	√2	2.0	2.5	3.0	3.5
	1	1.5	1.6	1.7	1.8	1.9
	2	3.0	3.1	3.2	3.3	3.4
C.F.= 2.0	3	P.F.=-0.85	P.F.=-0.80	P.F.=-0.75	P.F.=-0.70	P.F.=-0.65
C.F.= 2.5	4	P.F.=-0.70	P.F.=-0.65	P.F.=-0.60	P.F.=-0.50	P.F.=-0.40
C.F.= 3.5	5	P.F.=-0.50	P.F.=-0.45	P.F.=-0.40	P.F.=-0.35	P.F.=-0.30
C.F.= 2.0	6	P.F.= 0.85	P.F.= 0.80	P.F.= 0.75	P.F.= 0.70	P.F.= 0.65
C.F.= 2.5	7	P.F.= 0.70	P.F.= 0.65	P.F.= 0.60	P.F.= 0.50	P.F.= 0.40
C.F.= 3.5	8	P.F.= 0.50	P.F.= 0.45	P.F.= 0.40	P.F.= 0.35	P.F.= 0.30
square wave	9	1.0	1.1	1.2	1.3	1.4
DC	10	√2dc	2dc	2.5dc	3.0dc	3.5dc

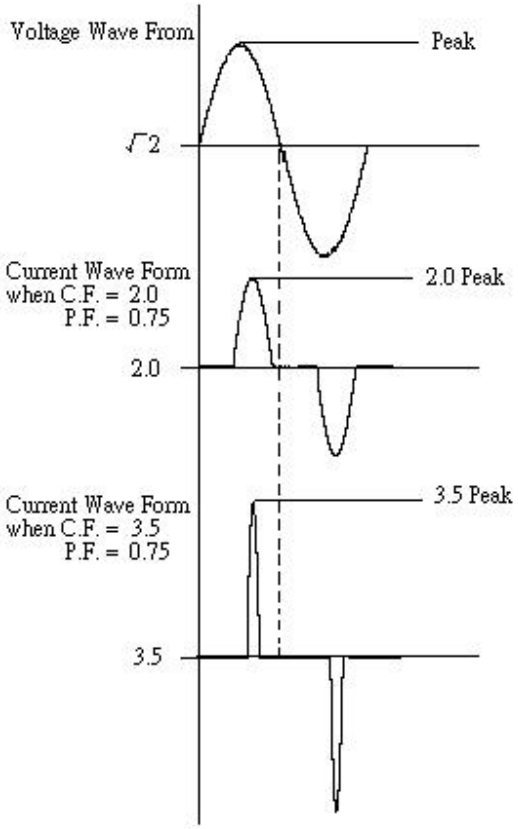
1.1 C.F. value of sine wave consists of √2～3.5 totaling 15 banks of which the definition is described in figure below:



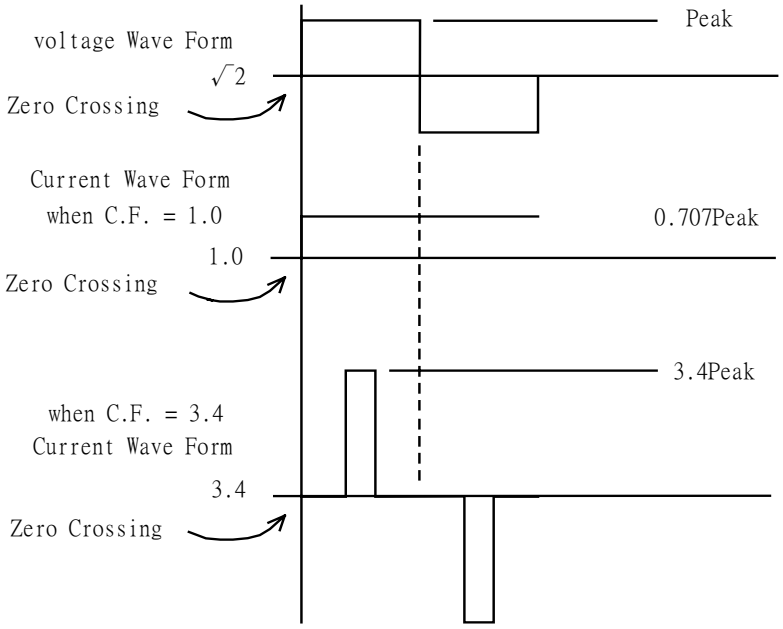
1.2 C.F. value of sine wave consists of 2.0～3.5 and P.F. value is -0.85 ~ -0.30 totaling 15 banks of which the definition is described in figure below:



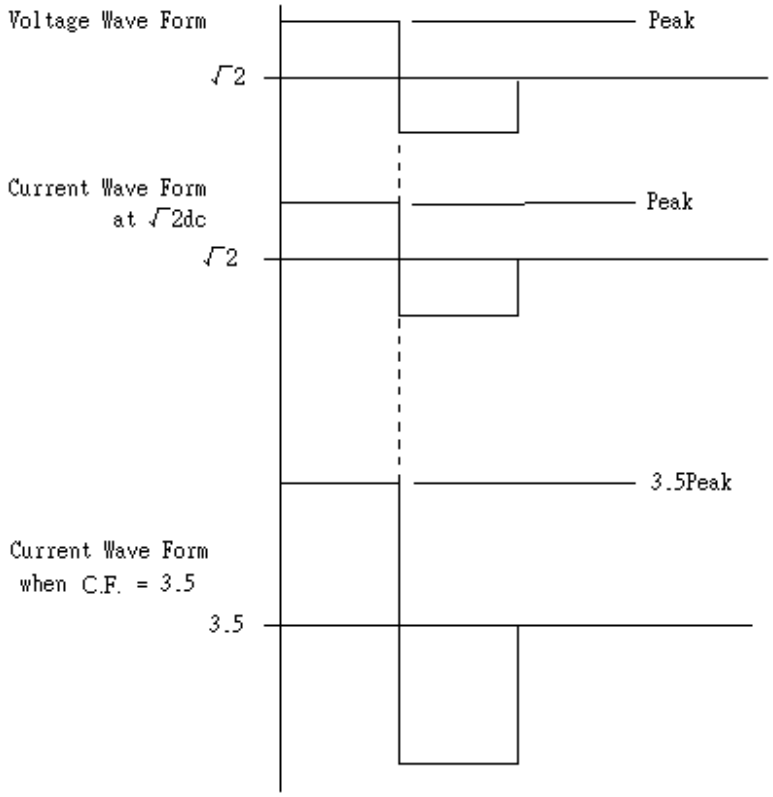
1.3 C.F. value of sine wave consists of 2.0～3.5 and P.F. value is 0.85 ~ 0.30 totaling 15 banks of which the definition is described in figure below:



1.4 C.F. Value of square wave consists of 1.0～1.4 totaling 5 banks of which the definition described in figure below:



1.5 DC Wave form information consists of √2 fold DC level totaling 5 banks of which the definition described in figure below:



Appendix II Setting of AC or DC Electronic Load

3260 Series High Power electronic load is the full function electronic load for AC and DC. The setting of electronic load for AC or DC depends on the output frequency of U.U.T. The setting is described as follows:

2.1 Setting of AC Electronic Load

When 3250A series High Power electronic load is attempted to be used for AC, the frequency of 3250A series High Power electronic load must be set in accordance with the frequency of U.U.T. Even if the output frequency of U.U.T. is 50 Hz, the frequency of 3260 series High Power electronic load must be set to 50.0 Hz by means of FREQ function.

2.2 Setting of DC Electronic Load

When 3250A series High Power electronic load is attempted to used for DC, 3250A series High Power electronic load must be set to DC. When DC is set, bank function will fail (fixed on DC, the monitor will not display BANK).