High Precision Programmable AC Load-6KW/3KW User Manual

MATRIX TECHNOLOGY INC.

CATALOG

Chapter I Functions and Technical Indexes

1.1 Product function

High Precision Programmable AC Load is a program-controlled adjustable load box, which can also be manually controlled. Test by setting different power, current and resistance under fixed voltage. Intelligent operation achieves the function of constant power or constant current or resistance. 24-bit AD conversion is adopted, the sampling period is about 8000 times/s, and the voltage and current are sampled simultaneously. It can be used for power detection of battery pack, inverter, intelligent switch and other products. New power consumption components are adopted with high power density, and forced air cooling is adopted for heat dissipation.

1.2 Technical indicators

Product name	High Precision Programmable AC Load	
Model	APL3000	
Working power	Input voltage	AC220V±10% 50Hz
	Rated power	60W
Communication	RS-232	Baud rate 9600
Load function	Input voltage	AC80 ~ 240V; Rated AC110V/AC220V
	Enter the frequency	50Hz/60Hz
	Rated power	3000W
	Rated current	27A@105 ~ 135V 13.6A@215 ~ 240V
	Power setting accuracy	20W
	Current setting accuracy	0.09A
	Load Return Actual Accuracy	-3% + 1.5% or ± 20W
	Resistance setting range and accuracy	4.1 ~ 600Ω@110V 7 ~ 2400Ω@220V ±5%
	Power factor	PF=1.0
	Heat dissipation mode	Air Cooling
	Other functions	Unload/short circuit
Measurement and error	Voltage	± (0.1% of reading + 0.2% of span)
	Electric current	± (0.1% of reading + 0.1% of span)
	Active power	± (0.1% of reading + 0.1% of span)
	Frequency	±0.1%
	Power factor	±0.02
Protection function	Overpressure	
	Overpower	
	Overtemperature	
Work environment	Temperature	0 ~ 40℃
	Humidity	≤85%RH
	Atmospheric pressure	86 ~ 106kPa (4000m and below)
Size	L* H*D	483mm x 264mm x632mm
Weight	Net weight	About 17 Kg

Product name	High Precision Programmable AC Load	
Model	APL6000	
Working power	Input voltage	AC220V±10% 50Hz
	Rated power	100W
Communication	RS-232	Baud rate 9600
Load function	Input voltage	AC80 ~ 240V; Rated AC110V/AC220V
	Enter the frequency	50Hz/60Hz
	Rated power	6000W
	Rated current	54A@105 ~ 135V 27A@215 ~ 240V
	Power setting accuracy	20W
	Current setting accuracy	0.09A
	Load Return Actual Accuracy	-3% + 1.5% or ± 20W
	Resistance setting range and accuracy	4.1 ~ 600Ω@110V 14 ~ 2400Ω@220V ±5%
	Power factor	PF=1.0
	Heat dissipation mode	Air Cooling
	Other functions	Unload/short circuit
Measurement and error	Voltage	± (0.1% of reading + 0.2% of span)
	Electric current	± (0.1% of reading + 0.1% of span)
	Active power	± (0.1% of reading + 0.1% of span)
	Frequency	±0.1%
	Power factor	±0.02
Protection function	Overpressure	
	Overpower	
	Overtemperature	
Work environment	Temperature	0 ~ 40℃
	Humidity	≤85%RH
	Atmospheric pressure	86 ~ 106kPa (4000m and below)
Size	L* H*D	481.8mm x 180mm x 568mm
Weight	Net weight	About 17 Kg

Chapter II Instructions for Use

2.1 Front panel

2.2 Rear panel
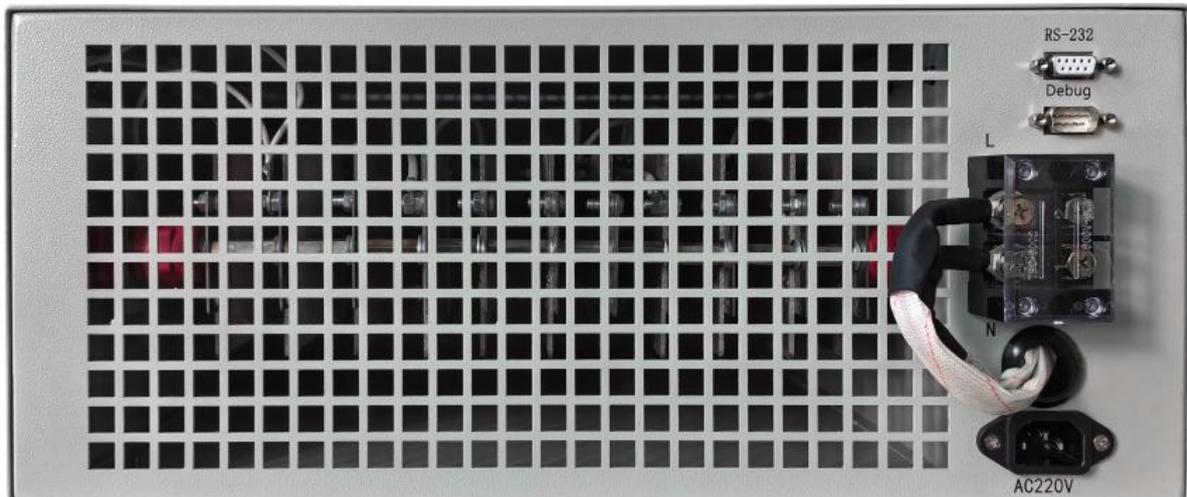
2.3 Manual setting screen of display screen
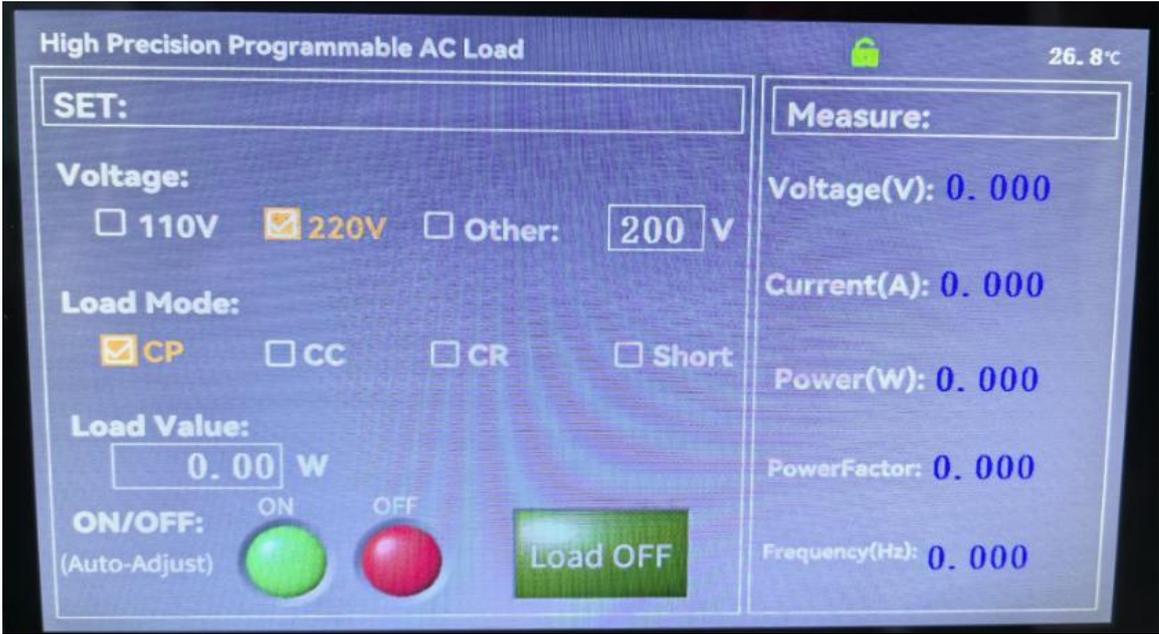
Setup and Measurement Screen

Note: Auto Compensation/No Compensation Press and hold for 3 seconds to switch.

Auto compensation, adjust the load according to the actual voltage to achieve constant power/constant current function.

No compensation, test at preset voltage and load.

Virtual numeric keypad entry, allowing 2 decimal places

2.4 Dimensional drawing (unit: mm)
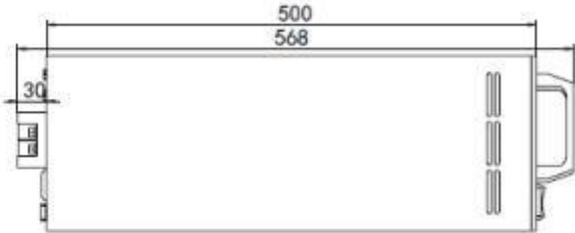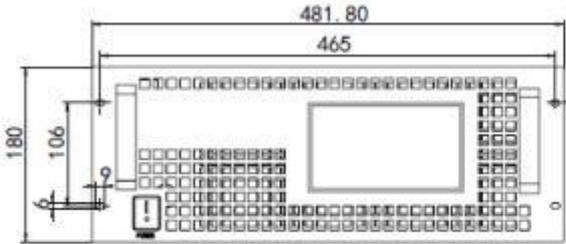
Chapter III Communications

3.1 Communication interface and parameters

1.Communication interface RS-232

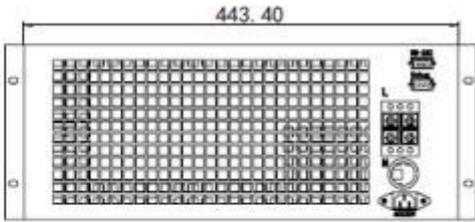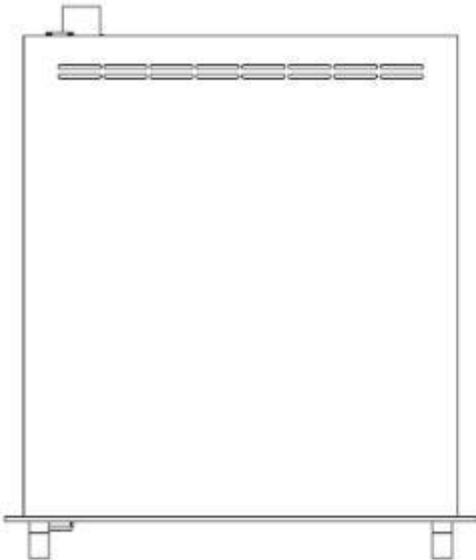Use an RS-232 cable with a DB-9 interface (male to female direct connection) to connect to the serial port of the controller (such as a PC).

Pin No.	Description	Pin picture
1	No connection	
2	TXD, transmit data	
3	RXD, receive data	
4	No connection	
5	GND	
6	No connection	
7	No connection	
8	No connection	
9	No connection	

RS-232 interface description

2.Communication parameters

Agreement	Baud rate	Digit	Stop Bit	Check
Modbus_RTU	9600	8	1	N

3.2 Communication instructions

3. Read registe instruction

● Send format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0~FE
2	Function Code	**03**
3	Register Start Address High Byte	00~FF
4	Register Start Address Low Byte	00~FF
5	Register Count High Byte	00
6	Register Count Low Byte	00~FF
7	CRC16 check high byte	
8	CRC16 check low byte	

● Return format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0~FE
2	Function Code	**Normal return: 03** **Error return: 80**
3	Number of register data bytes	00~FF
4	Register 1 Data High Byte	
5	Register 1 Data Low Byte	
6	Register 2 Data High Byte	
7	Register 2 Data Low Byte	
...		
n-1	CRC16 check high byte	
n	CRC16 check low byte	

4. instruction to write a single registe

● Send format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0 ~ FF (FF is broadcast)
2	Function Code	**06**
3	Register Address High Byte	00~FF
4	Register address low byte	00~FF
5	Data high byte	
6	Data low byte	
7	CRC16 check high byte	--
8	CRC16 check low byte	--

● Return format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0~FE
2	Function Code	**06**
3	Register Address High Byte	00~FF
4	Register address low byte	00~FF
5	Data high byte	00
6	Data low byte	01: Execution succeeded, 02: Address does not exist, 03: Other errors
7	CRC16 check high byte	--
8	CRC16 check low byte	--

5. Write multiple registe instruction

● Send format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0 ~ FF (FF is broadcast)
2	Function Code	**10**
3	Register Start Address High Byte	00~FF
4	Register Start Address Low Byte	00~FF
5	Register Count High Byte	
6	Register Count Low Byte	
7	Number of register data bytes	
8	Data 1 High Byte	
9	Data 1 Low Byte	
	...	
n-1	CRC16 check high byte	--
n	CRC16 check low byte	--

● Return format

Byte sequence No.	Byte name	Value range (hexadecimal)
1	Device address	0~FE
2	Function Code	**10**
3	Register Start Address High Byte	00~FF
4	Register Start Address Low Byte	00~FF
5	Data high byte	00
6	Data low byte	01: Execution succeeded, 02: Address does not exist, 03: Other errors
7	CRC16 check high byte	--
8	CRC16 check low byte	--

3.3 Register address and description

Read register:

Register Address (Hex)	Register name	Size	Read and write	Explain
00	Instrument model	6Byte	Read only	APL3000
03	Version number	2Byte	Read only	Obtain version number: 0001 ~ FFFF
04	Voltage RMS value	4Byte	Read only	Float in Vac
06	Current RMS value	4Byte	Read only	Float in A
08	Power value	4Byte	Read only	Float in W
0A	Apparent power VA	4Byte	Read only	Float in VA
0C	Power factor	4Byte	Read only	Float,0~1
0E	Frequency	4Byte	Read only	Float in Hz

Write to register:

Register Address (Hex)	Register name	Size	Read and write	Explain
10	Set the current measurement position	2Byte	Read and write	0: Automatic 1: Forced low gear 2: Forced high grade
11	Set the load voltage	2Byte	Read and write	0:110V 1:220V 2: Other voltage
12	Set the loading mode	2Byte	Read and write	0:CP 1:CC 2:Short 3.CR
13	Set the load value	4Byte	Read and write	Float
15	Set the loading status	2Byte	Read and write	0:OFF 1:ON
16	Whether to enable dynamic adjustment (default is 1)	2Byte	Read	0: No adjustment 1: Adjust
17	Other load voltage	2Byte	Read and write	4~240
18	Set the relay status	2Byte	Write	One Bit corresponds to one IO

3.4 Examples of instrument communication data

Example of meter communication data (all data below in hexadecimal):

1.Read the instrument voltage value (read a single register)

A, sending by an upper computer

1	2	3	4	5	6	7	8
Device address	Function Code	Register Start Address High Byte	Register Start Address Low Byte	Register Count High Byte	Register Count Low Byte	CRC16 check high byte	CRC16 check Low byte
00	03	00	04	00	02	1B	84

B. Instrument loopback

1	2	3	4	n-1	n
Device address	Function Code	Number of register data bytes	4-byte floating point number According to, high byte first	CRC16 check high byte	CRC16 check low byte
00	03	04	5B B1 5C 43	01	D1

Data read: Voltage = 220.6928

2.Read meter voltage/current/power values (read multiple registers)

A, sending by an upper computer

1	2	3	4	5	6	7	8
Device address	Function Code	Register Start Address High Byte	Register Start Address Low Byte	Register Count High Byte	Register Count Low Byte	CRC16 check High byte	CRC16 check Low byte
00	03	00	04	00	06	D8	85

B. Instrument loopback

1	2	3	4	n-1	n
Device address	Function Code	Number of registers Number of data bytes	4-byte floating point data, high byte first	CRC16 check high byte	CRC16 check low byte
00	03	0C	BB 7F 5D 43 88 67 ED 3E 23 5C CD 42	47	E6

Data read: voltage = 221.4989; current = 0.4636805; Power = 102.68

3. Set the voltage level 220V (write to a single register)

A, sending by an upper computer

1	2	3	4	5	6	7	8
Device address	Function Code	Register Start Address High Byte	Register Start Address Low Byte	Data high byte	Data low byte	CRC16 check high byte	CRC16 check low byte
00	06	00	11	00	01	DE	19

B. Instrument loopback

1	2	3	4	5	6	7	8
Device address	Function Code	Register Start Address High Byte	Register Start Address Low Byte	Data high byte	Data low byte	CRC16 check high byte	CRC16 check low byte
00	06	00	11	00	01	DE	19

4. Set voltage level 220V/constant power/100/load (write to multiple registers)

A, sending by an upper computer

1	2	3	4	5	6	7	8	n-1	n
Device address	Function Code	Register Start Address High Byte	Register Start Address Low Byte	Register The quantity is high Byte	Register Low quantity Byte	Register Data word Number of sections	Data high byte first	CRC16 Check high Byte	CRC16 check low byte
00	10	00	11	00	05	0A	00 01 00 00 00 00 C8 42 00 01	5D	13

B. Instrument loopback

1	2	3	4	5	6	7	8
Equipment Address	Function Code	Register Start Address High Byte	Register start Address low byte	Data is high Byte	Data low byte (01: execution succeeded; 02: address does not exist; 03: other errors)	CRC16 check high byte	CRC16 check low byte
00	10	00	11	00	01	1D	50

Chapter IV Product maintenance and warranty

4.1 Product maintenance

1. Clean the chassis and panel regularly to prevent dust accumulation at the input and output ports.
2. Do not place heavy sundries and liquid containers on the chassis.
3. Avoid working in places with volatile flammable liquids and conductive fiber dust.

4.2 Warranty period

1. The company's products are guaranteed for one year from the date of sale (the contract shall prevail if otherwise stipulated in the contract). 2. If the product needs warranty service or maintenance, the product must be sent back to the company or the maintenance unit designated by the company.

4.3 Warranty Limitations

The foregoing warranty shall not apply to damage resulting from:
1. The customer incorrectly or inappropriately repairs the product.
2. Unauthorized modification or misuse.
3. The product model or body serial number is altered or unrecognizable.
4.The damage is caused by accident, including but not limited to lightning strike, water ingress, fire, etc.