## I HTRIX

## User Manual

APS-4000\&APS-7000 series
AC Frequency Conversion Power Supply

## Chapter 1 Safety Regulations

You should note safety regulations and matters when using it!

## Safety signs

Caveat
It reminds users to pay attention to certain operation procedures, practices, conditions and other matters that may cause personal injury.

Note
It reminds the user of procedures, practices, conditions, etc. that may cause instrument damage or permanent data loss.



Refer to the warnings in the relevant documents and pay attention to the tips.
(High voltage, please do not touch during operation, beware of touching Electricity, do not use the machine in unsafe places)

## 1 Safety instructions

-Before using this AC variable frequency power supply, please read this operating instruction completely, and fully understand the safety signs used by this machine for safety.
-Please select the correct input voltage specification before turning on the input power switch of this machine.
To prevent accidental injury or death, professionals must connect the input or output lines. When moving and using the machine, be sure to observe clearly before operating■

## 2 Maintenance

User maintenance
To prevent electric shock, please do not open the cover of the instrument. All parts inside the instrument absolutely do not require user maintenance. If an abnormal situation occurs in the instrument, please seek maintenance from our company or its designated distributor. The attached circuit and block diagram are for reference only.

## Regular maintenance

The AC power supply, the relevant accessories of the input power cord, etc. must be carefully checked and calibrated at least once a year to protect the safety of users and the accuracy of the instrument.

## User modification

The user must not change the circuit or parts of the machine by themselves. If it is changed, the warranty period of the machine will automatically expire and our company is not responsible. The use of parts or accessories not approved by our company is also not guaranteed. If the machine returned for inspection is found to be changed, our company will restore the circuit or parts of the machine to the original design and charge a repair fee.

## Chapter 2 Installation Essentials

Rules for product unpacking, inspection, preparation before use, and storage.
2.1 Unpacking and inspection

1. Unpack the AC inverter power supply, please check the attached accessories, Accessories:
2. User Manual
3. Warranty Card
4. Power cable
5. The package of this product is protected by pearl cotton. If the customer receives a damaged box, please check the appearance of the machine for deformation, scratches, or damage to the panel.
6. If there is damage, please notify our company or its distributor immediately. And please keep the packing box and pearl cotton. Our service center will help you repair or replace the new machine. Do not return the product immediately without notifying our company or its distributor.

### 2.2 Check before use

1. Before the input power supply wiring, the power required for this machine, all switches should be placed in OFF position. Please connect the wiring according to the logo.
2. Please make sure all the wiring is correct before starting.
3. The model will be displayed on the screen when the computer is turned on, and the CPU will call the last setting value before shutting down, because the setting value has been memorized in the EEPROM of the machine after leaving each setting state .

Input voltage requirements and options
APS series AC variable frequency power supply uses single-phase 220 V power supply. Before turning on the power switch of the machine, please confirm the choice of power supply. At the same time, you must use a regular fuse (already equipped at the factory). The specification of the fuse has been marked on the back panel of the instrument.

Before replacing the fuse, the input power must be turned off to avoid danger.

Input power requirements
Before connected to the input power, power must first confirm the ground line has been properly connected and also connected to the ground | WARN "on the ground terminal body. The power plug on the instrument can only be plugged into a power socket with a ground wire. Such as
I WAKZ1 [If you use an extension cord, you must pay attention to whether it has a ground wire. This AC variable frequency power supply uses a three-core power cord. When the cable is plugged into a socket with a ground wire, the body is grounded.

## Environmental conditions of use

1. Temperature: $0^{\circ} \mathrm{C}-40 \mathrm{t}$
2. Relative humidity: W80\% RH
3. High degree: at an altitude of 2000 meters above sea level.
4. No gas, vapor, chemical deposit, dust, dirt and other explosive and corrosive media that seriously affect the machine at the installation site;
5. The installation site should be free from severe vibration or bumps.

### 2.3 Storage and transportation

## Surroundings

APS series AC variable frequency power supply can be stored and transported under the following conditions:
Ambient temperature the Temp 20C to to 60C
The height of the Height 7620 meters
This machine must avoid abrupt changes in temperature, which may cause moisture to condense inside the body.

## Packing

Original package
Please keep all the original packaging materials, if the machine must be returned to the factory for repair, please use the original packaging materials. And please contact our company's maintenance center first. When sending for repair, please be sure to return all accessories such as the power cord together, please indicate the symptoms and causes. Also, please note in the package "Easy Scrap" Please handle with care.

Other packaging
If you cannot find the original packaging materials to pack, please follow the instructions below:
1, first with EPE bag or bubble pack the machine properly.

2 , then the machine is placed can withstand 150 Kg multilayer carton packaging.
3 , around the machine must be filled shockproof material, a thickness of about 70 to 100 mm .
4 , properly sealed box.
5, marked "easy and scrap" Please handle with care.

## Chapter 3 Technical Specifications

### 3.1 Main technical specifications

## Technical specification table:

| Model |  | APS-4000A | APS-4000B | APS-4000C |
| :---: | :---: | :---: | :---: | :---: |
| Power |  | 350VA | 700VA | 1200VA |
| Working |  | SPWM ( Sinusoidal Pulse Width Modulation) |  |  |
| INPUT |  |  |  |  |
| Phase |  | 1 Ф2W |  |  |
| Voltage |  | 220V $\pm 10 \%$ |  |  |
| Frequency |  | $47 \mathrm{~Hz}-63 \mathrm{~Hz}$ |  |  |
| OUTPUT |  |  |  |  |
| Voltage |  | 0-150VAC / 0-300VAC AUTO |  |  |
|  |  | 45-250Hz(0.01 Step) |  |  |
| Maximum Current | L=120V | 3A | 6A | 10A |
|  | $\mathrm{H}=240 \mathrm{~V}$ | 1.5A | 3A | 5A |
| Load |  | 1\% |  |  |
| T.H.D |  | $2 \%$ (low -end 120 V , high-end 240 V , with pure resistive load) |  |  |
| Frequency stability |  | 0.01\% |  |  |
| LED Display |  | Voltage Vrms, current Arms, frequency, power, power factor |  |  |
| Voltage resolution |  | 0.01 V |  |  |
| Frequency resolution |  | 0.01 Hz |  |  |
| Current resolution |  | 0.001 A |  |  |
| Memory |  | M1-M5CV-F-A) |  |  |
| Measurement accuracy | voltage | $\pm 0.5 \% \mathrm{FS}+5 \mathrm{dgt}$ |  |  |
|  | current | + 0.5\%FS+5dgt |  |  |
|  | frequency | $\pm 0.01 \%$ FS +5 dgt |  |  |
|  | power | $\pm 0.5 \%$ FS +5 dgt |  |  |
| Setting accuracy | voltage | $\pm 1 \%$ FS |  |  |
|  | frequency |  | $\pm 0.1$ \%FS |  |
| I-LIM Set |  | 0 -Max Current ( $>$ The maximum current is: maximum capacity / 240 V is $\mathrm{P} / 240$ ) |  |  |
| Output protection |  | Overcurrent, over temperature, overload, short circuit |  |  |
| Weight ( Kg ) |  | 12.7 | 15 | 18.5 |

### 3.2 Main technical specifications

## Technical specification table:

| Model |  | APS-7105 | APS-7100 | APS-7200 | APS-7300 | APS-7500 | APS-7110 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Capacity |  | 500VA | 1KVA | 2 KVA | 3KVA | 5KVA | 10KVA |
| Production method |  | SPWM (Sinusoidal Pulse Width Modulation) |  |  |  |  |  |
| INPUT |  |  |  |  |  |  |  |
| Phase |  | 1 Ф2W |  |  |  |  |  |
| Voltage |  | $220 \mathrm{~V} \pm 10 \%$ |  |  |  |  |  |
| frequency |  | $47 \mathrm{~Hz}-63 \mathrm{~Hz}$ |  |  |  |  |  |
| OUTPUT |  |  |  |  |  |  |  |
| Voltage |  | 0-150VAC / to 0-310 VAC AUTO(0-600V can be customized |  |  |  |  |  |
| frequency |  | $45-500 \mathrm{~Hz}$ (0.1Step) |  |  |  |  |  |
| Maximum current | $\mathrm{L}=120 \mathrm{~V}$ | 4.2A | 8.4A | 16.8A | 25A | 42A | 84A |
|  | $\mathrm{H}=240 \mathrm{~V}$ | 2.1A | 4.2A | 8.4A | 12.5A | 21A | 42A |
| Load regulation rate |  | 1\% |  |  |  |  |  |
| T.H.D |  | $2 \%$ (low -end 120V, high-end 240V, with pure resistive load) |  |  |  |  |  |
| Frequency stability |  | 0.01\% |  |  |  |  |  |
| Significantly small |  | Voltage Vrms , current Arms , frequency Fre, power Watt x power factor PF |  |  |  |  |  |
| Voltage resolution |  | 0.01 V |  |  |  |  |  |
| Frequency resolution |  | 0.01 Hz |  |  |  |  |  |
| Current | solution | 0.001 A |  |  |  |  |  |
| Memory |  | M1 (V_F_A) , M2 (V_F_A) , M3 (V_F_A) M4 ^ M5 |  |  |  |  |  |
|  | voltage | $\pm 0.5 \%$ FS + 5 dgt |  |  |  |  |  |


| Measuring <br> Accuracy | current | $\pm 0.5 \%$ FS + 5dgt |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | frequency | $\pm 0.01 \%$ FS + 5 dgt |  |  |  |  |  |
|  | power | $\pm 0.5 \%$ FS + 5dgt |  |  |  |  |  |
| Setting accuracy | voltage | $\pm 1 \%$ FS |  |  |  |  |  |
|  | frequency | $\pm 0.1 \%$ FS |  |  |  |  |  |
| Interface |  | RS232C |  |  |  |  |  |
| Current limit setting |  | 0-Max Current (the maximum current is: maximum capacity / 240V , ie P / 240 ) |  |  |  |  |  |
| Output protection |  | Overcurrent, Over Current, Over Temperature, Over Temp, Overload, Over Load shortcircuit, Short Circuit |  |  |  |  |  |
| Weight (Kg) |  | 20.6 | 23 | 30.5 | 33.3 | 48 | 80 |
| WxHxD (mm) |  | $480 \times 135 \times 515$ |  | $480 \times 225 \times 53.5$ |  | 480*240*590 | 430*590*810 |
| Operating environment |  | $0 \sim 40^{\circ}$ C 20-80\% RH |  |  |  |  |  |

# Chapter 4 Introduction of Operation Panel 

### 4.1 Panel function introduction

APS-4000 series front panel
APS-4000 series rear panel


APS-7000 series front panel
APS-7000 series rear panel


## Chapter 5 Operating Instructions

### 5.1 Button layout



APS4000 Series


APS-7000 Series

Key Description

| Key position | Key function description |
| :--- | :--- |
| 110 V | 110 V setting shortcut |
| 220 V | 220 V setting shortcut key |
| 50 Hz | 50 Hz setting shortcut |
| 60 Hz | 60 Hz setting shortcut |
| VSET | Voltage setting key |
| FSET | Frequency setting key |
| I SET | Maximum current setting key |
| SYSTEM | System setting key |
| HIGH / LOW | Power \& power factor switch |
| P / PF | Setting parameter up key (APS5000AS column) |
| $\boldsymbol{\Delta}$ | Setting parameter down key (APS5000AS column) |
| $\boldsymbol{\nabla}$ | Save key |
|  | Save key |
| M2 | Save key |
| M3 | Save key (APS4000S column) |
| M4 | Save key ( APS4000 series) |
| M5 | Output switch \& reset button |
| ON / OFF |  |

### 5.3 Voltage setting

In the standby or output state, press the VSET key and or key to adjust the voltage value (APS5000A ^ U only). It can also be set by adjusting the knob. The voltage range is divided into high and low gears, and the low gear voltage can be set as $0-150 \mathrm{~V}$, the high-end voltage can be set in the range of $\mathrm{O}^{\wedge} \mathrm{OOV}$; if you want to adjust the voltage above the low gear, remember to switch the voltage to the high gear to adjust, otherwise the voltage will be displayed at the highest voltage of the low gear.

The specific operations are as follows:

1. Press the "VSET" key in the standby or output state, the voltage window flashes, at this time you can use the or key to adjust the voltage value;
2. In standby or output state, press the "V-SET" key. When the voltage window flashes, you can also change the setting value by turning the knob to the left or right. Lightly press the knob to move the digit you want to set. When you press continuously, you can move from right to left Circular movement
3. If the voltage setting value is not changed for about 2 seconds, the voltmeter will flash once, and the new voltage value after memory will be memorized and then automatically leave the setting screen.

### 5.4 Frequency setting

In the standby or output state, press FSET and or key to adjust the frequency value ( APS5000A ^ column only ). At the same time, it can also be set by adjusting the knob. In the range of $45 \sim 250 \mathrm{HZ}$, the minimum change is Q1HZ / STEP, (others are the same as the voltage setting method).

### 5.5 High and low voltage switching

The voltage high / low switch button, when the low-level output, the rated current of the output is large, and when the high-end output, the rated current of the output is halved (refer to Chapter 3 Product Specifications). Switching the high / low range will not affect the voltage setting value, but if switching when the input is ON , the output will be temporarily powered off (at least 20 mS ) , and it should be avoided as much as possible. Unreasonable switching will not be accepted by the Model Version (for example, if the voltage is set to 300 V , you want to switch to low gear).

### 5.6 Current limit setting

Press the ISET key in standby or output state to display the preset current limit value, if you press the "eight" or key again to adjust the value, (others are the same as the voltage setting method).
When the output current exceeds a set value, the machine buzzer alarm, stops output, ON / OFF of the LED blink, by ON / OFF for key reset.

### 5.7 P/PF Selection Key

Press the P / PF selection key at any time to select the power or power factor to be observed.

### 5.8 ON/OFR

The ON / OFF state of the output can be switched. When the ON / OFF light is on, there is output, and when the light is off, there is no output. When the output is abnormal, the output will be turned to the OFF state. The ON / OFF

LED indicator flashes. If you press the first button to clear the buzzer alarm, press the second button to reset the error message and restore the output.

### 5.9 M1. M2. M3. M4. M5

Five groups of memory modes (three groups for APS5000A series) can store the setting state of voltage and frequency in any group of memory modes. To memorize, press and hold any key of M1, M2, M3, M4, M5 for more than one second, the indicator flashes, then it can be stored in the memory. To call / click any one of M1, M2, M3, M4, M5 You can call the stored memory condition.

### 5.10 Setting of system parameters

In the OFF standby state, press the "SYSTEM" button on the panel to enter the parameter item setting, press the "eight" or button to change the selection of the item setting (APS4000A series can be changed by turning the knob left and right Select), press the "SYSTEM" button will turn to the next parameter setting item, as shown below:

The baud rate, communication protocol, and communication address settings are invalid for the APS4000 series. For communication, please select the APS5000A series

| Show small <br> content | Description of content |
| :---: | :--- |
| Set the baud rate, use the up and down keys to change the setting, in |  |
| order: $2400,4800,9600,19200,38400$ |  |$\quad$| Press K to set K, Lake to open, PFF "to be off, and F to F to only "ON / OFF " , and " |
| :--- |
| SYSTEM " button. |

Precautions:

- Before using this instrument, please read this operating manual carefully and completely.
- The instrument must use a power cord and output cord that meet the rated voltage and current standards.
- The input and output cables of the instrument must be in good contact to avoid fire due to poor contact.
- The instrument is prohibited to be used in flammable, explosive or corrosive environments.
- The instrument must be operated within the range that the operator can monitor. The power supply should be cut off when there is no personnel monitoring to ensure the safety of personnel and property.
- Connect the load to the output terminal, and confirm that everything is correct before turning on the power output switch.
- the machine with overload or short circuit protection device to protect the circuit when the overload or short circuit immediately starts (the machine automatically cut off the power supply output, an alarm buzzer sound and the alarm indicator light,), the first output switch OFF, to check whether the use of overloading . (If there is overload, please reduce the load) Reset again. After everything returns to normal, confirm that it is correct before you can continue to use it.


## Chapter 6 Appendix Information

### 6.1 Fault repair

1. Phenomenon: No voltage output, all display lights on the panel are off.

Reason: No power input
Exclusion: A, check switch is turned on.
$B$, check the fuse is blown.
$C$, the input power is properly plugged into the socket or power outage.
2. Phenomenon: No voltage output, frequency meter display flashes, voltage display " 0 " and buzzer sound

Causes: A, overload or abnormal load.
$B$, the load starting current is too large.
Exclusion: Turn off the switch, press ON / OFF, after reducing or checking the load, just turn on the output switch.
3. If there is a failure that cannot be eliminated, please notify the maintenance department of our company, and we will do good after-sales service for you.

### 6.2 Product maintenance

1. The quality guarantee period of this product is twelve months, during which non-human faults can be guaranteed free of charge.
2. If the quality guarantee period is exceeded, only Victoria's cost will be charged.
3. Long-term tracking and service, and establish files for customers.
4. Can undertake customized batches and special specifications.

### 6.3 APS5000A series product communication protocol

## Agreement 1

Instruction list:
Integer Reader Command

| instruction | Parameter range | Explanation |
| :--- | :--- | :--- |
| ?MAXPOW |  | Machine power |
| ?MAXVOL |  | Maximum voltage of the machine |
| ?MAXCUR |  | Maximum current of the machine |
| ?MAXFRE |  | Maximum frequency of the machine |
| ?MINFRE |  | Machine minimum frequency |
| ? MODEL |  |  |
|  |  |  |


| instruction | Parameter range | Explanation |
| :--- | :--- | :--- |
| PON |  | start up |
| POFF |  | stop |
| SVOL n |  | Set voltage |
| SFRE n |  | Set frequency |
| SCUR n |  | Ret current |
| ? SVOL |  | Read the current set frequency |
| ? SFRE |  | Read current measurement voltage current |
| ? SCUR |  | Read the current measurement frequency |
| ? MVOL |  | Read the current measured PF value |
| ? MFRE |  | Read current measurement power |
| ? MCUR |  | Switch low gear |
| ? MPF |  | Switch upscale |
| ? MPOW |  |  |
| SSHIFTL |  |  |
| SSHIFTH |  |  |

Remarks: The communication protocol can be selected in the "PLC" item in the "SYSTEM" menu. Use the up and down keys to change the setting. " 0 " is to close the communication function, "1" is the ASCII protocol, and "2" is the Hex protocol.

## Agreement 2

The format of the host computer (PC) sending data to the power supply:
Device number ID (1 byte) + command code (1 byte) + operation code (1 byte) + data (4 byte) + check code (1 byte)

| Device ID | $1-28$ | ID number corresponding to each <br> inverter power supply |  |
| :--- | :--- | :--- | :--- |
| Command <br> code | ASCII | HEX |  |
|  | R | $0 \times 52$ | Read data |
|  | W | $0 \times 57$ | Write data |
|  | X | Software reset |  |
| Opcode | There is a description behind <br> dack <br> back there is a detailed description later | Operation object |  |
| Check code |  | Write command: data written to the lower <br> computer |  |

## 1. The data format of the power supply response to the host computer:

Device number ID (1 byte) + command code (1 byte) + operation code ( 1 byte) + data ( 4 byte) + check code (1 byte)

| Device ID | $1-28$ | ID number corresponding to each <br> inverter power supply |  |
| :--- | :--- | :--- | :--- |
| Command <br> code | ASCII | HEX |  |
|  | $R^{\prime}$ | $0 \times 52$ | Read response |
|  | W | $0 \times 57$ | Write response |
| Opcode | There is a detailed description later | The low byte is in the front, the high bytes are in the <br> back, there is a detailed description later | $4-$ byte data returned |
| data |  | Sum of the first 7 bytes of data |  |
| Check code |  |  |  |

Note: The power supply will not return the response command after receiving the software reset command.

## 2. Instructions

| Opcode | Function Description | the data shows |  | Meaning of reading data | Write data meaning |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0x30 | Output status | byte | Whether the current is overloaded | 1 : Current overload <br> 0 : normal | 0 : clear current overload sign |
|  |  | Byte 1 | Power failure alarm | 1 : Power failure 0 : normal | 1: Reset to clear the alarm mark |
|  |  | Byte 2 | Is it currently in high-end or low-end | 1: high-end 0: low gear | be ignored |
|  |  | Byte 3 | Whether to output | $\begin{array}{\|l\|} \hline \text { 1: output } \\ 0: \text { No output } \end{array}$ | be ignored |
| 0x31 | $\begin{aligned} & \text { Target } \\ & \text { frequency } \end{aligned}$ | Frequency value of 4 bytes, unit 0.1 H B range$450-1200$ |  | Current frequency value | Updated frequency value |
| 0x32 | $\begin{aligned} & \text { High-end } \\ & \text { target } \\ & \text { voltage } \end{aligned}$ | 4 -byte value of the voltage, the unit of 0 . The 1V, range 0-3000 |  | Current voltage value | The updated voltage value, if it was low gear before, it will also switch to high gear |
| 0x33 | Automatic target voltage | 4 -byte value of the voltage, the unit of 0 . The 1V, range 0-3000 |  | Current voltage value | The updated voltage value will switch between high and low gears according to the value of the set voltage. The standard for the switch is: set the voltage to 1500 to upshift, otherwise low |


| $0 \times 34$ | Maximum output current | Current value of 4 bytes, unit 0.001 A , not higher than 30000 | Current threshold | Current threshold |
| :---: | :---: | :---: | :---: | :---: |
| 0x35 | Control output | 4- byte output (read operation is valid) | $\begin{array}{\|l\|} \hline 1: \text { output } \\ \hline 0: \text { not output } \\ \hline \end{array}$ | Enable output |
| 0x36 | Control output | 4 bytes of output status value (read operation is valid) | $\begin{array}{\|l\|} \hline 1: \text { output } \\ \hline 0: \text { not output } \\ \hline \end{array}$ | Output prohibited |
| $0 \times 4 \mathrm{~A}$ | serial number | 4- byte serial number | serial number | Not writable |
| 0x60 | Irms | 4- byte current root mean square value, unit 0.001A | Square root value | Not writable |
| 0x61 | Vrms | 4 bytes of voltage root mean square value, unit 0.1V | E-government root value | Not writable |
| 0x62 | Ipeak | 4- byte peak current, unit 0.001A | Peak current | Not writable |
| 0x63 | Vpeak | 4- byte voltage peak, unit 0.1V | Voltage peak | Not writable |
| 0x64 | Pva | 4 bytes of the apparent power, the unit of 0.1 VA | Apparent power value | Not writable |
| 0x65 | Pw | 4 -byte Active power of 0.1 W | Active power value | Not writable |
| $0 \times 66$ | Pf | 4- byte power factor, unit 0.001 | Power factor value | Not writable |
| $0 \times 67$ | Freq | 4- byte frequency value, unit 0.1 Hz | Measuring frequency | Not writable |

3. Illustration (assuming ID number is $0 \times 01$, the following are 16 hexadecimal):
(1) Set the automatic gear voltage 120V: 015733 B0 $0400003 F$ successful response: 015733 B0 0400 $003 F$.
(2) Provided autopilot voltage 240V: 0157 is 0900003360 of the F4 success response: 016009000057 is 33 is the F4.
(3) Setting grade voltage 120V: 0157 is 32 B0 040000 3E success response: 0157 is 32 B0 040000 3E.
(4) Setting grade voltage 240V: 01326009000057 is F3 success response: 01326009000057 is F3.
(5) Set the frequency $60 \mathrm{~Hz}: 01573158020000 \mathrm{E} 3$ successful response: 015731580200 00 E3.
(6)Output ON: 01573500000000 8D successful response: 01573501000000 8E.
(7)Output OFF: 0157 is 3.6 billion 8E success response: 01573.6 billion 8D.
(8)Clear fault (CLEAR): 0157300001000089 successful response: 0,157,300,000,000,088.

## 4. Send instructions:

(1) The data (voltage) and (frequency) must be sent first, and then the power supply (ON) is output, and the power supply responds immediately when sending data during output.
(2) Send (OFF), the power supply stops outputting.
(3) If the output short circuit or power failure, the transmission (the CLEAR), to clear the fault, the output is stopped.

