



ABD SERIES PROGRAMMABLE DC POWER SUPPLY

OPERATING MANUAL

Thank you for choosing our products. Please read this manual completely
before operating.

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Warranty Statement

K-FACTOR guarantees that the new products are warranted to be free from defects in workmanship and material for a period of one (1) years from date of shipment. In case of warranty or repair, Free repair and replacement of any failed component during warranty. K-FACTOR reserves the right to use its discretion on replacing the faulty parts or replacing the assembly or the whole unit. K-FACTOR will void your warranty

under the following states:

- Operation of the product under non-normal conditions
- Any non-authorized modifications, tampering or physical damage
- Elimination of any connections in the earth grounding system
- Use of non-authorized parts in the repair of our products. Replacing parts must be recommended by K-FACTOR as an acceptable part.

This warranty does not cover accessories not associated of K-FACTOR



Chapter 1 Safety Notification//Instructions

To ensure personal health and safety, the electrical installation must fulfil all local regulations and Legislation.

1.1 Safety Signs

The regulations Safety Signs below should be noticed before use!!!



Hi-voltage Warning



Danger Hi-voltage



Grounding



Grounding

1.2 Safety Statement

1.2.1 Please do not open the cover of the ABD unit to avoid getting electric shock but only when you need to. Have only qualified people remove covers for maintenance or troubleshooting or Please contact us if any repair.

1.2.2 Be sure to Power off the ABD unit first before re-located it.

1.2.3 When connecting the unit to the load, make sure that the output power is off.

1.2.4 Internal parts where the voltage exceeds 50 V are covered and / or marked with:

1.2.5 Keep away from fans.



1.3 Maintenance

1.3.1 DON'T

Most internal parts of the ABD unit absolutely do not need maintenance by user. If there is any fault, please contact us for technical support.

1.3.2 DO

-The input power cord/Input cables and the exhausted fans and the electrolytic capacitors inside the unit must be carefully visually inspected at least once every 6 months to ensure the safety of users and the normal operation of the ABD unit.

Please be aware that the Capacitors can remain charged to a dangerous voltage up to 10 minutes after the mains input has been disconnected. So please do wait for 10 minutes to touch the capacitors when you need.

-If the ABD unit is used in a harsh environment, please open the cover of the unit to remove dust every three months or more frequently to ensure the normal operation of the unit.

Chapter 2 Installation

2.1 Unpacking and inspection

Open the package of the ABD unit and check the along accessories. The accessories include a manual and a input power cord only for the 500VA and 1kVA models. If the ordered unit require RS232 interface, it would come along a RS232 communicated wire as accessory.

2.2 Installation Attention

2.2.1 Attention for Input power supply selection

The ABD series DC power supply uses single-phase $220V \pm 10\%$ or $120V \pm 10\%$ and three-phase $380V \pm 10\%$ or $440V \pm 10\%$ or three-phase $220V \pm 10\%$ as input power supply. What kind of input power supply requires for your unit, please check it in the technical parameter table in Chapter 3. Please make sure you choose the right input power supply before turn on the unit.

2.2.2 Please ensure that the ABD unit is grounded no matter it has single-phase or three-phase input power supply.

2.2.3 Each unit is equipped with a fuse before leaving the factory. If you need to replace the fuse, please replace it with the same specifications. Before replacing the fuse, you must turn off the ABD unit to avoid getting shock.

2.2.4 Application environment/condition

- ✧ Ambient Working Temperature: $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$, please derate when temperature exceeds 40°C .
- ✧ Storage Temperature: $-20^{\circ}\text{C} \sim 50^{\circ}\text{C}$
- ✧ Relative Humidity: Between 10~90%

- ✧ Height :Below 2000 meters altitude
- ✧ There must be no gas, steam, chemical deposition, dust dirt and other explosive and etching medium in the installation sites.
- ✧ Installation safety distance:The distance between the ABD unit and the wall should be kept at 30~50cm

2.3 How To Install

2.3.1 ABD series' rear panel for the units with output <100A



- ① Input terminal
- ② Output terminal DC- and DC+
- ③ Communicated interface/Port (optional, this is available only when your order has RS232/485 interface)
- ④ Fuse 1
- ⑤ Fuse 2
- ⑥ Vent

2.3.2 ABD series' rear panel for the units with output $\geq 100A$



- ① Communicated interface/Port (optional, this is available only when your order has RS232/485 interface)
- ② Forced cooling
- ③ Output Terminal DC- and DC+
- ④ Input Terminal

Chapter 3 Technical Parameter

Model	ABD – _____ P/N: _____
Manufacture Date	____ / ____ / ____ (Year/Month/Day)
Output Capacity	_____ kW
Input Voltage	____ Phase ____ Wire _____ V $\pm$ 10% ☐ Other _____
Input Frequency	☐ 47Hz~63Hz ☐ Other _____
Output Voltage	____ DC _____ (V)
Output Current	____ DC _____ (A)
Load Regulation	☐ $\pm$ 1% ☐ Other _____
Ripple	☐ $\leq$ 0.5%FS+10mVrms ☐ Other _____
Voltage Regulation	☐ $\pm$ 1% ☐ Other _____

Circuit Type	☐ IGBT/PWM ☐ Linear amplification ☐ Other_____
Efficiency	☐ $\geq 85\%$ (@ full load) ☐ Other_____
Protection	Over voltage,Over current,Over heat ,Short Circuit Protection(cut off the output automatically and make alarm)
LCD Display Accuracy	Voltage : ☐ 0.01V ☐ other_____ Current : ☐ 0.01A ☐ 0.1A ☐ other_____ Times : ☐ 1S ☐ other_____ Power : ☐ 0.1W ☐ 1W ☐ 0.1KW ☐ 1KW ☐ Other_____
Memory	Store 32 group data(Voltage/Current)for easily recall
IP Enclosure	☐ IP 20 ☐ IP32 ☐ IP44 ☐ IP 54 ☐ IP 65 ☐ Other_____
Interface	☐ RS232C ☐ RS485 ☐ GPIB ☐ Not Available ☐ Other_____
Input Cable Connector	☐ Terminal block ☐ Power cord ☐ Other_____
Output Cable Connector	☐ Terminal block ☐ Universal Socket ☐ Copper Bar ☐ Other_____
Working Condition	Environment:-10°C~45°C Humidity:10%~90%
Altitude	≤ 1800 meters
Dimension/Weight	_____W*_____H*_____D(mm), _____Kg(Net)

Chapter 4 Front Panel Introduction

4.1 For the models are $< 3\text{kVA}$,and output current is less than 100A and voltage is less than 1000V.There is a knob at the right.



4.2 For the models are $\geq 3\text{kVA}$,and output current is $\geq 100\text{A}$ and voltage is $\geq 1000\text{V}$.There is No a knob.

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Chapter 5 How To Operate

5.1 Attention

Before turn on the unit, please check whether the wiring to the input and output terminals is correct and whether the input voltage is within acceptable range.

5.2 Start Up

Press the button of "POWER" to turn on the unit Or Close up the input breaker to turn on the unit. The LCD display screen will light up and show its model number, what mode it is in, because the unit will memorize the last setting value and store it in the unit.

5.3 Fn Button

The unit has two mode, manual mode and programmable mode. In the standby state, press Fn to switch between manual mode and programmable mode, as shown in the figure below.

manual	OFF	AUTO
0.000V		Vset: 5.00
0.000A		Iset: 20.00
		Pset: 2000

0.000W	Time: 0.0
--------	-----------

Program	OFF	AUTO
0.000V		PgNo:1
0.000A		Vset: 5.00
0.000W		Iset: 20.00
		Pset:2000
		Trf: 0.0
		Ton:0.0

5.4 How To Set Parameter and operate the unit in manual mode

5.4.1 Vset(Voltage setting)

In the standby state (OUT:OFF), press the " $\wedge$ " or " $\vee$ " key to move the cursor to the voltage setting window, you can directly press the number keys to input the voltage value, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

In the output state(OUT:ON), press the " $\wedge$ " or " $\vee$ " key to move the cursor to the voltage setting window, and press the "<" or ">" key to directly increase or decrease the original voltage value.

5.4.2 Iset (Current setting)

In the standby state (OUT:OFF), press the " $\wedge$ " or " $\vee$ " key to move the cursor to the current setting window, you can directly press the number keys to input the current value, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

In the output state(OUT:ON), press the " $\wedge$ " or " $\vee$ " key to move the cursor to the current setting window, and press the "<" or ">" key to directly increase or decrease the original value.

5.4.3 Pset(Power setting)

Pset is not available in this model. **Although you can successfully set the P value, it is invalid on this model.**

5.4.4 Time(Running time setting)

Default is 0.0 ,It means the unit can run as long as you want until the user turns it off,if set with 150.0,the unit will stop in 150 seconds automatically,if set with 900.0,the unit will stop in 900 seconds automatically.

5.4.5 ON Button

After confirming that the setting in 5.4.1 and 5.4.2 are correct, press the "ON" key, and the unit is in the output state (It is having load now), as shown in the figure below.

manual	ON	AUTO
5.000V		Vset: 5.00
10.000A		Iset: 20.00
50.000W		Pset: 2000
		Time: 0.0

5.4.6 OFF Button

In the output state, press the "OFF" key and the unit will stop output as shown in the figure below.

manual	OFF	AUTO
0.000V		Vset: 5.00
0.000A		Iset: 20.00
0.000W		Pset: 2000
		Time: 0.0

Note: If the output has error, the unit will stop output automatically and alarm up, the LCD screen will display "N/A". If you press "OFF" key once, the alarm (Alarm) will stop.

5.4.7 The Knob (it is available for some models)

The knob on the right can also be used to adjust voltage/current/time in output "ON/OFF" state: press the knob once, the voltage setting window is highlighting, and now rotate the knob to adjust the voltage setting, the slower the speed, the smaller the voltage get up/down, and the faster the speed, the larger the voltage get up/down.

Press the knob once, the current setting window is highlighting, and now rotate the knob to adjust the

current setting, the slower the speed, the smaller the current rising step, and the faster the speed, the larger the current step. Each time the knob is pressed, Vset/Iset/Pset/Time on the LCD screen is highlighted in turn. At this time, rotate the knob and the corresponding value will change.

5.5 How To Set Parameter and operate the unit in programmable mode

Program	OFF	AUTO
5.000V		PgNo:1 Vset: 5.00
10.000A		Iset: 20.00 Pset:2000
50.000W		Trf: 0.0 Ton:0.0

Note:In the programmable mode, the unit can automatically run 32 group of data, cycle 99999 times.

5.5.1 PgNo (Data group setting)

In the standby state (OUT:OFF), press the "∧" or "∨" key to move the cursor to the PgNo setting window, Press "<" or ">" key to increase or decrease the original value.

5.5.2 Vset(Voltage setting)

In the standby state (OUT:OFF), press the "∧" or "∨" key to move the cursor to the voltage setting window, you can directly press the number keys to input the voltage value, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

5.5.3 Iset (Current setting)

In the standby state (OUT:OFF), press the "∧" or "∨" key to move the cursor to the current setting window, you can directly press the number keys to input the current value, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

5.5.4 Pset(Power setting)

Pset is not available in this model.

5.5.5 Trf (Output voltage rising time setting)

In the standby state (OUT:OFF), press the "∧" or "∨" key to move the cursor to the Trf setting window, you can

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directly press the number keys to input the value of the delay times, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

5.5.6 Ton(Running time setting for each group of data)

In the standby state (OUT:OFF), press the "∧" or "∨" key to move the cursor to the Ton setting window, you can directly press the number keys to input the value of the running time, and press the "ENTER" key after confirming that value is correct. if the value is wrong, press the "ESC" key to clear it and then re-input it; Or Press "<" or ">" key to increase or decrease the original value.

5.6 Menu(system parameter setting)

In the standby state, press Menu button to set the system parameters as shown in figure below.

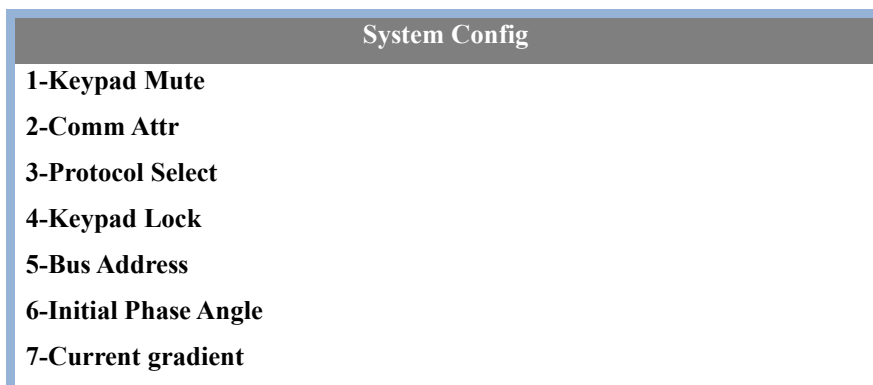
Press the number keys to select one from the five options on the screen below, then press

Enter button to enter the drop-down menu, press Esc to return to the previous menu.



5.6.1 System setup

In the Menu column, press the "1" key to select the system setup which is shown in the figure below, press the "<" or ">" key to turn the pages



System Config

- 1-Voltage gradient
- 2-PA Correct
- 3-Voltage Protection
- 4-Current Protection
- 5-Power protection

5.6.1.1 Keypad Mute

1. Keypad sound mute, Press "∧" or "∨" key to set mute or Non-mute

'* Disable' stand for mute, '* Enable' stand for non-mute

Keypad Mute

- Disable
- * Enable

5.6.1.2 Comm Attr(Communication)

2. Communication Serial port baud rate setting: Modifying the baud rate will restart the unit.

Comm Attr

- 2400,8,n,1
- 4800,8,n,1
- * 9600,8,n,1
- 19200,8,n,1
- 38400,8,n,1
- 57600,8,n,1
- 115200,8,n,1

5.6.1.3 Protocol Select

3. Serial port protocol settings: Modbus-RTU is the standard MODBUS RTU protocol (default), SCPI is the character protocol, SP1000 is an internal self defined character protocol, Com backhaul test is the serial port test and Return the sent content, Com disable is to disable the serial port function. Change the protocol selection the unit will restart.

Protocol Select (Need to reboot)

- * **Modbus-RTU**
- SCPI**
- SP1000**
- Com Backhaul test**
- Com disable**

5.6.1.4 Keypad Lock

4. '*When communication' means lock the keyboard when the unit is in communication with PC/PLC

'Never': unlocked

Keypad Lock

When Communication

- * **Never**

5.6.1.5 Bus Address

5. Serial port address setting: maximum 247

Bus Address

Current Value = 1

New Value = 1

5.6.1.6 Initial phase angle

6. This unit does not have this function

'Current value = ? ': The last set value of the unit

'New value': new set value, press Enter key to confirm the setting.

Initial Phase Angle

Current Value = 0

New Value =

5.6.1.7 Current gradient

7.Current(Ampere) Rising Rate

Current Gradient

Current Value = 0.001

New Value =

5.6.1.8 Voltage gradient

Second page 1. Voltage gradient means voltage rising rate.

Voltage gradient

Current Value = 0.0

New Value = 0.0

5.6.1.9 PA correct

Second page 2. This unit does not have this function

5.6.1.10 Voltage protection

Second page 3. Overvoltage protection setting, the unit will stop output when voltage exceed setting value.

Voltage protection

Current Value = 0.0

New Value = 0.0

5.6.1.11 Current protection

Second page 4. Current protection setting, unit will stop output when current exceed setting value.

Current Protection

Current Value = 0.0

New Value = 0.000

5.6.1.12 Power protection

Second page 5. Power protection setting, the unit will stop output when power exceed setting value.

Power Protection

Current Value = 0.0

New Value = 0.0

5.6.2 Output mode

In the Menu column, press the "2" key to select the output mode which is shown in the figure below

'* Manual': means normal mode

'PG': means Programmable mode

Output Mode

* **Manual**

PG

5.6.3 Range option (HIGH/AUTO Range Selection)

In the Menu column, This unit does not have this function

Range option
HIGH
* AUTO

5.6.4 Test format (time value decimal point setting)

In the Menu column, press the "4" key to select the test format which is shown in the figure below

Tset format
123456
* 12345.6
1234.56
123.456

5.6.5 Version info

In the Menu column, press the "5" key to select the version info to see software version information

Version Info
1-firmware

Press the 1 key for firmware information

Version Info
appver: X.XX
Date&time: mmm dd aaaa hh:mm:ss

Press ESC to exit settings

5.7 Save Button

The unit can store 32 groups of data (voltage/current) in Manual Mode after finishing the voltage and current settings, press “Save” button to store the first group and the second group. . . Up to 32 groups

5.8 Recall Button

To recall the memory 32 group data

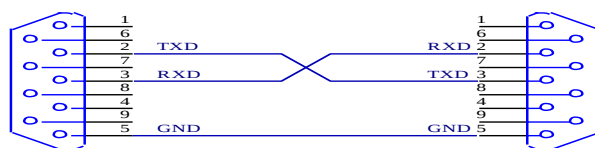
5.9 Lock Button

Press Lock button to lock the keyboard. If the unit is controlled by PC, the panel control is invalid.

5.10 RS232 Serial port instruction(Optional)

The hardware of the serial port is a D-type 9-pin interface, and the pin definitions are as below

RS232: 2---TXD, 3---RXD, 5---GND;



DC POWER SOURCE

HOST COMPUTER

Note: In case there is overload or short circuit, please turn off the output before resetting

Chapter 6 Trouble Shooting And Fault Code list

6.1 What happened: No output, and the display unit(LCD lights) does not light up

Why: No input power supply

Solution: A- Make sure the switch/input breaker is turned on. B. Make sure the fuse is not fused.

6.2 What happened: No output, the voltage meter shows "0" and there is a alarm

Why: Over load or abnormal loading b. The loads have too big starting current(inrush current) to start by the ABD unit

Solution: Turn off the output, press "ON/OFF" button to Reset, then reduce or check the load then try again.

6.3 Serial port communication failed

Solution A: Check whether the unit has the same the communication address and communication baud rate as the host computer(software), if they are different, make the setting to be same.

Solution B: Disconnect the connection between the ABD unit and the host computer, and measure the serial port's signal between ABD unit and the host computer. The TXD to GND of ABD unit and the host computer should have a voltage of -8V~-12V, If the measuring value you got is out of this range, it tells the problem comes from the serial port or the wiring between both

6.4 What happened: Data can be received during communication, but the data is wrong.

Solution: Check whether the wiring connection between the ABD unit and host computer is tight enough.

If the interference in environment is large, the wires should be shielded and grounded

6.5 Fault Code list and description of fault code

6.5.1 OCP code, it stands for over current protection, it is software protection. When the output current reaches the overcurrent protection point set by the software, the power supply will alarm and stop output. It gets normal after the load is reduced.

6.5.2 OVP code, it stands for over voltage protection, it is software protection. When the output voltage reaches the over voltage protection point set by the software, the power supply will alarm and stop output. It gets normal after reducing the setting voltage.

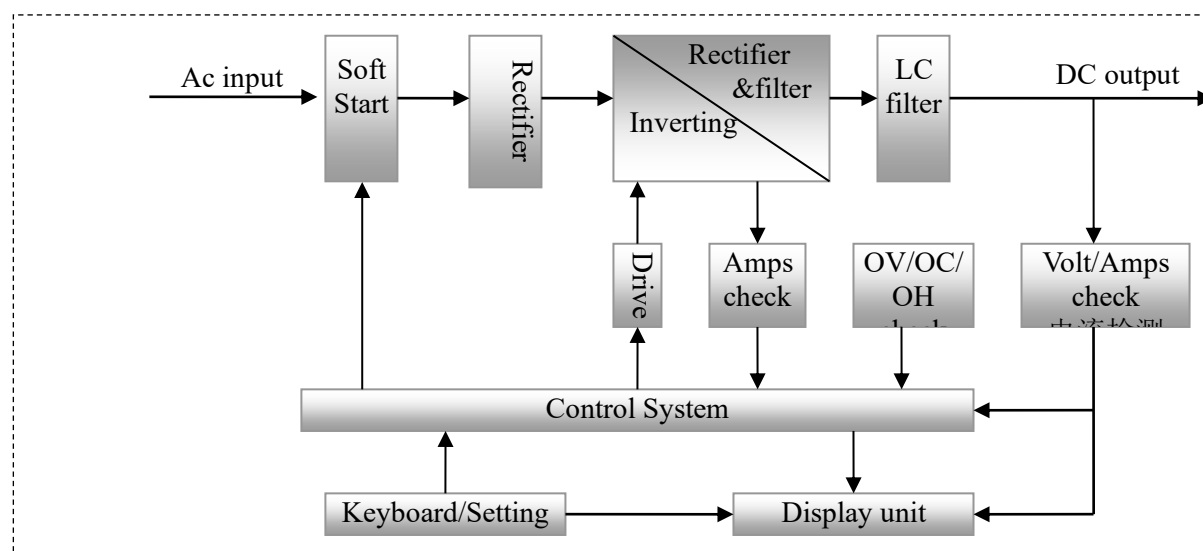
6.5.3 ALA Code, It is hardware fault code, such as IGBT modular faulty, fuse blown down etc.

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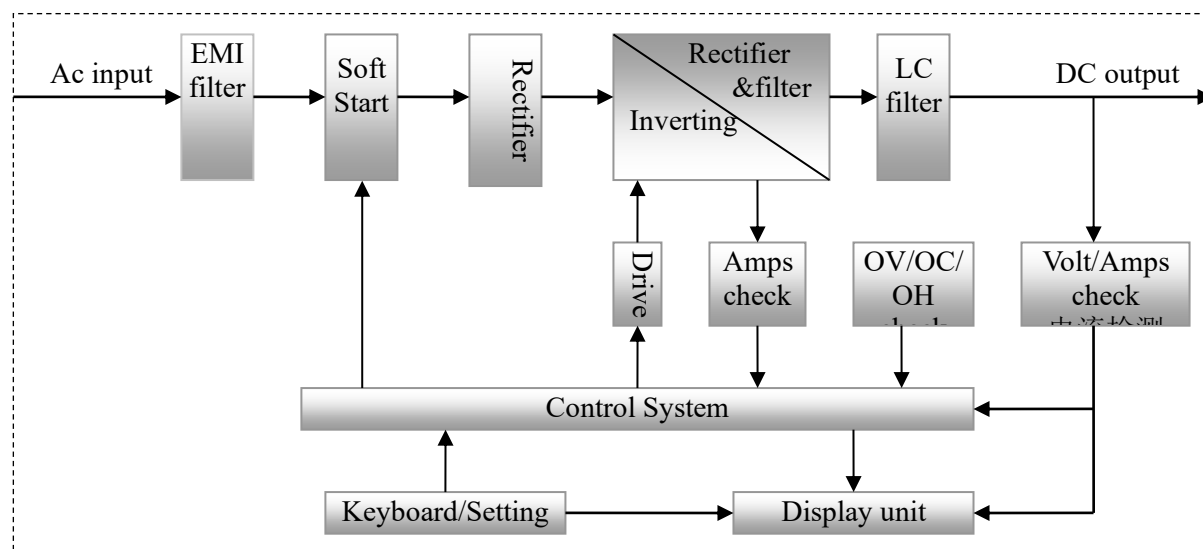
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Chapter 7 ABD Series Block Diagram

7.1 Standard Unit



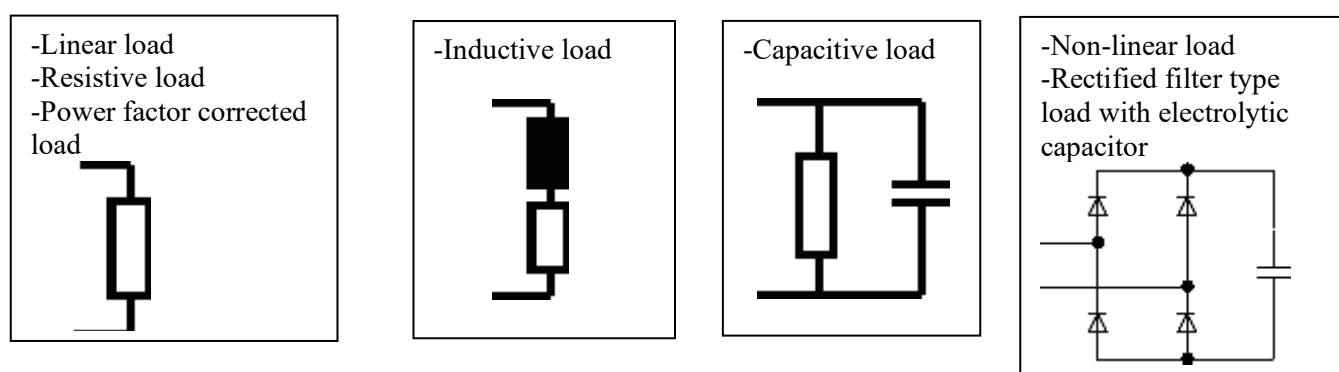
7.2 Option (Input end with EMI filter)



Chapter 8 How to choose the right size for the ABD units

ABD units are capable of having many types of loads, including inductive, resistive, and rectifying loads. But please pay attention to choosing the appropriate capacity for the ABD unit.

The load types are as following.



- For resistive/linear load: ABD's kVA = $1.1 \times \text{load power}$
- For Inductive load: ABD's kVA = $\text{load starting current} / \text{load rated current} \times \text{load power}$
- For rectified load: ABD's kVA = $\text{load current crest factor} / 1.5 \times \text{load power}$
- For mixed load: ABD's kVA = The sum of power required for each load type above

Chapter 9 MODBUS RTU communication protocol(Optional)

For the units which have RS232/RS485 interface

9.1 Byte format

Byte transmission includes 1 start bit, 8 data bits, no parity bit, and 1 stop bit. The byte transmission time sequence is shown in the table below.

Start bit	D0	D1	D2	D3	D4	D5	D6	D7	Stop bit
-----------	----	----	----	----	----	----	----	----	----------

9.2 Data transmission method

Data type	Number of registers	Number of bytes	Description
Byte data	1	1	
Shaped data	1	2	High byte first, low byte second
Long integer number	2	4	High word first, low word second
Floating point data			

9.3 Frame format

9.3.1 Read holding register (function code 03H)

9.3.1.1 Frame format sent by the host computer

Order	Code	Description
1	Address	Correspondence address (1-127)
2	03H	Function code
3	Start register address high byte	Register start address
4	Start register address low byte	
5	Number of registers high byte	Number of consecutive registers
6	Low byte of register number	
7	CRC16 low byte	CRC check data
8	CRC16 high byte	

9.3.1.2 Normal response frame format

Order	Code	Description
1	Address	Correspondence address (1-127)
2	03H	Function code
3	Data field bytes (N)	
4	Byte 1	
.....		
	Byte N	
N+4	CRC16 Low byte	
N+5	CRC16 high byte	

9.3.1.3 Abnormal response

Order	code	description
1	Address	The communication address of the instrument (1-127)
2	83H	function code
3		Error code

		01H:wrong register address or number; 02H:data error; 05H:IO error
4	CRC16 low byte	
5	CRC16 high byte	

9.3.2 Continuous write holding register (function code 10H)

9.3.2 .1 Frame format sent by the host computer

Order	code	description
1	Address	Correspondence address (1-127)
2	10H	Function code
3	Register start address high byte	Start register address
4	Low byte of register start address	
5	Number of registers high byte	Number of registers
6	Low byte of register number	
7	Bytes (N)	
8	Byte 1	
	Byte 2	
	Byte 3	
		
	Bytes N	
M+8	CRC16 Low byte	CRC check data
M+9	CRC16 high byte	

9.3.2.2 Normal response

Order	Code	Description
1	Address	Correspondence address (1-127)
2	10H	Function Code
3	Start address high byte	Register start address
4	Start address low byte	
5	register number high byte	
6	Low byte of register number	
7	CRC16 low byte	CRC check data
8	CRC16 high byte	

9.3.2.3 Abnormal response

Order	Code	Description
1	Instrument address	Communication address of the instrument (between 1-255)

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2	90H	Function code
3		Error code 01H:wrong register address or number; 02H:Data error 05H:IO error
4	CRC16 low byte	
5	CRC16 high byte	

9.3.3 Read-only register (function code 04H)

9.3.3.1 Frame format sent by the host computer

Order	Code	Description
1	Address	Correspondence address (1-127)
2	04H	function code
3	Start register address high byte	Register start address
4	Start register address low byte	
5	Number of registers high byte	Number of consecutive registers
6	Low byte of register number	
7	CRC16 low byte	CRC check data
8	CRC16 high byte	

9.3.3.2 Normal response frame format

Order	Code	Description
1	Address	Correspondence address (1-127)
2	04H	function code
3	Data field bytes (N)	
4	byte 1	
.....		
	bytes N	
N+4	CRC16 low byte	
N+5	CRC16 high byte	

9.3.3.3 Abnormal response

Order	Code	Description
1	Address	Correspondence address (1-127)
2	84H	function code
3		Error code 01H:wrong register address or number; 02H:data error 05H:IO error
4	CRC16 low byte	
5	CRC16 high byte	

You can set the communication baud rate in the menu, please read the relevant chapters of manual for more detail

	Optional baud rate
1	2400bps
2	4800bps
3	9600bps
4	19200bps
5	38400bps

9.5 The instrument address

The instrument address is the communication address, which can be set in the menu. please refer to the relevant chapters of the manual.

9.6 Communication function code

10H:	Write setting parameters, control power output stop
03H:	Read setting parameters
04H:	Read measurement data and status

9.7 Communication data CRC check

```
static const unsigned char aucCRChi[] = {  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,  
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
```

```

0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40
};

static const unsigned char aucCRCLo[] = {
  0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7,
  0x05, 0xC5, 0xC4, 0x04, 0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E,
  0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09, 0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9,
  0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC,
  0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
  0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32,
  0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D,
  0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A, 0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38,
  0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF,
  0x2D, 0xED, 0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
  0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1,
  0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4,
  0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB,
  0x69, 0xA9, 0xA8, 0x68, 0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA,
  0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
  0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0,
  0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97,
  0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E,
  0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89,
  0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
  0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83,
  0x41, 0x81, 0x80, 0x40
};

```

Unsigned short

usMBCRC16(unsigned char * pucFrame, unsigned short usLen)

```

{
  unsigned char      ucCRCHi = 0xFF;
  unsigned char      ucCRCLo = 0xFF;
  int                iIndex;

  while( usLen-- )
  {
    iIndex = ucCRCLo ^ *( pucFrame++ );
    ucCRCLo = ( unsigned char )( ucCRCHi ^ aucCRCHi[iIndex] );
    ucCRCHi = aucCRCLo[iIndex];
  }
  return ( unsigned short )( ucCRCHi << 8 | ucCRCLo );
}

```

9.8 Data register address

Register address (decimal)	Description	Unit	Data range	Function code	Data format
41001	Voltage setting	Voltage value*1000		10H	S32
41003	Current setting	Current value*1000			S32
41007	Power setting	Power value *1000			S32
41009	High/Low range setting	N/A	0:high range 1:Low range		U16
46001	output	N/A	any value	10H	U16
46002	stop	N/A	any value		U16
31101	Measured voltage value	Voltage value / 1000	S32	04H	S32
31103	Measured current value	Current value / 1000	S32		S32
36004	Measuring active power value	Power value/1000	S32		S32
35999	status word	N/A	see appendix 1 below		U16

Note:

S32 signed long integer

U16 unsigned short integer

9.9 Description of Status Words

BIT15~BIT4	BIT3	BIT2	BIT1	BIT0
Reserved	0	0	1:There is an alarm 0: no alarm	1:output 0:stop

9.10 Command VS code

Output command: 01 10 B3 B0 00 01 02 00 9B 7F

02 10 B3 B0 00 02 66 98

01 10 23 8E 00 01 02 00 3C AA 6D

02 04 B3 B0 00 01 16 9A

Return: 01 10 B3 B0 00 01 26 AA

Stop command: 01 10 B3 B1 00 01 02 00 A6 BF

Return: 01 10 B3 B1 00 01 77 6A

Voltage measured command: 01 04 79 7C 00 02 A9 4F

Return: 01 04 04 00 00 22 A0 E3 5C /22A0=8864/1000=8.864V

Set voltage 100V command: 01 10 A0 28 00 02 04 00 01 86 A0 3B CE

0186A0=100000/1000=100.000V

Return: 01 10 A0 28 00 02 E3 C0

Set current 50A command: 01 10 A0 2A 00 02 04 00 00 C3 50 D9 03 C350=50000/1000=50.000A

Return: 01 10 A0 2A 00 02 42 00

01 04 79 7C 00 02 A9 4F

01 04 04 00 00 BF 93 CB D9

01 00 A0 28 00 02 22 03

49V 01 10 A0 28 00 02 04 00 00 BF 68

Status command: 01 04 8C 9E 00 01 7A B4

Return: 01 04 02 00 00 B9 30 //OFF

01 04 02 00 01 78 F0 //ON

01 04 02 00 02 38 F1 //ALARM

Chapter10 K-FACTOR's Product Range

- Frequency Converter / AC Power Supply
- Marine Frequency Converter/Shore AC Power Supply
- Programmable AC Power Supply
- Programmable DC Power Supply
- Uninterruptible Power Supply(UPS)
- Resistive/Electronic Load Bank
- Static Voltage Stabilizer
- Servo Voltage Stabilizer
- DC To AC Inverter
- Solar Inverter